

CG4

Gas Burner Manual

Operation On/Off
Rate: 80 to 250 MBH



Beckett

CORPORATION



WARNING

Fire or Explosion Hazard



Can cause severe injury, death or property damage

If the information in these instructions is not followed exactly, a fire or explosion may result causing personal 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.
- **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.
 - 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.

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Before Calling Beckett . . .

Before contacting us about your burner, you must have a completely filled out copy of the **Contractor Start-Up Form** (Located inside of last page). This information is crucial for troubleshooting and obtaining the correct replacement part.

Hazard Definitions:



Indicates a hazardous situation that, if not avoided, *will* result in **death or serious injury**.



Indicates a hazardous situation that, if not avoided, *could* result in **death or serious injury**.



Indicates a hazardous situation that, if not avoided, could result in **minor or moderate injury**.



Used to address practices not related to physical injury.



Safety instructions signs indicate specific safety-related instructions or procedures.

General Information

To the Owner:

This equipment must be installed, adjusted and started by a qualified service agency that is licensed and experienced with all applicable codes and ordinances and responsible for the installation and commissioning of the equipment.

Thank you for purchasing a Beckett CG4 burner for use with your heating appliance. Please pay attention to the Safety Warnings contained within this instruction manual. Keep this manual for your records and provide it to your qualified service agency for use in professionally setting up and maintaining your burner.

Your CG4 burner will provide years of efficient operation if it is professionally installed and maintained by a qualified service technician. If at any time the burner does not appear to be operating properly, **immediately contact your qualified service agency** for consultation.

We recommend annual inspection/service of your gas heating system by a qualified service agency.



Burn Hazard, Hot Surface



Burner flange and air tube are hot when burner is in operation. Do not service this area during or immediately after operation. Allow area to cool.

Owner's Responsibility:



Explosion, Fire, Asphyxiation Hazard



Failure to follow these instructions, misuse, or incorrect adjustment of the burner could lead to equipment malfunction and result in asphyxiation, explosion or fire.

Contact a professional, qualified service agency for the installation, adjustment and service of your gas burning system. Thereafter, have your equipment adjusted and inspected at least annually to ensure reliable operation. This work requires technical training, trade experience, licensing or certification in some states and the proper use of special combustion test instruments.

Please carefully read and comply with the following instructions:

- See the front cover for 'What to do if you smell gas'.
- Never store or use gasoline or other flammable liquids or vapors near this burner or appliance.
- Never attempt to burn garbage or refuse in this appliance.
- Never attempt to light the burner/appliance by throwing burning material into the appliance.
- Never attempt to burn any fuel not specified and approved for use in this burner.
- Never restrict the air inlet openings to the burner or the combustion air ventilation openings in the room.



Frozen Plumbing and Water Damage Hazard

If the residence is unattended in severely cold weather, burner primary control safety lockout, heating system component failures, power outages or other electrical system failures could result in frozen plumbing and water damage in a matter of hours. For protection, take preventive actions such as having a security system installed that operates during power outages, senses low temperature and initiates an effective action. Consult with your heating contractor or a home security agency.

NOTICE

Contact a professional, qualified service agency to replace any component that has been exposed to water.

Professional Installer's Responsibility:

WARNING

Professional Service Required



Failure to follow these instructions could lead to equipment malfunction and result in asphyxiation, explosion or fire.

- Please read all instructions before proceeding. Follow all instructions completely.
- This equipment must be installed, adjusted and started by a qualified service agency that is licensed and experienced with all applicable codes and ordinances and responsible for the installation and commissioning of the equipment.
- The installation must comply with all local codes and ordinances having jurisdiction and the latest edition of the National Fuel Gas Code ANSI Z223.1 (NFPA 54) and CAN1-B149.1 in Canada.

WARNING

Fire Hazard: Overheating



Should over-heating occur:

- Shut off the manual gas control to the appliance.
- DO NOT shut off power to the equipment, allow the blower and pumps to continue running.

NOTICE

Special Requirements:

When contacting Beckett for service information — Please have the burner serial number and contractor start-up form available when calling or writing. You will find the serial number on the label located on the left rear of the burner. Refer to **Figure 2**.

NOTICE

Concealed damage – If you discover damage to the burner or controls during unpacking, notify the carrier at once and file the appropriate claim forms. Do not install a burner or control that has been damaged.

Specifications

Table 1 – Burner Specifications

Input Firing Rate ❶	80,000 - 250,000 BTU/hr
Firing Mode	On-Off Only
Fuel	Natural gas - 0.64 specific gravity LP gas - 1.53 specific gravity
Required Input Gas Supply Pressure	4.5" WC minimum 14" WC maximum
Input Voltage ❷	120 Vac + 10% / -15%; 60 Hz
Input Current	2.75 A (Run); 12.0 ALR
Gas Valve	24 Vac Dual Seat with integral regulator set to 3.5" WC for both natural gas and LP
Burner Control	Beckett 7590D Direct Ignition
Flame Detection	Flame Rectification
Igniter	Beckett 7474001 Gas Igniter
Motor	1/7 Hp; PSC
Combustion Air Proving	Differential Pressure Switch
Weight	55 lbs.
Mounting Orientation	Up to 90° from upright with motor shaft horizontal
Dimensions	10.3" x 13.1" x 15.8"
Acceptable Ambient Temperature Range	-40°F to 150°F
Acceptable Ambient Humidity	5% - 95% RH non-condensing

❶ For altitudes higher than 2,000 feet, derate the burner capacity 4% for each 1,000 feet above sea level.

❷ Burner is not approved for use in 50 Hz applications.

NOTICE

For use only on approved applications. See **www.beckettcorp.com/cg4apps** for the list of approved applications.



UL listed for use in the US or Canada per ANSI Z21.17(a) / CSA 2.7(a) For use with natural gas or propane.

**If any of these instructions are not clear,
Call Beckett at 1-800-645-2876 for assistance.**

Figure 1 – Burner Dimensions

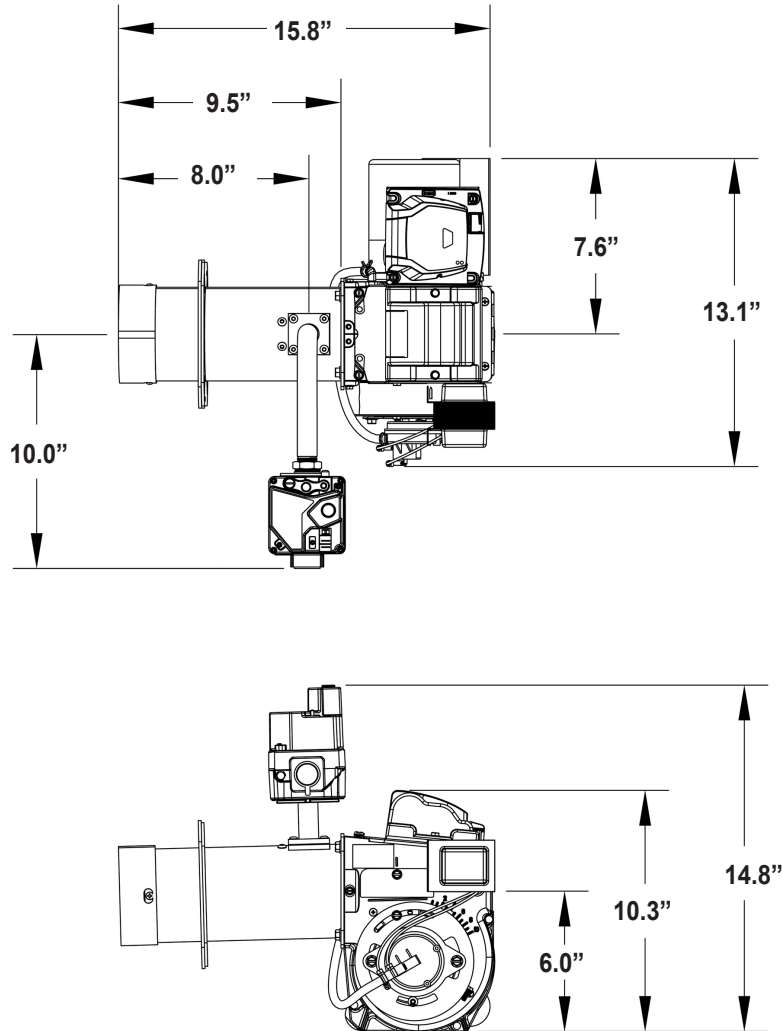


Figure 2 – Burner Nameplate

Your burner will have labels that are specific to its construction. This is for reference only.

<p>General Model Information →</p> <p>Serial Number →</p> <p>R.W. Beckett Specification Number and Revision →</p> <p>Approvals / Certifications →</p>	<p>Model "CG4" Gas Conversion Burner Brûleur de conversion</p> <p>SERIAL NUMBER 140121-08157</p> <p>CG4001 Rev.A 00</p> <p>UL LISTED MH60758</p> <p>Domestic Gas Conversion Burner IN ACCORDANCE WITH ANSI Z21.17a-2008/CSA 2.7a-2008</p> <p>Brûleur de conversion au gaz domestique EN CONFORMITÉ AVEC ANSI Z21.17a-2008/CSA 2.7a-2008</p>	<p>Rating Information ←</p> <p>80 TO 250 MBH, 24 to 73 kW 120V/60Hz, 3A run, 12A LR</p> <p>For use with natural gas or propane. A conversion kit supplied by the manufacturer shall be used to convert to the alternate fuel. Manifold pressure: 3.5" W.C. Max press. to valve: 1/2 PSI Min press. to valve: 4.5" W.C.</p> <p>Fuel, Construction, and Setting Data ←</p> <p>A utiliser avec du gaz naturel ou du propane. Se servir de la trousse de conversion fournie par le fabricant pour passer d'un type de carburant à l'autre. Pression d'admission: 870 Pa Pression max. à la soupape: 3450 Pa Pression min. à la soupape: 1120 Pa</p> <p><i>R.W. Beckett Corp.</i> Elyria, Ohio Made in the U.S.A.</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">SK10519</p>
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Inspect/Prepare Installation Site

Indoor Installation

WARNING

Explosion, Fire, Asphyxiation Hazard



Wet or dusty environments could lead to blocked air passages, corrosion damage to components, impaired combustion performance and result in asphyxiation, explosion or fire.

- This burner is designed for clean, dry installations.
- Electrical controls are not protected against rain or sprayed liquids.
- Keep the installation clear of dust, dirt, corrosive vapors, and moisture.
- Protective covers and frequent maintenance may be required.

WARNING

Fire, Smoke & Asphyxiation Hazard



- Carefully inspect the chimney, chimney liner & exhaust vent system.
- Make sure it is properly sized and in good working condition.

- Follow the instructions supplied by the appliance manufacturer.

- If a draft regulator is required, it must be a double-acting type, agency recognized for use with gas vent systems.
- The chimney installation and vent sizing must strictly comply with all applicable codes, authorities having jurisdiction and the latest revision of the National Fuel Gas Code (ANSI Z223.1, or NFPA54) or CAN/CGA B/49 Canada. Remove any vent damper device.
- Regulation by these authorities take precedence over the general instructions provided in this installation manual.

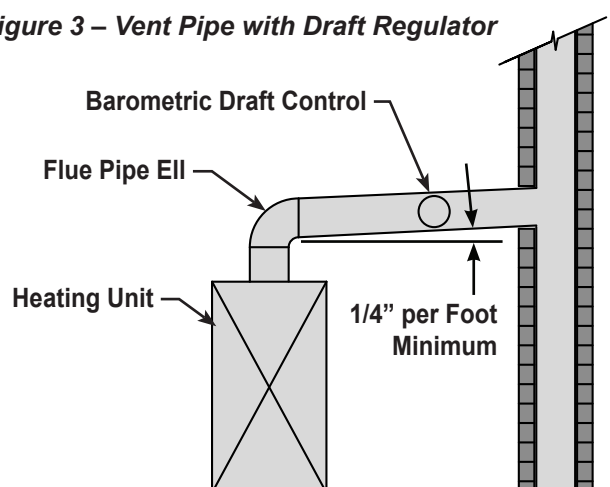
Examine the installation site for conditions that could adversely affect the health and safety of installation personnel and the user of the appliance or proper operation of the burner and appliance, and correct any defects found.

- The area around the appliance should be unobstructed and dry.
- Wiring must be in good condition and meet code requirements.
- If the burner is replacing an existing oil burner, old piping and the tank must be secured or removed to prevent leakage or unintended deliveries of oil.
- Local jurisdictions may require removal of oil tanks. See NFPA-30 flammable and combustible liquids code for approved procedures.

Inspect Chimney and Vent System

1. Any accumulation of soot or debris in chimney offsets must be removed
2. Any obstructions such as a protruding joint or a piece of broken tile wedged in the chimney must be removed.
3. No other appliance connection should be made to the same flue pipe.
4. The flue pipe should have an upward pitch toward the chimney of at least 1/4" per foot of length. It should fit tightly and should not project into the chimney, see **Figure 3**.

Figure 3 – Vent Pipe with Draft Regulator



5. Any leakage between tiles, around clean-out doors, or around the vent pipe should be sealed.
6. A Draft regulator is required, it shall be a double-acting type, agency recognized for use with gas vent systems.
7. The design and sizing of the appliance's vent system shall comply with the requirements of NFPA 54 Chapters 12 and 13.
8. A chimney flue shall extend at least 3 feet above the highest point at which the chimney comes in contact with the roof, and not less than 2 feet above the highest roof surface or structure within 10 feet horizontally of the chimney. Refer to **Figure 4**.

NOTICE Some local codes and gas utilities require the installation of a thermal Safety switch on the double-acting draft control, or draft hood. This is a very good practice and provides the following protection:

The thermal safety switch senses flue gas spillage caused by blocked flue exhaust, prolonged down-draft, or insufficient draft. The safety is wired in series with the burner control circuit and shuts the burner off, when the spillage of hot flue gases is detected.

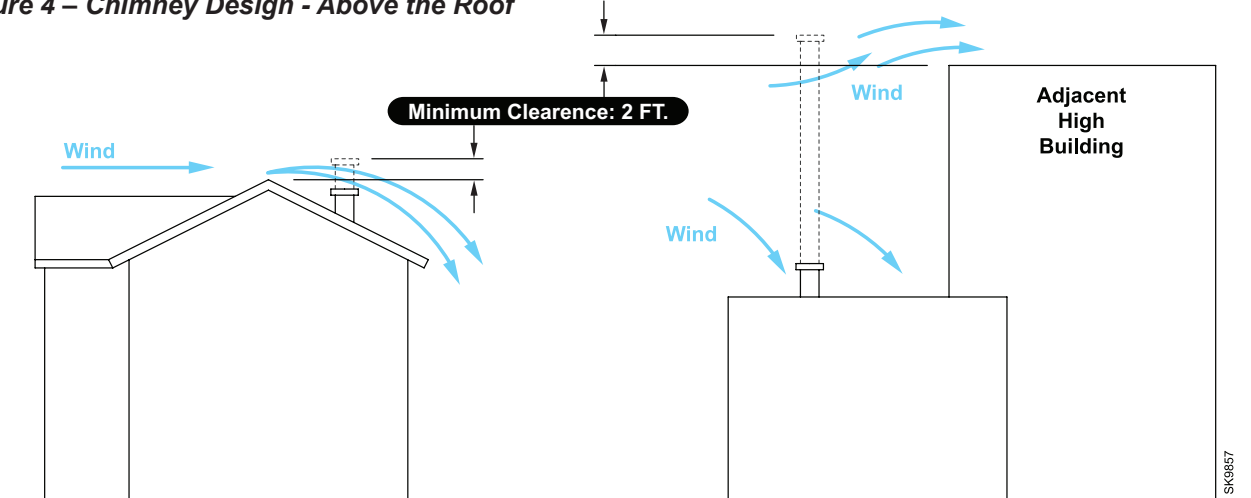
Insulated stainless steel chimney liners

The new designs of furnaces and boilers in conjunction with flame retention gas burners are more efficient. One result of increased efficiency is lower flue gas temperatures. As flue gases rise in the chimney, they cool and condense when they reach the dew point. The condensation mixes with sulphur in the flue gases creating sulfuric acid. The acid attacks the chimney mortar, brick and clay liners causing corrosion, deterioration and blockage of the chimney. Eventually the blockage could prevent exhausting the flue gases. Instead, the flue gases vent out the barometric damper into the living space.

Therefore it is strongly recommended that an approved insulated stainless steel chimney liner be installed. The installing contractor is solely responsible for installation of the proper vent system.

- For those installations not requiring a chimney, such as through-the-wall vented appliances, follow the instructions given by the appliance and power venter (if used) manufacturers.

Figure 4 – Chimney Design - Above the Roof



NOTE: Correct chimney design is shown by dotted lines. Incorrect chimney design, as shown by the solid lines, may result in down-drafts.

Combustion Air Supply

NOTICE

Some local codes and gas utilities require the installation of a CO detector, this is strongly recommended in all applications.



WARNING

Carbon Monoxide Hazard

Do not block combustion air inlet. Failure to provide adequate air supply could seriously affect the burner performance and result in damage to the equipment and emission of poisonous carbon monoxide gas.

Buildings with Adequate Air Infiltration

In many cases, a burner operating in an unconfined space of a conventional frame, brick or stone building will receive adequate air supply from leakage in the building itself. But if the burner is located in a confined space such as a furnace or boiler room, that space must have one permanent opening toward the top of the space and one near the bottom of the space.

Each opening must have a free area of not less than one sq. in. per 1,000 BTU per hour of the highest input rating listed for the appliance (refer to NFPA 54 & 58).

Remember to take the total input of all air-using appliances into consideration when figuring the openings. The openings must connect with the inside of the building, which should have adequate infiltration from the outside.

As an example:

If a gas burner was firing at 175,000 BTU/Hr and a water heater was firing at 70,000 BTU/Hr, in an enclosed room in a building each opening in the enclosure should be 245 sq. in. ($245,000/1,000 \times 1 \text{ sq. in.} = 245 \text{ sq. in.}$) A 245 sq. in. opening would typically be 10" x 25" or 16" x 16".

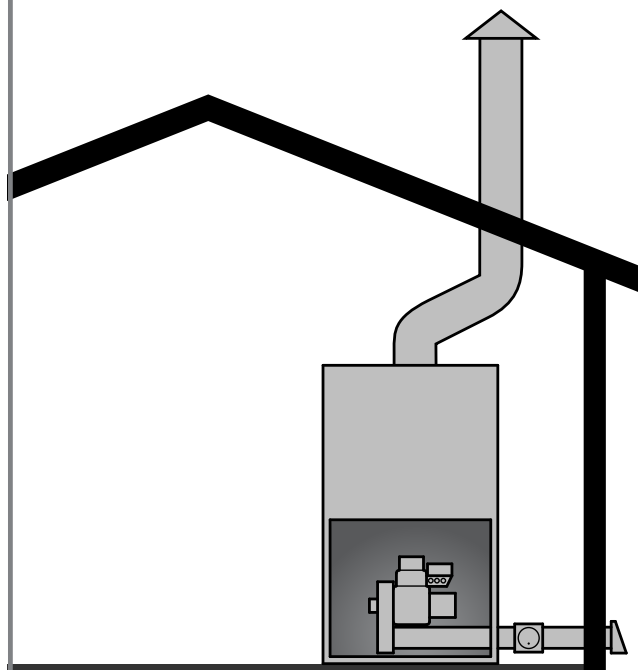
Buildings with Less Than Adequate Air Infiltration

If the burner is located in a tightly constructed building where there is inadequate outside air infiltration, outside combustion air must be supplied by some other means.

One method to accomplish this is through a permanent opening(s) in an exterior wall. The opening, or openings, must have a total free area of not less than one sq. in. per 5,000 BTU per hour. All appliances must be taken into consideration. Refer to NFPA 54 & 58.

Another method is to supply outside air directly to the burner through round, smooth duct work (See **Figure 5**). Some manufacturers offer accessories which allow outside combustion air duct work to be coupled to the burner. These kits must meet the engineered system requirements of NFPA54. For safety reasons it is important that you comply strictly with their installation instructions.

Figure 5 – Outdoor Air Ducted to Burner



Clearances to Burner and Appliance

- Provide space around burner and appliance for easy service and maintenance.
- Check minimum clearances against those shown by the appliance manufacturer and by applicable building codes.
- The recommended clearance around the burner itself is 12" minimum for service access.

Fuel Gas Supply



WARNING Explosion, Fire, Asphyxiation Hazard



Leaking gas could result in asphyxiation, explosion, or fire hazard.

Prior to burner installation all gas supply piping must be inspected, tested and purged in accordance with the requirements of the National Fuel Gas Code ANSI Z 223.1 (NFPA 54).

The burner valve must not be exposed to pressure exceeding 1/2 PSI under any circumstances.

Insure that the supply gas pipe size is capable of providing at least 4.5" W.C. pressure to the burner gas train inlet at the burner's full capacity rating. Refer to **Tables 2 and 3**.

Table 2

Gas Supply Pressure Requirements (Natural or Propane)	
Maximum	14" WC (1/2 PSI)
Minimum	4.5" WC

Table 3 – Gas supply piping capacity, CFH

Schedule 40 metallic pipe with 0.50 psi or less inlet pressure and 0.30" W.C. pressure drop					
Maximum capacity in cubic feet of gas per hour (CFH). Natural gas with 0.60 specific gravity.					
Pipe Length (ft.)	Pipe size (inches) IPS				
	1/2"	3/4"	1"	1-1/4"	1-1/2"
10	132	278	520	1050	1600
20	92	190	350	730	1100
30	73	152	285	590	890
40	63	130	245	500	760
50	56	115	215	440	670
60	50	105	195	400	610
70	46	96	180	370	560
80	43	90	170	350	530
90	40	84	160	320	490
100	38	79	150	305	460
110	34	72	130	275	410
120	31	64	120	250	380
150	28	59	110	225	350

If the gas supply pressure is not correct, it must be corrected before starting the CG4 installation. Contact your gas utility or qualified contractor.



Explosion, Fire, and Gas Leak Hazard



A Drip Leg is required in Gas Supply Piping. Foreign matter could lodge in gas valve cutoff seals, resulting in gas leak-through, explosion or fire.

Insure that a full-size drip leg or dirt pocket has been installed in the piping directly ahead of the main shutoff valve to capture foreign matter.

Electrical Supply

Check the nameplate on the burner to verify that the power connections available are correct for the burner. Refer to **Figure 2** on Page 5. All power must be supplied through a disconnect switch fused at 20A maximum and comply with the latest edition of National Electric Code NFPA 70 (Canada CSA C22.1) and all other local or applicable codes.

Verify Burner Components

Your CG4 burner is shipped in two boxes. Verify that you received all the necessary components.

The larger box contains:

- The burner chassis
- The literature package, which includes the burner manual
- The gas valve and threaded bushing.
- A small parts bag, containing a reducing tee, a pipe plug, a union and a baffle (P/N 5880)

The smaller box contains:

- The air tube
- A blank air band (only packaged with tubes using the F3G head)
- A box containing the manifold assembly, the natural gas orifices, LP orifices, a gasket and 10 mounting screws.

Verify Burner Selection

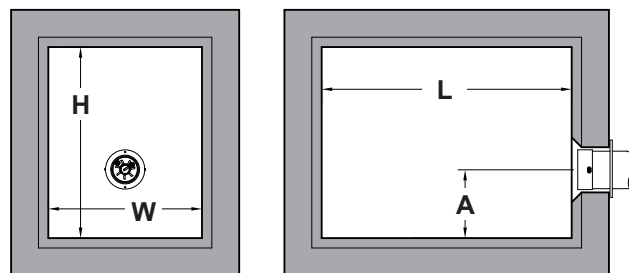
If the burner is supplied as an original equipment part of a boiler or furnace appliance the information in this section may be disregarded. Instead, use the appliance manufacturer's specifications.

Verify that the proper burner chassis and air tube assembly have been selected.

- Determine the appliance's design firing rate from the appliance rating plate. The appliance rating plate will probably have an input rating and an output rating.

Table 4 – Minimum Combustion Chamber Dims.

Firing Rate MBH	Rectangular		Horizontal Cylinder I. D.	Length (L)	Floor to Tube (A)
	Width (W)	Height (H)			
80	8	8	9	13	4
105	9	9	10	13.5	4.5
140	10.5	10.5	12	14	5.3
175	11.5	11.5	13	14.5	5.8
210	13	13	14.5	15	6.5
250	15	15	16	16	7.5

**Table 5 – Firing Rates and Configurations**

Firing Rate BTU/Hr. ❶	Fuel Orifices		Air Tube Components ❷			Chassis Components ❸		Initial Settings ❹	
	Natural Gas Orifice Dia. Inches ❺	L P Orifice Dia. Inches ❻	Burner Head	Nozzle	Static Plate	Baffle	Band	Shutter	Band
80,000	0.219	0.166	F3G	01	32910-001	5880	Blank	2-1/2	Blank
90,000	0.234	0.177	F3G	01	32910-001	5880	Blank	4	Blank
100,000	0.25	0.189	F3G	01	32910-001	5880	Blank	5-1/2	Blank
110,000	0.277	0.206	F3G	01	32910-001	5880	Blank	7-1/2	Blank
120,000	0.316	0.219	F3G	01	32910-001	5880	4-slot	9	0
130,000	0.364	0.234	F3G	01	32910-001	n/a	4-slot	5-1/2	0
140,000	N/A	0.242	F3G	01	32910-001	n/a	4-slot	7-1/2	0
130,000	0.281	0.217	F4G	02	32910-001	5880	4-slot	8	0
145,000	0.316	0.234	F4G	02	32910-001	5880	4-slot	10	0
160,000	0.348	0.246	F4G	02	32910-001	n/a	4-slot	6-1/2	0
175,000	0.406	0.261	F4G	02	32910-001	n/a	4-slot	8-1/2	0
190,000	N/A	0.281	F4G	02	32910-001	n/a	4-slot	10	0
180,000	0.332	0.246	F6G	03	n/a	n/a	4-slot	5-1/2	0
190,000	0.354	0.256	F6G	03	n/a	n/a	4-slot	7	0
205,000	0.377	0.266	F6G	03	n/a	n/a	4-slot	8-1/2	0
220,000	0.422	0.281	F6G	03	n/a	n/a	4-slot	10	0
235,000	0.484	0.295	F6G	03	n/a	n/a	4-slot	10	2
250,000	N/A	0.312	F6G	03	n/a	n/a	4-slot	10	4

❶ - Firing rates are based on 3.5" WC manifold gas pressure and use of the appropriate orifice for the fuel being fired.

❷ - Air tube assemblies are provided with a full selection of the natural gas orifices appropriate to the burner head.

❸ - LP orifices are provided in kits containing all the LP orifices for the burner head size. The installer is responsible for selecting and installing the appropriate orifice for the application.

❹ - Burner heads and nozzles are identified with the markings shown to assure the use of compatible combinations.

❺ - Burner chassis are built for the highest rate configuration. The installer is responsible to add the baffle and/or change the band as required for the application.

❻ - Initial settings are intended for use only as a starting point for burner adjustments. They can not make provision for all installation possibilities. It is important that you adjust your burner to your installation requirements using properly calibrated flue gas analysis instruments.

The burner's firing rate is the input rating. If it is given in GPH of oil, multiply by 140,000 to get BTU/Hr for gas or by 140 to get MBH.

- The burner's firing rate must be no more than 5% higher than the appliance's stated input rate (based on industry tolerance) and no more than 10% lower than the appliance's stated input rate (based on the potential for low stack temperature condensation hazards).
- Determine the burner's appropriate chassis and air tube components from **Table 5**, being sure to apply the altitude adjustment from **Table 1** on Page 4, if applicable.
- Verify that the chassis has the correct air band and baffle (if required)
- Verify that the air tube has the correct head and nozzle (markings are visible without disassembly) and static plate (there is only one choice, and it is visible without disassembly).
- Verify that you have the correct fuel orifice for the intended firing rate (**Table 5**) – sizes are stamped on the orifices
- Examine the appliance's combustion chamber and compare its dimensions to the rate-appropriate line in **Table 4** to verify that the chamber is large enough to handle the flame size.
- Examine the appliance's mounting dimensions and compare them to those of the mounting flange on the air tube, making sure that the distance from the flange to the furnace end of the burner head provides for the ¼" set-back shown in **Figure 11** on Page 16.



Carbon Monoxide Hazard

DO NOT INSTALL a Beckett gas burner and air tube combination with a firing rate more than 10% lower than the appliance name plate's input BTU rating. The appliance and vent system could be damaged due to condensation, leading to flue gas leakage.

NOTICE

DO NOT INSTALL a Beckett gas burner and air tube combination with a firing rate more than 5% above the appliance name plate's maximum input BTU rating.

Prepare the Appliance



Breathing Hazard

Ceramic fiber or Fiberglass insulation



Ceramic fiber materials, such as chamber liners, may contain carcinogenic particles (crystalline silica) after exposure to heat. Airborne particles from fiberglass or ceramic fiber components have been listed as potentially carcinogenic by the

State of California. Take the following precautions when removing, replacing and handling these items.

Avoid breathing dust and avoid contact with skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves and eye protection. Use a NIOSH N95 certified respirator. This respirator meets requirements for protection from crystalline silica. Actual job requirements for NIOSH regulations may require other or additional protection. For information, refer to the NIOSH website, <http://www.cdc.gov/niosh/homepage.html>.

Ceramic fiber removal: To prevent airborne dust, thoroughly wet ceramic fiber with water before handling. Place ceramic fiber materials in a plastic bag and seal to dispose.

Avoid blowing, tearing, sawing or spraying fiberglass or ceramic fiber materials. If such operations are necessary, wear extra protection to prevent breathing dust.

Wash work clothes separately from other laundry. Rinse clothes washer thoroughly afterwards to prevent contamination of other clothing.

NIOSH First aid procedures:

- Eye exposure - irrigate eyes immediately
- Breathing - fresh air



Asbestos Hazard



NEVER attempt to retrofit an appliance containing asbestos. Contact a professional to remove the asbestos prior to installation. If unsure call a qualified contractor to verify if asbestos is present.

Thoroughly clean appliance heat exchanger and replace damaged combustion chamber materials, if necessary.

- Seal all clean-outs, burner mounting plate and vent pipe connections.
- Verify all appliance operating and safety controls are functional and operating correctly. Replace any that are questionable.
- Verify all wiring and controls comply with National/Local codes and authorities having jurisdiction.

WARNING**Fire and Asphyxiation Hazard**

Failure to comply with manufacturer's instructions could result in damage to the stainless steel combustion chamber which can result in fire or asphyxiation hazards.

If retrofitting a CG4 to a stainless steel combustion chamber, check the appliance manufacturers instructions to determine if a lining is required and comply with their recommendations.

Assemble the Burner

Gather the Necessary Parts

1. You have already verified that you received all the components shipped with the burner.
2. In addition to the parts provided with the burner you will need $\frac{3}{4}$ " pipe nipples (schedule 40, black iron – do not use galvanized) to make up the connection to the supply piping, and pipe joint compound. Pipe lengths must be selected to fit your installation. We recommend a 3" to 6" length between the gas valve and the union.

Prepare the Chassis

1. Determine whether you must add a baffle using the appliance's firing rate and **Table 5** on Page 10.
2. If a baffle must be added, open the burner's top access cover by loosening the two front screws and pivoting their clips out of the way.
3. Align the baffle between the two pins on the motor side of the housing (**Figure 6** on Page 13) and against the housing partition and tap it securely onto the partition.
4. Determine whether you must change from the 4-slot air band shipped on the chassis to the blank air band using the appliance's firing rate and **Table 5**.
5. If the air band must be changed, remove the air proving switch, the shutter and the slotted band (**Figure 7** on Page 14).
6. Install the blank band and return the shutter and air proving switch in the reverse order from step 5, tightening the screws securely.

Prepare and Install the Air Tube

1. The air tube may be shipped without the head installed. If so, align the openings in the swirl vanes with the flame rod and ignition electrodes and

press the head onto the OD of the air tube until the head is seated and the screw holes on the sides align. Use care to avoid bending the swirl vanes or the front edge of the shroud. Install the retaining screws packed with the head and tighten securely.

2. Remove 2 screws from the housing end of the air tube that secure the rear edge of the gas gun.
3. Install the air tube onto the housing with the gas connection on the top side of the air tube (**Figure 8**). Install the (4) $\frac{1}{4}$ -20 screws finger tight. Install the remaining 4 screws. After all 8 screws are in place tighten them all securely.
4. Route the ignition (black) and flame sensing (yellow) wires from the air tube into the chassis.
5. Connect the yellow (flame sense) wire from the air tube to the yellow wire in the chassis, and take up all slack in the wire by pushing it back into the electrical box.
6. Connect the black (ignitor) wire to the igniter with the access cover partially closed. Close the cover, secure it with its retaining clips, and tighten the clip screws securely.

Assemble the Gas Valve and Manifold

1. You will need to provide a $\frac{3}{4}$ " schedule 40 black iron pipe nipple (3" to 6" long is convenient) and joint compound to complete this assembly. Refer to **Figure 9** on Page 15.
2. Install the factory assembled burner manifold on the outlet side of the valve (the side the arrows point towards), following the valve manufacturer's piping instructions supplied with the valve.
3. Install a $\frac{3}{4}$ " pipe nipple and union on the inlet side of the valve, following the valve manufacturer's piping instructions supplied with the valve.

NOTICE

The gas valve is sensitive to its installation orientation. It must only be installed in horizontal piping with its electrical connections on top as shown in Figures 9 and 10.

WARNING**Explosion, Fire, and Gas Leak Hazard**

- Do not disassemble gas valve
- Do not use Teflon tape on gas piping. Damage to gas valve seats and bodies could cause gas leaks and result in asphyxiation, explosion, or fire.
- Valve must be installed with flow direction arrow pointing to burner.

Pieces of tape can be cut loose during installation and lodge in gas valves causing cutoff seal problems.

Teflon tape lubricates pipe threads, allowing iron pipes to penetrate too deeply into aluminum valve bodies causing distortion and leakage.

Use only pipe sealant compounds that are resistant to the gas being used.

NOTICE

Verify that the gas valve is not damaged and that all piping and fittings are de-burred and clean inside and out.

Install the Valve and Manifold to the Burner

1. Determine the correct fuel orifice using the appliance's fuel type, firing rate and **Table 5** on Page 10, and insert it into the recess in the manifold adapter on the top of the burner's air tube (**Figure 10** on Page 15). Notice in **Table 5** that not all natural gas applications use a fuel orifice.
2. Place gasket between aluminum block of gas gun mounting flange and the mounting flange of the gas manifold assembly. Align holes in all three parts. See **Figure 10**.
3. You may mount the manifold assembly with the valve on either the right or left side of the burner (**Figure 10**). Tighten its screws securely.
4. Connect the violet and white wires (from the electrical box adjacent to the air tube) to their mating spade terminals on the top of the gas valve. The white wire goes to the terminal marked "C" and the violet wire goes to the terminal marked "MP".

Propane Applications

Beckett CG4 burners are designed to fire either natural gas or propane gas by changing only the fuel orifice (**Figure 10**, Page 15). **Table 5** on Page 10 lists the correct fuel orifices for both fuels by firing rate together with the other rate-variable components of the burner. All the burner's adjustments and settings for propane will be the same as for natural gas when the appropriate fuel restrictors are in place. For ANSI Z21.17a purposes, the propane restrictors listed in **Table 5** are considered to be Beckett's propane conversion kits.

NOTICE

Use authorized replacement parts only. Fuel orifices are precision-machined parts and O-rings are rated for fuel contact. Do not attempt to replicate or modify any parts. Refer to **Table 5** on Page 10.

NOTICE

With the propane orifice installed, as shown in **Figure 10**, Page 15, all burner air adjustments and gas manifold pressure adjustments for propane will be approximately the same as the natural gas adjustments shown in the burner manual, or printed on the "Mfr's Settings" label on the burner housing. For a copy of the current burner manual go to <http://www.beckettcorp.com/protect/tech.asp>. If further technical assistance is required, call 800-645-2876, Monday thru Friday, 8AM to 5PM EST.

WARNING

Explosion, Fire and Asphyxiation Hazard



This conversion kit must be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction.

(In Canada, in accordance with the requirements of the CAN/CGA-B149 Installation Code.) If the information in these instructions is not followed exactly, a fire, explosion, or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked, as specified in the manufacturer's instructions supplied with the kit.

Figure 6 – Baffle Installation

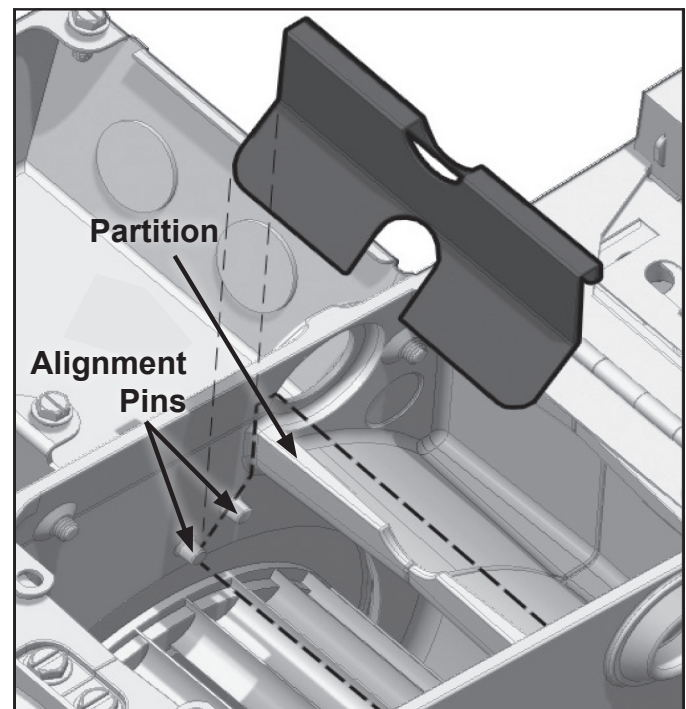


Figure 7 – Installation of air band, shutter, and air provings switch

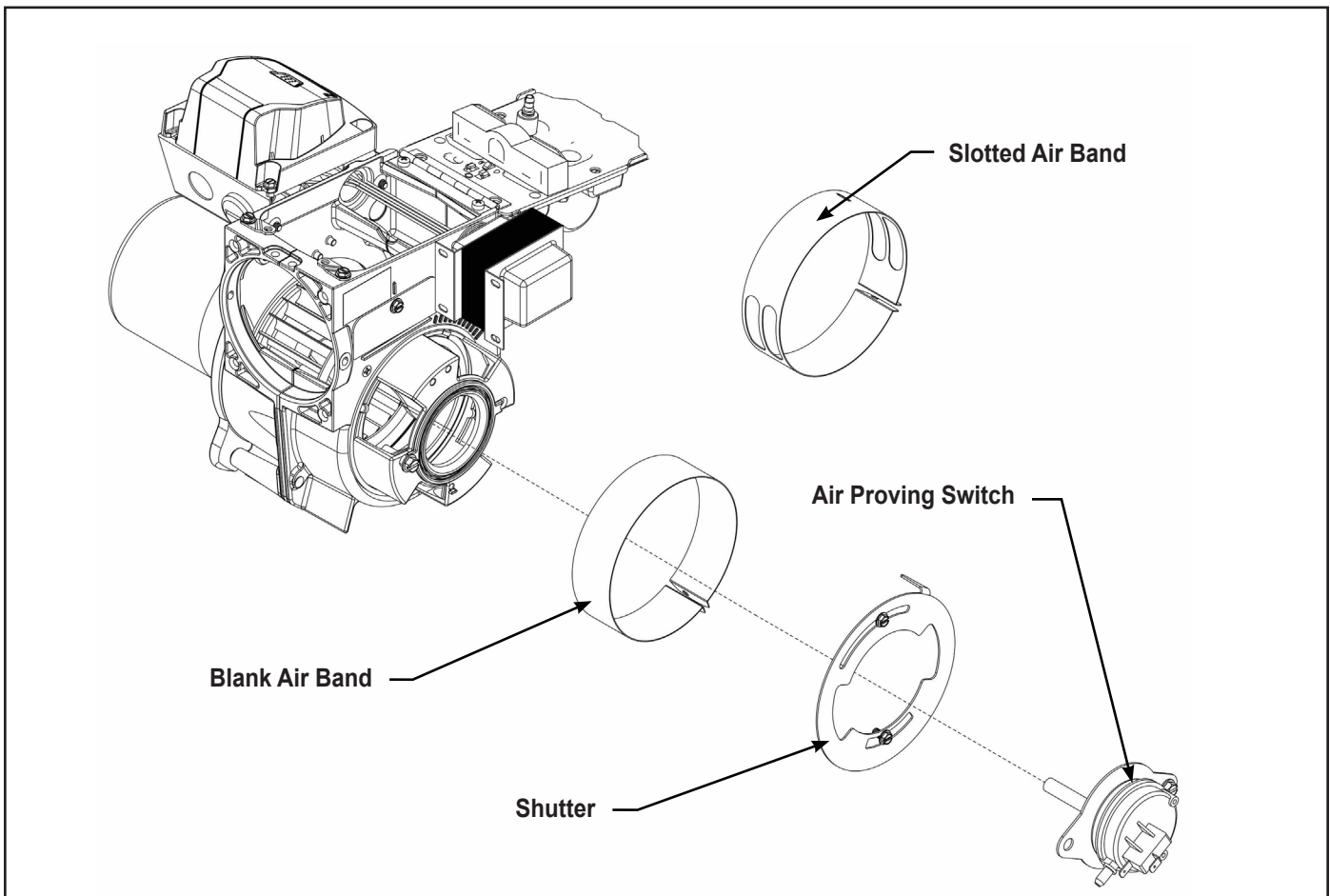


Figure 8 – Air Tube Installation

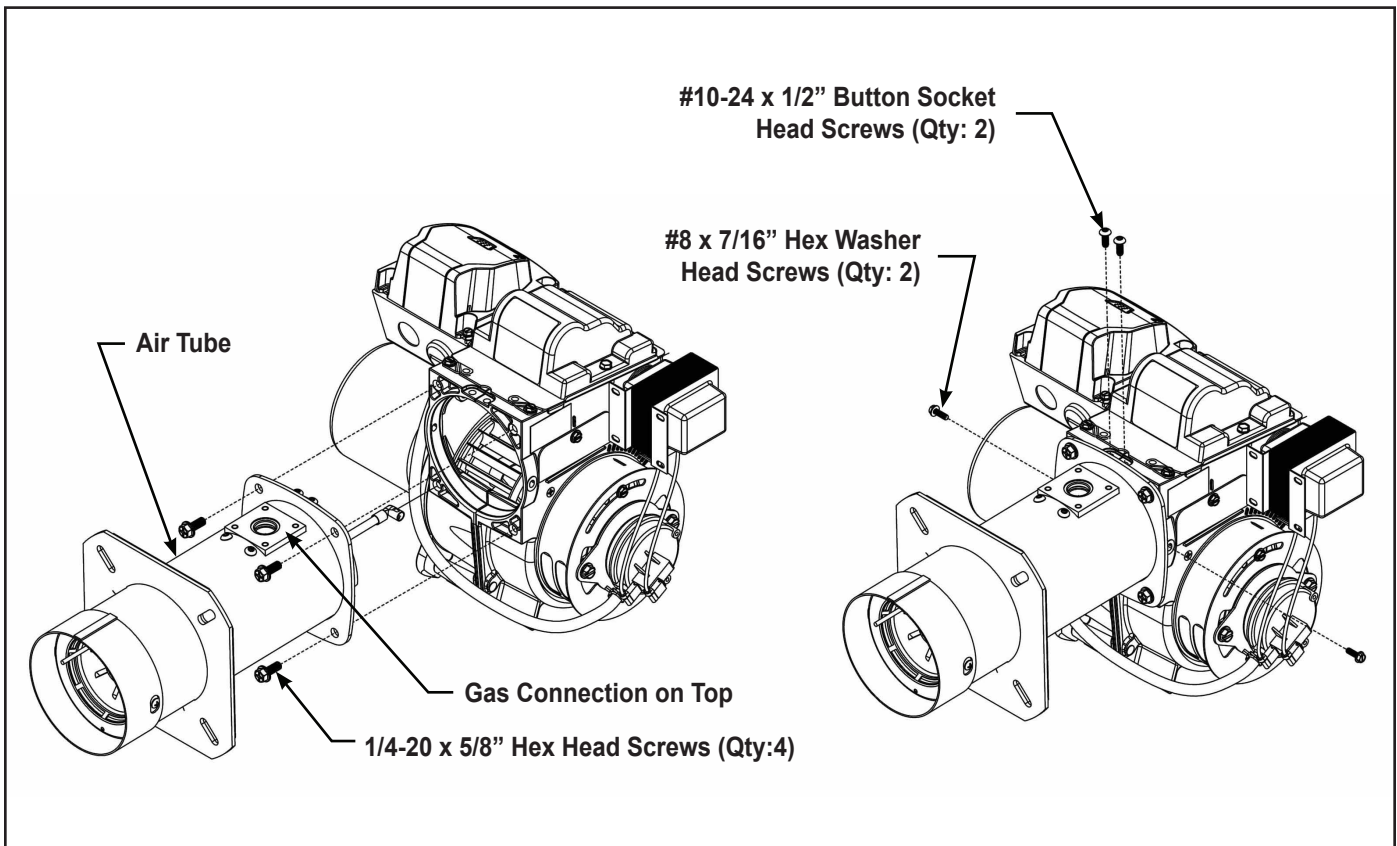


Figure 9 – Gas Manifold

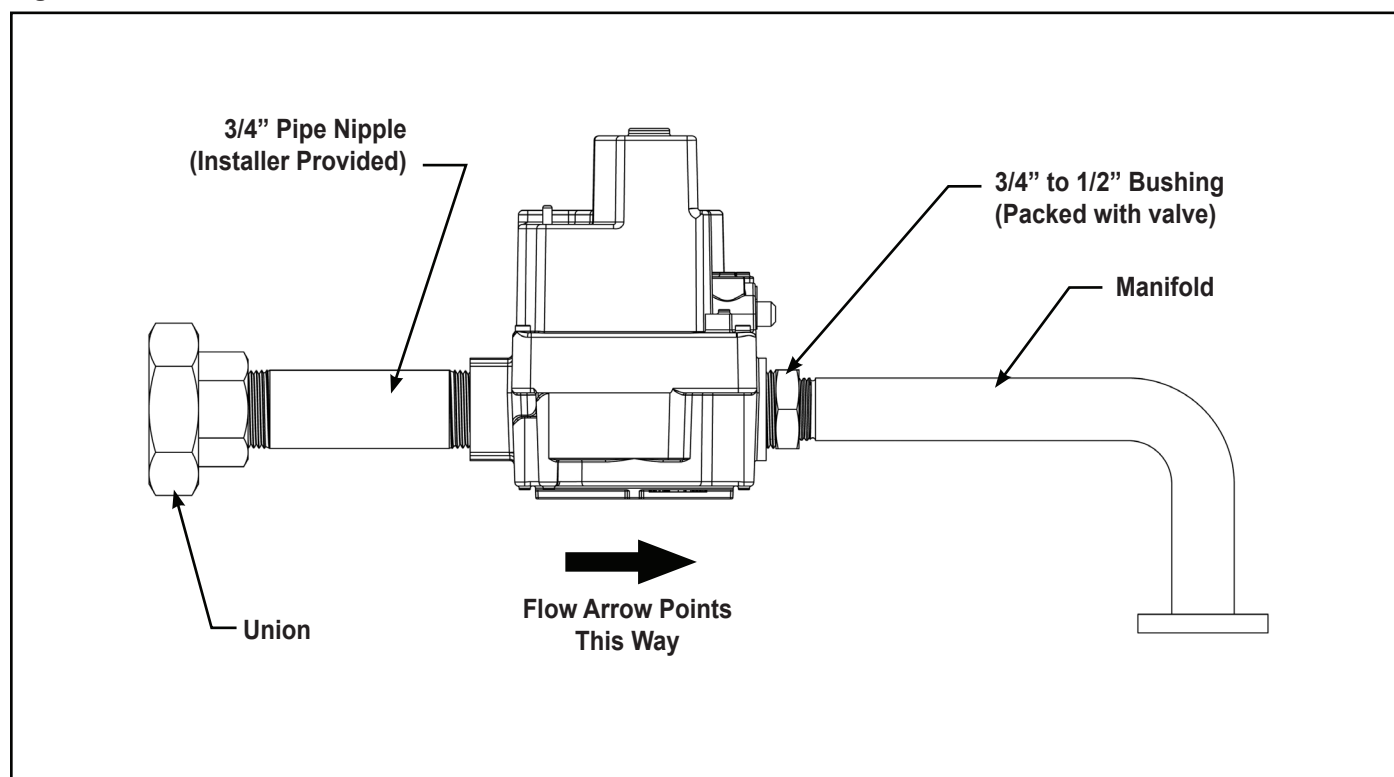
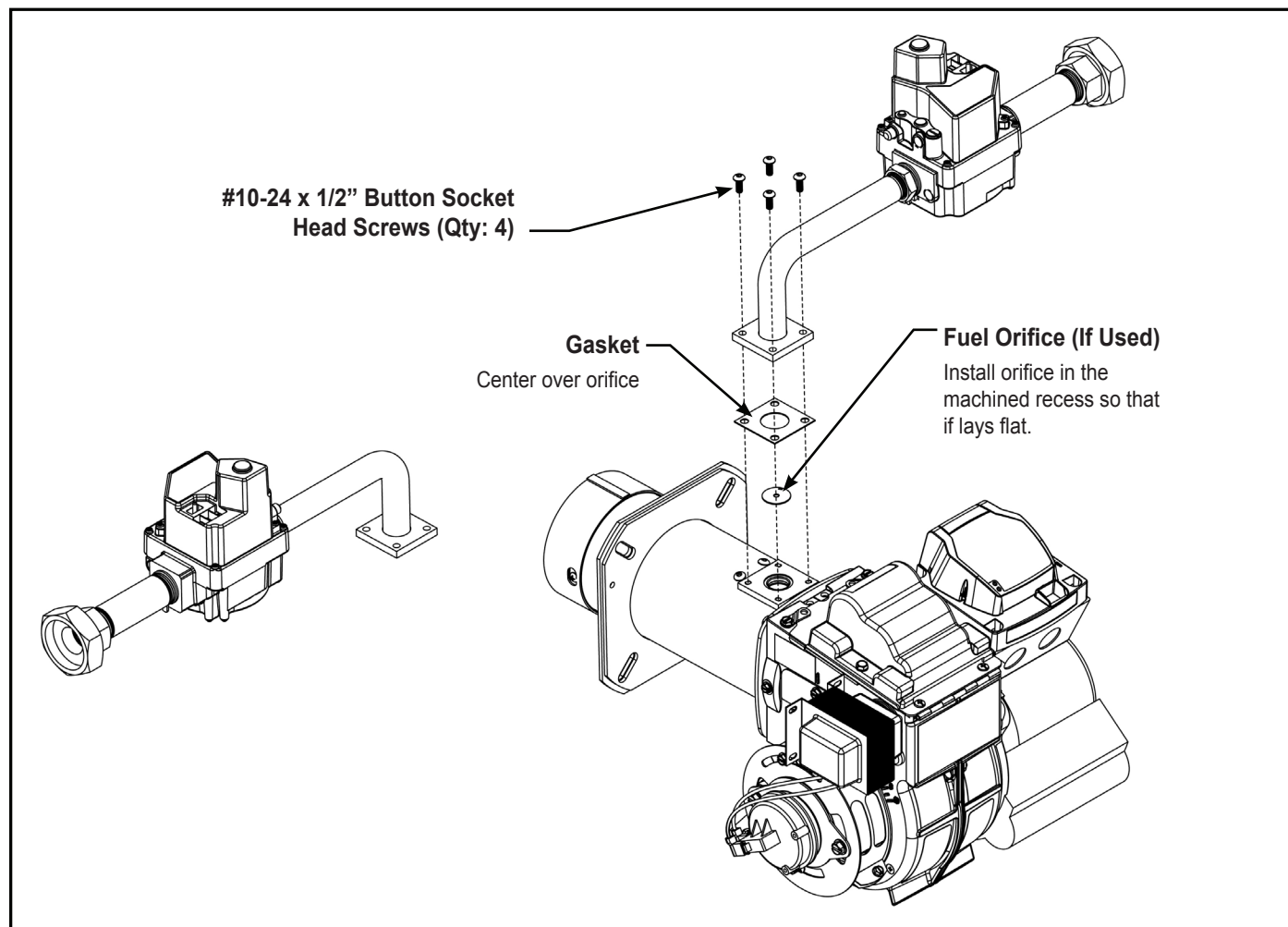


Figure 10 – Gas Manifold Installation



Mount the Burner

Mount the burner to the appliance. The burner specified for packaged equipment will have a flange welded for the required insertion. Follow the appliance manufacturer's instructions for mounting.

NOTICE

Protect the Air Tube from Overheating

Overheating could cause damage to the air tube and other combustion components leading to equipment malfunction and impaired combustion performance.

1. Verify the Burner's Insertion Depth

The end of the air tube should be set back $\frac{1}{4}$ " from flush with the refractory inside wall to prevent damage from overheating (See **Figure 11**).

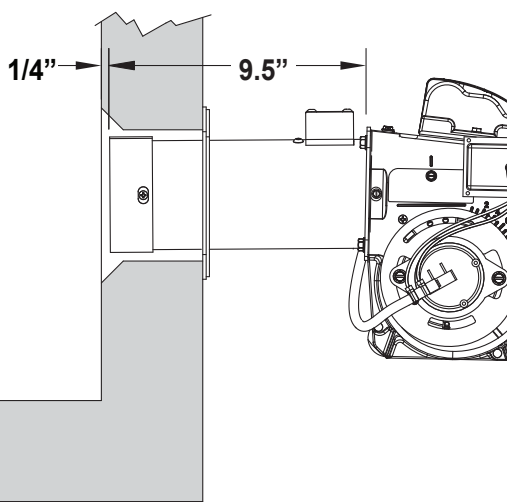
The end of the air tube must not extend into the combustion chamber unprotected unless it has been factory-tested and specified by the appliance manufacturer.

2. Bolt the burner to the appliance using the factory-mounted flange and gasket.
3. Provide support under the burner if required.

NOTICE

Some Local codes require the burner to have a stand. If this is required use Beckett Part #5685 Pedestal Kit.

Figure 11



Connect Gas Piping

Install the test cock tee, its plug, and the union (provided with the burner) into the supply piping and connect them to the burner valve and manifold (**Figure 12**).

NOTICE

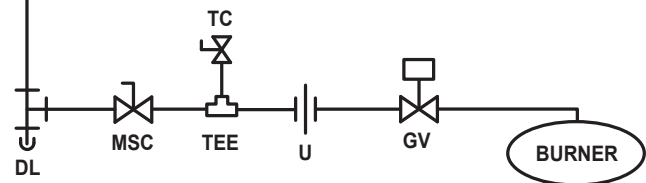
Gas supply piping must be structurally supported independent of the burner. The burner manifold and gas valve are not designed to support piping loads.

Figure 12 – Typical Gas Piping Layout

KEY

Abbrev.	Item Description
MSC	Main Shutoff Cock *
TC	Test Cock *
U	Union
GV	Gas Valve
DL	Drip Leg *

* Provided by Installer



WARNING

Explosion and Gas Leak Hazard



Provide Over-pressure Protection

The National Fuel Gas Code, ANSI Z223.1 (NFPA 54) and ASME CSD-1 require that if gas pressure entering the building exceeds the rating of any gas train component an overpressure protection device must be installed.

Wire the Burner

Install the burner and all wiring in accordance with the National Electric Code ANSI/NFPA 70 (Canada CSA C22.1) and all applicable codes and requirements. Wire the burner in compliance with all instructions and diagrams provided by the appliance manufacturer. Verify operation of all controls in accordance with the appliance manufacturer's guidelines.

NOTICE

See **Figure 13** for a typical wiring diagram, with the GeniSys 7590.

NOTICE

Maximum fuse size for the 120 Vac 60 Hz electrical power supply to the burner is 20 Amps.

CAUTION

Keep Service Access Covers Securely Installed

All covers must be securely in place to prevent electrical shock, protect against injury from moving parts and prevent damage from external elements.

All covers or service access plates must be in place at all times except during maintenance and service.

This applies to all controls, panels, enclosures, switches, and guards or any component with a cover as part of its design.

WARNING



Electrical Shock Hazard

Electrical shock can cause severe personal injury or death.

Disconnect electrical power before installing or servicing the burner.

Provide ground wiring to the burner, metal control enclosures and accessories. (This may also be required to aid proper control system operation.)

Perform all wiring in compliance with the National Electrical Code ANSI/NFPA 70 (Canada CSA C22.1)

WARNING



Explosion, Fire and Asphyxiation Hazard

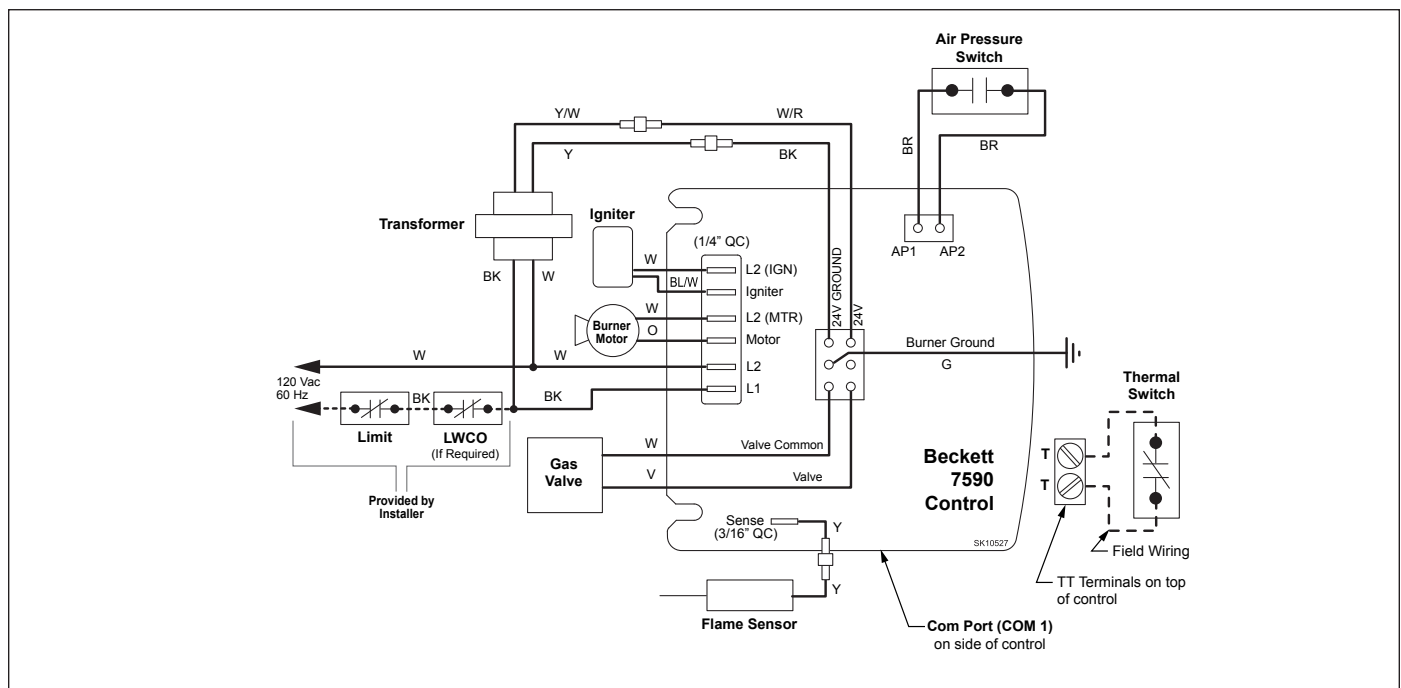
Tampering with, or bypassing safety controls could lead to equipment malfunction and result in asphyxiation, explosion or fire.

Safety controls are designed and installed to provide protection.

Do NOT tamper with or bypass any safety control.

If a safety control is not functioning properly, shut off all main electrical power and gas supply to the burner and call a qualified service agency immediately.

Figure 13 – Typical CG4 Wiring (Boiler Applications)



Sequence of Operation

WARNING

**Delayed Ignition,
Explosion, and Fire
Hazards**



**Use only the Beckett 7590 Control on
the CG4 Burner.**

NOTICE

This operation sequence is typical for operation with a 7590 control. This is the only control approved for use on the CG4 Gas Power Burner.





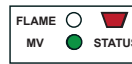
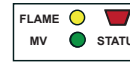
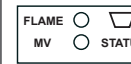
Do not start the burner yet.

(Reference **Table 6**)

- Call for heat, Status LED is turned on.
 - Control performs safe-start check
 - If safe-start fails, control locks out.
 - If safe-start passes, control checks for presence of flame.
 - If flame is present, control will enter hold state until flame is no longer present. Flame LED and Status LED will flash until flame is no longer present.
 - If flame is not present, control will check status of air proving switch. If switch is closed, (indicating the pressure switch is stuck) control will enter lockout.
- If the air proving switch is open, the motor will start. Once the air proving switch closes, pre-purge will begin (lasting 30 seconds). Pre-purge or ignition timings will not start until the air proving switch closes.
 - The air proving switch must close to prove combustion air is present. If switch fails to close during the specified period, the control will enter lockout.
- When pre-purge is completed, the control turns on the igniter and the gas valve. MV LED will turn on.
 - Spark continues until end of ignition timing or until flame is proved.
- Once flame is proved, The Flame LED is turned on and the spark is turned off. The gas valve and MV LED remain energized.
 - If flame is not proved, the control will lockout or enter the inter-trial waiting period. Status LED will flash rapidly for lockout or slowly for inter-trial waiting.
 - If multiple trial logic is used, the control will complete the trials for ignition
 - When flame is proved the control will continue in run mode until the end of the call for heat.
- When the call for heat is ended, the gas valve, MV LED, Flame LED, Status LED and motor turn off.

Additional information on control operation is available in the GeniSys 7590 Control Manual (61981-001).

Table 6 – Operating Sequence

	SEQUENCE 					
LEDs	Call for Heat  Status LED turns on	Motor Start  Status LED ON	Pre-purge  Status LED Flashes	Ignition  Status, MV LEDs On	Run  Status, MV, Flame LEDs On	End Call for Heat  LEDs Off
Timers & Timings			Pre-purge Timer 1 - 240 Seconds	Ignition Trial Timer 4 - 15 Seconds		
Flame Check	On	On	On	On	On	
Motor/Blower		Blower Starts	On	On	On	Off
Air Switch Check	On	Air Switch Closes	On	On	On	
Igniter				On	Off	Off
Gas Valve				On	On	Off

Prepare the Burner for Start-up



Asphyxiation, Explosion/ Fire

Professional Installation & Service Required. Incorrect installation and mishandling of start-up could lead to equipment malfunction.

This burner must be installed and prepared for start-up by a qualified service technician who is trained and experienced in gas burner system installation and operation.

Do not attempt to start the burner unless you are fully qualified.

Carefully follow the wiring diagrams, control instruction sheets, control sequence of operation, test procedures and all appliance manufacturer's directions that pertain to this installation.

Start-up Checklist

Verify the following before attempting to start the burner:

1. Test Instruments

The following calibrated test equipment is required to properly install the appliance. Whether these are included in one kit or are individual test components, they should be calibrated and in good working order.

- A combustion analyzer capable of measuring oxygen (or carbon dioxide), carbon monoxide, stack temperature, ambient temperature, and appliance efficiency.
- Electrical multi-meter capable of measuring voltage, ohms, amps, and DC micro-amps for measuring the flame signal. These could be included in one meter or separate meters, but should be calibrated and accurate.
- Calibrated manometers and gauges capable of measuring all pressure ranges in the gas supply and appliance draft. This could typically range from a few PSI to 0.1" W.C.

Start the Burner



Asphyxiation, Explosion/ Fire

Professional Installation & Service Required. Incorrect installation and set up could lead to equipment malfunction.

This burner must be installed and prepared for start-up by a qualified service technician who is trained and experienced in gas burner system installation and operation.

Do not attempt to start the burner unless you are fully qualified.

Do not continue with this procedure until all items in the 'Prepare the Burner for Start-up' section have been verified.

Carefully follow the wiring diagrams, control instruction sheets, control sequence of operation, test procedures and all appliance manufacturer's directions that pertain to this installation.

Burner Start Procedure

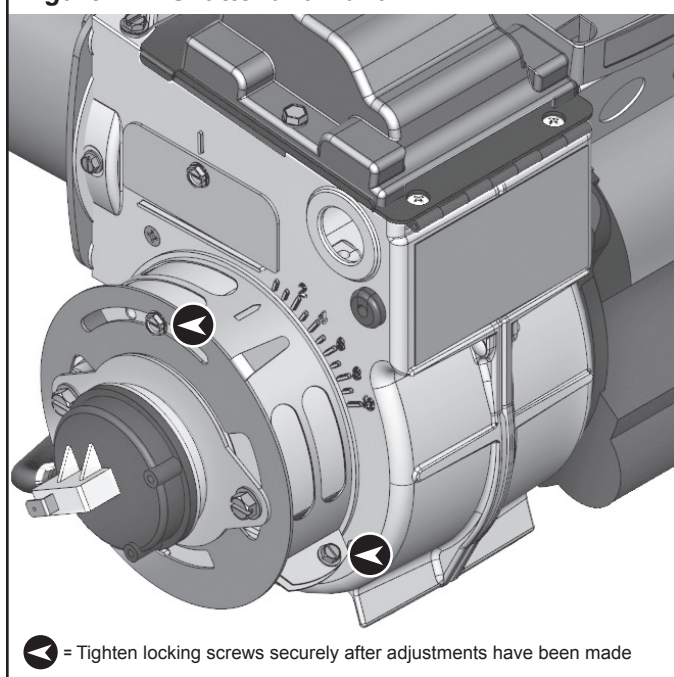
(Before proceeding, turn off and lock out electrical power and close the main shut off cock to shut off gas to the burner.)

1. With the power and main gas supply to the burner turned off, make sure gas has not accumulated in the boiler or flues.
2. Check the initial air settings (shutter & band) for input firing rate. If adjustment is necessary refer to **Figure 14** and loosen the adjustment screws then twist the shutter and/or air band until the indicators point to the values listed in **Table 5** on Page 10.
3. With the main shutoff cock closed. Set the limit or controller to call for heat then apply power to start the burner.
4. In order to check the function of each component (i.e.: 7590 sequence, airflow proving switch, ignition transformer, gas valves, safety lockout timing, etc.), with the main shutoff cock closed, monitor a complete burner run sequence. Note that the 7590 control will lock out following the 3rd try for ignition since the fuel supply has been closed off. Reset the control by pressing the reset button while the control is powered or by removing power from the control for 10 seconds or more.
5. If 7590 operation sequence and function is correct, turn off power and remove sensor wire from bottom of 7590 control. Turn on power and fuel and initiate

Call for Heat. Verify that burner fires up and the gas valve closes. After control locks out, flame shall go off.

6. Turn power off and reattach sensor wire. Turn power back on. Control should reset. Initiate Call for Heat.
7. After you have observed main flame for a brief time, press the reset button on the control for 1 second to shut down and re-start the burner. Monitor the flame and safety shutoff valves to assure that shutdown is controlled by the valves and that they operate properly. With this test passed, you may safely initiate automatic start-ups on subsequent cycles.
8. While the burner is firing, examine the vent system for evidence of leaks, obstructions, and for correct function of the barometric draft control. Leak test all gas piping from the burner to the utility supply piping. If leaks are found, correct them immediately.

Figure 14 – Shutter and Band



NOTICE

The shutter and band both control the amount of flow area available for air inlet to the burner. The greater their combined flow area, the higher the firing rate. The primary differences between the two are their ease of adjustment and their total airflow area. The shutter turns more easily and has a smaller net flow area. As a result we have found the shutter to be better suited for low rate adjustments, and the band better suited for high rate adjustments. We recommend that at low rates the band be left completely closed until the shutter has been fully opened, and that for higher rates the shutter is left completely open as the band is opened.

Verify the Firing Rate

The **primary method** for verifying the burner's firing rate, for either natural gas or propane, is to assure that the correct fuel orifice is properly installed and that the gas valve outlet pressure is accurately set to 3.5" water column.

1. Turn off electrical power to the burner and close the main shutoff cock supplying gas to the burner.
2. Remove the plug from the outlet pressure tap on the outlet end of the gas valve (**Figure 15**) and install a hose barb fitting and manometer.
3. Turn on system power and gas supply and initiate a call for heat to light the burner.
4. The manometer should show 3.5" water column pressure. If it does, turn off the burner and skip ahead to step 6. If it doesn't, let the burner continue to run and adjust the gas valve pressure regulator in the following steps.
5. Remove the regulator cover screw (see **Figure 15**) from the regulator adjustment tower and turn the regulator adjust screw clockwise to increase pressure or counterclockwise to decrease pressure. Set the regulator to produce a 3.5" water column reading in the manometer. Check the appliance breech or draft setting and adjust if necessary as it can affect the setting. Replace the regulator cover screw.
6. Turn off the burner and turn off all electrical power to the system.
7. Remove the manometer hose and barb fitting from the gas valve outlet pressure tap.
8. Replace the outlet pressure tap plug and tighten (clockwise 40 – 60 in-lbs.).
9. Turn on system power and start the burner.
10. Check for leaks at the gas valve outlet pressure tap plug using a leak detection solution or soapsuds. Bubbles forming indicate a leak. **SHUT OFF GAS AND FIX ALL LEAKS IMMEDIATELY.**

If the burner is firing natural gas it may be possible to verify the firing rate by "clocking" the gas meter:

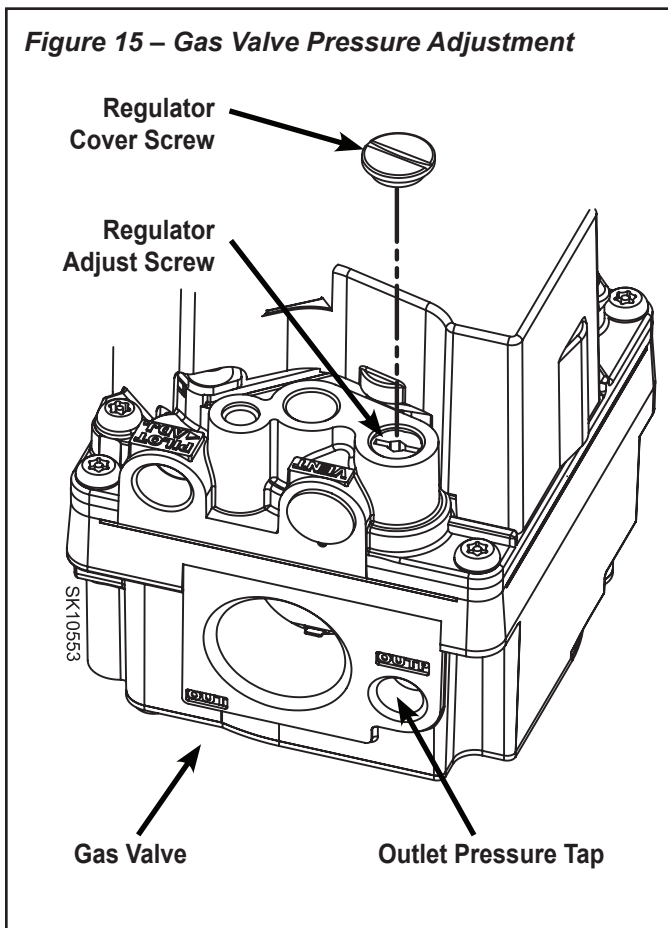
1. Locate the gas meter and examine its display to be sure that you can determine a 1 cubic foot usage of gas and that the meter is temperature compensated.
2. Contact the gas utility to find the **heating value** of the gas. It can vary from about 950 BTU/Ft³ to about 1,100 BTU/Ft³.
3. Examine the gas piping to know of any other gas appliances connected to it. Turn them off so that only this burner is using gas from the meter.

4. Start the burner and use a stopwatch to measure the number of **timed seconds** it takes for the burner to fire 1 cubic foot of gas.
5. Calculate the firing rate in BTU/Hr. using the following equation:

$$\text{Firing rate BTU/Hr.} = \text{Heating value (BTU/Ft}^3\text{)} \times 3,600 \div \text{Timed seconds}$$

For example, if the heating value is 1,050 BTU/Ft³ and you timed 1 cubic foot of gas at 42 seconds then firing rate BTU/Hr = 1050 x 3,600 ÷ 42 which calculates to 90,000 BTU/Hr.

If the burner is firing LP gas, a meter is usually not available. Contact your LP supplier for recommendations.



Check Operation and Safety Controls



WARNING

Explosion, Fire and Asphyxiation Hazard



Testing by Qualified Technician Required. Failure to properly test and verify the correct function of operation and safety controls could lead to equipment malfunction and result in asphyxiation, explosion or fire.

The testing of operating and safety controls requires technical training and experience with power gas burners and appliances.

Carefully follow the manufacturer's instructions supplied with the appliance and the controls.

Verify the correct function of all operating and safety controls used in the installation.

If instructions are not available, use the following recommended procedures and record all results in a start-up log.

1. **High limit/ Pressure Control** – To check the High Limit, raise the temperature or pressure of the operating control to a higher level and lower the limit to a setting less than the operating control. Run the burner until the high limit opens and shuts the burner off. Adjust the controls back to the desired settings.
2. **Operating control** – Run the burner until the operating control shuts it off. If necessary, make adjustments to ensure the control cycles the burner in the desired temperature or pressure range.

NOTICE

Operating controls should be set to minimize the number of firing cycles that the burner runs. High cycling rates increase the possibility of light-off lock outs.

3. **Low water cutoff (LWCO)** – With the burner firing, open the blow down valve on the low water cutoff, if applicable. As the water level drops, the LWCO switch contacts open and shut the burner off. When the water level rises, the LWCO contacts close and restart the burner. Monitor the LWCO switch operation in relation to the water level in the sight-glass for synchronization.

Use Test Instruments to Set Combustion

NOTICE

Always use calibrated test instruments to set combustion levels. Verify that test instruments are calibrated and in good working condition. If not already provided, drill test access holes in the flue pipe near the breech (or upstream of the boiler breech damper, if applicable) and in the front mounting plate area for firebox pressure. Be careful not to damage any water-backed surface.

Verify that all boiler sections, canopy, and access plates or doors are fully equipped with gaskets and sealed against any leakage, which could affect the combustion test results. Before making these tests, operate the burner to allow the heating system temperature to stabilize or nearly reach steady-state levels. Record all results in the start-up log for future reference.

- **Draft** – Set the stack or over-fire draft to the level specified by the appliance manufacturer.
 - **Natural Draft Applications**; typically over-fire draft is $-0.01''$ or $-0.02''$ W.C.
 - **Direct Venting**; typically may not require draft adjustment.
 - **High Efficiency/Positive Pressure Appliances**; (see manufacturer's recommendations).
- **Oxygen** – It is recommended that you measure the oxygen (O_2) early in the test sequence because high levels of carbon monoxide can be created at very low or even very high O_2 levels. The typical operating range is between 3% – 5%.
- **Carbon monoxide (CO)** – An operating range of 0 -50 PPM is recommended for the CG4 burner. The maximum carbon monoxide (CO) level permitted in the flue gas by the UL 795 Standard is 400 PPM (.04%).
- **Stack Temperature** – The stack temperature must be within the range specified by the appliance manufacturer. Generally a 325°F stack temperature is high enough to avoid corrosive condensation in the vent system, however a large cross sectional flow area chimney or a very tall chimney may require a higher temperature. See ANSI Z 223.1/NFPA 54 for design requirements.

WARNING

CO Leakage, Asphyxiation
Failure to maintain proper stack temperature could result in flue gas condensing and cause chimney damage which could result in CO leakage into dwelling.

Recommended Combustion Adjustment Procedure

1. Initiate a call for heat.
2. Adjust the draft or breech pressure to the appliance manufacturer's recommended level after flame has stabilized. A breech pressure that does not exceed -0.04 to $-0.06''$ W.C. is generally acceptable.
3. Measure the carbon monoxide level and adjust air settings, if necessary, to temporarily raise CO to about 50 PPM for a test point.
4. Measure the O_2 or CO_2 at the 50 PPM CO level. For this discussion, assume the O_2 is 1.5% (11% CO_2).
5. Open the air adjustment until the O_2 level is increased by at least 1% or to 3% O_2 (whichever is higher). This should reduce the CO level and provide a margin of reserve air to accommodate variable conditions.
6. Sample the CO level again. It should be in the 0 to 20 PPM range.
7. Check the draft to ensure it still meets specifications. If a major change in draft is required, repeat the above steps.
8. Check draft regulator for spillage. Confirm the condition of the chimney if spillage is present.
9. Verify stack temperature meets appliance manufacturer's recommendations.
10. Perform any final adjustments and lock the air settings securely. Run the burner through several cycles to verify prompt ignition and stable burner operation.
11. Record the combustion performance readings, burner settings and appliance data on the start-up form in the back of this manual and on the start-up tag. If the burner is firing LP gas you must also record set-up information on the propane conversion label and attach it to the appliance.
12. Hang the start-up tag in a prominent, safe location on or near the burner for future reference.

Maintenance and Service



Explosion, Fire and Asphyxiation Hazard



Annual Professional Service Required. Tampering with or making incorrect adjustments could lead to equipment malfunction and result in asphyxiation, explosion or fire.

Do not tamper with the burner or controls or make any adjustments unless you are a trained and qualified service technician.

To ensure continued reliable operation, a qualified service technician must service this burner annually.

More frequent service intervals may be required in dusty or adverse environments.

Operation and adjustment of the burner requires technical training and skillful use of combustion test instruments and other test equipment.



Electrical Shock and Explosion Hazard



Failure to turn off electric and gas supply could result in electrical shock, gas leakage, explosion, or fire hazards.

Turn main gas valves and electric power off before performing any maintenance.

If a maintenance procedure requires electrical power, use extreme caution.

NOTICE

Label all wires prior to disconnecting when servicing controls. Wiring errors can cause improper and dangerous operation.

Verify proper operation after servicing.



Explosion, Fire, Asphyxiation Hazard

Use authorized replacement parts only. Do not attempt to replicate or modify any parts.

Annual Maintenance



Explosion, Fire and Asphyxiation Hazard



Inspect Heating System Regularly. Lack of regular inspections and inadequate maintenance could lead to equipment malfunction and result in asphyxiation, explosion or fire.

(Always follow the appliance manufacturer's recommended service instructions, when available.)

- The following checklist is intended to be used as a minimum reference guide only and does not supersede or replace the heating appliance manufacturer's recommended service and maintenance instructions or any code requirements.
- Consult the installation and service instructions provided by the individual control or component manufacturer and carefully follow their directions.
- Maintenance and testing may be required more frequently due to dusty or severe operating conditions.
- If unusual or questionable performance is observed, shut the system down and contact your qualified service agency immediately.

(The following should be performed by a qualified service technician only.)

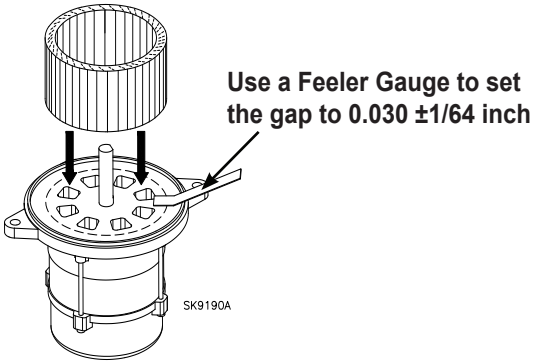
- Inspect and Clean the Burner
 1. Inspect and clean all dirt accumulation from the gas train, burner exterior, burner air band/shutter, and surrounding area.
 2. Remove the blower motor and clean any accumulated matter from the blower wheel and motor end bell.
 3. Check wheel for damage and the hub setscrew for tightness. If the blower wheel must be removed from the motor shaft, insure that clearance specifications are maintained. See **Figure 16** on Page 25.
 4. Clean the inside surfaces of the burner housing scroll and especially the air intake area and airflow proving switch suction tube.
 5. Clear any debris from the air vents on the motor body.
 6. Clean the ignition transformer, baseplate, and terminal bushing. Inspect the ignition lead for signs of deterioration and loose terminals.
 7. Remove the gas gun assembly and clean the entire unit, paying special attention to the air diffuser and gas orifices. Do not loosen or disassemble the mounting blocks from the gas tube. Their settings are important and difficult to produce under field conditions. See **Figure 17** on Page 25.

8. Inspect the flame rod for oxidation or distortion. Clean all surfaces, set the probe position, and insure that the flame rod is securely fastened. Refer to **Figure 17**.
 9. Inspect the ignition electrode for any damage. Clean all surfaces, set the proper electrode gap, and make sure it is securely fastened.
 10. Clean the inside of the air tube and inspect the combustion end for any deterioration. Referring to **Figure 11** on Page 16, check the recess dimension from refractory.
 11. Inspect gas tube O-ring condition and replace if damaged. Install gas gun assembly back into the burner and tighten the gas gun securely in place. (Automotive chassis or bearing grease is suitable for o-ring lubrication.)
 12. Inspect the condition of the appliance mounting plate and burner mounting flange gaskets and replace any damaged materials.
 13. Inspect all burner control wiring and the burner control for damaged insulation and loose terminals/connections.
 14. Verify that the source voltage to the burner and control panel is within 10% of the burner rating as listed on the nameplate (**Figure 2** on Page 5).
- **Appliance –** (Follow appliance manufacturer's service procedures. The following steps are emphasized because they relate to burner operation)
 1. Insure that the flue passages, flue vent pipes, and chimney flues are clean and unobstructed.
 2. Check barometric damper or draft hood for proper operation.
 3. Check the condition of the combustion chamber refractory, the front-plate insulation, and all gaskets and seals. Repair or replace as necessary.
 4. Inspect boiler sections and system load piping for possible leaks. Make all necessary repairs.
 5. Check all operating and safety controls on the boiler for proper installation and operation.
 6. Perform all maintenance and tests according to the burner control manufacturer's instructions (limits, controllers, low water cutoff, relief valves, feed valves, etc.).
 - **Gas supply piping:**
 1. Inspect all piping for leakage and proper installation.
 2. Perform necessary repairs to comply with all codes.
 3. Check inlet pressure to the gas valve.
 - **Installation area:**
 1. Insure that there are no combustible materials, flammable liquids or vapors in the vicinity of the heating appliance.
 2. Verify that the combustion air supply is adequate.
 - **Adjust the burner for proper combustion:**
 1. Run the burner and perform a complete combustion test using the proper instruments. If necessary refer to the section labeled Start the Burner. Record the results for reference.
 2. Visually inspect the flame. Look for changes in shape, size, and color.
 3. Monitor several burner start-up cycles. Verify prompt ignition and flame stability.
 4. Calculate the input firing rate and compare to the appliance specifications.
 5. Monitor the stack temperature. Compare to start-up and trend level.
 - **7590 GeniSys Primary Control:**

Follow the instructions in Beckett GeniSys Model 7590 manual (available at www.beckettcorp.com or by calling 1-800-645-2876). Verify that the control is functioning to specifications. See "Check for Normal Operation" section.
 - **Manual shutdown for long periods:**
 1. Close all gas valves in the gas supply piping system.
 2. Turn off all electrical power to the burner.
 3. Protect the burner and controls from moisture and dirt.
 - **Gas Valve**

The gas valve has a cycle rating of 100,000 (10 years of 6 cycles per hr.). When valve has exceeded this value, it should be replaced.

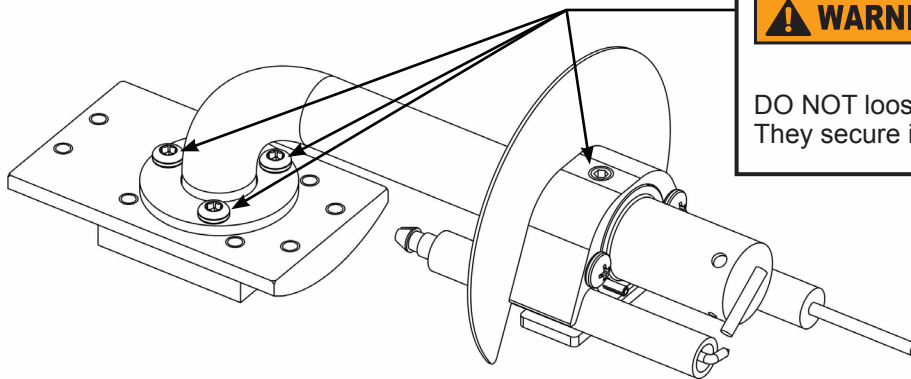
Figure 16 – Blower wheel assembly



Replace the Blower Wheel

1. Turn off all power to the burner before servicing.
2. Disconnect the burner motor wires.
3. Remove the bolts securing the motor to the burner housing.
4. Remove the motor and blower wheel.
5. Remove the existing blower wheel.
6. Referring to the illustration to the left, slide the new blower wheel onto the shaft.
 - Use a feeler gauge to set the wheel-to-motor gap, 0.030 \pm 1/64 inch.
 - Slide blower wheel toward motor until it contacts feeler gauge.
 - Rotate the blower wheel until the setscrew is centered on the flat of the motor shaft. Tighten the set screw 45 to 80 in.-lbs. to secure the wheel.
7. DO NOT use a motor that has endshield openings outside the blower wheel circumference (represented by the dashed line).
8. Install the motor on the burner housing. Tighten screws. Reconnect wires.
9. Restore power, start the burner and perform combustion tests. Refer to the section "Recommended Combustion Adjustment Procedure" on page 22.

Figure 17 – Gas Gun Assembly

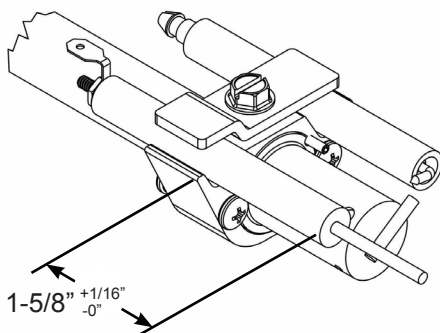


WARNING

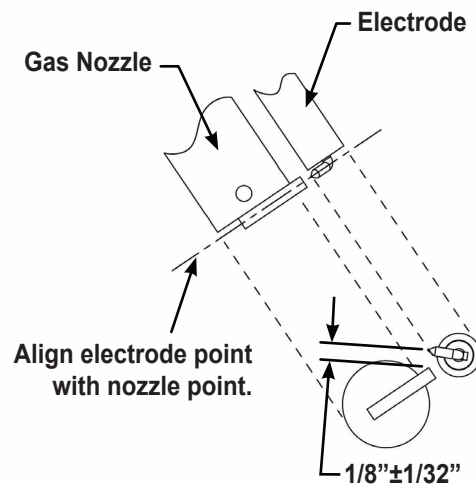
**Delayed Ignition,
Explosion, and/or
Fire Hazard**

DO NOT loosen or remove these screws.
They secure important factory settings.

Flame Rod Position

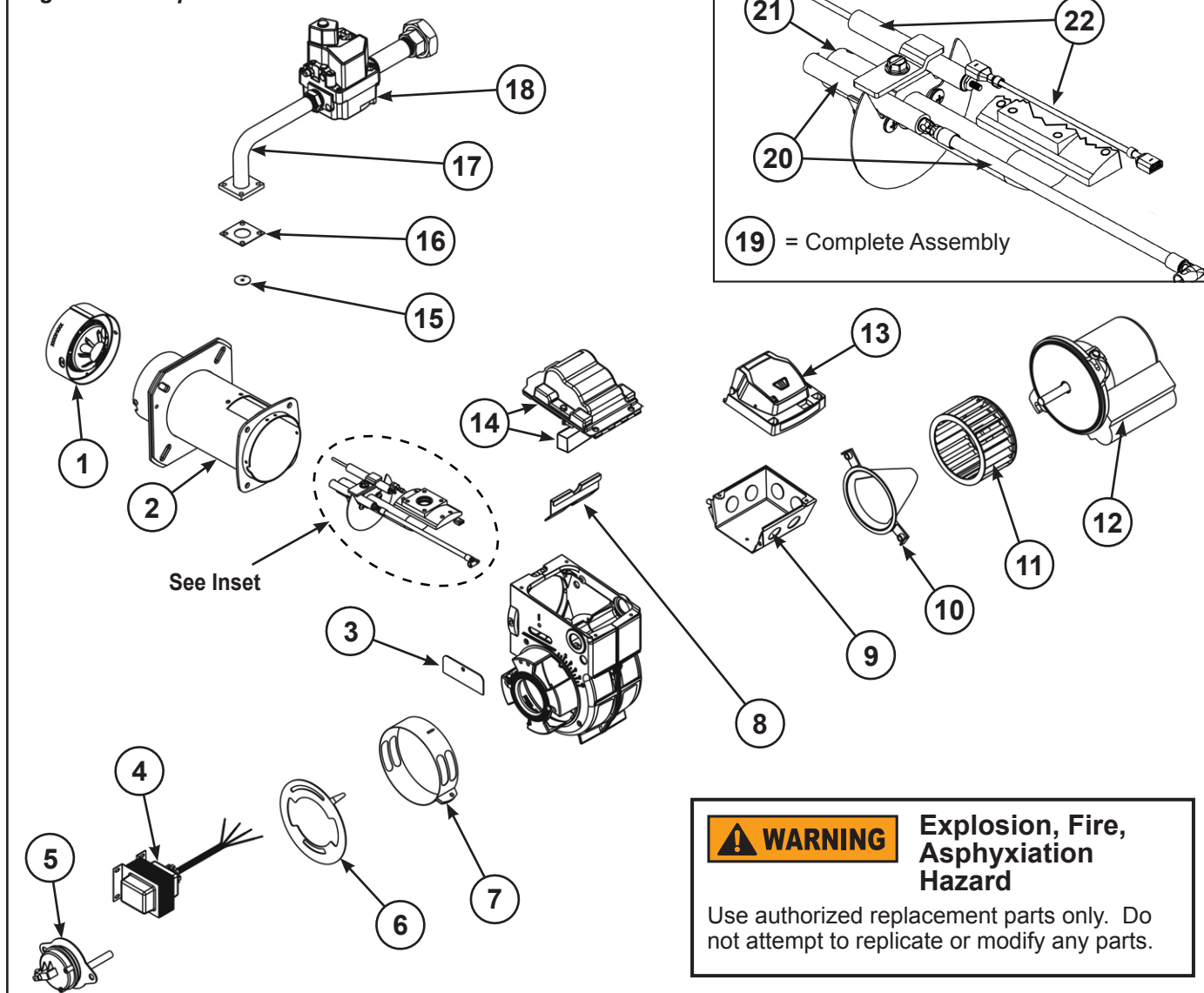


Ignition Electrode Adjustment



Replacement Parts

Figure 18 – Replacement Parts



Item	Description	Part #
1	Head	F3GU, F4GU, or F6GU
2	Air Tube Assy	Specify*
3	Cover Plate	32282U
4	Transformer	52310U
5	Air Proving Switch & Cover Assy	52264U
6	Shutter (4-slot)	3709U
7	Air band (Blank)	5151502
	Air Band (4-Slot)	5151504
8	Air Baffle	5880
9	Electrical Box	5770
10	Air Guide	31231U
11	Blower Wheel	2999U
12	Motor	21805U
13	GeniSys Primary Control	7590D0001U
14	Igniter & Gasket	7474U

Item	Description	Part #
15	Natural Gas Orifice pk (F3G)	F3GNATU
	Natural Gas Orifice pk (F4G)	F4GNATU
	Natural Gas Orifice pk (F6G)	F6GNATU
	LP Orifice Kit (F3G)	F3GLPU
	LP Orifice Kit (F4G)	F4GLPU
	LP Orifice Kit (F6G)	F6GLPU
16	Gasket, Manifold	33021001U
17	Gas Manifold Assy	52296001U
18	Gas Valve	22470U
19	Gas Gun Assy	Specify*
20	Electrode/Wire Assy	5784U
21	Nozzle (F3G)	F3GNOZU
	Nozzle (F4G)	F4GNOZU
	Nozzle (F6G)	F6GNOZU
22	Flame Rod/Wire Assy	7590FRU

*Contact your Beckett representative for part number and pricing.

Contractor Start-Up Form

Installation Name: _____ Installation Date: _____

Installation Address: _____

Start-Up Company's Name _____ Phone: _____

Name of Technician _____

■ Appliance *(Below information can be obtained from appliance name plate)*

Manufacturer: _____

Type (circle one): [**Boiler / Furnace / Other**] Model #: _____ Serial #: _____

Input MBH: _____ Original Appliance Designed for (circle one): [**Oil / Natural Gas / Propane**]

Output MBH: _____

Limits	Limit Model No. (Indicate n/a if not required by the appliance manuf.)	Operation Verified
Temperature		YES / NO
Pressure		YES / NO
LWCO		YES / NO
Other Limits		YES / NO / n/a

■ Burner

Fuel: [**Natural Gas / Propane**] Model #: _____ Serial #: _____

Combustion Head: [**F3G / F4G / F6G**] Fuel Orifice Size: _____ Air Shutter Setting: _____

Air Band Setting: _____ [**or Blank Band Installed**] Baffle: [**Installed / Not Required**]

■ Chimney/Smoke Pipe

Chimney Type: [**Masonry / Metal Vent / Direct Vent**] Location (circle one): [**Inside / Outside**]

Chimney Height: _____ Flue Pipe Size: _____ Flue Pipe Length: _____

Number of Elbows: _____ Confirm Double Acting Draft Regulator Installed: [**Yes / No**]

Thermal Safety Switch Installed [**Yes / No**] Voltage: [**120V / 24V**]

Gas Supply Piping

Pipe Diameter: _____ Length of Pipe from Burner to Meter: _____ Number of Elbows: _____

Gas Pressure to Burner Gas Valve While Burner is Operating _____ Inches W.C.

■ Combustion Readings

O₂: _____ % CO: _____ PPM CO₂: _____ % Stack Temperature (325°F MIN.): _____ °F

Manifold Gas Pressure: _____ (Inches W.C.) Draft at Breech _____ W.C.

Limited Warranty Information

The R. W. BECKETT CORPORATION ("Beckett") warrants to persons who purchase its "Products" from Beckett for resale, or for incorporation into a product for resale ("Customers"), that its equipment is free from defects in material and workmanship. To qualify for warranty benefits, products must be installed by a qualified service agency in full compliance with all codes and authorities having jurisdiction, and used within the tolerances of Beckett's defined product specifications.

To review the complete warranty policy and duration of coverage for a specific product, or obtain a written copy of warranty form 61545, please choose one of the following options:

1. Visit our website at: www.beckettcorp.com/warranty
2. Email your request to: rwb-customer-service@beckettcorp.com
3. Write to: R. W. Beckett Corporation, P. O. Box 1289, Elyria, OH 44036

NOTE: Beckett is not responsible for any labor cost for removal and replacement of equipment.

THIS WARRANTY IS LIMITED TO THE PRECISE TERMS SET FORTH ABOVE, AND PROVIDES EXCLUSIVE REMEDIES EXPRESSLY IN LIEU OF ALL OTHER REMEDIES, AND IN PARTICULAR THERE SHALL BE EXCLUDED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL BECKETT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE OF ANY NATURE. Beckett neither assumes, nor authorizes any person to assume for Beckett, any other liability or obligation in connection with the sale of this equipment. Beckett's liability and Customer's exclusive remedy is limited to the cost of the product.



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