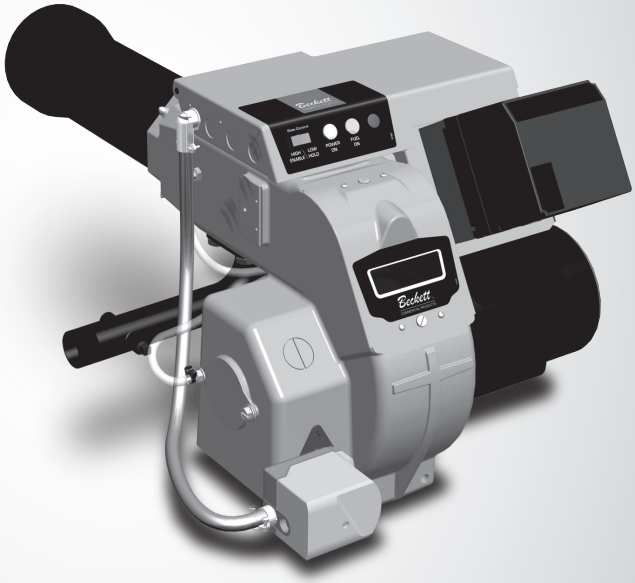
CG15
CG25
CG50

Gas Burner Manual

Operation: High/Low or Modulation



Beckett™
COMMERCIAL PRODUCTS

GAS-FIRED
c UL us
LISTED

⚠ WARNING

Fire, Explosion and Asphyxiation Hazards

Failure to follow these instructions exactly could lead to fire or explosion and result in death, severe personal injury 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 telephone outside the building.
  - Follow the gas supplier's instructions.
  - Call the fire department if you cannot contact your supplier.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

Table of Contents

Figures & Tables

General Information

Thank you for purchasing this Beckett product 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 system.

If at any time the product does not appear to be operating properly, immediately contact your qualified service agency for consultation.

Hazard Definitions

⚠ DANGER	Indicates a hazardous situation that, if not avoided, **will** result in **death or serious injury**.
⚠ WARNING	Indicates a hazardous situation that, if not avoided, **could** result in **death or serious injury**.
⚠ CAUTION	Indicates a hazardous situation that, if not avoided, **could** result in **minor or moderate injury**.
NOTICE	Used to address practices not related to physical injury.
SAFETY INSTRUCTIONS	Safety instructions signs indicate specific safety-related instructions or procedures.

⚠ WARNING

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:

⚠ WARNING

Follow these instructions exactly.

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.

⚠ CAUTION

Frozen Plumbing and Water Damage Hazard

If the facility 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 security agency.

NOTICE

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

Professional Installer's Responsibility

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard

Professional Service Required.

- 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.
- Burner must be used within the limits of Table 1.

⚠ 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.

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.

NOTICE

FOR OUTDOOR USAGE it is the responsibility of the OEM equipment manufacturer to protect the burner system and components from exposure to water in the end-use application.

c UL US LISTED

This burner is UL listed for use in the US or Canada per ANSI/UL 295 & CSA/CGA 3.4. For use with natural gas or propane.

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

Specifications

Table 1 gives typical burner specifications; there are more options available that are not shown. Specific configurations for each burner model (i.e. 15.1, 15.2, etc.) are used to achieve different firing rates within the range listed under Input Firing Rate. Refer to the burner label to find specific information about your burner. ***Figure 1*** outlines how to read the label.

Figure 2 and ***Figure 3*** give the physical dimensions of the burner for installation.

Figure 1 — Burner Label Information

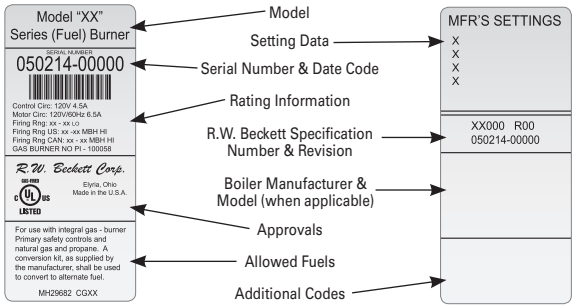
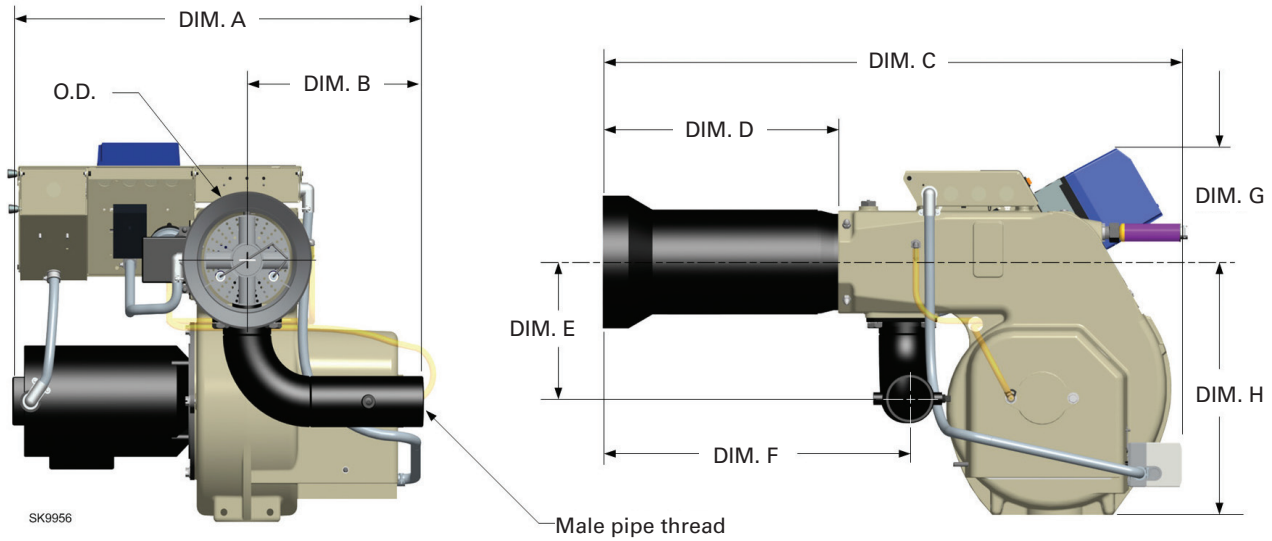


Table 1 — Burner Specifications

Burner Model	CG15		CG25		CG50	
Input Firing Range†:	USA	Canada	USA	Canada	USA	Canada
High Fire (Max.)	1,500 MBH	1,370 MBH	2,700 MBH	2,300 MBH	5,000 MBH	4,000 MBH
High Fire (Min.)	800 MBH	800 MBH	1,300 MBH	1,300 MBH	2,000 MBH	2,000 MBH
Low Fire (Max.)	560 MBH	560 MBH	990 MBH	990 MBH	1,400 MBH	1,400 MBH
Low Fire (Min.)	350 MBH	350 MBH	550 MBH	550 MBH	730 MBH	730 MBH
Fuel:						
Natural Gas	0.6 Specific Gravity Typical		0.6 Specific Gravity Typ.		0.6 Specific Gravity Typ.	
Propane (LP)	1.53 Specific Gravity Typical		1.53 Specific Gravity Typ.		1.53 Specific Gravity Typ.	
Gas Train:						
Standard	UL Listed / CSD-1 configuration		UL Listed / CSD-1 configuration		UL Listed / CSD-1 configuration	
Options	IRI, FM		IRI, FM		IRI, FM	
Gas Train Inlet Pressure Range:						
Minimum	3.7" WC*		3.5" WC*		3.5" WC*	
Maximum	0.5 PSI Typical (1, 5, & 10 available)		0.5 PSI Typical (1, 5, & 10 available)		0.5 PSI Typical (1, 5, & 10 available)	
Manifold to Furnace Pressure Drop:**						
Highest High Fire	3.7" WC		3.5" WC		3.5" WC	
Lowest High Fire	2.7" WC		2.5" WC		2.5" WC	
Firing Modes Available:	Low Fire Start High/Low Modulation		- High/Low Modulation		- High/Low Modulation	
Standard Flame Safeguard:						
Low Fire Start	RM7897A		-		-	
High / Low	RM7897C		RM7897C		RM7897C	
Modulation	RM7897C		RM7840L		RM7840L	
Flame Detector:						
Standard	UV		UV		UV	
Proof of Combustion Air:	Standard		Standard		Standard	
Gas Pressure Switches:	Standard High and Low		Standard High and Low		Standard High and Low	
Ignition:	Direct Ignition of Main Flame		Direct Ignition of Main Flame		Direct Ignition of Main Flame	
Motor:						
HP	1/2HP		3/4 HP		2 HP	
RPM	3450 RPM		3450 RPM		3450 RPM	
Standard Voltage	120 volt, 1 ph, 60 Hz		120 volt, 1 ph, 60 Hz		208/230v, 1 ph, 60 Hz	
Motor FLA	6.4 Amps @120 volt AC		10.4 Amps @120 volt AC		13.4 Amps @230 volt AC	
Optional Voltages	208/230v, 1 ph, 60 Hz 208/230v, 3 ph, 60 Hz 460v, 3 ph, 60 Hz 575v, 3 ph, 60 Hz		208/230v, 1 ph, 60 Hz 208/230v, 3 ph, 60 Hz 460v, 3 ph, 60 Hz 575v, 3 ph, 60 Hz		208/230v, 3 ph, 60 Hz 460v, 3 ph, 60 Hz 575v, 3 ph, 60 Hz	
Weight:	125 lbs.		145 lbs.		165 lbs.	
Dimensions:	Refer to Figures 2 and 3.					

*See manufacturer's nameplate settings for specific minimum gas pressure requirements.
** See Figures 14A, 14B, & 14C.
† Canada High Fire rate is reduced to accomodate 25% reserve air.
†† More otions available not shown on table

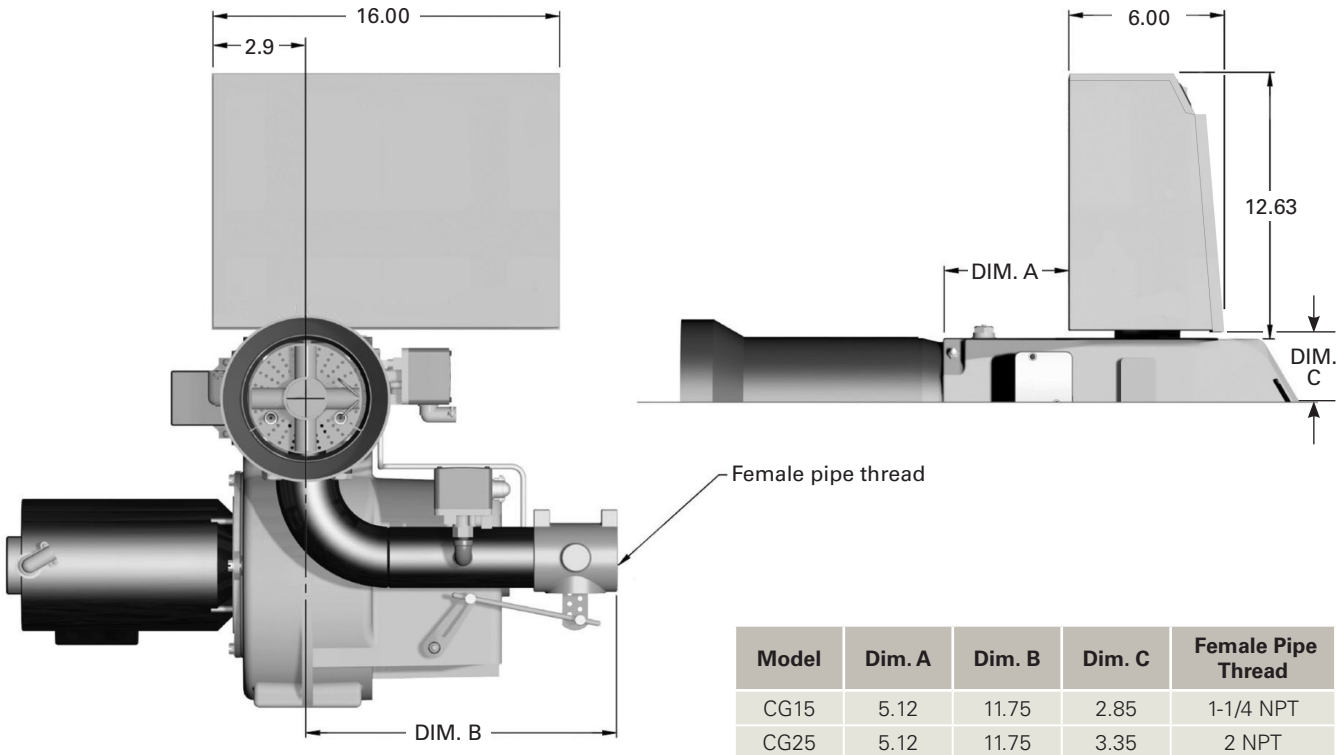
Figure 2 — Burner Dimensions



Model	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	O.D.	Male Pipe Thread
CG15	20.8	9.4	32.7	13.7	5.2	18.4	6.2	10.8	5.6	1-1/4 NPT
CG25	20.9	9.3	33.2	13.4	6.8	17.8	6.7	12.6	6.9	2 NPT
CG50	24.4	10.5	33.6	13.5	7.5	17.4	6.7	14.6	7.7	2-1/2 NPT

NOTE: All dimensions are in inches.

Figure 3 — Panel and Modulating Valve Dimensions



Model	Dim. A	Dim. B	Dim. C	Female Pipe Thread
CG15	5.12	11.75	2.85	1-1/4 NPT
CG25	5.12	11.75	3.35	2 NPT
CG50	5.81	13.25	3.38	2-1/2 NPT

NOTE: All dimensions are in inches.

Inspect & Prepare Installation Site

Indoor Installation

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard

Wet or dusty environments could lead to blocked air passages, corrosion damage to components, impaired combustion performance.

- This burner is designed for clean, dry installations.
- This burner is not intended for outdoor use or applications subject to any liquid.
- Keep the installation clear of dust, dirt, corrosive vapors, and moisture.
- Protective covers and frequent maintenance may be required.
- 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 to which this burner is applied.
- 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 state and local code requirements.
- If the burner is replacing an existing oil burner, the 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. The flue pipe must 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.
4. Any leakage between chimney tiles, around clean-out doors, or around the vent pipe should be sealed.
5. A barometric draft control is required. It shall be a double-acting type, agency recognized for use with gas vent systems.
6. The design and sizing of the appliance's vent system shall comply with the requirements of NFPA 54 Chapters 12 and 13.
7. 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 flue Safety switch on the double-acting draft control or draft hood. 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.

Chimney Liners

⚠ WARNING

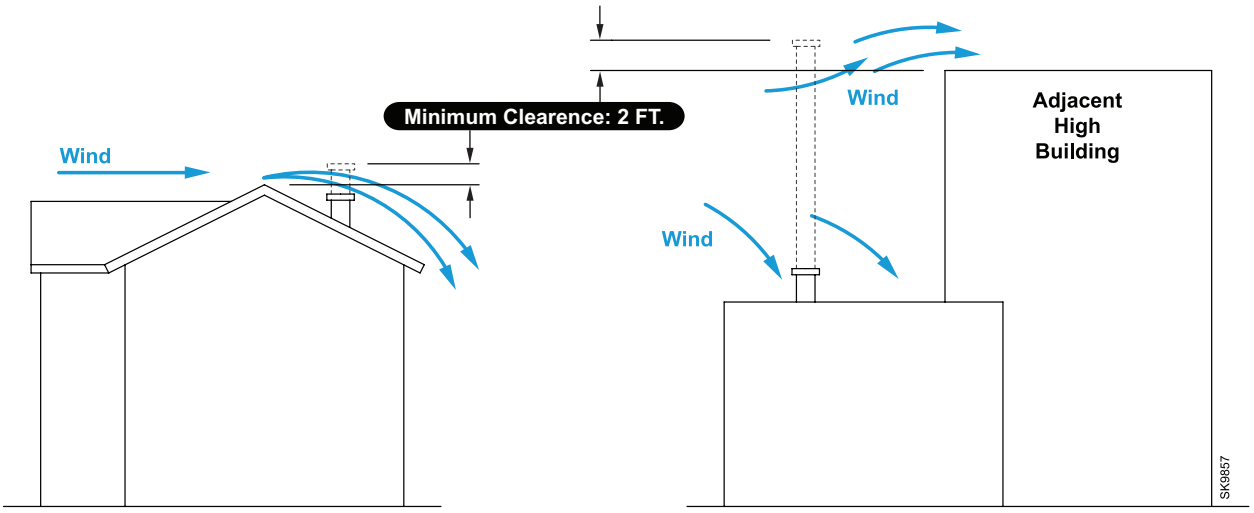
Explosion, Fire, and Asphyxiation Hazard

The new designs of furnaces and boilers 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, leaks, or 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.

Approved insulated stainless steel chimney liner should 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.

Flue Pipe and Barometric Draft Control

The flue pipe should be same size as the breech connection on the appliance (see ***Figure 5*** and ***Figure 6***). For modern units this should cause no problem in sizing the flue pipe.

The flue pipe must 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.

A barometric draft control is required. It shall be a double-acting type, agency recognized for use with gas vent systems.

Please reference appliance instruction for chimney size.

Chimney liners may be required by local code.

Figure 5 — Venting Single Appliance with Power Gas Burner

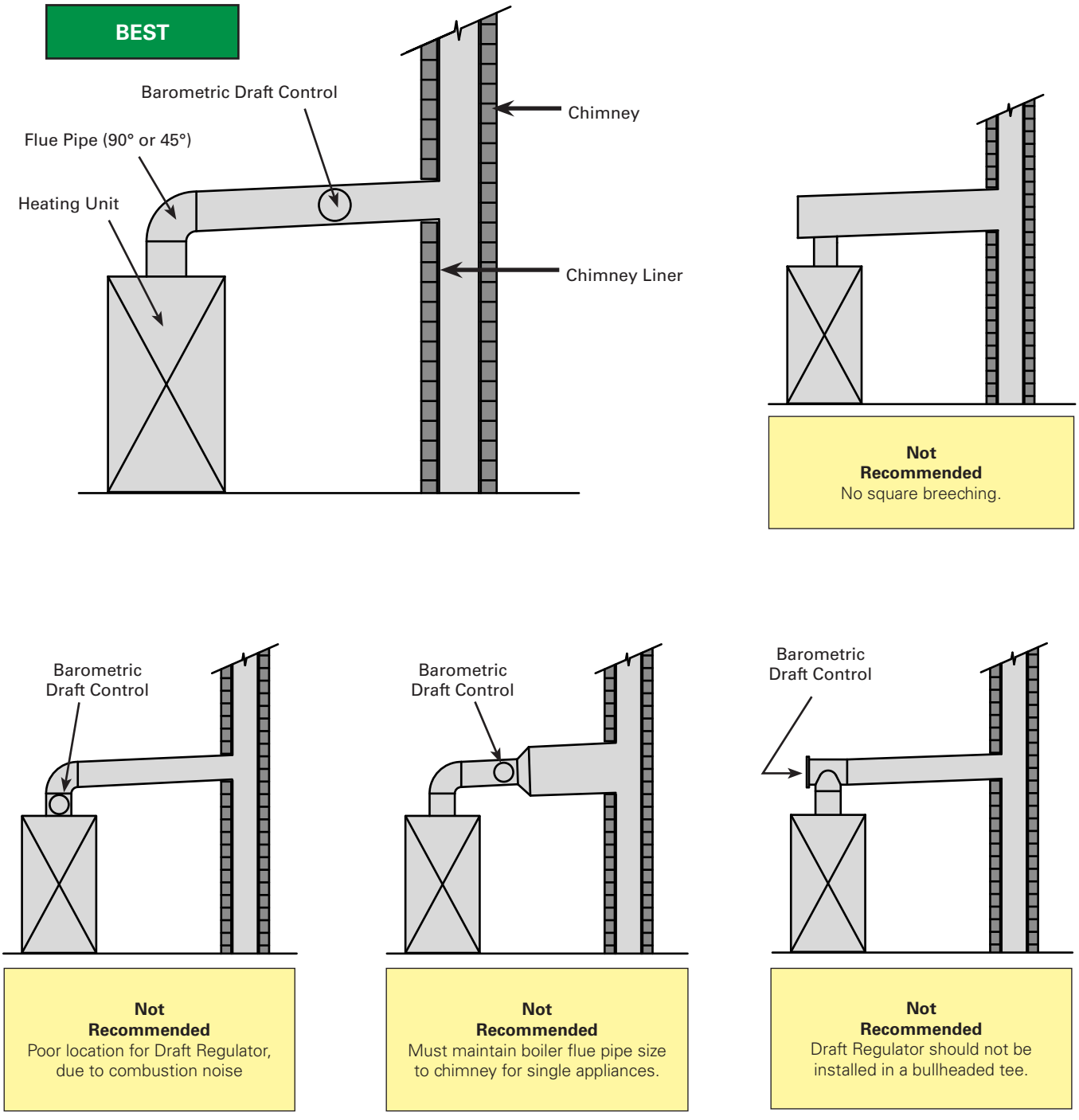
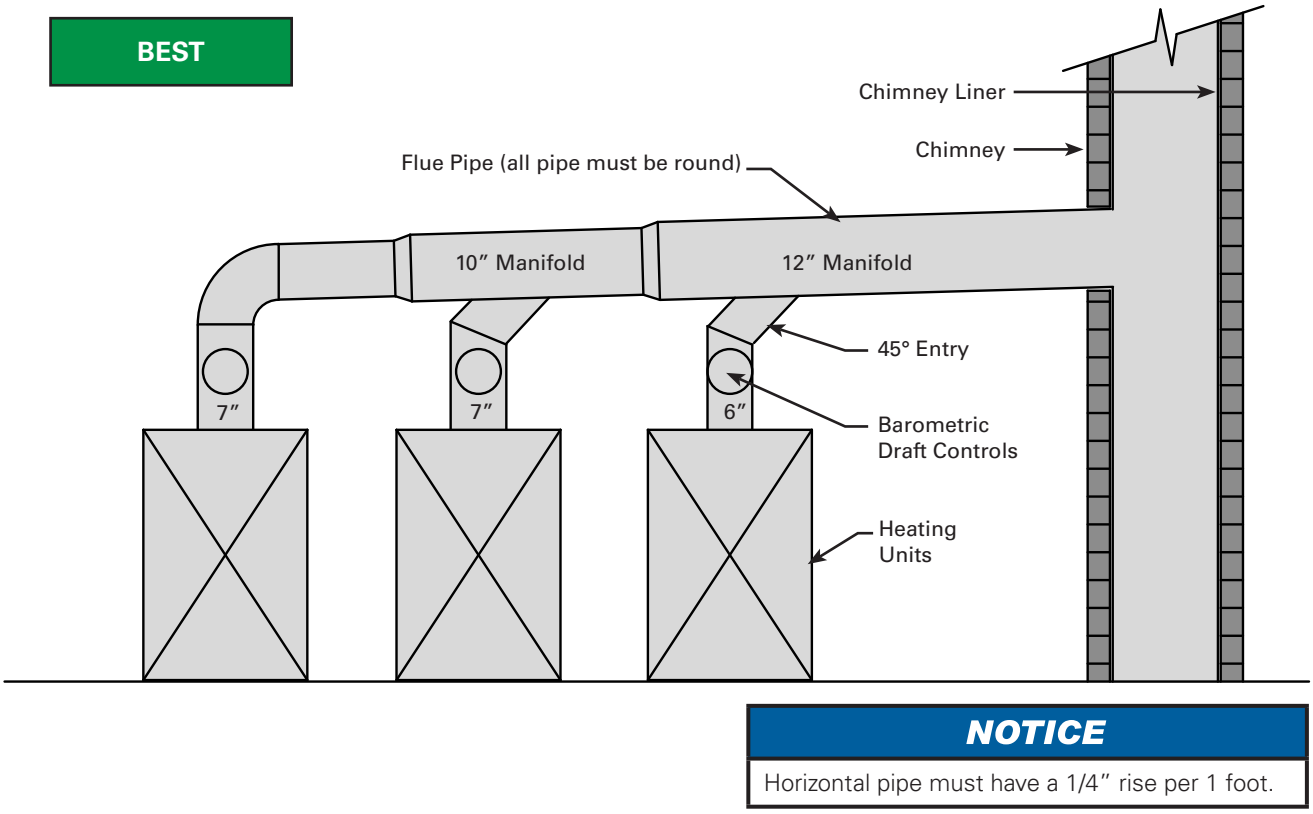
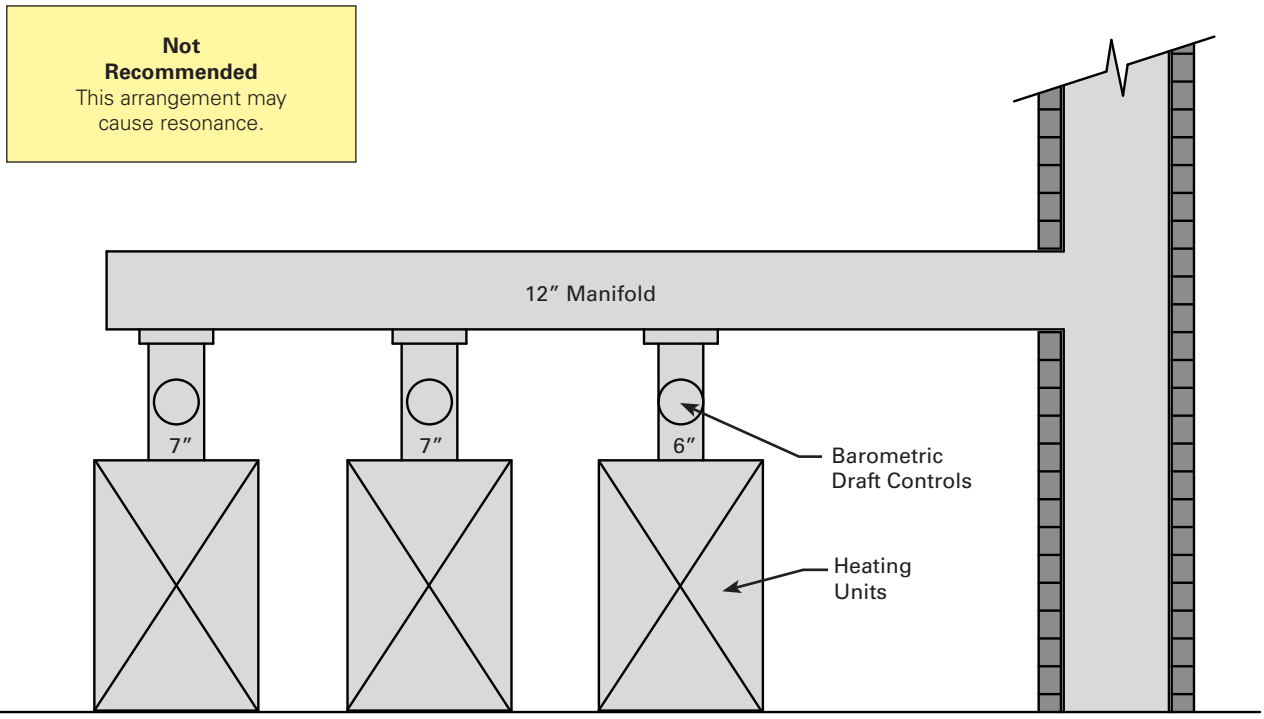


Figure 6 — Venting Multiple Appliances with Power Gas Burners



NOTICE

Horizontal pipe must have a 1/4″ rise per 1 foot.



Combustion Air Supply

⚠ 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.

NOTICE

Some local codes and gas utilities require the installation of a CO detector, this is strongly recommended in all applications. Consult with your heating contractor or a home security agency.

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 350,000 BTU/Hr, in an enclosed room in a building each opening in the enclosure should be 350 sq. in. (350,000/1,000 x 1 sq. in. = 350 sq. in.) A 350 sq. in. opening would typically be 12″x30″ or 19″x19″.

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.

Minimum Burner and Appliance Clearance

- Provide at least 15 inches of space around the burner for easy service and maintenance.
- Check minimum clearances against those shown by the appliance manufacturer and by applicable building codes.

Fuel Gas Supply

⚠ WARNING

Explosion, Fire, 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.

⚠ WARNING

Explosion and Fire Hazard

Never use an open flame for leak testing supply piping or equipment.

Never use Oxygen for leak testing or purging of fuel supply piping.

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.

A typical gas piping layout is shown in ***Figure 7***.

The gas supply system must be sized to deliver at least the minimum required pressure to the gas train inlet.

The installer must verify:

- Piping design meets all applicable codes.
- Piping and components are inspected and in good working condition.
- Piping is sized correctly to supply required gas pressure to the burner and any other gas appliances in the facility.
- Newly installed gas supply piping must be pressure tested as outlined in ANSI Z223.1 / NFPA 54.

⚠ WARNING

Explosion, Fire, and Gas Leak Hazard

Do not use Teflon tape on gas piping. Damage to gas valve cutoff seals and valve bodies could cause gas leaks.

- 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.

⚠ WARNING

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.

Install a full-size drip leg or dirt pocket in the piping directly ahead of the main shutoff valve to capture foreign matter.

NOTICE

All gas piping installation must comply with the latest edition of the National Fuel Gas Code ANSI Z223.1 (NFPA 54) and other applicable local codes.

New facility piping must be pressure tested in accordance with ANSI Z223.1 / NFPA 54.

A leak test must be performed on supply piping immediately after gas is turned back on. Any leaks must be fixed before continuing with the installation.

Figure 7 — Typical Gas Piping Layout

ABBREV.	ITEM DESCRIPTION
HGPS	HIGH GAS PRESSURE SWITCH
LGPS	LOW GAS PRESSURE SWITCH
MSC	MAIN SHUTOFF COCK
MLTC	MAIN LEAK TEST COCK
PG	PRESSURE GAUGE
S	STRAINER
SSOV1	SAFETY SHUTOFF VALVE #1
TC	TEST COCK
U	UNION
PRSSOV	PRESSURE REGULATING SAFETY SHUTOFF VALVE

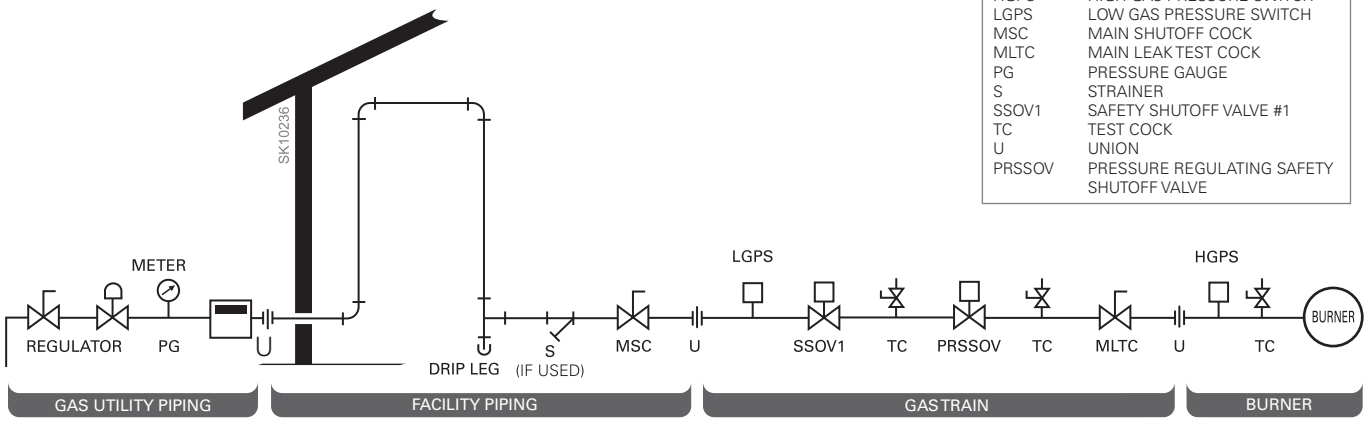


Table 2 — Gas Supply Piping Capacity

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 size (inches) IPS								
Pipe Length (ft.)	**0.75"**	**1.0"**	**1.25"**	**1.5"**	**2.0"**	**2.5"**	**3.0"**	**4.0"**
10	278	520	1050	1600	3050	4800	8500	17500
20	190	350	730	1100	2100	3300	5900	12000
30	152	285	590	800	1650	2700	4700	9700
40	130	245	500	760	1450	2300	4100	8300
50	115	215	440	670	1270	2000	3600	7400
60	105	195	400	610	1150	1850	3250	6800
70	96	180	370	560	1050	1700	3000	6200
80	90	170	350	530	990	1600	2800	5800
90	84	160	320	490	930	1500	2600	5400
100	79	150	305	460	870	1400	2500	5100
125	72	130	275	410	780	1250	2200	4500
150	64	120	250	380	710	1130	2000	4100
175	59	110	225	350	650	1050	1850	3800
200	55	100	210	320	610	980	1700	3500

For other inlet pressures and pressure drops, see NFPA 54 for Natural Gas piping or NFPA58 for LP Gas Piping.

Installation Instructions

Mount the Burner

⚠ WARNING

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

⚠ WARNING

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.

⚠ WARNING

Carbon Monoxide Hazard

Burner mounting gasket must be used to seal against leakage from the appliance. Do not use a damaged mounting gasket. Verify that all boiler sections, canopy, and access plates or doors are fully equipped with gaskets and sealed against any leakage.

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard.

Adjustable flange shall not be used with portable equipment.

⚠ CAUTION

Carbon Monoxide Hazard

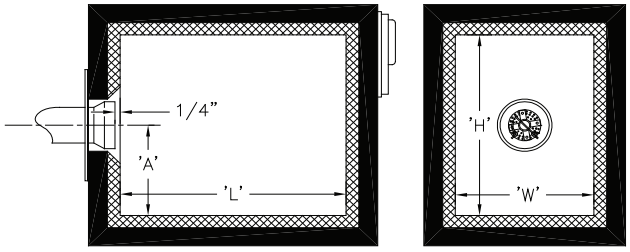
Protect the Air Tube from Overheating. Overheating could cause damage to the air tube and other combustion components leading to equipment malfunction and impaired combustion performance.

- 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.
- The end of the air tube should be set back ¼" from flush with the refractory inside wall to prevent damage from overheating.
- Refer to the instructions outlined in this section for methods of additional protection.

To ensure correct installation, verify the following:

- The burner specified for packaged equipment has a flange to match the appliance bolt pattern and welded for the required insertion. Follow the appliance manufacturer's instructions for mounting.
- The end of the burner air tube will be set back 1/4" from the interior surface of the combustion chamber when the burner is mounted to the appliance. See ***Figure 8***. If this dimension cannot be achieved, protect the end of the air tube by installing a suitable ceramic refractory material such as a refractory mill board capable of withstanding at least 2300°F.
- The burner flame size is suitable for the appliance combustion chamber. See ***Figure 8*** for minimum combustion chamber dimensions at the stated firing rate ranges.
- The supplied gasket is in place on the burner air tube flange and then mount the burner to the appliance using appliance or field supplied hardware.

Figure 8 — Minimum Combustion Chamber Dimensions



Minimum Inside Dimensions (inches)				
Burner Model	Width	Height	Length at Min Height & Width	Burner Head Centerline to floor
	W	H	L	A
CG15.1S	15	16	42	7
CG15.2S	16	17	45	8
CG15.3S	17	18	47	8
CG15.4S	18	19	50	9
CG25.1S	19	20	45	9
CG25.2S	20	21	48	10
CG25.3S	21	22	50	10
CG25.4S	22	23	52	11
CG25.5S	23	25	55	11
CG50.1S	21	23	55	10
CG50.2S	22	24	58	11
CG50.3S	24	26	62	12
CG50.4S	25	27	65	12
CG50.5S	27	29	70	13

NOTICE

Dimensions shown are for cast iron sectional boilers with uptakes between sections. For minimum dimensions of other furnace types consult R.W. Beckett Corporation.

Assemble Gas Train

- The gas train is normally shipped as components and must be assembled and installed at the site.
- The gas train is used for both natural gas and propane; for converting burner, see Propane Conversion instructions on page 18.
- Verify that the gas train components are not damaged and all piping and fittings are clean inside and out.

See ***Figure 9*** through ***Figure 11*** for typical component layout.

Vent lines

Install vent lines to any gas valve component that requires atmospheric air pressure to balance a diaphragm. Vent lines must be run to the outdoors, with the termination point away from fresh air intakes and windows. The terminal opening must be fitted with a wire mesh screen to block insects and other contaminants from entering the vent and must be mounted in such a position that water, ice, dirt, or any other foreign matter cannot infiltrate and block the vent piping. Make sure the final assembly is anchored securely.

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard.

Do not use Teflon tape on gas piping. Damage to gas valve cutoff seals and valve bodies could cause gas leaks.

- 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.

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard.

The orientation of the gas valves may have an effect on operation and safety. Gas valves shall be mounted in accordance with their manufacturer's instructions.

Never disassemble gas valve. Always install the gas valve with the gas flow in the same direction as the arrow. These actions may cause gas valve to leak.

Figure 9 — UL Gas Train: Lo/Hi/Off or Lo/Hi/Lo, CG15 & CG25 (1 million to 2.5 million BTU)

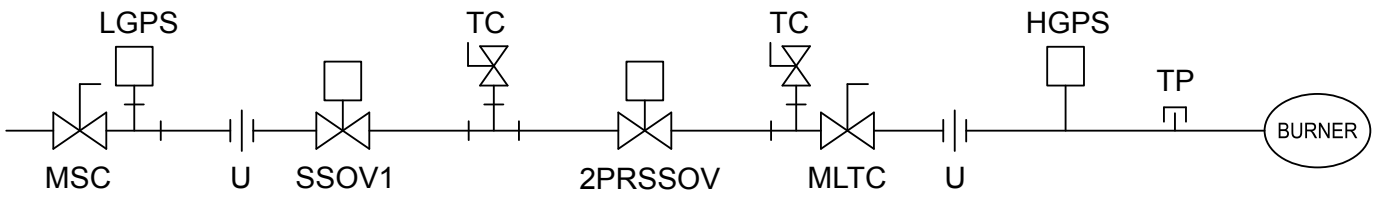


Figure 10 — UL Gas Train: Lo/Hi/Off or Lo/Hi/Lo (1 million to 5 million BTU)

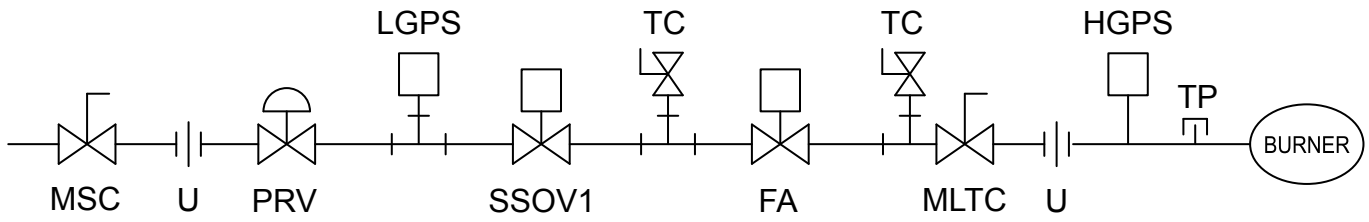
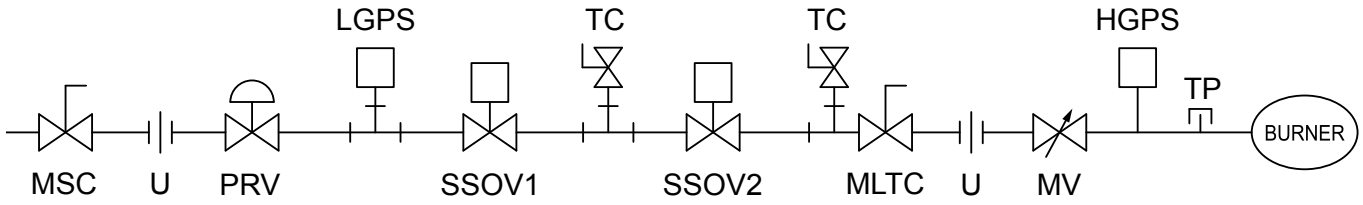


Figure 11 — UL Gas Train On/Off Full Modulation (1 million to 5 million BTU)



ABBREV	ITEM DESCRIPTION
FA	HIGH/LOW FLUID ACTUATING VALVE
HGPS	HIGH GAS PRESSURE SWITCH
LGPS	LOW GAS PRESSURE SWITCH
MSC	MAIN SHUTOFF COCK
MLTC	MAIN LEAK TEST COCK
MV	MODULATION VALVE
SSOV1	SAFETY SHUTOFF VALVE #1
SSOV2	SAFETY SHUTOFF VALVE #2
TC	TEST COCK
TP	TEST PORT
U	UNION
2PRSSOV	HIGH/LOW PRESSURE REGULATING SAFETY SHUTOFF VALVE

NOTICE

The distance from SSOV1 (as shown in ***Figure 9*** though ***Figure 11***) to the burner manifold must be kept under the length specified in the table below.

NOTICE

Regulator (PRV) must be rated for incoming gas pressure.

NOTICE

When pressure reducing safety shutoff valves are used, the distance from the final shutoff valve (PRSSOV and FA) to the burner manifold must be kept to a minimum for good light-off reliability. R.W. Beckett recommends the following maximum lengths. When two shut-off valves are used, the distance between valves should not exceed the max. length specified below:

Pipe Size	Max. Length
3/4"	12"
1"	12"
1-1/4"	15"
1-1/2"	18"
2"	24"

If a Normally Open Vent Valve (not shown) is used, the distance between the SSOVs must be kept to a minimum using the shortest practical nipples.

Converting the Burner for use with Propane Gas

The Beckett Propane Restrictor Conversion Kit allows for the conversion of CG15, CG25, and CG50 burners for use with propane gas. With the proper installation of the restrictor and attached O-ring, adjustments and settings for propane use will be the same as the adjustments and settings for natural gas use as detailed in the burner manual.

⚠ WARNING

Explosion, Fire, and Carbon Monoxide Hazard.

This conversion kit shall 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 12 — Propane Conversion Major Components

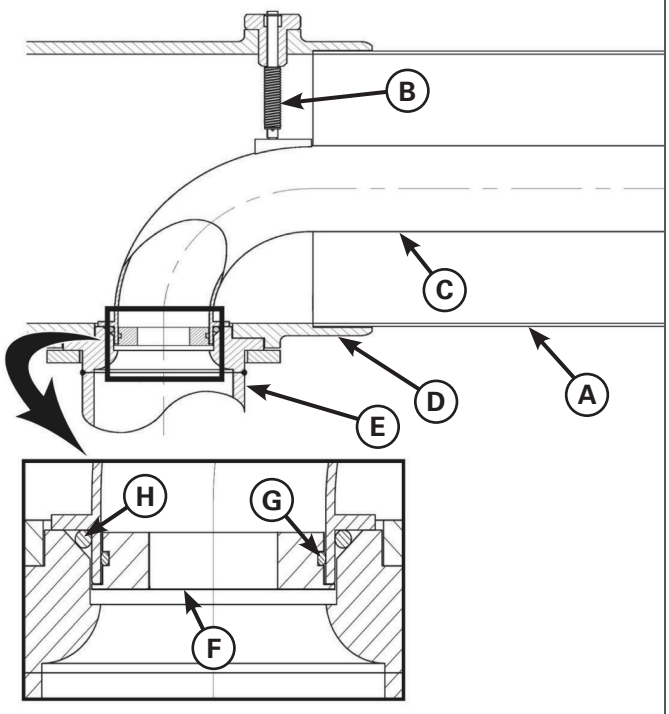
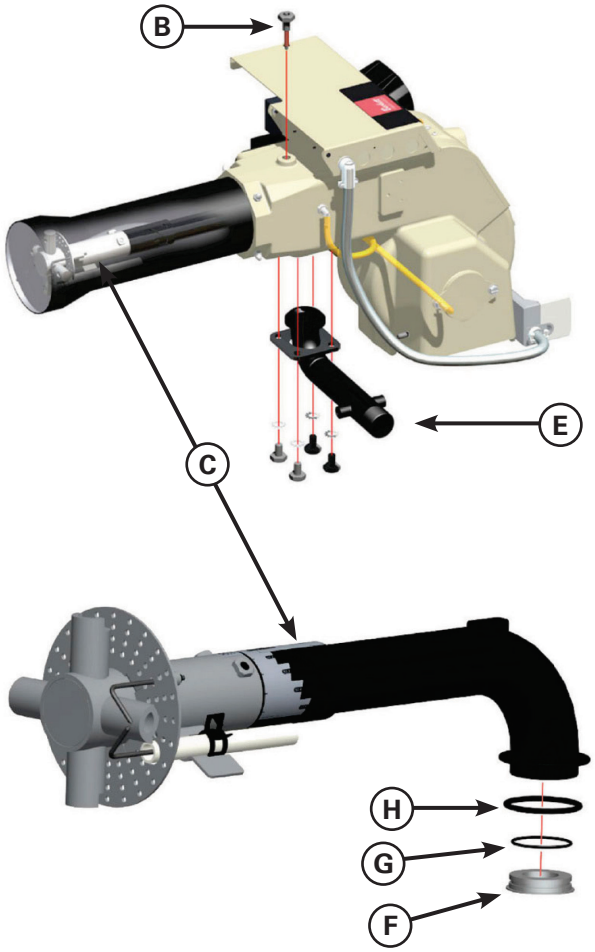


Figure 13 — Component Locations



Major Component Key			
A	Air Tube	E	External Gas Manifold
B	Jacking Screw	F	Propane Restrictor
C	Internal Gas Tube	G	Restrictor O-ring
D	Burner Housing	H	Gas Tube O-ring

Installing the Propane Restrictor

Refer to ***Figure 12*** and ***Figure 13*** when performing the following steps.

1. Remove the jacking screw (**B**) from the housing to free the internal gas tube (**C**).
2. Gently rock the internal gas tube (**C**) to loosen the tube from the burner housing (**D**).
3. Inspect the O-rings and ensure that they are properly lubricated. (A silicon O-ring lubricant is recommended, but automotive chassis or bearing grease is an acceptable substitute.)
4. Referring to ***Figure 13***, place the restrictor (**F**) with pre-attached, pre-lubricated O-ring (**G**) into the internal gas tube (**C**). Use your hand to press the restrictor into the tube. The O-ring will hold the restrictor in place.
5. Ensure that the O-ring (**H**), attached to the outside diameter of internal gas tube, is properly lubricated and seated against the flange on the internal gas tube.
6. Install the internal gas tube (**C**) back into the housing, refer to ***Figure 12***. Fit the end of the tube into the external gas manifold (**E**).
7. Re-install the jacking screw (**B**). (Refer to the above notice for installation details.)
8. Fill out and place the supplied Conversion Data Plate (Part No. 61712) adjacent to the rating plate.
9. Complete and attach the supplied Adjustment Data Tag (Part No. 61711).

NOTICE

With the Propane restrictor installed, as shown in ***Figure 12*** and ***Figure 13***, 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. For a copy of the current burner manual go to http://www.beckettcorp.com/protect/tech.asp. If furtherTechnical assistance is required, call 800-645-2876, Monday thru Friday, 8AM to 5PM EST.

Figure 14 — Gas Gun Installation

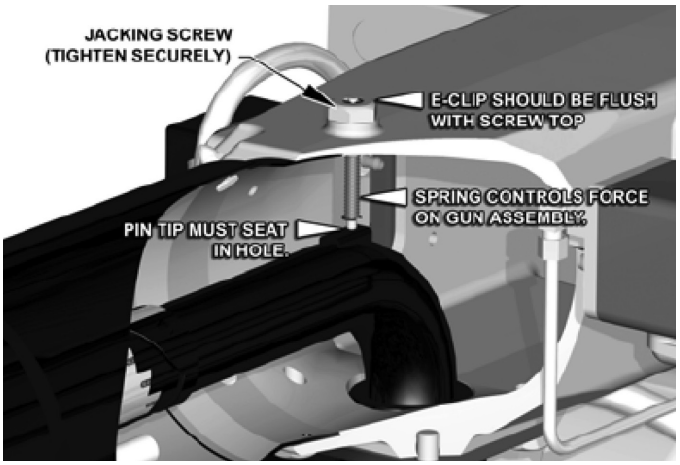


Table 3 — Propane Restrictors Replacement Part Numbers

Burner Model	Restrictor Part Number	Restrictor Inside Diameter	O-Ring Part Number
CG15.1S	3246709U	0.532	3226401U
CG15.2S	3246710U	0.576	3226401U
CG15.3S	3246711U	0.623	3226401U
CG15.4S	3246712U	0.677	3226401U
CG25.1S	3246713U	0.712	3226402U
CG25.2S	3246714U	0.742	3226402U
CG25.3S	3246715U	0.796	3226402U
CG25.4S	3246716U	0.833	3226402U
CG25.5S	3246717U	0.889	3226402U
CG50.1S	3246718U	0.925	3226403U
CG50.2S	3246719U	0.980	3226403U
CG50.3S	3246720U	1.031	3226403U
CG50.4S	3246721U	1.103	3226403U
CG50.5S	3246722U	1.150	3226403U

NOTICE

Use authorized replacement parts only. Restrictors are precision-machined parts. Do not attempt to replicate or modify any parts. Refer to ***Table 3***.

NOTICE

The gun assembly is secured inside the air tube by a spring-loaded jacking screw. It is spring loaded in order to control the force it can impose on the gun assembly. When installing the jacking screw look inside the air tube to verify that the pointed tip of the jacking screw pin is seated into the small slot on the locating pad on top of the gun. There is also an external verification of correct assembly: when the screw is fully tightened, the e-clip on the top of the center pin should come flush with the top of the screw. Refer to ***Figure 14***.

Wire the Burner

Wire the burner per National Electric Code ANSI/ NFPA 70 (Canada CSA C22.1) and all applicable codes and requirements. High and Low gas pressure switches must be installed and wired in accordance with manufacturer's instructions. 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

Wiring diagrams included with literature package.

⚠ WARNING

Explosion, Fire, Scald, and Asphyxiation Hazard

All heating appliances must have HIGH LIMIT protection to interrupt electrical power and shutdown the burner if operating or safety controls fail and cause a runaway condition.

- Follow the appliance manufacturer's wiring diagrams and note all required safety controls.
- Typical safety controls include high temperature or pressure limits, low water cutoffs, pressure relief valves and blocked flue sensing switches.
- Do not tamper with, or bypass, safety controls.Verify all limit and safety controls are installed and functioning correctly, as specified by the manufacturer, applicable safety standards, codes and all authorities having jurisdiction.
- 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.

⚠ 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.

NOTICE

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

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.

- Line voltage neutral shall not be used as a substitute for ground.
- Disconnect electrical power before installing or servicing the burner.
- Provide ground wiring to the burner, metal control enclosures and accessories. A good ground is required to maintain a good flame sensing.
- Use a ground fault interrupt if grounding of the burner can be compromised.

⚠ WARNING

Fire or Explosion Hazard

Can cause severe injury, death, or property damage.

- The control can malfunction if it gets wet, leading to accumulation of gas.
- Never install where water can flood, drip or condense on the control.
- Never use a control that has been wet - replace it.

⚠ WARNING

Explosion, Fire and Asphyxiation Hazard

Do not tamper with, or bypass, safety controls. 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.

⚠ WARNING

Fire or Explosion Hazard

Can cause severe injury, death, or property damage.

When replacing a 7800 series control on a Beckett CG gas burner the "JR1" jumper must be clipped for a 4 sec proof of flame time.

NOTICE

Electromagnetic Interference

Operation of this burner in a residential area may cause interference, in which case the user will be required to correct the interference.

Start Up and Operation

RM7897C & RM7840L Flame Safeguard Controls Sequence

1. **Initiate** – The primary control enters the INITIATE sequence when the control is first powered on or power returns after an interruption. The initiate sequence is a ten second delay during which the control verifies line voltage stability.
2. **Standby** – The control enters STANDBY until the limits, operating limit control, burner switch, and all microcomputer-monitored circuits are in the correct state.
3. **Load Demand** – Operating limit control contacts close on drop in temperature (or pressure) and initiates the start sequence.
4. **Prepurge** – The control will signal the PREPURGE sequence when the airflow interlock and all switches are in the correct state. The Prepurge sequence is the amount of time the blower motor runs prior to the ignition start sequence. Timing for the Prepurge sequence is determined by a card mounted inside the control module (typically 30 seconds). For the RM7897C control, Prepurge is conducted with the air damper in the low fire position. For the RM7840 control the air damper opens to the high fire position for the timed prepurge period and returns to the low fire position before releasing the control for ignition.
5. **Trial for Ignition (TFI)** – After the Prepurge sequence has timed out, the ignition and main gas valves will be energized. Because the burner has direct spark ignition for the main flame, the flame must be established and detected by the control within 4 seconds or lockout will occur.
6. **Flame Stabilization** – The burner will operate in low fire for 10 seconds before initiating high fire.
7. **Run** – With a flame established and the control continuing to detect a flame, the burner will operate in the RUN mode until the load demand is satisfied or a limit opens.

    - For High/Low control wiring, if terminals RC1 and RC2 are jumpered, the burner operates in the Low-High-Off mode. The burner starts at Low and goes to High after the flame stabilization period. Flame is extinguished when the load is satisfied or a limit opens, and the burner is sent to post purge.

    - For High/Low control wiring, if a high / low control has been wired between terminals RC1 and RC2 the burner starts at Low and is released to go to High after the flame stabilization period. It can repeatedly cycle between low and high as necessary to meet load demand until the load is satisfied or a limit opens, and the burner is sent to post purge.

    - For modulating control wiring, the burner starts at Low and is released to modulate after the flame stabilization period. It can modulate between low and high as necessary to meet load demand until the load is satisfied or a limit opens, and the burner is sent to post purge.
8. **Load Satisfied** – The fuel valves are closed. After a 15 second post purge, the burner switches to idle until the next call for operation.

NOTICE

This operation sequence is typical and for reference only. The primary control could vary, depending on the customer specification and code requirements. For the specific operating sequence that applies to your installation, consult the appliance manufacturer's directions, wiring instructions, and control manufacturer's literature supplied with your burner.

Burner Start-up Prep

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard

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

⚠ WARNING

Asphyxiation Hazard

It is recommended that you measure the oxygen (O2) early in the test sequence because high levels of carbon monoxide (CO) can be created at very low or very high O2 levels. The typical operating range is between 3%-5% O2.

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

Do not continue with this procedure without the proper test instruments.

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

Complete contractor start up form in back of manual.

Test Instruments

The following calibrated test equipment is required to properly install the appliance. 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.
- Calibrated manometers and pressure 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.

Burner Start/Check 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 for input firing rate. See ***Table 4*** for initial air settings.
3. With the main shutoff cock closed, set the limit or controller to call for heat then apply power to start the burner.
4. Verify Burner Safety Control Function – In order to check the function of each component (i.e.: 7800 Series sequence, airflow proving switch, ignition transformer, gas valves, safety lockout timing, etc.), with the main shutoff cock closed, monitor a complete burner run sequence. Reset the control by pressing and holding the reset button while the control is powered.
5. Verify Flame Sensor Function – If 7800 Series operation sequence and function is correct, turn off power and remove sensor wire from terminal 'F' on control. Turn on power and fuel then initiate Call for Heat. Verify that burner lights off and the gas valve closes. After control locks out, flame shall go off. It may require several cycles to purge the line.
6. Turn power off and reattach sensor wire. Turn power back on and reset the control using reset button. 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.
9. Low gas pressure switch – With the burner firing and a manometer attached to a test port near the low pressure switch, gradually close the main leak test cock to shut off the gas supply. Note the pressure at which the low gas pressure switch opens and shuts the burner off. Manually reset the switch. The low gas pressure switch should be set at half of the normal supply pressure in the line.
10. High gas pressure switch – With the burner firing and a manometer attached to the test port nearest the high pressure switch, gradually increase the gas pressure until the high pressure switch opens and shuts the burner off. Note the pressure and manually reset the switch. The high gas pressure switch should be set at one and one half times the high fire manifold pressure.

Table 4 — Initial Burner Settings for Both Propane & Natural Gas

			Furnace Pressure at High Fire															
			0" W.C.				0.25" W.C.				0.50" W.C.				1.00" W.C.			
High Fire Rate MBH	Low Fire Rate MBH	Burner Model	Low Fire Gas Pressure, inch WC	Low Fire Damper Setting	High Fire Gas Pressure, inch WC	High Fire Damper Setting	Low Fire Gas Pressure, inch WC	Low Fire Damper Setting	High Fire Gas Pressure, inch WC	High Fire Damper Setting	Low Fire Gas Pressure, inch WC	Low Fire Damper Setting	High Fire Gas Pressure, inch WC	High Fire Damper Setting	Low Fire Gas Pressure, inch WC	Low Fire Damper Setting	High Fire Gas Pressure, inch WC	High Fire Damper Setting
CG15																		
800	468	CG15.1S	0.9	9	2.7	25	1.0	9	2.9	26	1.1	9	3.2	27	1.3	10	3.7	31
900	468	CG15.1S	0.9	9	3.4	32	1.0	9	3.7	34	1.1	9	3.9	37	1.2	10	4.4	43
950	548	CG15.2S	0.9	12	2.6	30	0.9	13	2.9	33	1.0	13	3.1	36	1.2	14	3.6	42
1050	548	CG15.2S	0.9	12	3.2	38	0.9	13	3.4	48	1.0	13	3.7	58	1.1	14	4.2	84
1150	641	CG15.3S	0.9	16	2.8	42	0.9	17	3.1	49	1.0	17	3.3	56	1.2	19	3.8	74
1250	641	CG15.3S	0.9	16	3.3	52	0.9	17	3.6	68	1.0	17	3.8	85	-	-	-	-
1300	750	CG15.4S	0.9	20	2.7	51	1.0	21	2.9	66	1.0	22	3.2	80	-	-	-	-
1400	750	CG15.4S	0.9	20	3.1	66	1.0	21	3.3	100	-	-	-	-	-	-	-	-
CG25																		
1350	669	CG25.1S	0.7	17	2.7	38	0.7	17	3.0	38	0.8	17	3.2	39	0.9	18	3.7	41
1450	669	CG25.1S	0.7	17	3.1	41	0.7	17	3.4	41	0.8	17	3.6	42	0.9	18	4.1	41
1550	774	CG25.2S	0.7	20	2.7	41	0.7	20	2.9	42	0.8	21	3.2	43	0.9	23	3.7	46
1700	774	CG25.2S	0.7	20	3.2	48	0.7	20	3.4	49	0.8	21	3.7	51	0.9	23	4.2	56
1800	896	CG25.3S	0.7	23	2.7	54	0.7	23	2.9	55	0.8	24	3.2	56	0.9	26	3.7	60
2000	896	CG25.3S	0.7	23	3.3	66	0.7	23	3.6	68	0.8	24	3.8	70	0.9	26	4.3	78
2100	1037	CG25.4S	0.7	27	2.8	66	0.7	27	3.1	71	0.8	28	3.3	76	0.9	30	3.8	90
2300	1037	CG25.4S	0.7	27	3.4	84	0.7	27	3.6	93	0.8	28	3.9	102	-	-	-	-
2400	1200	CG25.5S	0.6	30	2.5	85	0.7	30	2.8	100	0.8	31	3.0	115	-	-	-	-
2500	1200	CG25.5S	0.6	30	3.0	100	0.7	30	3.2	115	-	-	-	-	-	-	-	-
CG50																		
2000	888	CG50.1S	0.5	7	2.4	20	0.5	7	2.6	20	0.6	7	2.9	21	0.7	8	3.4	23
2200	888	CG50.1S	0.5	7	3.1	22	0.5	7	3.3	23	0.6	7	3.6	24	0.7	8	4.1	26
2400	1044	CG50.2S	0.5	8	2.5	23	0.5	8	2.8	24	0.6	9	3.0	25	0.7	10	3.5	28
2700	1044	CG50.2S	0.5	8	3.2	28	0.5	8	3.5	29	0.6	9	3.7	30	0.6	10	4.2	34
2900	1228	CG50.3S	0.5	9	2.6	27	0.5	9	2.9	28	0.6	10	3.1	29	0.6	11	3.6	33
3200	1228	CG50.3S	0.5	9	3.2	31	0.5	9	3.5	33	0.6	10	3.7	35	0.6	11	4.2	41
3400	1443	CG50.4S	0.5	11	2.7	33	0.5	11	2.9	35	0.6	12	3.2	37	0.7	13	3.7	42
3800	1443	CG50.4S	0.5	11	3.3	44	0.5	11	3.6	46	0.6	12	3.8	48	0.6	13	4.3	54
4000	1700	CG50.5S	0.5	13	2.7	50	0.5	13	3.0	52	0.6	14	3.2	54	0.7	17	3.7	60
4500	1700	CG50.5S	0.5	13	3.5	70	0.5	13	3.7	76	0.6	14	4.0	82	0.6	17	4.5	96
4800	1700	CG50.5S	0.5	13	4.0	98	0.5	13	4.2	115	-	-	-	-	-	-	-	-
Gas pressures are as measured at the manifold test connection.																		

NOTICE: The settings in this chart are for reference only. The actual conditions at the installation may require further adjustment by the fully qualified and experienced start-up technician.

NOTICE: The light-off rate must not be set below the low fire recommendation. Lower rates will lengthen the time it takes for gas to get to the burner head and may cause ignition failures.

Figure 15 — Manifold to Furnace Pressure Drop vs Rate CG15 *

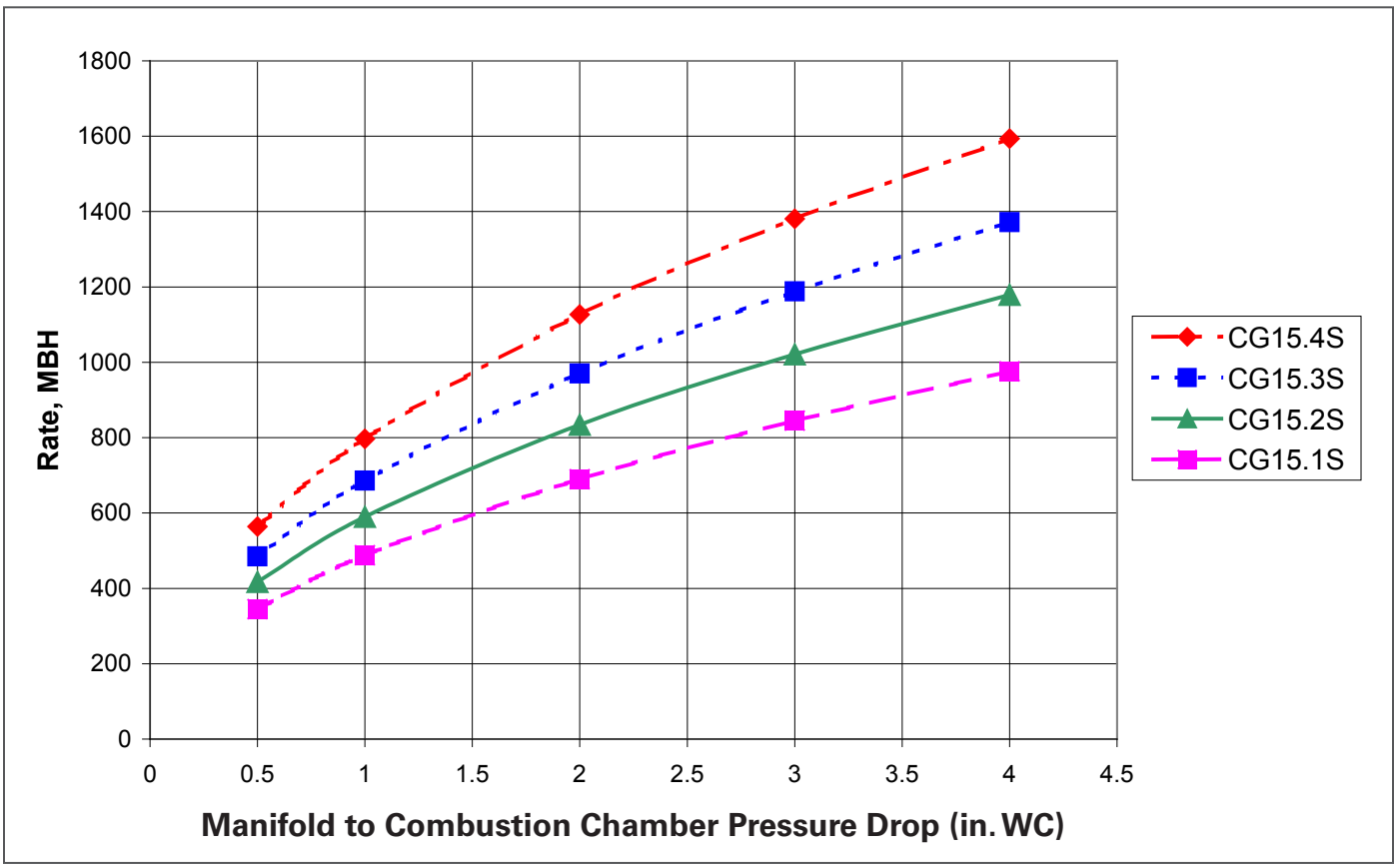
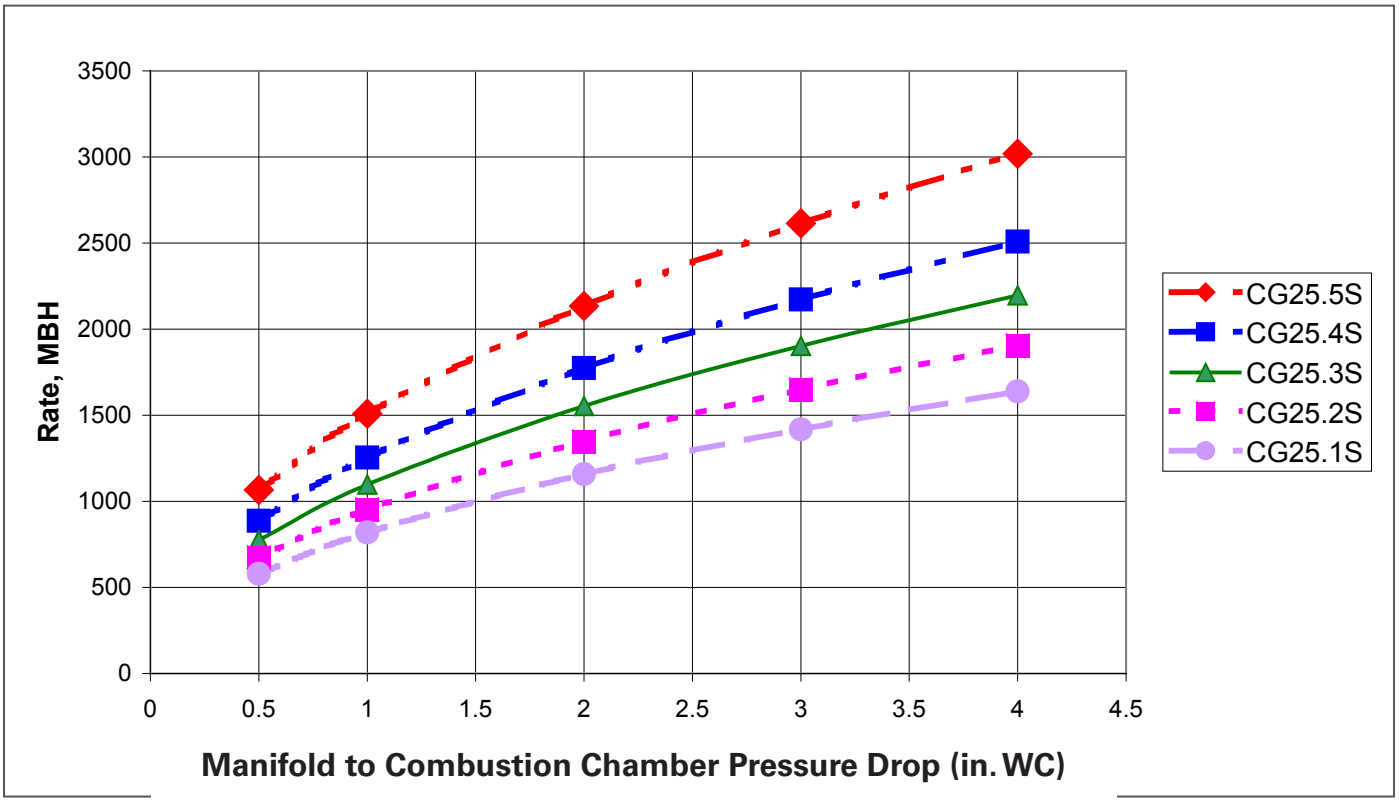
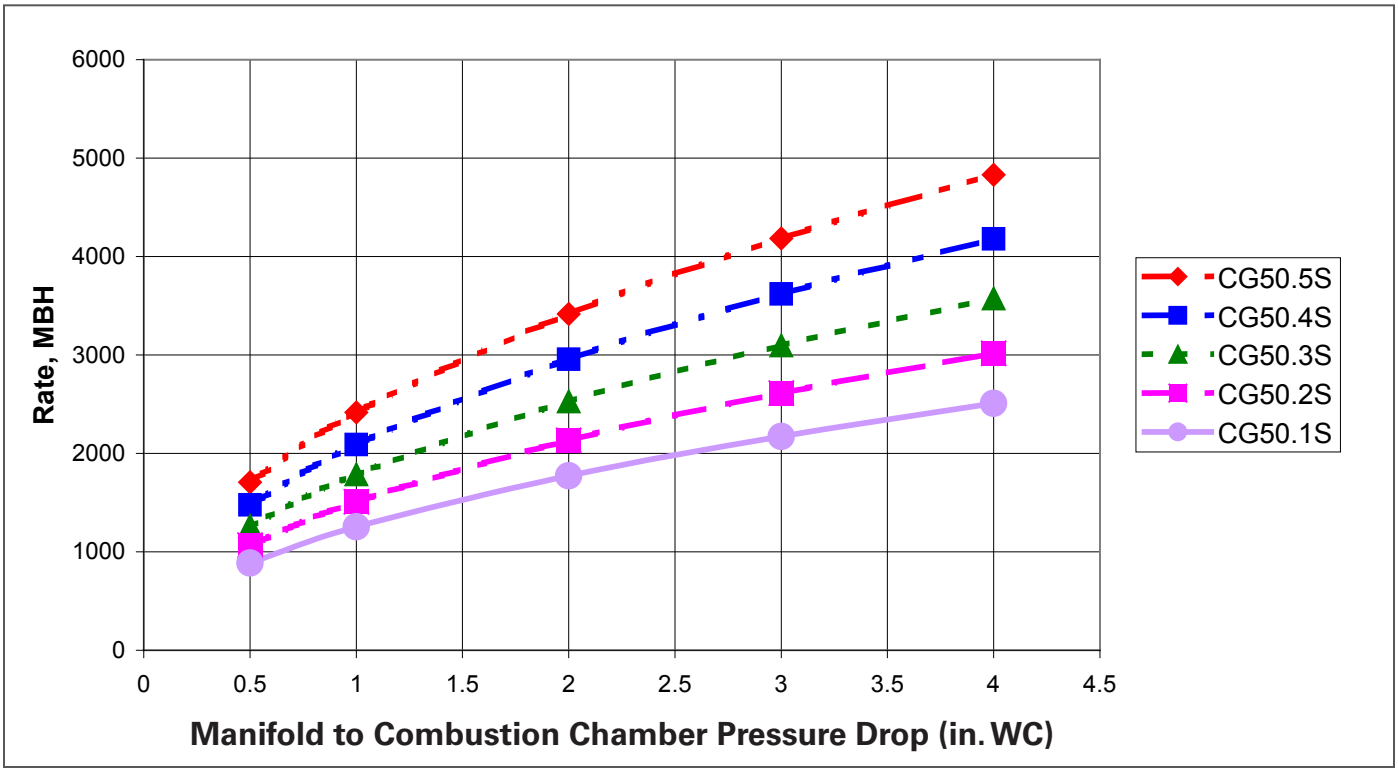


Figure 16 — Manifold to Furnace Pressure Drop vs Rate CG25*



* Charts represent both natural and propane gas.

Figure 17 — Manifold to Furnace Pressure Drop vs Rate CG50*



* Charts represent both natural and propane gas.

Estimating Rate

Manifold to Furnace Pressure information can be used to estimate the burner's firing rate when it is not possible to clock a meter for the rate. To estimate the burner's firing rate:

1. Measure the furnace pressure over fire.
2. Measure the manifold pressure (at the manifold pressure test connection).
3. Subtract the furnace pressure from the manifold pressure.
4. Compare the result to the data in ***Figure 15*** through ***Figure 17*** as appropriate for your burner.

Clocking the Gas Meter

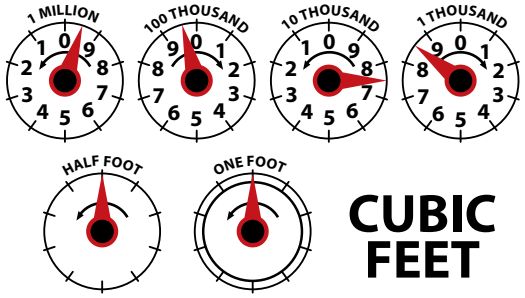
If the burner is firing natural gas it may be possible to verify the firing rate by "clocking" the gas meter:

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. (***Figure 18***)
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:

   Firing rate BTU/Hr. = Heating value (BTU/Ft³) x 3,600 ÷ 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.

Figure 18 — Typical Gas Meter Layout



Combustion Adjustment Procedure

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 appliance 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.

Combustion Adjustment Procedure

- **Oxygen** – It is recommended that you measure the oxygen (O2) early in the test sequence because high levels of carbon monoxide can be created at very low or even very high O2 levels. The typical operating range is between 3% – 5%.
- **Carbon monoxide (CO)** – An operating range of 0 to 50 PPM is recommended for the gas 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.

1. Initiate a call for heat.
2. Adjust the burner

   Set the damper motor Blue, Red, and Orange dials to correct settings (see OEM Spec Guide). Start burner. Watch to see damper motor move to Low Fire setting. If it doesn't move, turn burner off. Open air damper blade and then restart the burner. Once burner is operating, allow it to warm up the boiler before switching it to High Fire. Please meet the following results (see ***Figure 21*** and ***Figure 19***.
3. Adjust the draft or breech pressure to the appliance manufacturer's recommended level after flame has stabilized.
4. Measure the carbon monoxide level and adjust air settings, if necessary, to temporarily raise CO to about 50 PPM for a test point.
5. Measure the O2 or CO2 at the 50PPM CO level.
6. Open the air adjustment until the O2 level is increased by at least 1% or to 3% O2 (whichever is higher). This should reduce the CO level and provide a margin of reserve air to accommodate variable conditions.

NOTICE

For gas valve adjustment instructions, refer to the manufacturer's literature.

7. Sample the CO level again. It should be in the 0 to 20 PPM range (must be below 50 ppm)
8. Check the draft to ensure it still meets specifications. If a major change in draft is required, repeat the above steps.
9. Check draft regulator for spillage. Confirm the condition of the chimney if spillage is present.
10. Verify stack temperature meets appliance manufacturer's recommendations.
11. Perform any final adjustments and lock the air settings securely. Run the burner through several cycles to verify prompt ignition and stable burner operation.

Damper Terminals Explained

Figure 19 — Damper Actuator Terminals

Terminal	Explanation
N	Neutral
4	Not Used for Beckett's low/high burners
3	Not Used for Beckett's low/high burners
2	120v When the burner is in Low Fire
1	120v When the burner is in High Fire
5	120v When the Valve circuit from the control gets energized (After Pre Purge)
7	Not Used for Beckett's low/high burners
6	120v When the burner is in High Fire. This powers the high rate valve. Orange cam must be in between the Blue and Red cams. If there is no Voltage here in High Fire, make sure the Orange cam is between the Blue and Red Cams.

Adjusting the Damper

Low Fire (Blue):

Adjust the blue cam accordingly. Push disengaging pin (see figure 6) and manually move the damper plate to a number higher than your new set point. When the burner starts up, it will drive down to your new number immediately. This will go to your new set point. Verify your new position by looking at your actual position indicator (See ***Figure 21***).

High Fire (Red):

Adjust the red cam accordingly. The burner will go to your new set point after it lights, then transitions to High Fire. Verify your new position by looking at your actual position indicator (See ***Figure 21***).

Transition (Orange)

The orange cam should be set at a set point between the blue and red cams. Ex: Blue = 20, Red = 40, Orange = 30. This cam energizes Terminal #6 which energizes the Hi Fire Fuel Circuit. See ***Figure 21***.

⚠ WARNING

Explosion and CO_2 Hazard

- The orange cam must never be set or left below the blue cam.

Check Operation & Safety Controls

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.

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.
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.

Figure 20 — Beckett Damper Actuator Familiarization

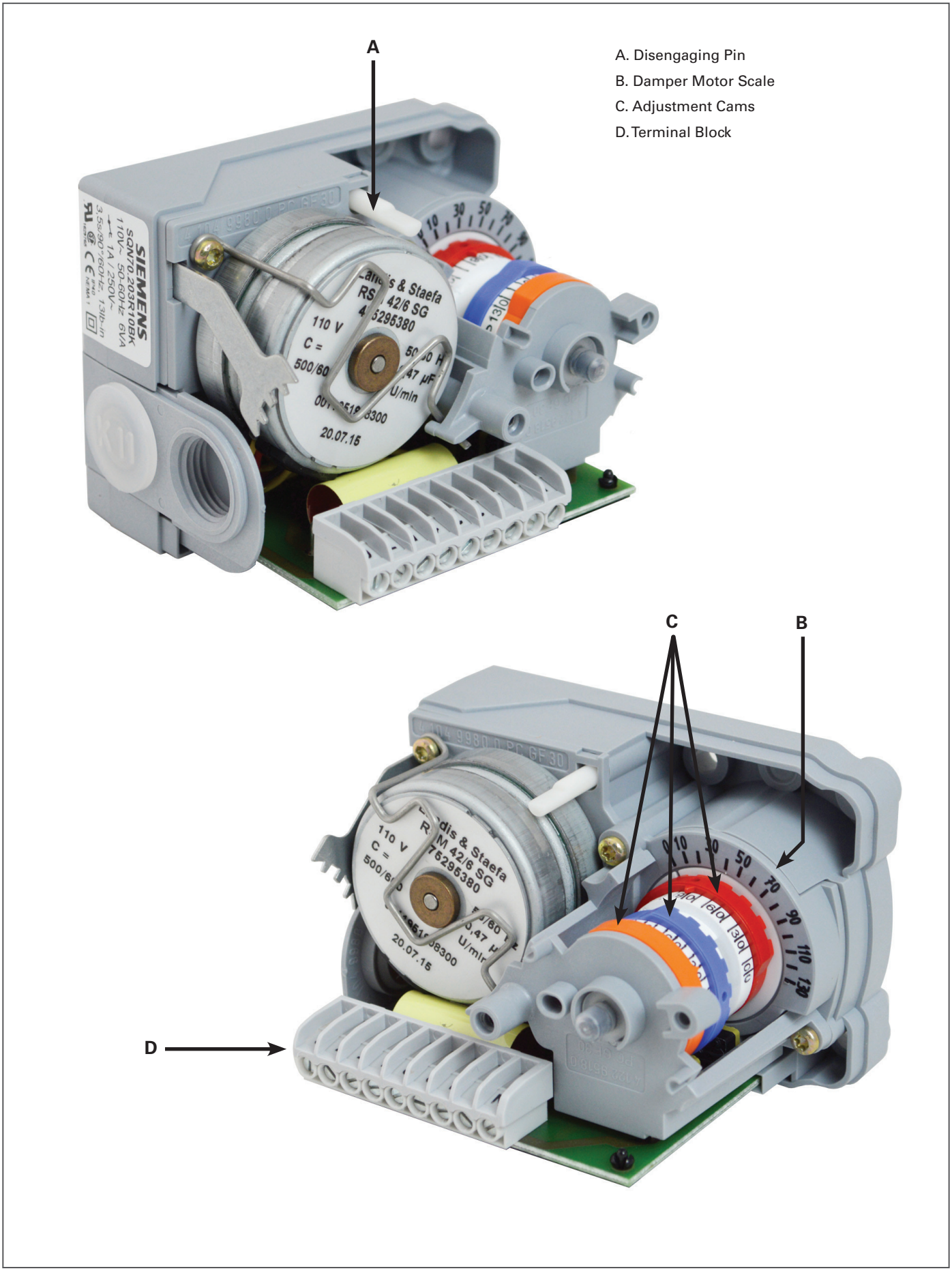
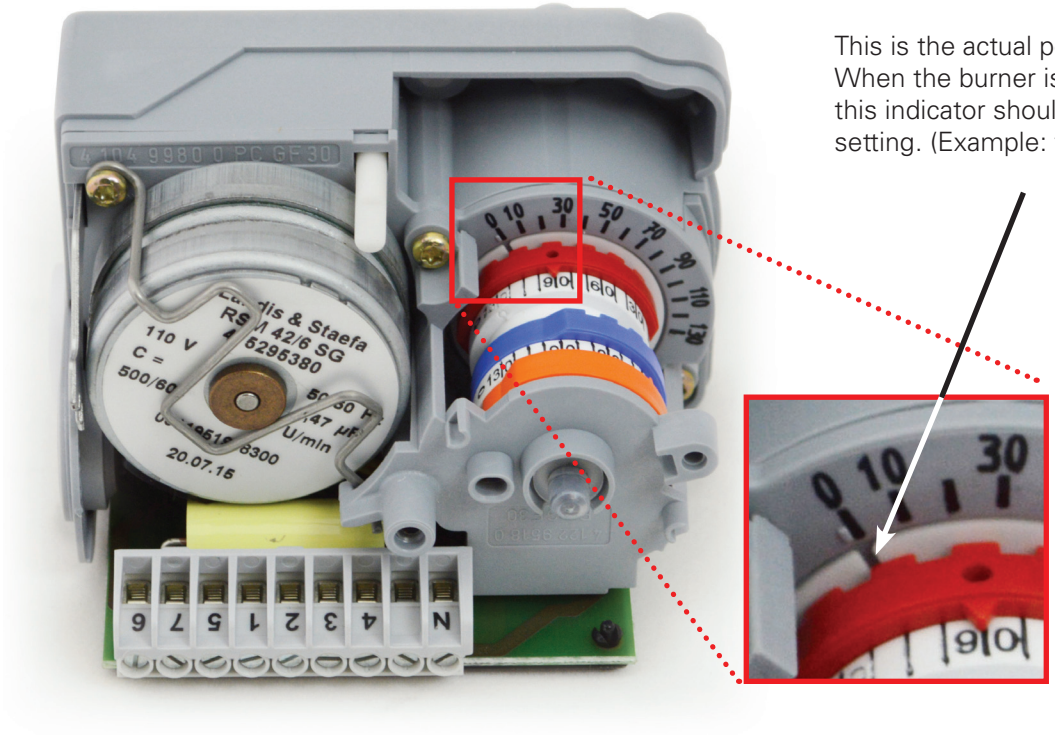
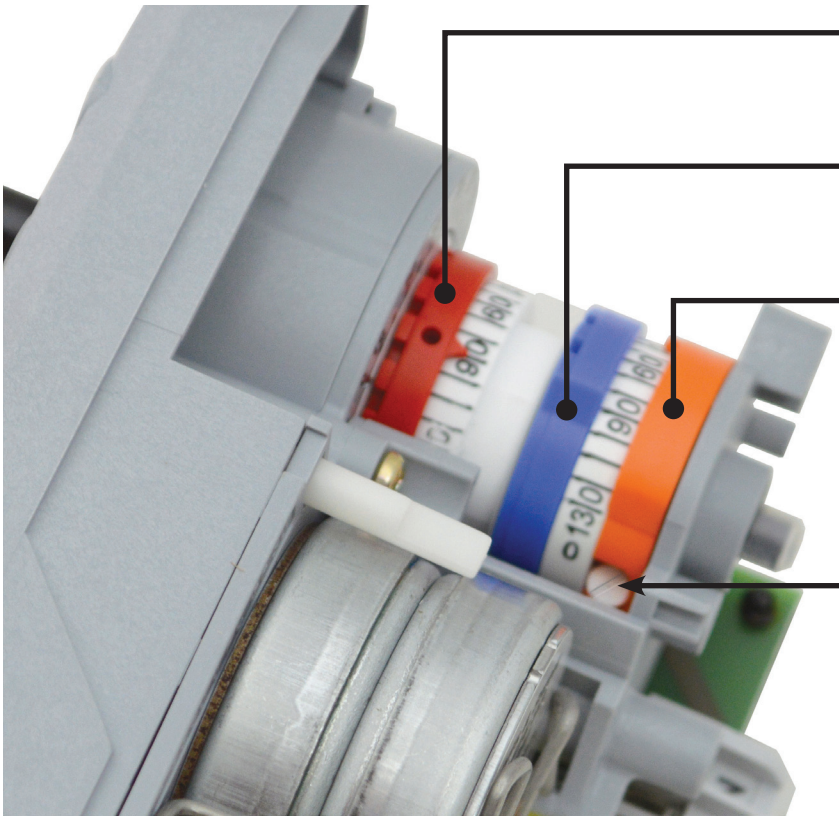


Figure 21 — Damper Actuator Cams & Scale

- The cam numbers are degree of angle of the burner's air damper plate (0 to 130).
- 0 is completely closed and 105 is full air. 106 to 130 is actually less air (the damper begins to revert to a more closed position).





Full Modulation

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard

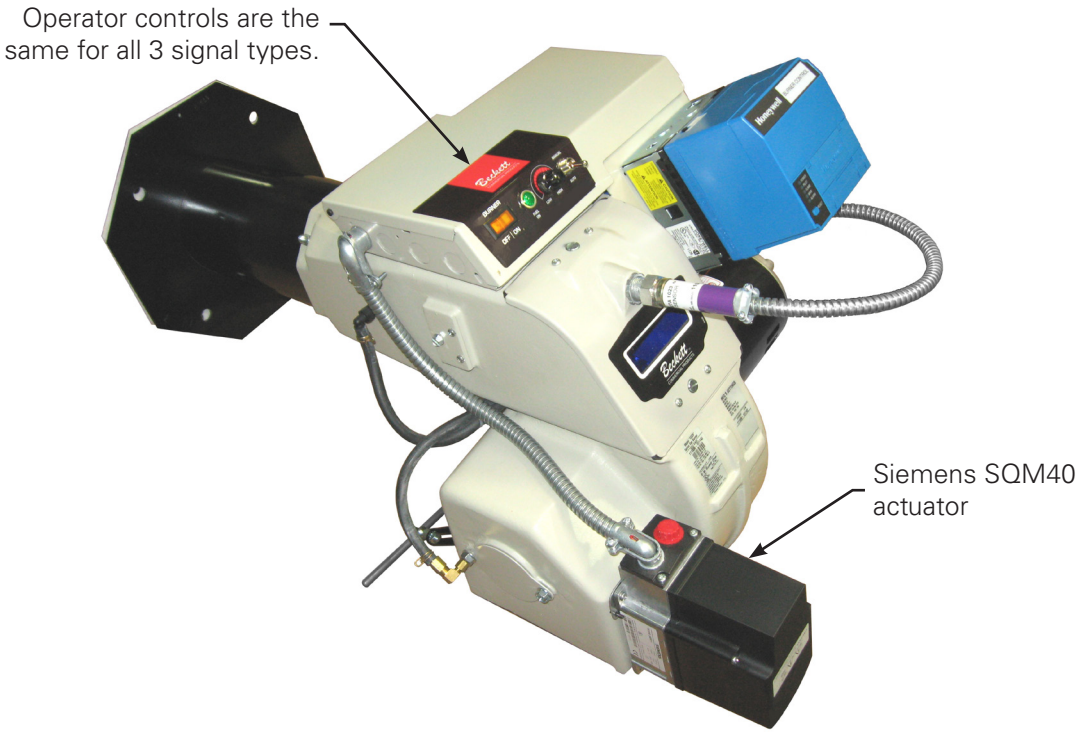
Professional Installation and Service Required

Incorrect installation and mishandling of startup could lead to equipment malfunction and result in asphyxiation, explosion, or fire.

- This Gas Burner Supplement shall be used in conjunction with the Beckett 6104 BCG50 Installation Manual.
- This burner shall only be installed and prepared for startup by a qualified service technician who is trained and experienced in commercial gas burner system installation and operation.
- Carefully follow the wiring diagrams, control instruction sheets, flame safeguard sequence of operation, test procedures and all appliance manufacturer's directions that pertain to this installation.
- Perform all wiring in accordance with the National Electric Code ANSI/NFPA 70, Canada CSA C22.1 and all authorities having jurisdiction.
- If any of these items are not clear or are unavailable, call Beckett at 1-800-645-2876 for assistance.

The CG15, CG25, and CG50 gas burners are available in three optional configurations that can be controlled by the three most popular modulation control signals: 135 Ohm, 4 – 20 mA, or 2 – 10 VDC. All three of these options use the Siemens SQM40 actuator for damper control. The SQM40 accepts any of those signals, so the difference between burners using any of those control signals is internal wiring of the burner, the control signal connections you make, and trim adjustments. When operating with any of these signals, the burner's firing rate responds in a direct proportional control manner, making them well suited for use with lead/lag or building automation system controls. The standard burner configuration for these modulation systems is with the junction box (shown in ***Figure 22***), but a panel enclosure is optionally available.II.

Figure 22 — Burner with Siemens SQM40 Actuator



Wiring for Full Modulation

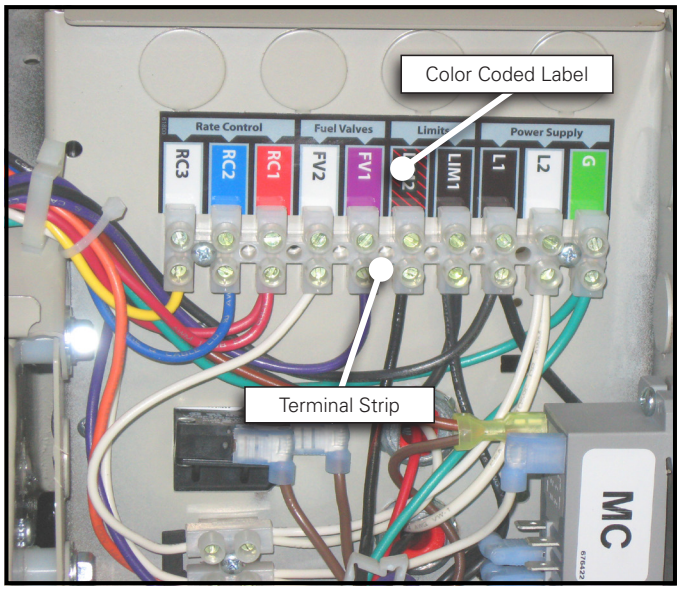
⚠ WARNING

Electric Shock Hazard

Turn off all electric power to the burner before servicing.

If power is required for adjustments, use extreme care while working near live conductors.

Figure 23 — Terminal Strip Wiring



For standard construction burners the junction box contains a color coded terminal strip showing connections for control system power (and blower motor power for 120 VAC blower motors), limit string connections, gas valve connections, and rate control connections. The terminal strip markings match the wiring diagram specific to your burner. All of your control connections are to be made to this terminal strip. For burners with blower motors operating at a voltage greater than 120 VAC the junction box will have a separate motor contactor section with its own power connections. Refer to the wiring diagram supplied with your burner for connection details.

Damper Motor Components

The damper motor positions for high fire and for low fire are set by adjustment of individual cams in a cam stack (Shown in ***Figure 24***). Only three of the cams in this motor are active, the red, black and green cams.

- The red cam limits the maximum position of the motor to the burner's high fire setting.
- The black cam limits the minimum position of the motor to the burner's low fire setting.
- The green cam could be used to set a third position, for example an off position for the damper. We do not use the green cam, but we recommend that it be set to the same position as the black cam.

Figure 24 — Damper Cam Adjustment

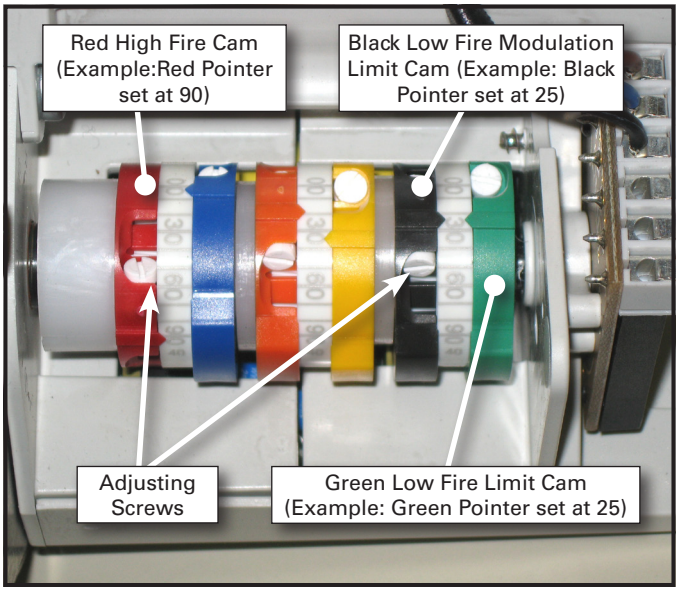
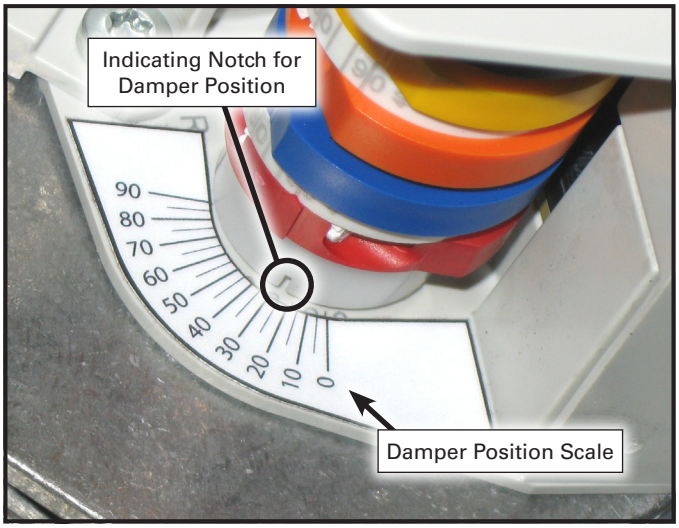


Figure 25 — Damper Cam Position Scale

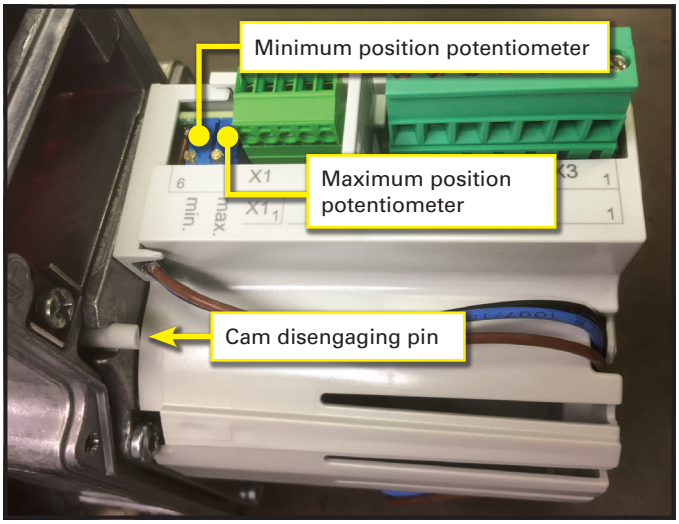


A notch in the white spacer at the base of the cam stack indicates the position of the damper by its alignment with the degree marker on the damper position label (Shown in ***Figure 24***). To set a cam, turn that cam's adjustment screw until the pointer on the cam aligns with the desired setting on the white spacer between cams. The burner's damper can be manually rotated by disengaging the motor's gear train from the cam stack (Shown in ***Figure 25***).

1. Press in and towards the center of the motor on the cam disengaging pin. It will allow the damper to move while the cam remains stationary.
2. After adjusting the cams for high and low fire settings it is important to set the damper position between the adjusted limits. If the damper position is left outside the adjusted limits the actuator may not be engaged until the end of the first operating cycle.
3. **WARNING!** Re-engage the pin by pushing it toward the side of the motor and allowing it to pop out to its original position, otherwise the motor will rotate without moving the damper.

If the proportional controller signal does not fully open or close the damper to its high or low fire setting during modulation, or if modulation is not linear across

Figure 26 — Damper Cam Adjustment



the control range, it may be necessary to adjust the maximum or minimum position potentiometer in the damper motor (Shown in ***Figure 26***). See the SQM40 manual in the burner's literature package for detailed instructions. Note: Both potentiometers require 30 turns to span their range. Don't give up too soon.

Modulation Adjustment Instructions

Modulating burners are provided with manual controls that allow set-up adjustment of the burner (***Figure 27*** and ***Figure 28***).

When the Manual / Auto switch is in the Manual position, control of the damper position is set by the firing rate potentiometer. When the Manual / Auto switch is in the Auto position the firing rate potentiometer has no effect on damper position, and the damper is controlled by the flame safeguard during start-up and shut-down and by the boiler's modulating control during the run interval.

For 135 OHM controls only, If the Manual/Auto switch is in the Manual position and the boiler pressure (or temperature) approaches the control limit set on the boiler's modulation control (or lead / lag or building automation system), that control will over-ride the manual control and drive damper position back to low. This feature can be used to limit the firing rate when warming up a cold boiler.

Figure 27 — Firing Rate Control on Wiring Box

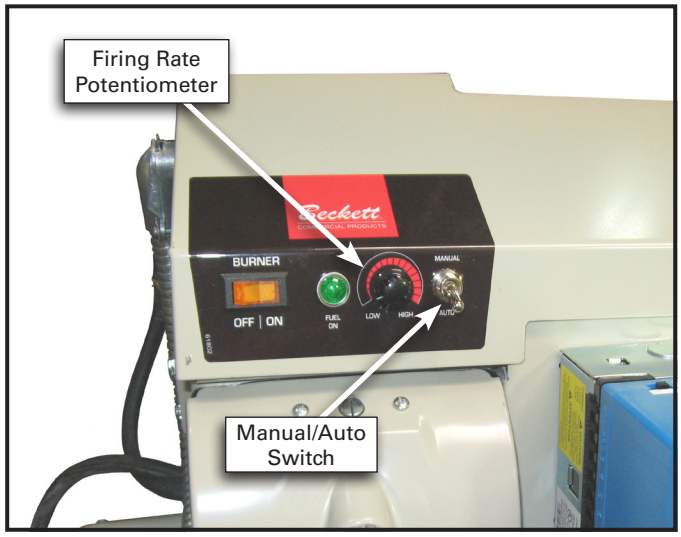


Figure 28 — Firing Rate Control on 12 x 16 Panel

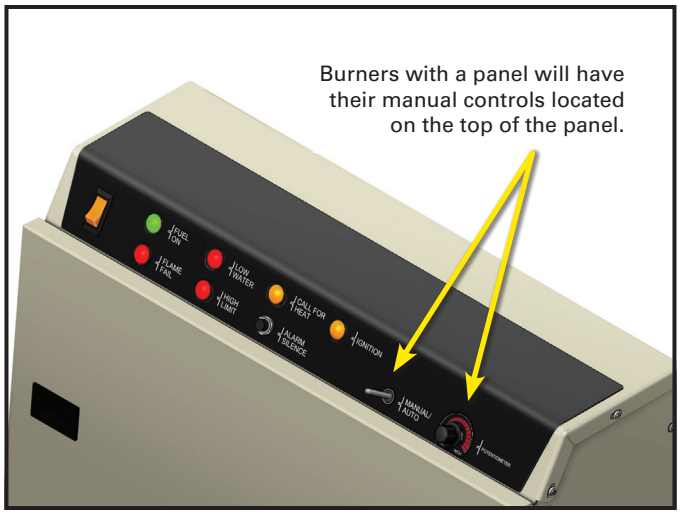
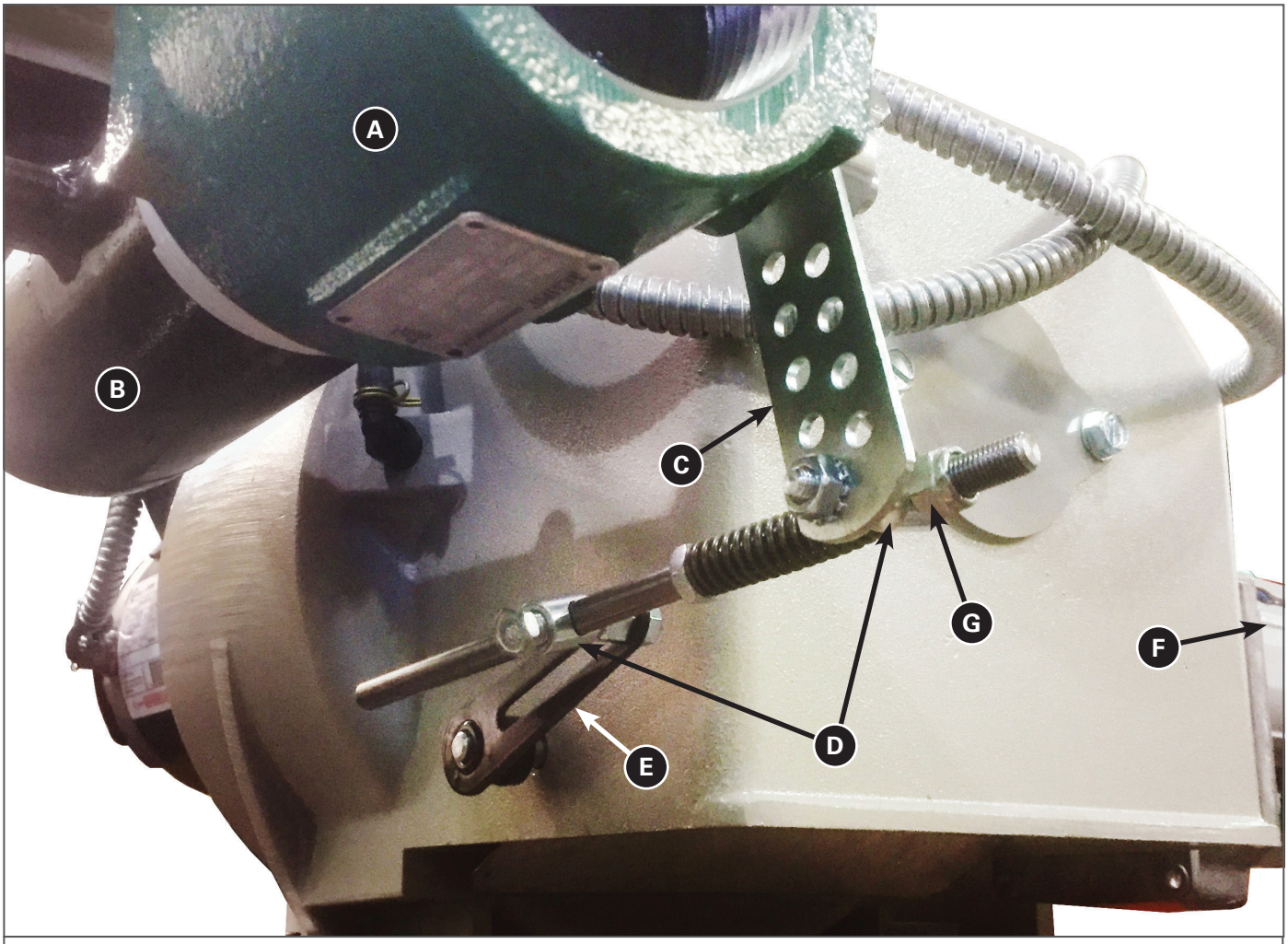


Figure 29 — Modulation Linkage



A. Butterfly Valve	D. Swivels	G. Low Fire Gas Pressure Adjustment Nut
B. Gas Manifold	E. Damper Crank Arm	
C. Valve Arm	F. Siemens SQM40 Damper Motor	

To Set Firing Rate:

Hi Fire: Switch to Manual Mode and turn rate potentiometer to high, once linkage has travelled to fully open use gas regulator to set manifold gas pressure (See OEM Spec Guide for setting).

Lo Fire: Turn rate potentiometer to low, once linkage has fully travelled use the Low Fire Adjustment nut on linkage to set the manifold gas pressure (should be between 0.75" W.C. and 1.5" W.C.)

Maintenance and Service

For the Operator

⚠ WARNING

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.

Table 5 — Periodic Inspection Sheet

Test/Inspection	Frequency	Comments
Inspect area surrounding heating plant	Daily	Keep area clean and free of clutter
Inspect gas supply system for leaks	Daily	Use visual and electronic leak detection
Inspect appliance & piping for water leaks	Daily	Keep burner and controls dry at all times
Inspect gauges, indicators, monitors	Daily	Note condition. Replace defective parts
Check temperature and pressure levels	Daily	Compare to manufacturer's specifications
Make visual inspection of flame	Daily	Look for changes in shape, size, and color.
Monitor burner start-up	Daily	Verify prompt ignition and flame stability.
Monitor stack temperature	Daily	Compare to start-up and trend level.
Test low water cutoff and alarm	Daily	Follow control manufacturer's instructions & procedures in ASME Boiler & pressure vessel Code, Section VI - Recommended rules for care and operation of heating boilers.
Calculate fuel gas input firing rate	Weekly	Compare to appliance manufacturer's Specifications
Check flame safeguard sequence of operation.	Weekly	Follow control manufacturer's instructions
Flame failure response & lockout timing.	Weekly	Follow control manufacturer's instructions
Flame sensor signal level (if meter is hard-wired)	Weekly	Compare to control manufacturer's specifications
Main fuel gas valves	Weekly	Open high limit and verify cutoff operation
Inspect exhaust vent system for blockage	Weekly	Remove any restrictions
Inpect combustion air supply	Monthly	Remove any restrictions
Check high and low gas pressure interlocks	Monthly	Follow control manufacturer's instructions
Check all safety valves	As required	Follow control manufacturer's instructions & procedures in ASME Boiler & Pressure Vessel Code, Section VI - Recommended Rules for Care and Operation of Heating Boilers.

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard

Annual Professional Service Required. Tampering with or making incorrect adjustments could lead to equipment malfunction.

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.

NOTICE

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.

⚠ WARNING

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.

⚠ WARNING

Fire Hazard

Removing the igniter from the factory-installed baseplate could cause serious death or injury.

Do not remove igniter from factory installed baseplate.

NOTICE

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

Required Annual Maintenance

⚠ WARNING

Explosion, Fire, and Asphyxiation Hazard

Inspect Heating System Regularly. Lack of regular inspections and inadequate maintenance could lead to equipment malfunction.

(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

- ☑ Inspect and clean all dirt accumulation from the gas train, burner exterior, burner air band/shutter, and surrounding area.
- ☑ Remove the blower motor and clean any accumulated matter from the blower wheel and motor end bell.
- ☑ Check wheel for damage and the hub setscrew for tightness.
- ☑ Clean the inside surfaces of the burner housing scroll and especially the air intake area and airflow proving switch suction tube.
- ☑ Clear any debris from the air vents on the motor body.
- ☑ Clean the ignition transformer, baseplate, and terminal bushing. Inspect the ignition lead for signs of deterioration and loose terminals.

☑ Remove the gas gun assembly and clean the entire unit, paying special attention to the air diffuser.

☑ Inspect the ignition electrode for any damage. Clean all surfaces, set the proper electrode gap, and make sure it is securely fastened. See ***Figure 30***.

☑ Clean the inside of the air tube and inspect the combustion end for any deterioration. Check the recess dimension from refractory.

☑ Inspect gas tube O-ring condition and replace if damaged (see replacement parts in back of manual). 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.)

☑ Inspect the condition of the appliance mounting plate and burner mounting flange gaskets and replace any damaged materials.

☑ Inspect all burner control wiring and the burner control for damaged insulation and loose terminals/ connections.

☑ Verify that the source voltage to the burner and control panel is within 10% of the burner rating as listed on the burner nameplate.

- **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.

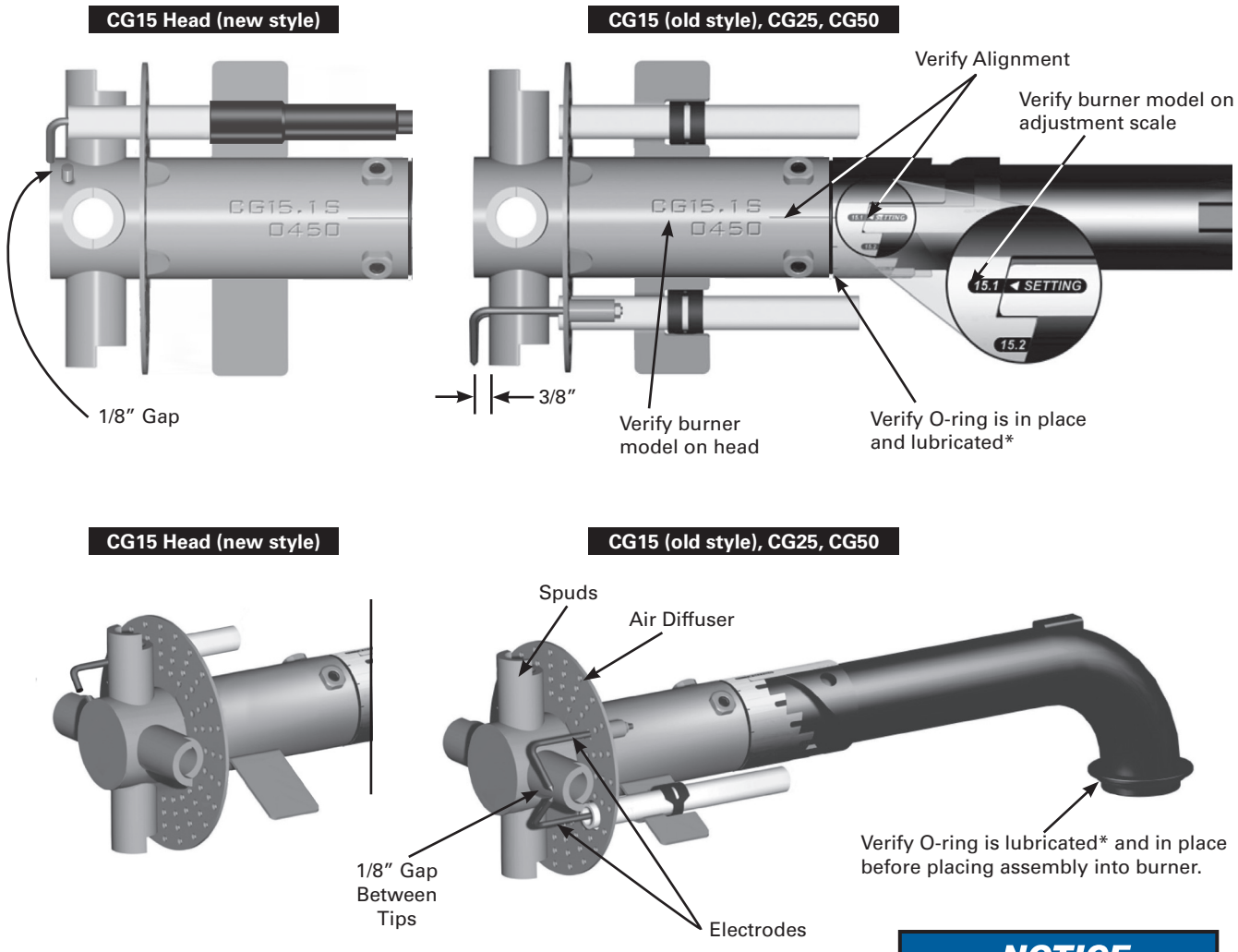
- **Adjust the burner for proper combustion**:
  1. Run the burner and perform a complete combustion test using the proper instruments. If necessary refer to section titled "Burner Start/ Check Procedure" on page 22. Record the results for reference.
  2. Visually inspect the flame. Look for changes 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.

- **Primary Control**:

  Follow the manufacturer's instructions in the Primary Control manual. Verify that the control is functioning to specifications.

- **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.

Figure 30 — Gas Gun Assembly



NOTICE

Verify the gas spuds are free of debris.

* Automotive chassis or bearing grease is satisfactory o-ring lubricant.
- Disassembly of gas gun in not required for cleaning

Burner Head Adjustment - There is an optimum gas orifice size and burner head setting for each firing rate of the burner. The gas orifice size sets the gas flow velocity; the head setting establishes the airflow velocity. When those velocities are properly matched the burner provides its best performance and stability.

The gas orifice size is built into the burner head. You can verify the correct selection by looking for the burner model number stamped on the top centerline of the stainless steel tube that forms the base of the burner head. It should match the model number on the Beckett burner data label on the blower housing.

The head setting is established by a notched sleeve on the gas tube that can be rotated to positions on a scale marked by the burner's model number. The scale should normally be set to the model number on the Beckett burner data label. (If specific application requirements dictate an alternate head setting it will be noted by a label on the gun assembly.)

For normal service requirements it is not necessary to disassemble the head from the gas tube. If you disassemble the gas gun, make sure that when you re-assemble it:

1. The adjustment scale is set to the correct position as indicated by the burner model number or Gun Label.
2. The alignment marks on the head, scale and stop are in alignment.
3. The O-ring between the head and the adjustment scale is in place, is lubricated with grease, and is compressed between the head and scale as the setscrews that retain the head are tightened.

Troubleshooting

Reading the Control

- Without Digital Display.

  — The most common failure is flame signal absent; represented by two fast then two slow blinks, see ***Table 6*** for details. Refer to the control literature for all combination.

Table 6 — Two fast and two slow blinks (From the RM7895/RM7897 Manuals)

Fault Code	System Failure	Recommended Troubleshooting
Code 2-2 *Flame Signal Absent*	No-flame time present at the end of the Pilot Flame Establishing Period; lost during the Main Flame Establishing Period or during RUN.	1. Measure the flame signal. If one exists, verify that it meets specifications. 2. Make sure that the flame amplifier and flame detector are compatible. 3. Inspect the main fuel valve(s) and valve connector(s). 4. Verify that the fuel pressure is sufficient to supply fuel to the combustion chamber. Inspect the connections to the fuel pressure switches. Make sure they are functioning properly. 5. Inspect the Airflow Switch and make sure that it is functioning properly. 6. Check the flame detector sighting position; reset and recycle. Measure the flame signal strength. Verify that it meets specifications. If not, refer to the flame detector and/or flame amplifier check-out procedures in the installation instructions. 7. Replace the flame amplifier and/or the flame detector, if necessary. 8. If the fault persists, replace the relay module.

  — Code 2-2 could represent either fault (28 or 19) on a control with a digital display.

- With Digital Display

  — Fault Codes: If the control has a display it will give a more detailed error code, the two most common fault codes are shown in ***Table 6*** or ***Table 7***. Refer to the control literature for all combinations.

Table 7 — Fault Code 28 (From the 7800 SERIES Relay Module Fault Codes Literature)

Fault Code	System Failure	Recommended Troubleshooting
Fault 28 *Pilot Flame Fail*	Pilot Flame failure.	1. Check pilot valve wiring and operation. Correct any errors. 2. Check fuel supply. 3. Check pilot pressure and repeat pilot turndown test. 4. Check ignition transformer electrode, flame detector, flame detector sighting and flame amplifier. 5. If steps 1 through 4 are correct and the fault persists, replace the relay module.

Table 8 — Fault Code 19 (From the 7800 SERIES Relay Module Fault Codes Literature)

Fault Code	System Failure	Recommended Troubleshooting
Fault 19 *Main Flame Ign.* *(This code means the burner lit but failed shortly after.)*	Flame was lost during MFEP or the first 10 seconds of the RUN state.	1. Inspect the main fuel valve(s) and connections. 2. Make sure that the fuel pressure is high enough to supply fuel to the combustion chamber. 3. Make sure the flame detector is positioned to obtain the required flame signal strength; reset and recycle.

Failure Did Not Light

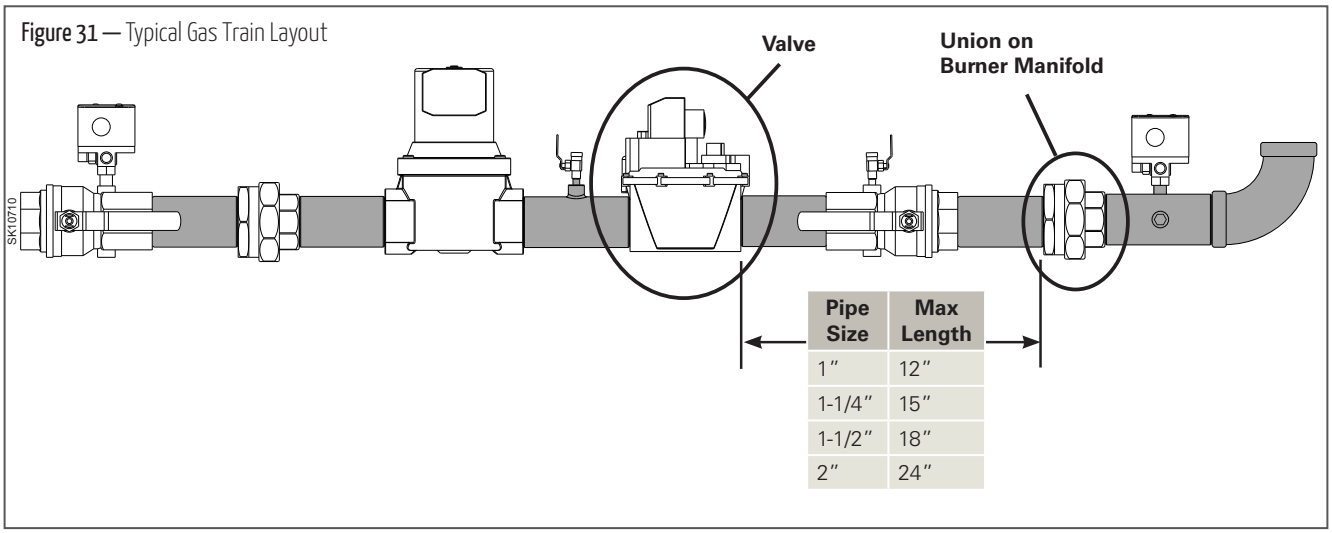
- Check Oxygen (O2) level in Low Fire

  — If higher than 6% O2 close damper until O2 is between 3% and 5%.

  — See “Adjusting the Damper” on page 27 for detailed instructions.

- Check manifold pressure in Low Fire.
  - — Typical light off pressure is between 0.8 in. W.C. and 1.1 in. W.C.
  - — If incoming pressure is too low gas will not reach the burner in time to light off, because low gas pressure will cause the valve to open slower.
  - — If the incoming pressure to the gas train is too high, valve may not open. For some gas valves (4944B as an example) if the gas pressure is >12 in. W.C. the valve may not open.
  - — See ***Table 4*** on page 23 for more detail on recommended gas pressures to burner.
  - — Check distance from gas valve to burner manifold, see ***Figure 32***.

Figure 31 — Typical Gas Train Layout



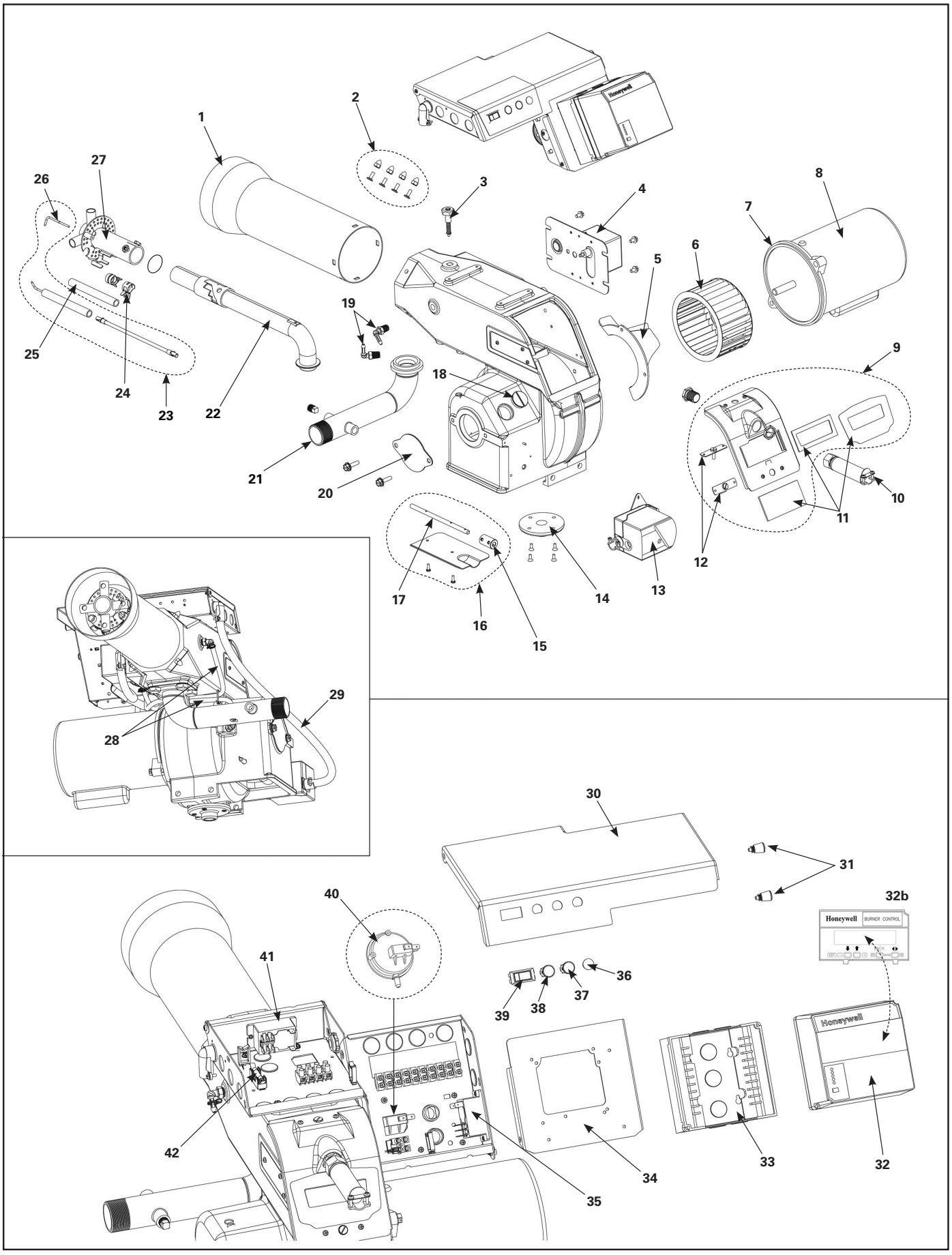
Pipe Size	Max Length
1″	12″
1-1/4″	15″
1-1/2″	18″
2″	24″

- Check breech pressure
  - — Most commercial boilers request a positive 0.1 in. W.C. while in high fire, when the burner is in low fire, draft reading is typically between positive 0.02 in. W.C. and 0.04 in. W.C.
  - — See manufacturer's spec for more information.
- Check exhaust system
  - — Install a dual acting barometric damper to alleviate draft fluctuations
  - — See ***Figure 5*** and ***Figure 6*** on page 11for recommended locations of barometric dampers.

Main Flame Establishment Period (MFEP) Fail

- Check valve timings
  - — If the high fire side of the valve does not open while high air is being introduced it can cause the MFEP to fail.
  - — See valve wiring diagrams for high and low side wiring.
- Check manifold pressure
  - — If manifold pressure does not change, make sure the orange cam on the damper motor is located between the blue and red cam.
  - — See "Adjusting the Damper" on page 27 for detailed instructions.
  - — Check the 4062A motor to ensure it pushes on the plunger when going to high fire.

Replacement Parts



Parts List — CG15, CG25, CG50

No.	Part Name / Description	Beckett Part No.		
		CG15	CG25	CG50
1	Air Tube	**See Note 1**		
2	Kit: 1/4-20 x 1/2 bolt (4x), 1/4-20 Acron nut (4x)	52531001	52531001	52531001
3	Jacking Screw Assembly	5193402U	5193403U	5193403U
4	Transformer	51976U	51976U	51976U
5	Air Guide	176	174	191U
6	Blower Wheel	21268U	21267U	21528U
7	Mounting Flange (for motor)	**See Note 2**	31347U	31449U
8	Motor 115-208-230V 1 Phase	21401U	21402U	21527U
	Motor 208-230/380-460V 3 Phase	21638U	21499U	21547U
9	Rear Cover Door Assy - Sheetmetal	5201303U	5201304U	5201304U
10	UV Scanner - Honeywell C7027A1023	7247U	7247U	7247U
11	Sight Glass Kit (includes gasket and label)	51348	51348	51348
12	Door Latch, Dzus Fastener	32444U	32444U	32444U
13	Damper Motor - Modulation Siemens SQM40.215 R11	3268401U	3268401U	3268401U
	Damper Motor - Modulation Siemens SQN70.203R20BK (used with RWF40 Controller)	750604U	750604U	750604U
14	Flange for 3/4" pipe	21256BK	21256BK	21256BK
15	Coupling, Damper Shaft Lo-Hi-Lo, RWF40 Modulation	32280	32280	32280
	Coupling, Damper Shaft Modulation 135 Ohm, 4-20mA	32658	32658	32658
16	Damper Plate Kit (includes Bushing, Shaft, Damper Plate, and Coupling and hardware)	32432U	32433U	32434U
17	Damper Shaft	32307P	32308P	32309P
18	Hole Plug	32439U	32439U	32439U
19	Barb Fittings	4508	4508	4508
20	Cover Plate	32247	32247	32247
21	Gas Manifold	5193101BK	5193102BK	5193103BK
22	Gas Tube Welded Assembly	5193202BK	5193203BK	5193204BK

No.	Part Name / Description	Beckett Part No.		
		CG15	CG25	CG50
23	Electrode Kit (includes cable)	2191206U	2191207U	2191208U
24	Spring Clamp	4474U	4474U	4474U
25	Ceramic	3231	3231	3231
26	Ground Electrode	2191106	2191107	2191108
27	Head, Welded Assembly	**Specify Model**		
28	Tubing, 1/4" I.D. (includes spring clamps & barb fittings)	32404U	32404U	32404U
29	Steel Flexible 3/8" Conduit	■	■	■
30	Lid, Junction Box (120V Burner)	32522GY	32522GY	32522GY
31	Plunger for Lid & Primary Control Base	32523	32523	32523
32	Control - Honeywell RM7897C1000	7554U	7554U	7554U
	Control - Honeywell RM7840L1075	7397U	7397U	7397U
32b	Display for Mod Bus (Optional) Honeywell S7800A	7542U	7542U	7542U
32c	Amplifier UV - Honeywell R7849A1015	750402	750402	750402
32d	Timer Purge Card 60 Sec. - Honeywell ST7800A1054	7399	7399	7399
33	Control Subbase - Honeywell Q7800B	7386	7386	7386
34	Control Mounting Plate	32521GY	32521GY	32521GY
35	120v coil DPDT Relay (Motor 120V)	752801U	752801U	752801U
36	Hole Plug, 1/2"	21034	21034	21034
37	120v 1/2watt Green light (Fuel On)	21730U	21730U	21730U
38	120v 1/2watt White light (Power On)	21729U	21729U	21729U
39	120V 16amp Rocker switch Amber light (Hi/Lo)	21924	21924	21924
40	Endura ES2145-0438 Air Proving Switch	22181U	22181U	22182U
41	120v coil DPDT Relay (Damper)	752804	752804	752804
42	Fuse, 6A, Littelfuse 312006.HXP	32553U	32553U	32553U
	Fuse Holder	22185	22185	22185
—	Low Gas Pressure Switch - Antunes	52259-001U	52259-001U	52259-001U
—	High Gas Pressure Switch - Antunes	52259-002U	52259-002U	52259-002U
—	Gas Train Wiring Harness	52171U	52171U	52171U

■ = Not a replacement item through Beckett. An adequate replacement may be found at your local parts store.

Note 1: Appliance must be specified to order an airtube with welded mounting flange.
Note 2: Motor for CG15 has a built in mounting flange. For the CG25 and CG50, the mounting flange is separate.
Note 3: For modulation linkages refer to UL label for serial number. Call Customer Service for parts.

Gas Valve Replacement Parts (not shown)

Part Name / Pipe Size		Beckett Part No.
V4944B1109	1"	21977U
V4944B1125	1-1/4"	21979U
V4944B1141	1-1/2"	21981U
Normally Closed Safety Valve 120V	1"	2193401U
	1-1/4"	2193402U
	1-1/2"	2193403U
	2"	2193404U
	2-1/2"	2193405U
V4062A1131 Fluid Actuating Motor		2193803U
V5055B Valve Body	1-1/4"	2193601U
V5055B Valve Body	1-1/2"	2193602U
V5055B Valve Body	2"	2193603U
V5055B Valve Body	2-1/2"	2193604U

Part Name / Pipe Size		Beckett Part No.
RV61-88-0049	1"	2192902AU
RV61-1010-0018	1-1/4"	2192902BU
RV61-1212-0019	1-1/2"	2192903CU
RV61-1616-0019	2"	2192904DU
RV91	2-1/2"	2192904EU
R600-88-0019	1"	2193001AU
210D-88-0019	1"	2193002AU
210D-1010-0005	1-1/4"	2193002BU
210D-1212-0004	1-1/2"	2193002CU
210D-1212-0002	1-1/2"	2193003CU
210D-1616-0003	2"	2193003DU
210D-2020-0003	2-1/2"	2193004EU

Contractor Start-Up Form

Installation Name:_____ Installation Date:_____

Installation Address:_____

Start-Up Contractor'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**]

■ Burner

Model #:_____ Serial #:_____ Combustion Head:_____ Orifice Size:_____

Air Shutter Setting:_____ Air Band Setting:_____ Gas Valve Manufacturer:_____

Gas Valve Model:_____ Burner Control Manufacturer:_____ Model:_____

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**

■ Chimney/Smoke Pipe

Flue Pipe Size:_____ Flue Pipe Length:_____ Number of Elbows:_____

Draft Regulator Installed: [**Yes / No**], [**Single-Acting / Double Acting**]

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

■ Gas Piping

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

■ Combustion Readings

O_2 :_____% CO:_____ PPM CO_2 :_____% Stack Temperature (325°F MIN.):_____°F

Manifold Gas Pressure:_____ (Inches 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.

Beckett
CORPORATION

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.

USA: **R.W. Beckett Corporation,** 1-800-645-2876
Canada: **R.W. Beckett Canada Ltd.**, 1-800-665-6972

www.beckettcorp.com

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