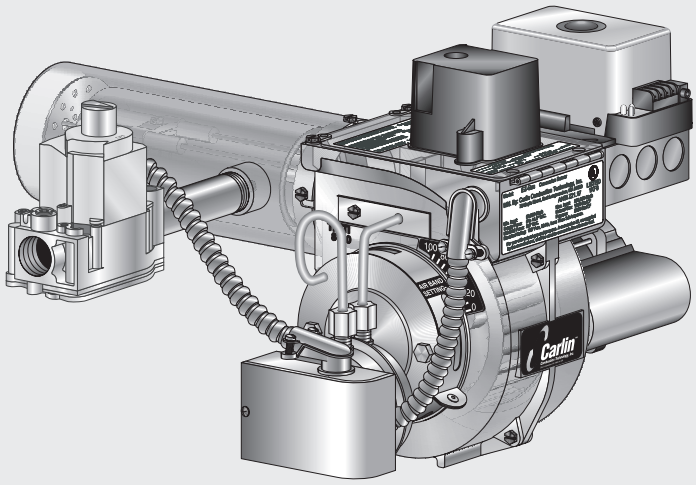
Carlin™
Combustion Technology, Inc.

MODEL **EZ-Gas™**

Gas burner



Instruction manual

Ratings

Input: .....50,000 to 275,000 Btuh

Fuels: .....Natural gas or propane gas

Max. supply pressure.....14 inches w.c.

Min. supply pressure.....5 inches w.c.

Manifold pressure .....3.5 inches w.c.

Electrical: Power.....120V/60 Hz/1-Phase

Motor..... 1/15, 1/7, or 1/6 HP, 3450 RPM

Current.....Approx. 2.0, 2.5 or 2.3 amps

Ignition: .....Carlin Model 41800 solid state ignitor

Control: ..... Carlin Model 60200FR microprocessor control

Agencies: .....UL Listed (US and Canada)

C UL US LISTED

WARNING **Installer/servicer** — Except where specifically stated otherwise, this manual must be used only by a ***qualified service technician***. (In the state of Massachusetts, this product must be installed by a licensed Plumber or Gas Fitter.) Failure to comply with this or other requirements in this manual could result in severe personal injury, death or substantial property damage.

WARNING **User** — Refer only to **User's Information** manual for information regarding operation of this burner. The burner **Instruction Manual** is intended only for your service technician. The burner and heat exchanger must be inspected and started at least annually by your service technician.

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PLEASE read this first . . .

Special attention flags

Please pay particular attention to the following when you see them throughout this manual.

DANGER Notifies you of hazards that ***WILL*** cause severe personal injury, death or substantial property damage.

WARNING Notifies you of hazards that ***CAN*** cause severe personal injury, death or substantial property damage.

CAUTION Notifies you of hazards that ***WILL or CAN*** cause minor personal injury or property damage.

NOTICE Notifies you of special instructions on installation, operation or maintenance that are important, but are not normally related to injury or property damage hazards.

General information

Burner applications

Follow all instructions in this manual and the appliance manual. Where appliance instructions differ from this manual, follow the appliance instructions. Read the label attached to the burner air tube to verify the burner is correct for the appliance being used. See page 7 for procedures.

Damage or shortage claims

The consignee of the shipment must file damage or shortage claims immediately against the transportation company.

When calling or writing about the burner . . .

Please provide us with the UL serial number and burner model number to assist us in locating information. Enter this information on the Installation Certificate in this manual. The certificate information can be helpful when troubleshooting or obtaining replacement parts.

Fill out burner adjustment label

Fill out the burner adjustment label, located on the front of the hinged cover plate (or on French language plate) after completing installation and burner setup.

WARNING Should overheating occur: (1) shut off the manual gas control to the appliance, (2) do not shut off the control switch to the pump or blower.

WARNING Follow the guidelines below to avoid potential severe personal injury, death or substantial property damage.

Installer/service technician . . .

- Read all instructions before proceeding. Perform all procedures, and in the order given to avoid potential of severe personal injury, death or substantial property damage.
- Before leaving the site after startup or service, review the ***User's information manual*** with the user. Make the user aware of all potential hazards and perform the training outlined below.

Train the user . . .

- To properly operate the burner/appliance per this manual, the appliance instructions and the **User's information manual.**
- To keep this manual at or near the burner/appliance for ready access by the user and service technician.
- To contact the service technician, gas supplier or fire department should the user smell gas .
- To keep the appliance space **free of flammable liquids or vapors and other combustible materials.**
- Do not use laundry products, paints, varnishes or other chemicals in the room occupied by the burner/appliance.
- To contact the service technician at least annually for startup and burner/appliance service.

When servicing the burner . . .

- **Disconnect electrical supply** to burner before attempting to service to avoid electrical shock or possible injury from moving parts.
- Burner and appliance components can be extremely hot. **Allow all parts to cool** before attempting to handle or service to avoid potential of severe burns.

Codes and standards

NOTICE The installer/servicer is solely responsible for compliance with all applicable codes and standards.

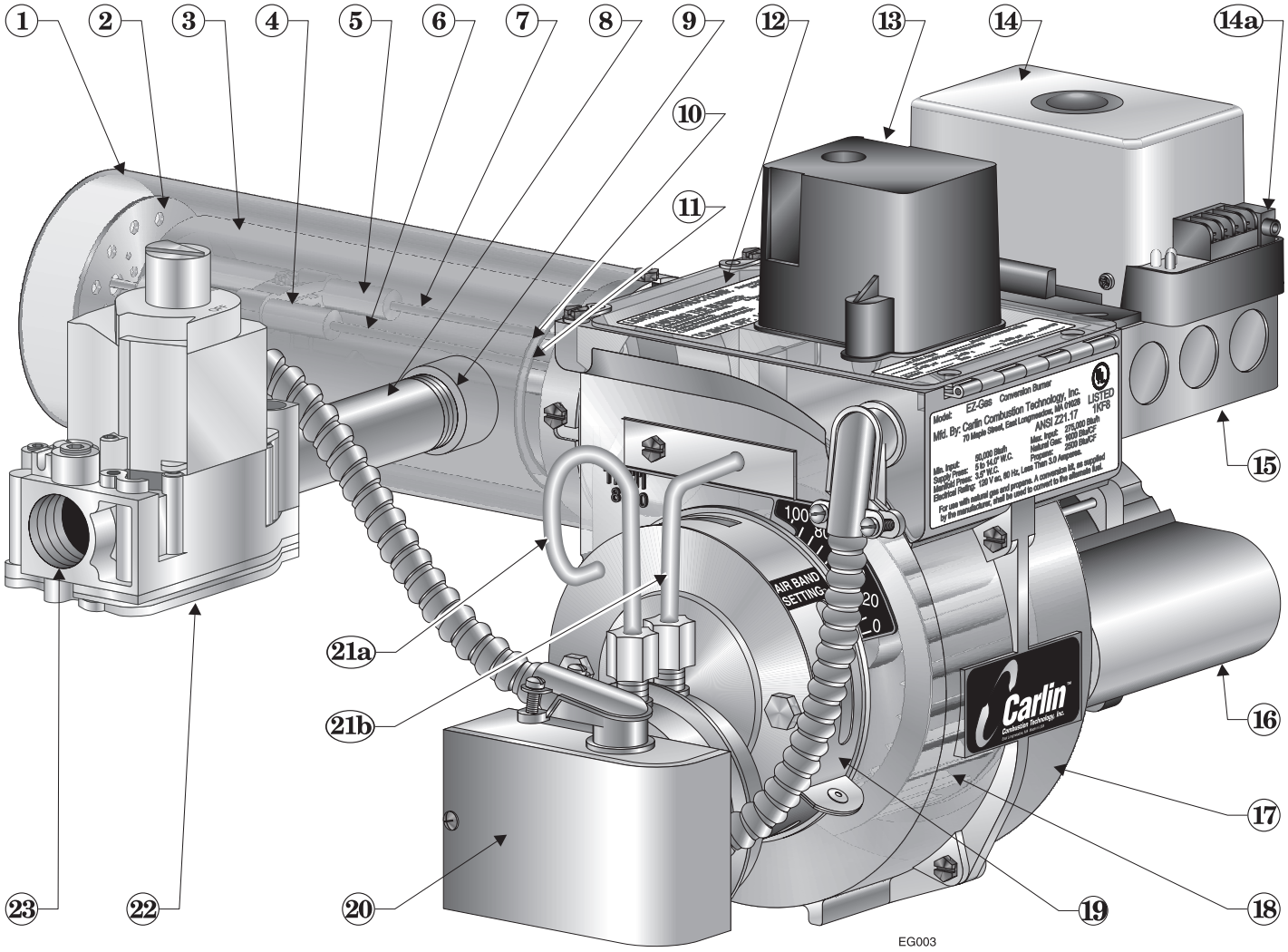
Burner listing

Carlin EZ-Gas burners are C-UL listed, for use in the US or Canada, per ANSI Z21.17/CSA2.7-latest edition, for use with natural gas or propane gas. Specify Canadian application when ordering the burner to obtain proper labeling and manuals.

Codes

The installation must conform with local codes or, in the absence of local codes, with the Standard for the Installation of Domestic Gas Conversion Burners, ANSI Z21.8, and the National Fuel Gas Code, ANSI Z223.1, or the CAN/CGA-B149, Installation Codes. The electrical installation must also conform with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, or the Canadian Electrical Code, CSA C22.1/CSA C22.2.

EZ-Gas burner at-a-glance



1 Air tube (flange omitted for clarity), with powder coat paint finish

2 Diffuser plate (hole or slot pattern)

3 Gas manifold (concentric cylinders swaged and welded at ends) — Gas manifold delivers gas to gas openings on inner wall of manifold near the diffuser plate.

4 Ignitor electrode insulator

5 Flame rod insulator

6 Ignitor electrode

7 Flame rod electrode

8 Gas orifice nipple — see pages 7 and 8 for orifice sizing requirements

9 Gas inlet connection (gas entrance to gas manifold)

10 Gas manifold outer wall

11 Gas manifold inner wall

12 Hinged cover plate (for access to blower wheel & electrodes)

13 Ignitor — Carlin Model 41800 solid state electronic ignitor — 9,000 volts, continuous duty rated)

14 Primary control (Carlin Model 60200FR microprocessor-based interrupted ignition flame supervisory control, for use with flame rod flame rectification)

14a Flame current test jack

15 Burner junction box

16 Motor (Carlin PSC motor, with permanently-lubricated bearings and automatic thermal overload protection)

17 Blower housing (cast aluminum), with powder coat paint finish

18 Blower wheel

19 Air band with indicator — Only a single adjustment required for setting combustion air; see page 7 for starting setting based on appliance model and input)

20 Airflow proving switch — Prevents burner from firing if air is not moving

21a Airflow proving switch sensing line (aluminum) — blower inlet

21b Airflow proving switch sensing line (aluminum) — blower outlet

22 Combination gas valve (with integral gas pressure regulation — set for 3½" w.c. outlet pressure)

23 Gas supply entrance — ¾" NPT; 5" w.c. min; 14" w.c. max

1. Prepare site • prepare burner • mount burner

Inspect installation site

Inspect, repair and/or replace vent system

WARNING Do not install this burner unless you have verified the entire vent system and the appliance are in good condition and comply with all applicable codes. And . . .

The vent and chimney must be sized and constructed in accordance with all applicable codes. If intended for use with an oil burner as well, the vent system must comply with relevant codes for both gas and oil firing. Appliances equipped with a gas conversion burner are treated as fan-assisted appliances.

The vent system must not be pressurized unless the vent piping and vent system are designed accordingly. The vent must provide draft at all times (negative pressure in vent).

Do not install or use an existing manual damper in the vent connector or vent.

Do not connect the appliance vent connector to a chimney or vent serving a fireplace, incinerator or solid-fuel-burning apparatus.

In a cold climate, do not vent into a masonry chimney that has one or more sides exposed to the outside. Install a listed stainless steel liner to vent the flue products.

A defective vent system could result in severe personal injury, death or substantial property damage.

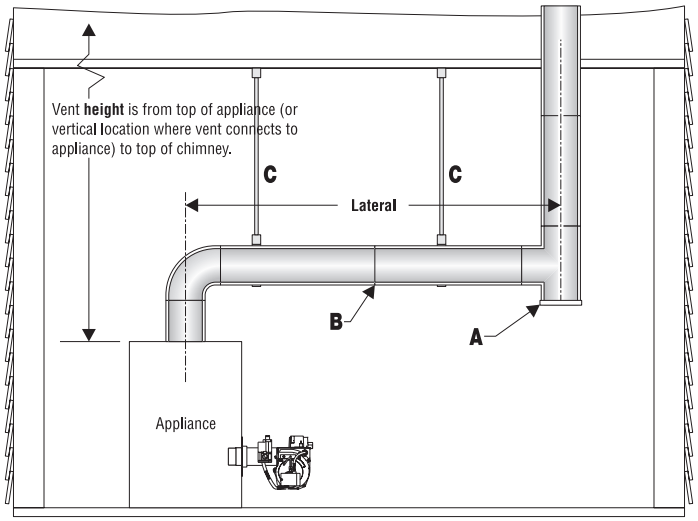
Vent/chimney sizing

- Follow all local codes when sizing the vent and chimney
- Refer to the appliance manufacturer's manual, when available, for venting recommendations.

Prepare vent/chimney

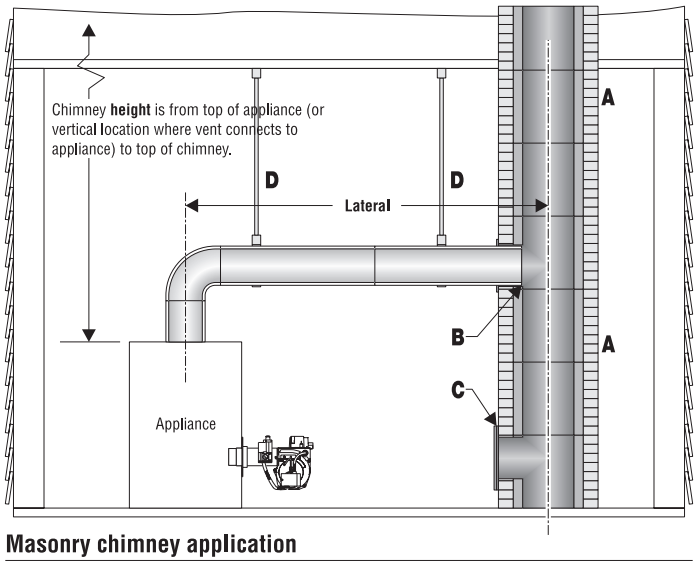
- Secure all metal vent joints with screws, following the vent manufacturer's instructions. Seal all joints in the vent system and chimney. Repair masonry chimney lining and repair all mortar joints as needed.
- Where draft fluctuations are likely, install a double-acting barometric draft regulator in the vent piping. (The damper must be located in the same space as the appliance.) Install a manual reset spill switch in the top of the draft regulator outlet. Wire the switch into the appliance limit circuit to shut off the appliance/burner if sustained downdraft should occur. Refer to the appliance manufacturer's instruction manual for redcommendations regarding the need for a barometric draft regulator.
- Provide support for the vent piping. Do not rest the weight of any of the vent piping on the appliance flue outlet.

Figure 1 *Vent and vent connector installation*



Metal vent application

A Connect to vertical with tee, if possible, to provide inspection/cleanout opening in vent.
B Seal all joints and access openings tightly to prevent draft loss.
C Support vent pipe so no weight of vent connector rests on appliance.



Masonry chimney application

A Tile-lined interior masonry chimney only; with all tile and joints in good condition.
B Vent pipe should be almost flush, but ***not extending into***, inside surface of liner.
C Seal all access openings tightly to prevent draft loss.
D Support vent pipe so no weight of vent connector rests on appliance.

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1. Prepare site • prepare burner • mount burner *(continued)*

Inspect installation site

Verify combustion/ventilation air openings

WARNING Installing the burner/appliance in a space that does not provide enough air for combustion and ventilation can result in severe personal injury, death or substantial property damage. Follow all applicable codes and guidelines below to ensure space has sufficient air openings.

Large spaces

For appliances located in basements, ventilated crawl spaces or other large areas, no additional air openings should be necessary. Exception: If the building construction is unusually tight (see National Fuel Gas Code for definition), you will need to provide air openings into the building if appliance air comes from inside. Provide one opening within 12 inches of the ceiling, and one opening within 12 inches of the floor. Size each opening to provide free area (after deduction for louvers) of 1 square inch per 1,000 Btuh input of all fuel-burning appliances in the building.

Confined spaces — air from inside building

If air openings connect to areas inside the building, provide two openings, one within 12 inches of the ceiling, the other within 12 inches of the floor. Each opening must have a free area (after deduction for louvers) of 1 square inch per 1,000 Btuh of all appliances in the space. If the building construction is unusually tight (see National Fuel Gas Code for definition), you will need to provide air openings into the building. Provide two openings sized and located as for the openings into the boiler space.

Confined spaces — air from outside

If air openings connect directly to outside, provide two openings, one within 12 inches of the ceiling, the other within 12 inches of the floor. Each opening must have a free area (after louver deduction) of:

- If directly through side wall: 1 square inch for each 4,000 Btuh of all appliances in the space.
- If through vertical ducts: 1 square inch for each 4,000 Btuh of all appliances in the space.
- If through horizontal ducts: 1 square inch for each 2,000 Btuh of all appliances in the space.

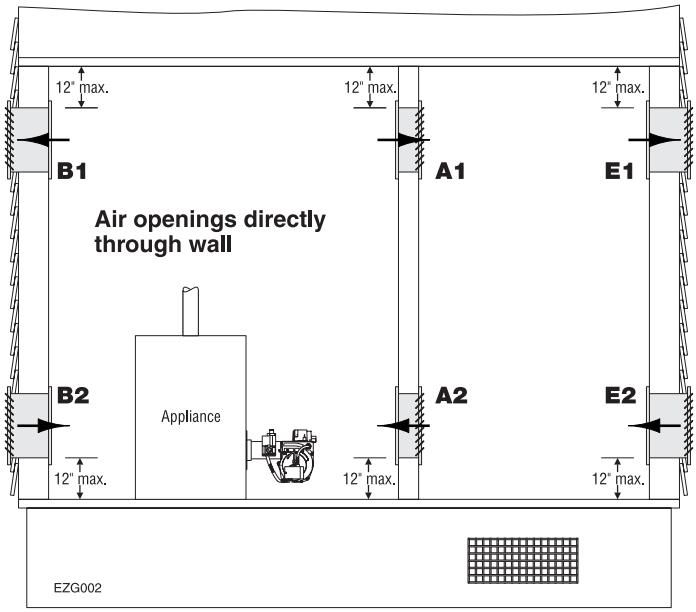
Optional air inlet boot

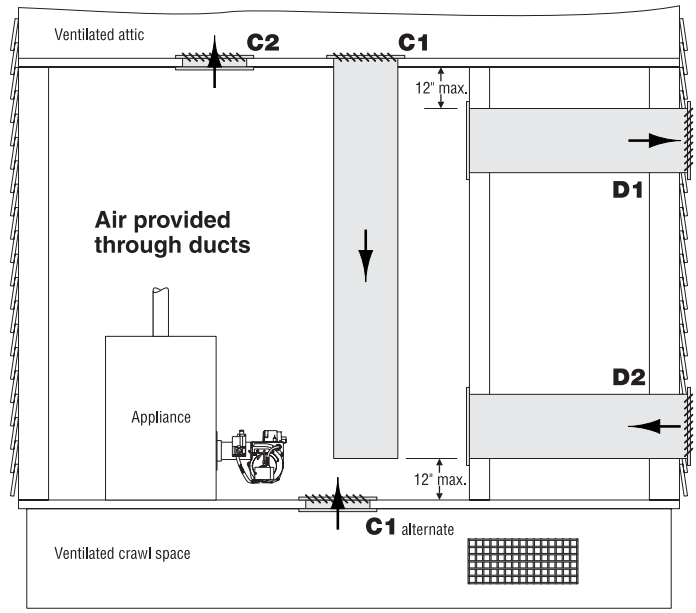
For spaces not fitted with large enough air openings, you may be able to apply the optional Inlet air boot, with air ducted directly to the air boot from outside. You must use a vent outlet/air inlet termination approved by the appliance manufacturer. Refer to the appliance instructions and Inlet air boot instructions for correct application.

You will also have to apply this option if the appliance space may contain corrosive contaminants, such as laundry products, paints, varnishes or other chemicals.

WARNING Even when using the optional Inlet air boot, make sure the space provides enough ventilation to prevent overheating of the appliance, burner and controls. If there is risk of overheating, you must install ventilation air openings sized large enough to provide air for cooling the equipment. Failure to provide ventilation can result in severe personal injury, death or substantial property damage.

Figure 2 *Locating & sizing air openings*





Minimum grille free area per 1,000 Btuh input of all appliances in space

A1 & 2	Two openings through interior wall	**1 sq. in.**
B1 & 2	Two openings through outside wall	**0.25 sq. in.**
C1 & 2	Two vertical ducts (to attic and crawl space)	**0.25 sq. in.**
D1 & 2	Two horizontal ducts from outside	**0.50 sq. in.**
E1 & 2	If building construction is unusually tight, provide two air openings as shown if appliance air comes from inside.	**1 sq. in.**

Example A space contains two fuel-burning appliances. The combined input is 120,000 Btuh. Air comes in through horizontal ducts from outside. This is case **D**. So multiply 0.50 sq. in. times 120 to get 60 sq. in. free area per opening. If louvers reduce free area to 70%, then divide minimum free area by 0.7 for actual grille area, or 60 ÷ 0.7 = 85.7 sq. in.

1. Prepare site • prepare burner • mount burner *(continued)*

Inspect installation site

Verify combustion/ventilation air openings (continued)

WARNING When sizing air openings for combustion and ventilation, include air required for exhaust fans and other appliances, such as clothes driers, that require air for operation.

Check appliance manual and applicable codes for required sizing of combustion and ventilation air openings.

- Verify that openings are unobstructed.
- Verify that appliance space and air source spaces are free of:
  - Gasoline or other flammable liquids or vapors.
  - Combustible materials.
  - Air contaminants, such as laundry products, paint, thinner, varnish, etc.
- Confirm with user that the area will be kept free of these materials at all times.

Prepare the appliance

WARNING **Burner input**: Install a gas burner sized for the normal input rating of the appliance. Do not install a burner with a higher firing rate than the appliance rating. Do not install a burner with a firing rate more than 10% lower than the appliance rating. The appliance and vent system could be damaged due to condensation.

Clean the appliance: Clean the appliance thoroughly and seal all joints. Test all electrical components and verify the relief valve works (boilers only).

Verify combustion chamber dimensions comply with the minimum dimensions shown in Figure 3, page 7. Install or replace combustion chamber liner if required by the appliance manufacturer. The burner must not extend into the combustion chamber. The end of the burner air tube must be within ¼" of the inside face of the combustion chamber. If the space around the burner air tube is more than ¼", wrap the burner air tube with minimum 2300-°F-rated ceramic fiber blanket to seal off the gap.

Repair or replace damaged appliance components. Inspect the appliance thoroughly. Follow appliance manufacturer's guidelines for repair or replacement of any component found defective.

When cleaning the appliance or working with **ceramic fiber refractories or fiberglass insulation**, see **WARNING** on this page.

Failure to comply with the above could result in severe personal injury, death or substantial property damage.

Verify clearances

- Verify that the burner/appliance will maintain all clearances to combustible walls or floor and all clearances required for service/maintenance as required in the appliance manual and applicable codes.

Ceramic fiber or Fiberglass insulation

WARNING Ceramic fiber materials, such as chamber liners, may contain carcinogenic particles (chrystobalites) 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 chrystobalites. Actual job requirements or 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 immediately

Breathing — fresh air.

Prepare appliance for burner mounting

WARNING The universal flange supplied with EZ-Gas burners is intended only for firing chambers with negative overfire pressure. For pressurized firing, you must obtain a burner with a welded flange, designed for use with the appliance. Failure to comply could result in severe personal injury, death or substantial property damage.

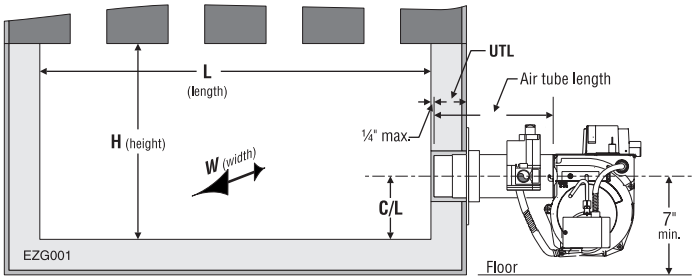
See page 19 for required dimensions and bolt locations.

1. Prepare site • prepare burner • mount burner *(continued)*

Inspect burner and components

WARNING Do not install or operate the burner if any component is damaged or if burner does not comply with the specifications or any other guidelines in this manual.

Figure 3 *Combustion chamber dimensions (see Table 1)*



Air tube insertion length (UTL)

- Usable air tube length (UTL) is the distance from mounting flange to end of air tube. Verify that the end of the air tube will be flush with, or no more than ¼ inch short of, the inside of the appliance combustion chamber front wall when the burner is mounted. See Figure 3 and Table 1 below for further information.

Diffuser plate

- Verify correct diffuser plate (item 2, page 3). Compare diffuser plate listed on air tube label with diffuser plate listed in Table 1.

Gas orifice drill size

- The gas orifice is drilled through a plate in the end of the orifice nipple (see item 8, page 3). Read the factory-drilled orifice size on the label attached to the burner air tube (see item 1, page 3) near the blower housing end. If the gas orifice size is not correct for your application, or if the label is illegible for any reason, check the orifice size directly and redrill orifice or replace if necessary, as follows (next page).

Table 1 *Burner specifications for EZ-Gas burners (see Figure 3)*

Input Note 1	**Burner orifice drill size**		**Approximate air band setting** Notes 1 & 2		**Diffuser**	**Minimum chamber dimensions** Inches (Notes 3, 4, 5) (VC = min. diam. of vertical cylinder chamber)					**UTL Air tube insertion length**		
Btuh	Natural Gas	Propane Gas	Opening	Slots		C/L	L	W	H	VC			
50,000	5/32	1/8	5 %	1	C	3	7	6	8	7	Burners with ***welded flange*** have fixed usable tube length (UTL). Verify length is correct for the application. Burners with ***adjustable flange***: Usable tube length (UTL) varies with air tube length:		
75,000	3/16	9/64	5 %	1	B	3	7	6	8	7			
100,000	7/32	11/64	20 %	1	B	3½	8	7	9	8			
125,000	1/4	13/64	30 %	1	B	3½	9	7	9	8½	Nominal air tube length:	UTL min.	UTL max.
150,000	9/32	7/32	45 %	1	B	4	11	8	10	9½			
175,000	5/16	1/4	30 %	2	A	4	12	8	10	10			
200,000	5/16	1/4	35 %	2	A	4½	14	8	11	12	10”	1 ¾”	3 ½”
225,000	11/32	9/32	45 %	2	A	4½	15	9	11	13	12”	1 ¾”	5 ½”
250,000	13/32	5/16	55 %	2	A	4½	16	9	11	14	14”	1 ¾”	7 ½”
275,000	7/16	11/32	75 %	2	A	4½	17	9	11	15			

Note 1	High altitude applications: The maximum burner input at sea level is 275,000 Btuh. Reduce this capacity by 4% per 1,000 feet above sea level. Example — max. capacity at 5,000 feet is 220,000 Btuh (20% reduction). Pressurized firing: Maximum burner input decreases with increasing overfire pressure. Assume a reduction in maximum burner input of approximately 5% at 0.1 inches w.c. and 10% at 0.2 inches w.c. You will have to increase the air band opening to compensate for the increased pressure. Follow the procedures given in this manual to check combustion with instruments to determine the correct air band setting. Do not fire into a chamber with pressure higher than 0.2 inches w.c. and never fire at a higher pressure than recommended by the appliance manufacturer.
Note 2	Use this as the starting setting only. Adjust air band setting, if necessary, after performing combustion testing (see page 13).
Note 3	Some tested appliances may operate satisfactorily with dimensions less than the above.
Note 4	Horizontal cylindrical chambers — diameter must be no less than column “W” above Horizontal stainless steel cylindrical chambers — diameter at least 1 to 4 inches larger than column “W” above.
Note 5	A corbel may help heat transfer in a larger boiler or furnace, provided it is recommended by the appliance manufacturer.

1. Prepare site • prepare burner • mount burner *(continued)*

Inspect/redrill gas orifice when required

- Turn off power to the burner/appliance before proceeding.
- Close main manual gas valve in gas line to burner. Then disconnect the ground joint union to allow rotating burner combination gas valve.

WARNING You must disconnect power to burner and close main manual gas valve before proceeding. Failure to do so could result in severe personal injury, death or substantial property damage.

- Remove wire junction box cover on gas valve by removing the single screw attaching the box to the valve body. Then pull the two insulated spade connectors off of the gas valve terminals.
- Remove the combination gas valve (item 22, page 3) and the orifice nipple (item 8, page 3). Remove the orifice nipple from the gas valve.
- Read the correct orifice drill size from Table 1, page 7. Then check actual orifice size using that size twist drill bit.
- ***If gas orifice is smaller than required***, redrill the orifice to the correct size, if necessary.
- ***If gas orifice is larger than required***, obtain a replacement orifice nipple from Carlin. If necessary, drill the orifice hole in the replacement orifice nipple to the correct size.

WARNING Drill the orifice carefully, avoiding drill wobble. Wobble will cause the orifice to be over-sized. The orifice nipple should be secured in a vise, if possible, to ensure it is steady during the drilling process.

- Write the orifice size on the orifice nipple label (or on the French label attached to the burner for Canadian installations).
- Replace the gas valve and piping, using only pipe dope listed for use with liquefied petroleum gases. Make sure the arrow on the orifice nipple label points in the direction of gas flow.

Flame rod and ignitor electrode

- Inspect the burner from air tube end. Flame rod should extend through the diffuser plate as shown in Figure 4. Ignitor electrode should be flush with inner face of diffuser plate as shown.
- The flame rod and ignitor electrode must not touch the diffuser or any grounded metal surface at any point. The flame rod and electrode should be as close as possible to the centers of the diffuser holes. If either the flame rod or electrode is closer than 1/16" to the diffuser, remove assembly (see page 16 for removal instructions and verify dimensions per Figure 5). Loosen the electrode bracket clamp screw. Rotate the assembly slightly on the support rod. Then re-tighten the clamp screw. Replace assembly and check spacing again. Continue adjusting as necessary until neither rod nor electrode is closer than 1/16" to the diffuser.

Install gas valve on burner

1. Read WARNING's on page 9 before installing gas valve.
2. Apply a small amount of pipe dope (suitable for propane gas) to gas valve outlet connection, gas line nipple and burner gas connection. Assemble pipe nipple to gas valve. Install gas line nipple in burner gas connection.

WARNING To avoid damage to gas valve, do not hold valve with a pipe wrench or over-tighten. Use only a crescent wrench or other means. Failure to comply could result in severe personal injury, death or substantial property damage.

3. Feed wires into air pressure switch housing and secure conduit fitting with lock nut.
4. Connect white wire from valve to white wire from burner with wire nut. Attach black wire quick-connect terminal to switch terminal connector (violet wire from burner is attached to other switch terminal).

Inspect components and wiring

- Visually inspect all burner components and wiring.
- Verify that wiring is intact and leads are securely connected.
- Verify that all burner components are in good condition.

Mount burner in appliance

- Verify appliance burner front plate dimensions per page 19.
- Slide gasket supplied with burner over end of air tube.
- Insert burner into appliance opening and bolt in place.

Figure 4 *Flame rod and ignitor electrode placement*

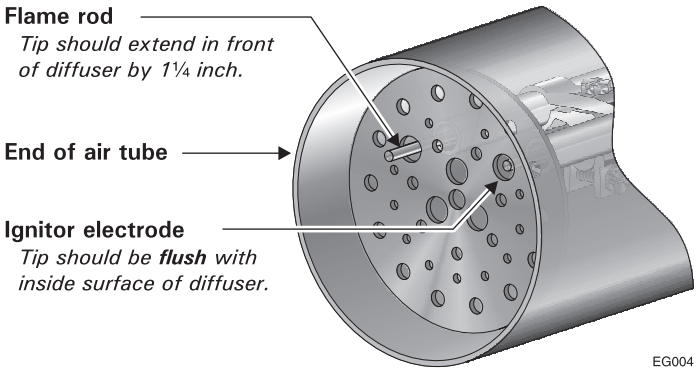
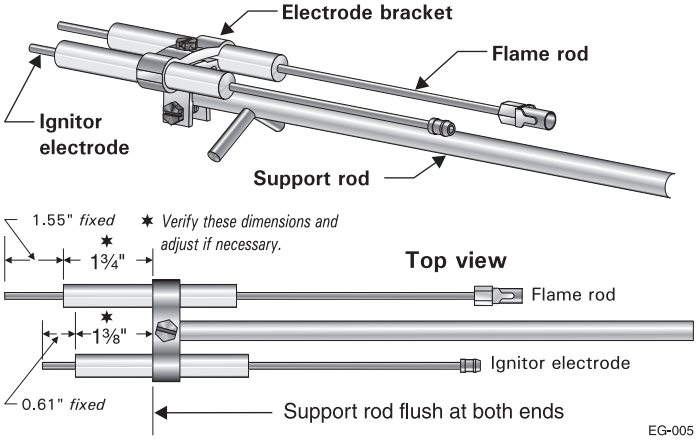


Figure 5 *Flame rod/ignitor electrode assembly*



2. Install gas piping from meter to combination gas valve

Piping from meter to burner

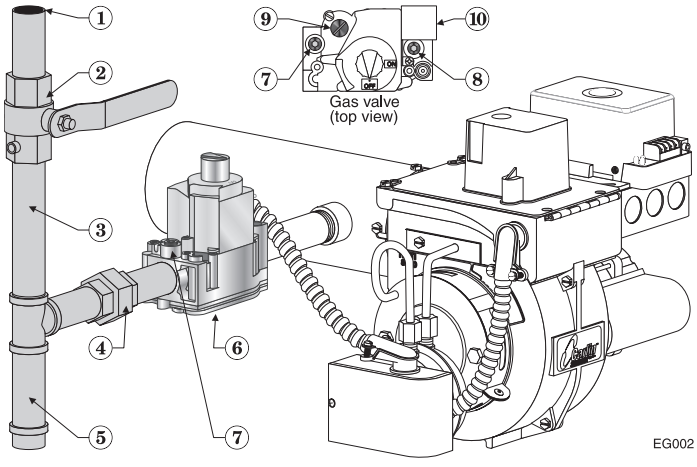
WARNING Connect from the gas supply to the burner combination gas valve inlet using new, clean black iron pipe and malleable iron fittings only. Do not use copper, brass, cast iron or galvanized pipe or fittings.

Provide support for gas piping. Do not rest weight of piping on burner gas valve.
Apply pipe dope sparingly at all joints. Use only pipe dope listed for use with propane gas. Do not use pipe sealing tape.
Do not hold gas valve with pipe wrench. Use crescent wrench or other smooth-jawed device. Do not over-tighten.
Failure to comply with above could result in severe personal injury, death or substantial property damage.

1. If possible, install a new gas line directly from the gas meter. If you are using an existing gas line, verify it is clean and in good condition, and verify it is large enough to handle the load of all connected appliances.
2. When branching from a common gas line, do not tap off from the bottom of horizontal sections — only from the side or top.
3. Install a main manual shutoff valve, sediment trap and ground joint union near the burner combination gas valve connection as shown in Figure 6.
4. If the burner is installed inside the appliance jacket, install the main manual gas valve and sediment trap external to the jacket.
5. Size piping (or verify size) using Table 2 . You will find additional information on gas line sizing in the National Fuel Gas Code, ANSI Z223.1.

WARNING In the state of Massachusetts, when lever-type gas shutoffs are used, they must be T-handle type only.

Figure 6 *Connecting gas supply piping to burner*



1 Pipe to meter or branch
2 Main manual gas shutoff valve
3 Use clean, burr-free black iron pipe and malleable iron fittings
4 Ground joint union
5 Sediment leg
6 Burner combination gas valve
7 Upstream pressure tap, 1/8"
8 Outlet pressure tap, 1/8"
9 Gas regulator access screw
10 Gas valve wire junction box

Gas supply pressure — *natural or propane*

- Maximum supply pressure: **14 inches** w.c.
- Minimum supply pressure: **5 inches** w.c.

WARNING Do not expose the combination gas valve to gas pressure in excess of 14 inches water column. Higher pressure could damage the valve seat, resulting in potentially hazardous condition. When pressure testing piping at higher pressures, disconnect burner from gas line before testing.

If the gas supply pressure can exceed 14 inches water column at any time, you must install a lockup type gas pressure regulator in the gas supply piping, ahead of the main manual gas valve installed at the burner.

Test and purge gas line

Read WARNING above.

Pressure test and purge the line. Pressure testing should be done by the gas supplier or utility, following all applicable codes.

Table 2 *Capacities of black iron pipe, cubic feet gas/hour*

Capacities in cubic feet per hour for pipe carrying natural gas or propane					
Pipe size (inches)	Total length of gas piping, from meter to burner connection (feet)				
	20	40	60	80	100
Natural gas @ .60 specific gravity, pressure drop 0.3 in. w.c. (note 1)					
½	92	63	50	43	38
¾	190	130	105	90	79
1	350	245	195	170	150
1¼	730	500	400	350	305
Natural gas @ .60 specific gravity, pressure drop 0.5 in. w.c. (note 1)					
½	120	82	66	57	50
¾	250	170	138	118	103
1	465	320	260	220	195
1¼	950	660	530	460	400
Propane gas @ 1.55 specific gravity, pressure drop 0.3 in. w.c.					
½	57	39	31	27	24
¾	118	81	65	56	49
1	217	152	121	105	93
Propane gas @ 1.55 specific gravity, pressure drop 0.5 in. w.c.					
½	74	51	41	35	31
¾	155	105	86	73	64
1	288	198	161	136	121
Note 1	For natural gas with specific gravity other than 0.60, consult National Fuel Gas Code for correction factor.				

3. Wire burner

Code compliance

The burner/appliance installation must comply with codes listed on page 2 and any other locally applicable codes.

General wiring requirements

WARNING ***Read and follow the guidelines below***. Failure to comply could result in severe personal injury, death or substantial property damage.

Electrical shock hazard — Disconnect electrical supply to the burner before attempting to service.

Electrically ground burner — The burner must be grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70 (in Canada, per Canadian Electrical Code, CSA C22.1/CSA C22.2).

Label all wires before removing for servicing. Wiring errors could result in unsafe appliance/burner operation.

NOTICE Read appliance manufacturer's instructions completely before wiring burner.

The 60200FR control requires a constant 120 VAC power source from the appliance as well as power from the appliance limit circuit. See Figure 7. Check polarity carefully. If hot and neutral wires are reversed at appliance power source, the control will lockout on flame failure.

If replacing any of the wire supplied with the burner, use minimum #18 AWG 125°C or better.

Verify power supply

1. The burner requires a 120VAC/60HZ/single-phase power supply, with at least a 5-amp fuse. The current draw will be (when equipped with Carlin motor and Carlin 41800 electronic ignitor):

Approximate amp draw of EZ-Gas burners			
Motor →	1/15 HP	1/7 HP	1/6 HP
During ignition	2.5 AMPS	3.0 AMPS	2.8 AMPS
Steady operation	2.0 AMPS	2.5 AMPS	2.3 AMPS

2. The 120 VAC power connections to the black and red/white wires of the 60200FR must be the same polarity ***from the same power source***. DO NOT attempt to supply separate power sources. Check the power from the heat exchanger with a voltmeter. Verify that the supply to the black and red/white wires are from the 120 VAC HOT side and that the power is no less than 102 VAC nor more than 132 VAC.

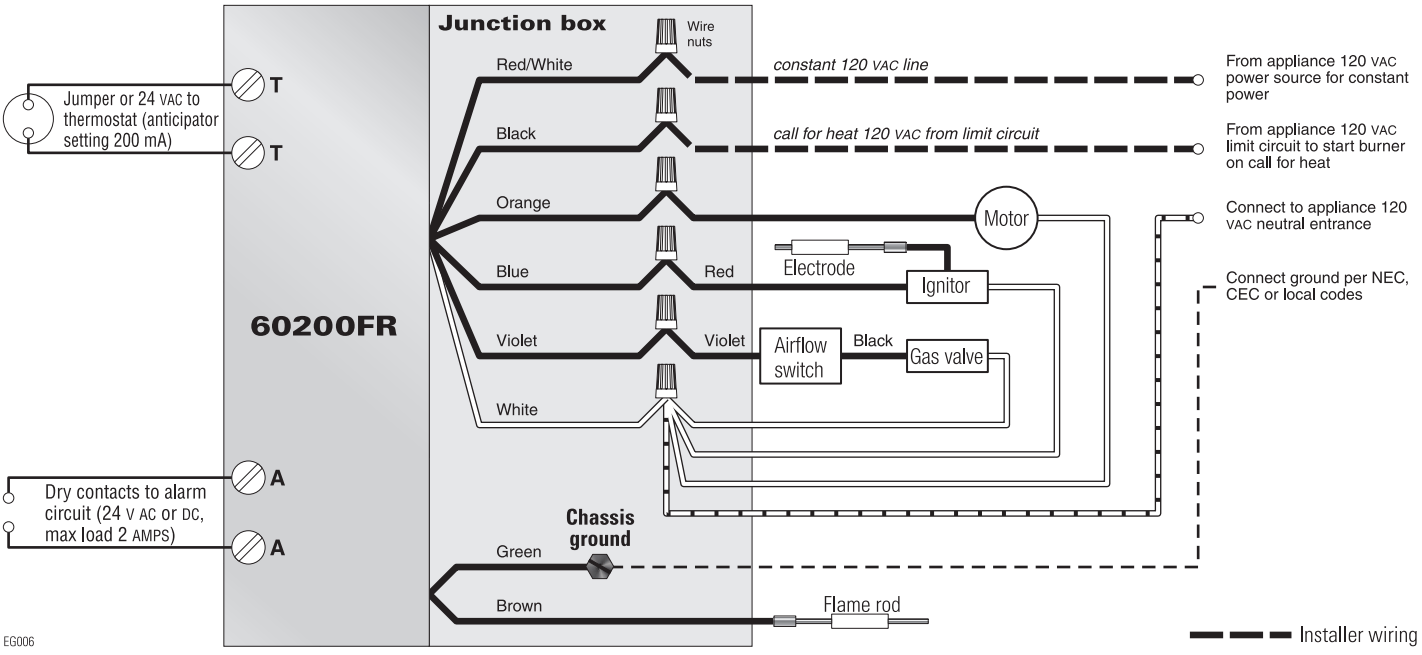
Checking burner flame signal

The 60200FR uses flame rectification to detect the flame. Because the grounded metal surface area near the flame rod is much larger than the surface of the flame rod, current flows through the flame more easily in one direction than the other. This causes an AC voltage applied to the flame rod to result in a DC current. (Note that, if the flame rod should touch a grounded metal part, the current would be AC, not DC, and the control would sense flame failure.)

The 60200FR control has a 3 mm flame signal test jack (item 14a, page 3) that can be used with a flame signal meter, such as the Honeywell W136. Or you can use a standard 3 mm stereo plug fitted with two leads. Connect these leads in series with your ammeter leads to read DC microamps.

The minimum flame signal needed to satisfy the 60200FR sensing circuit is 0.8 microamps. The control will register flame failure at any lower signal.

Figure 7 *Wiring diagram — EZ-Gas burner with 60200FR primary control — typical wiring to appliance*



4. Check system • start-up burner/appliance

Inspect/check system

Before starting the burner and appliance, verify the system has been installed as directed by this manual and the appliance instructions.

Check gas piping for leaks

WARNING Disconnect the burner from the gas supply line if gas line test pressure will exceed 14 inches w.c. Exposing the burner combination gas valve to pressure higher than 14 inches w.c. can damage the valve seat, resulting in potentially unsafe operation.

You can usually test the gas piping by allowing the line to fill with gas to main regulator outlet pressure.

1. Shut off gas flow to all appliances connected to the meter.
2. If test pressure will be less than 14 inches w.c., turn the burner combination gas valve knob to OFF. If test pressure will be higher than 14 inches, remove the burner from the gas line by shutting off the main manual gas valve installed near the burner (per Figure 6, page 9) and disconnecting the ground joint union. See warning above.
3. Watch the gas meter dial. For a one half cubic foot per revolution dial, there should be no movement of the dial for at least 5 minutes. For larger volumes per revolution, increase this time proportionately.
4. If you detect a gas leak, locate the leak with a soap suds mixture and repair it. Then test the system for leaks again.

WARNING Do not test for leaks with an open flame. And do not use oxygen as a test gas. Either of these could cause an explosion, resulting in severe personal injury, death or substantial property damage.

Bleed gas line

Purge all air from the gas line. Purge to outside of the building, NEVER into the appliance or burner.

Leak test near-burner gas piping

If piping near burner has not already been pressure tested, open main manual gas valve on supply to burner and smell around area for any signs of gas. Apply a soap suds mixture to all gas piping joints near burner and check for any leaks. If any leaks appear, repair before proceeding and retest.

Set burner air band

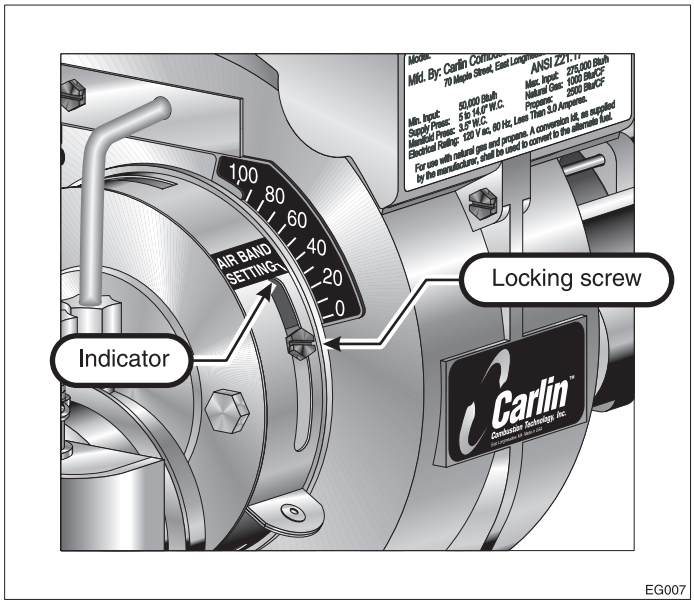
See Figure 8. Loosen air band locking screw. Then rotate band until indicator points to setting given in Table 1, page 7. Tighten air band locking screw.

The Table 1 setting will probably be satisfactory without change. If the combustion test indicates a need for more or less air, however, you will have to adjust the band accordingly.

Check burner and primary control

Inspect burner thoroughly. Verify hinged cover is in place and in good condition, cover is closed and clamps are tightened. Verify all wiring is in place and all components are secure and in position.

Figure 8 *Air band adjustment*



WARNING Do not start the burner if you smell gas or if there may be gas present in the appliance combustion chamber, heat exchanger or the vent system. An explosion could occur, causing severe personal injury, death or substantial property damage.

WARNING During initial start-up, you must be constantly alert for emergency conditions such as fuel leaks, electrical malfunctions, etc. Familiarize yourself with the location of manual shutoff valves and switches so you can quickly use them if needed.

WARNING If the burner fails to ignite, NEVER attempt to manually bypass the normal sequence of the control, which provides purging of the combustion chamber.

Verify flame failure lockout of 60200FR control

1. Install a hose barb fitting in the combination gas valve outlet pressure tap and connect with a hose to a U-tube manometer.
2. Close the main manual gas valve and turn the combination gas valve knob to ON.
3. Turn on power to appliance and set appliance limit(s) to call for heat.
4. Burner motor will start. The 60200FR will run for its prepurge timing, then start the ignitor. Approximately one second later, the combination gas valve will open. (The manometer should show almost no pressure, because the main manual gas valve is closed.)
5. After the Trial for Ignition Period, (TFI) the 60200FR will lockout and turn on the red LED. The ignitor will shut off and the gas valve will close. Turn off power and set controls to stop call for heat.
6. If lockout does not occur, replace the 60200FR control.

4. Check system • start-up burner/appliance *(continued)*

WARNING Should overheating or an emergency occur, immediately:

- Shut off main manual gas valve.
- Shut off control switch to burner.

Under some circumstances power should remain on for water pumps or circulating blowers. Determine proper response before attempting start-up.

If burner fails ignition on several attempts, close gas valve and use burner blower to purge appliance before restart.

Model 60200FR diagnostic LED's

Ⓐ – Amber **OFF** Ⓡ – Red **OFF** Ⓖ – Green **OFF**

Ⓐ – Amber **ON** Ⓡ – Red **ON** Ⓖ – Green **ON**

Ⓐ – Amber **FLASHING** Ⓡ – Red **FLASHING**

Ⓐ – Amber **BLINKING** (blinks off momentarily every 3 to 4 seconds)

NOTICE Please see 60200FR control label for trial for ignition (TFI) and purge timings.

Start-up & operation

WARNING Do not start the burner if the combustion chamber contains residual gas. Allow gas to disperse.

NOTICE Per UL requirements, the control will not turn on if the flame rod senses flame during the self-test. If the flame rod senses flame, the green LED turns on. The control will remain in self-test mode until the flame rod no longer senses flame. The amber LED will remain on, but blink off momentarily Ⓐ every 3 to 4 seconds.

ⒶⓇ **Power ON** Open all manual gas line valves. Close the line switch. (If Red LED turns on constant Ⓡ, control is in lockout. See below to reset.)

ⒶⓇ **Self-test 1** The control performs a "boot-up" test to verify internal operation each time power is applied to the red/white wire. About 4 seconds after power application, the amber LED turns on. The test continues for about 6 more seconds. If the test fails, the control turns the amber LED off and repeats this test sequence until successful.

ⒶⓇ **Stand-by** (No call for heat) If Self-test 1 is successful, amber LED turns off and control waits for heat call.

ⒶⓇ **Call for heat** Set operating control and all limit controls to call for heat. The 60200FR thermostat circuit must be closed (jumpered) and power coming to black wire from limits.

Self-test 2 The amber LED turns on. For the first 3 to 4 seconds, the control performs a self-test. If the flame rod senses flame, the green LED turns on. The control repeats the self-test until flame is no longer detected (green LED would turn off). During this time, the amber LED will remain on, but blink off momentarily Ⓐ every 3 to 4 seconds. If the control detects motor contacts closed or power to the gas valve, lockout occurs.

ⒶⓇ **Burner on** After the self-test, the amber LED turns off. The ***motor*** starts.

ⒶⓇ **Pre-purge** The ***ignitor*** starts after the pre-purge period. Two seconds later, the ***gas valve*** opens. The 2-second delay (ignition establishment period) helps ensure a stable spark is in place when the gas valve opens (to compensate for sluggish response of some AC ignition transformers).

ⒶⓇ **TFI** After gas valve opens, the flame rod must sense flame within the TFI time limit (trial for ignition). The green LED turns on Ⓖ at the end of the TFI if the flame rod senses flame.

ⒶⓇⒼ **Run** The burner continues firing during call for heat if the flame rod senses flame. Amber and red LED's are off and green LED is on during normal running.

ⒶⓇⒼ **Lockout** If the flame rod does not sense flame within the TFI time limit after gas valve activation, **lockout** occurs. The control turns the red LED on constant, and closes the ***alarm*** contact. Green LED is off.

To **Reset** Push in and hold reset button for 1 second, then release.

ⒶⓇⒼ **Latch-up** If the control locks out **3 times** during a single call for heat, **latch-up** occurs. The control turns on both the amber and red LED's constant. You must use the special procedure below to reset the control after latch-up.

WARNING **Reset from latch-up — *Only a qualified service technician should attempt to reset the control after latch-up. The problem that caused the repeated burner problems must be corrected before returning the burner to normal operation.***

ⒶⓇⒼ Push in and hold the reset button for about 10 seconds. The red and amber LED's will flash alternately.

ⒶⓇⒼ After the LED's begin flashing, continue to hold the reset button for about another 20 seconds. The LED's will turn off. Release the reset button and the control will restart. (Releasing the button before the LED's turn off will cause the control to remain in latch-up.)

NOTICE The 60200FR control will not reset from lockout or latch-up if power is interrupted.

ⒶⓇ **Flame failure** If the flame rod loses flame signal during operation (after the TFI), the red LED flashes. The ***gas valve*** closes within 2 seconds. The ***motor*** remains on for the post-purge period, then shuts off. **Recycle**: Control waits for 65 seconds (with red LED flashing), then begins again at **Self-test 2**. Red LED goes off Ⓡ.

(**NOTE**: **Controls with non-recycle feature will lock out on flame failure**.)

ⒶⓇ **Post-purge** Set operating control(s) and limit(s) to stop call for heat. The ***gas valve*** will turn off within 2 seconds. The ***motor*** remains on for the post-purge period, then turns off.

ⒶⓇ **Stand-by** Control remains in stand-by mode until limit circuit sends power to the black wire and thermostat circuit closes (or jumpered) — (call for heat).

4. Check system • start-up burner/appliance *(continued)*

Installer/servicer

Please check off and fill in certificate

WARNING Should overheating or an emergency occur, immediately:

- Shut off main manual gas valve.
- Shut off control switch to burner.

Under some circumstances power should remain on for water pumps or circulating blowers. Determine proper response before attempting start-up. If appliance fails ignition on several attempts, close gas valve and use burner blower to purge appliance before restart.

Preparation before checkout

❑ Burner/appliance installed per appliance instruction manual?

❑ Burner components verified against Table 1, page 7?

❑ Burner/appliance installed per all applicable codes?

❑ Installation site has adequate ventilation openings and vent system?

❑ Gas supply line in good condition and sized correctly?

❑ All gas line joints sealed with pipe dope listed for use with liquefied petroleum gases?

❑ Gas supply pressure to combination gas valve checked?

❑ Regulator installed if pressure can exceed 14 inches w.c.?

❑ Air purged from gas line?

❑ Gas piping checked for leaks?

❑ Wiring installed per burner and appliance instruction manuals?

❑ Burner inspected and primary control flame failure lockout checked?

❑ Start-up sequence performed (page 12)?

Make final burner adjustments

Check for leaks in gas piping

❑ Smell around burner to make sure there is no gas leak in near-burner piping. Verify integrity of gas line joints between combination gas valve and burner gas inlet tapping using soap suds mixture.

Check/adjust gas valve outlet pressure

❑ With burner running, check manometer reading for combination gas valve outlet pressure. Adjust valve regulator if necessary so the reading is 3.5 inches w.c. for either natural gas or propane gas.

Make final burner adjustments (continued)

Inspect flame

❑ Look at flame through appliance observation port. The flame should be a soft blue with well-defined orange and yellow tips for natural gas, or well-defined yellow tips for propane gas. (If you make air or gas pressure changes later, inspect the flame again.)

Check the firing rate

❑ Natural gas only — Turn off all other gas appliances connected to the gas meter. Use a stopwatch to time the number of seconds for a flow of one cubic foot of gas (two revolutions for a one half cubic foot per revolution dial, for example). You will also need to know the gas heat content in Btu per cubic foot. Determine the actual input from: INPUT = (3600 x Btu per cubic foot) ÷ (number of seconds for one cubic foot), for firing rate in Btuh. For example, for 1050 Btu per cubic foot natural gas, with meter timed at 30.2 seconds for one cubic foot of gas: INPUT example = (3600 x 1050) ÷ (30.2) = 125,200 Btuh. Firing rate should be within ± 5% of rated input for the appliance. Adjust the combination gas valve pressure regulator if necessary to obtain the correct firing rate. Valve outlet pressure must not be lower than 3.2 inches w.c. nor higher than 3.8 inches w.c.

❑ For propane gas, contact your propane supply for procedure to verify firing rate.

Check combustion using instruments

WARNING Do not attempt to confirm combustion simply by inspecting the flame visually. You must use combustion test instruments. Failure to properly verify/adjust combustion could allow unsafe operation of the burner, resulting in severe personal injury, death or substantial property damage.

Fuel	CO_2		O_2	
	Minimum	Maximum	Maximum	Minimum
Natural Gas	8.5%	10.4%	6.2%	3.0%
Propane Gas	9.5%	11.8%	6.0%	2.9%

❑ Insert test probe into vent above appliance to sample flue products. The results should show CO_2 or O_2 as follows:

❑ If the combustion results are outside the range above, and the firing rate of the burner is within 5% of rated input, open or close the air band until the CO_2 (or O_2) are acceptable.

WARNING After CO_2 (O_2) tests are completed satisfactorily, measure flue products for carbon monoxide (CO) concentration. The CO must not exceed 50 ppm adjust to “air free”, or other if specified by local codes.

❑ Check pressure overfire in appliance. Refer to appliance manual for recommended reading and barometric damper instructions for proper setting of damper.

5. Perform checkout procedures • fill out certificate

Verify burner/appliance operation

Check burner/appliance/controls operation

❑ Test operating and limit controls on appliance as specified in appliance instruction manual.

❑ Check operation of the 60200FR primary control by forcing Latch-up (three consecutive lockouts during the same call for heat) by closing the main manual gas cock and cycling the burner. Press the reset button to reset when the control locks out on flame failure. Do this two times and the control should enter Latch-up. See page 12 to reset control.

❑ Check operation of airflow switch.

- ❑ Cycle the burner off with the appliance controls. Then turn off power to the appliance. Remove the two sensing lines from the airflow switch by loosening the plastic sealing nuts and pulling the aluminum sensing tubes out of the sockets.
- ❑ With the sensing lines removed, turn on power to the appliance and set the controls to call for heat. Watch the manometer on the combination gas valve outlet pressure tap. After the control performs its pre-purge, it will try to turn on the gas valve. The gas valve should not open with the airflow sensor lines removed. Set the controls to stop the call for heat and turn off power to the appliance. If the airflow switch operates correctly (gas valve doesn't open), continue with normal operation. If switch fails to operate correctly, replace the switch and retest.

WARNING NEVER attempt to adjust the air pressure switch setting. This could allow unsafe operation of the burner, resulting in potential of severe personal injury, death or substantial property damage.

Verify burner operation

❑ Start and stop the burner several times, allowing the primary control to sequence through normal operation. Verify correct operation of burner and control throughout.

Verify burner/appliance operation *(cont.)*

Verify vent system operation

❑ Verify vent is operating correctly and flue products are properly exhausted from building.

❑ Check operation of barometric damper and spill switch.

❑ If the building contains any exhaust fans or conditions that could affect vent performance, check burner/appliance/vent operation with exhaust fans (or other conditions) operating.

Prepare burner for normal operation

❑ Cycle burner off with appliance controls. Then turn off power to the appliance.

❑ Close the main manual gas valve.

❑ Remove the U-tube manometer line from the combination gas valve outlet pressure tap hose barb. Remove hose barb and replace 1/8" NPT pipe plug in tapping.

❑ Verify all components and wires are in place and burner is ready for operation.

Train the user

❑ Train the user to operate the burner and appliance under normal conditions. Explain procedure to shut down burner/appliance when required.

❑ Review the user's information manual (and the appliance manual) with the user.

❑ Verify the user is aware of all procedures specified in the manual.

❑ Verify user will not store or use combustible liquids or materials or contaminants in the vicinity of the burner/appliance.

Fill out the certificate

❑ Fill out the Installation/Service certificate on the back page of this manual.

6. Maintenance and service procedures

WARNING This burner should be started and serviced at least annually by a qualified service technician. Failure to properly maintain and service the burner could result in severe personal injury, death or substantial property damage.

WARNING Turn off power to appliance and close main manual gas valve when servicing burner. See warnings on page 2 and elsewhere in this manual regarding correct procedures. Failure to comply could result in severe personal injury, death or substantial property damage.

Annual start-up & service

Annual start-up and service procedures

❑ Discuss burner/appliance operation with user to determine any problems that may have occurred during the previous season and to verify user is aware of proper operation and care of the burner/appliance.

❑ Turn off power to appliance and close main manual gas valve.

❑ Remove burner from appliance and inspect diffuser plate, ignitor electrode and flame rod (see Figure 4, page 8).

❑ Remove ignitor electrode/flame rod assembly to clean and adjust if necessary.

❑ To remove assembly:

1. Remove the connector wires from the flame rod and ignitor electrode.
2. Remove the lock nut securing the housing end of the assembly support rod.
3. Remove the access cover (item 14, page 21) by loosening the screw securing it in place.
4. Pull the electrode/flame rod assembly straight back and out.
5. Clean the assembly if necessary. Replace any part that is damaged.
6. Check the dimensions of the assembly against those shown in Figure 5, page 8. Adjust if necessary.

NOTICE If the inside surface of the air tube and/or diffuser plate need to be cleaned, clean them with a vacuum cleaner with brush attachment before replacing the electrode/flame rod assembly.

7. Replace the electrode/flame rod assembly:
   - Insert the electrode/flame rod assembly into the air tube, with support legs down (electrode/flame rod up).
   - Rest the support rod on the scroll extension and against the right side of the support rod mounting stud. Keep the support rod pressed against the mounting stud.
   - Slide the assembly forward. Keep the support rod mounting hole pointed upward.
   - When you feel the flame rod go through its diffuser plate hole, lift the support rod and slide its mounting hole onto the mounting stud.
   - Replace the locking nut on the mounting stud and tighten.
   - Replace the access cover (item 14, page 21) and tighten its retainer screw.

WARNING After replacing the electrode/flame rod assembly, follow the inspection procedure on page 8 to verify the electrode and flame rod are correctly positioned. Failure to properly install them can result in equipment failure.

❑ Close the housing cover plate and secure in place.

❑ Check the burner flange gasket. It must be in good condition. Replace gasket on burner flange and mount burner in appliance, securing to mounting studs.

❑ Perform the complete checkout procedures of pages 11 through 14, including system inspection and checks.

6. Maintenance and service procedures *(continued)*

Maintenance/service procedures

Cleaning blower wheel

1. The blower wheel accumulates dust and debris from normal operation. You will need to clean the wheel blades periodically to prevent reduction in airflow. To clean blades, remove the two bolts securing the motor to blower housing.

2. Slide the motor out and rotate to remove and access blower wheel.

3. Use a brush and vacuum to clean each blade and the blower housing interior.

4. Replace motor/wheel in blower housing and secure with the two bolts.

5. Push wire slack back into junction box.

Replacing blower motor or wheel

1. If either the blower wheel or motor must be replaced, remove the two bolts securing the motor to housing.

2. Disconnect the motor wires in the burner junction box.

3. Loosen the Allen screw securing the blower to the motor shaft and remove the wheel.

4. When assembling the replacement assembly, slide the wheel onto the motor shaft and use feeler gauges to set a space of 3/64 inch between the blower wheel and the motor face.

5. Replace the motor/wheel assembly in the housing, wire the motor leads and secure the motor with the two bolts.

Motor maintenance

The Carlin PSC motor is constructed with permanently-lubricated bearings, and requires no oiling. Should you replace the original motor with another type of motor, occasional oiling may be required, depending on motor design and manufacturer's recommendations.

WARNING Any time you replace a component or disassemble any part of the burner for service/ maintenance, perform a complete operational test after reassembly to verify the burner operates correctly. Failure to verify operation could result in severe personal injury, death or substantial property damage.

7. Troubleshooting

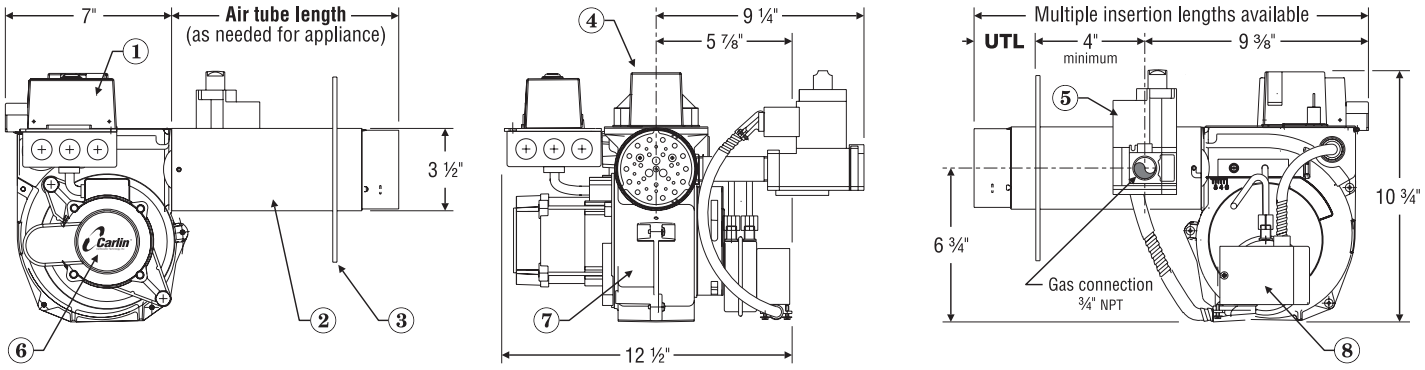
Problem	Possible cause	Corrective action
WARNING		These procedures must only be performed by a qualified service technician. Use care when performing tests on electrically or mechanically live parts. Disconnect power to burner/appliance and close main manual gas valve when removing components for service. Failure to comply could result in severe personal injury, death or substantial property damage.
Burner motor will not start	120 VAC power circuits	Check voltage and polarity at entrance to appliance and burner. Check fuse or breaker protecting circuit. Check appliance limit circuit — are controls calling for heat? Check electrical connections.
	Primary control is in Lockout	Red LED will be on. Press the reset button for 1 second. If red LED comes back on in a couple of seconds, there could be voltage present to the gas valve or the motor relay contacts could be stuck in the closed position. The Safety Monitoring Circuit causes lockout if this occurs. If there is no voltage present at the gas valve (using a voltmeter), replace the control. If there is voltage at the gas valve, check all wiring for accuracy. Replace the control if the 60200FR gas valve wire shows 120 VAC when disconnected from the burner wiring.
	Primary control is in Latch-up	Red and amber LED's will both be on. See page 12 for procedure to handle this condition. When resetting control from Latch-up, be sure to investigate what caused the repeated failures. Correct the condition.
	Incorrect wiring	Check wiring against appliance and burner wiring diagrams.Verify all connections are secure.
	Defective motor	Remove motor leads from junction box and apply power directly. If motor fails to operate, then replace.
	Defective primary control	If control receives power to both the black and red/white wires, but doesn't start the motor, the control may be defective. Replace control.
Repeated flame failures — burner won't light	Airflow too high	Check air band setting against Table 1, page 7. Reposition to correct setting if necessary.
	Gas orifice wrong	Check gas orifice size. See pages 7 and 8 for procedure.
	Wrong manifold pressure	Check combination gas valve outlet pressure — should be between 3.2 and 3.8 inches w.c.
	No gas supply to combination gas valve	Check main manual gas valve — might be closed. Attach manometer to combination gas valve supply pressure tapping and check pressure. If no pressure, trace gas line to find why no gas is available.
	Gas valve not opening	Check gas supply pressure to combination gas valve. Pressure in excess of 14 inches w.c. will cause valve to lockup. Check voltage to gas valve. Is gas valve receiving 120 VAC? If gas valve is receiving 120 VAC and not opening, and gas supply pressure is below 14 inches w.c., replace gas valve.
	Airflow switch	Check electrical connections and sensing connections to airflow switch. If blower operates, check across switch to see if it closes. If switch doesn't close with blower operating, measure the differential pressure between the two sensing lines with a manometer. Differential should be 2.5" w.c. minimum. If switch is correctly connected, but won't close, replace airflow switch.
	Primary control defective	Check voltage to gas valve during TFI. If no voltage to valve, replace control.

7. Troubleshooting *(continued)*

Problem	Possible cause	Corrective action
WARNING		These procedures must only be performed by a qualified service technician. Use care when performing tests on electrically or mechanically live parts. Disconnect power to burner/appliance and close main manual gas valve when removing components for service. Failure to comply could result in severe personal injury, death or substantial property damage.
Burner lights, but locks out after TFI	Insufficient flame signal	Flame signal at test jack on 60200FR must be at least 0.8 microamps. Check following if signal is lower. Flame rod may be touching ground, insulator may be broken, or contamination may cause path to ground. Inspect and clean if necessary. See Figures 4 and 5, page 8 for more information. Check flame rod position in burner per page 8, Figures 4 and 5. Adjust if necessary. Flame rod must be correctly positioned for best flame signal.
	Ignition — no spark or poor spark	Check wire connections to ignitor electrode. Check position of ignitor electrode per page 8, Figures 4 and 5. Adjust if needed. Check primary voltage to ignitor. If ignitor receives 120 VAC and doesn't generate spark, replace ignitor.
	Airflow	Check air band setting against Table 1, page 7.
	Wrong orifice size	Verify orifice size per Table 1, page 7. See pages 7 and 8 for procedure.
	Manifold pressure	Check combination gas valve outlet pressure — should be between 3.2 and 3.8 inches w.c.
	Inadequate gas supply	Check line pressure at combination gas valve supply pressure tapping. Gas pressure must be at least 5 inches w.c. If other appliances are on same line or regulator and burner pressure drops when they are on, line is undersized. Contact your gas supplier. If gas pressure is always low, check supply regulator setting and adjust if necessary. Gas pressure must not exceed 14 inches w.c.
	Improper draft	Over-fire draft should normally be no more than 0.02 inches w.c. Refer to appliance manufacturer's instructions for proper draft reading. Adjust barometric draft regulator if necessary.
	Flame rod grounded	Check flame rod and insulator. If flame rod is grounded in any way, the control will lockout after the trial for ignition.
	120 VAC polarity	Check polarity of power supply. If hot and neutral wires are reversed, flame rod circuit cannot sense flame correctly. Control will lockout after the trial for ignition.

8. Dimensions and mounting information

Figure 9 *Dimensional data*



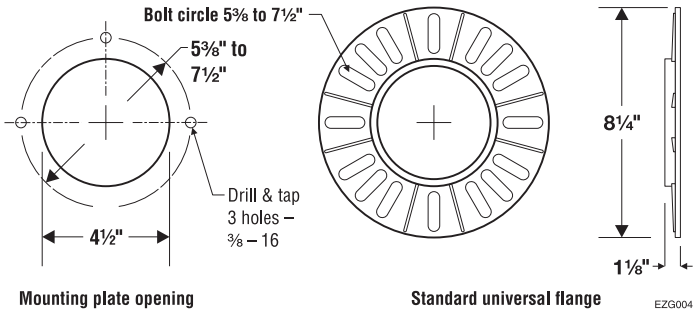
1. Carlin 60200FR microprocessor control
2. Air tube
3. Flange (selected to meet appliance requirements)
4. Carlin 41800 solid state ignitor
5. Combination gas valve
6. Carlin PSC motor
7. Cast aluminum blower housing
8. Air flow proving switch

Mounting burner to appliance

WARNING The universal flange is intended only for firing chambers with negative overfire pressure. For pressurized firing, you must obtain a burner with a welded flange, designed for use with the appliance. Failure to comply could result in severe personal injury, death or substantial property damage.

Prepare the burner opening on the front of the appliance as shown in Figure 10 if not already supplied. See page 7 to determine the location of the flange on the burner air tube. Tighten the flange locking screws firmly.

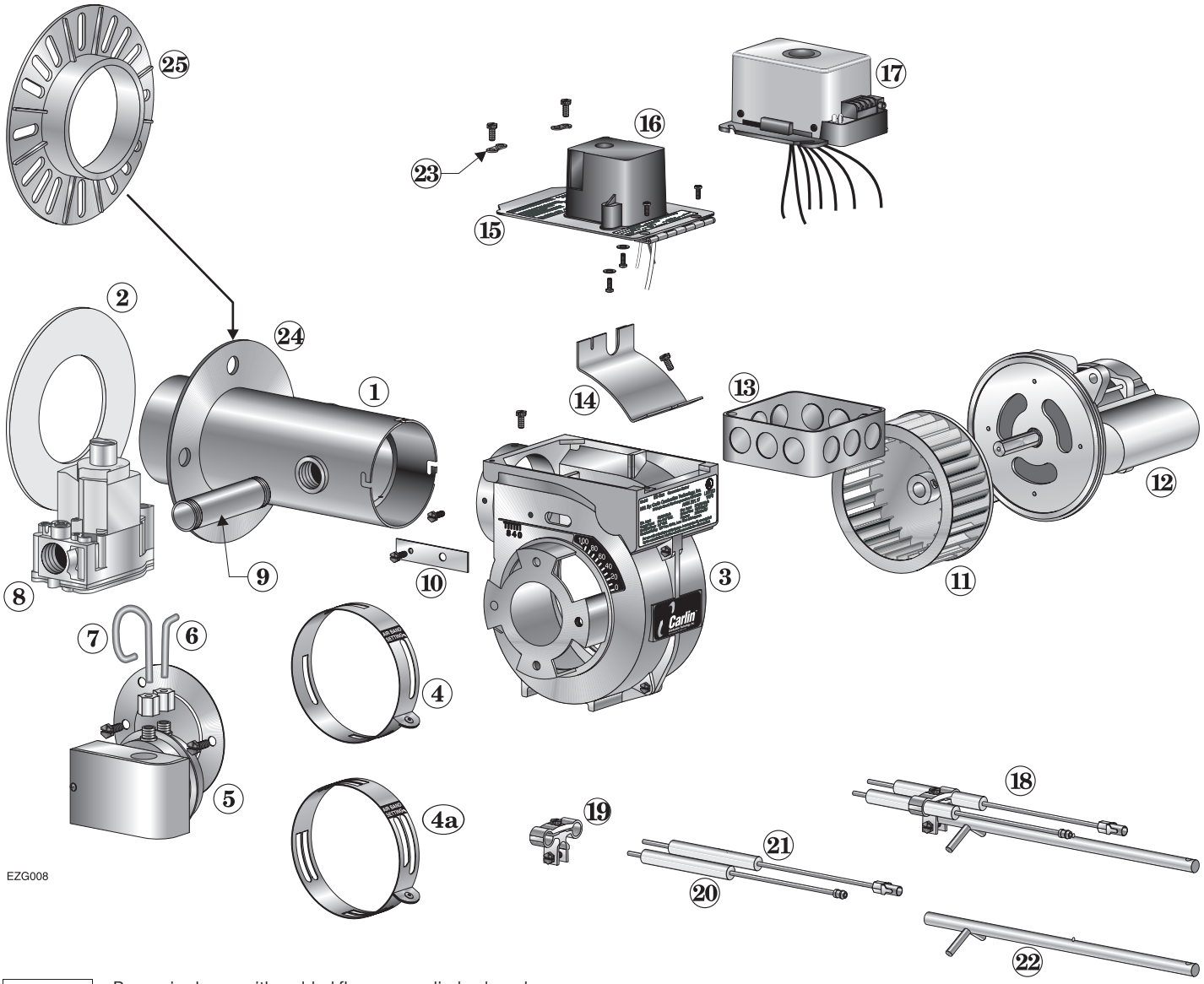
Figure 10 *Universal flange mounting*



9. Replacement parts

Item number	Description		Part number
1	Air tube with gas manifold & diffuser:	10-inch air tube with "A" diffuser 10-inch air tube with "B" diffuser 12-inch air tube with "A" diffuser 12-inch air tube with "B" diffuser 14-inch air tube with "A" diffuser 14-inch air tube with "B" diffuser 16-inch air tube with "A" diffuser 16-inch air tube with "B" diffuser 18-inch air tube with "A" diffuser 18-inch air tube with "B" diffuser	99392A 99392B 99392D 99392E 99392G 99392H 99392I 99392P 99392M 99392K
2	Gasket, mounting flange		40212
3	Blower housing		98550
4 4a	Air band, 1-slot Air band, 2-slot		98100 98101
5	Airflow switch and mounting plate assembly		98522
6	Blower inlet sensing line		98554
7	Blower outlet sensing line		98555
8	Gas valve, VR4305M-4540		98523
9	Gas orifice nipple, ¾" NPT both ends x 4"	Starter hole orifice Drilled to size	9938440XX Contact factory
10	Escutcheon plate		98548
11	Blower wheel		77933
12	Motor, Carlin PSC, 1/15 HP		98629
13	Junction box, 4" x 4", with grommet and lock washer		contact factory
14	Access cover		98281
15	Hinged cover plate for Carlin ignitor		98498
16	Ignitor, Carlin electronic Model 41800		4180002
17	Primary control, Carlin 60200FR microprocessor flame rod control		6020002FR
18	Ignitor electrode/flame rod assembly:	for 10-inch air tube for 12-inch air tube for 14-inch air tube for 16-inch air tube for 18-inch air tube	98572A 98572B 98572C 98572D 98572E
19	Electrode holding base with hardware		23135S
20	Flame rod:	for 10-inch air tube for 12-inch air tube f or 14-inch air tube f or 16-inch air tube f or 18-inch air tube	98434A 98434B 98434C 98434D 98434E
21	Ignitor electrode:	for 10-inch air tube for 12-inch air tube f or 14-inch air tube f or 16-inch air tube f or 18-inch air tube	98433A 98433B 98433C 98433D 98433E

9. Replacement parts *(continued)*



NOTICE Burner is shown with welded flange, supplied only on burners ordered for specific appliance applications. Other burners are supplied with the universal flange (item 24).

Item number	Description		Part number
22	Ignitor electrode/flame rod support rod:	for 10-inch air tube for 12-inch air tube for 14-inch air tube for 16-inch air tube for 18-inch air tube	98571A 98571B 98571C 98571D 98571E
23	Transformer hold-down tab, 2 required		44842
24	Welded flange (when supplied)		Included with air tube
25	Standard universal flange (supplied on burners without welded flange)		81364BLU

Where appliance instructions differ from this manual, follow the appliance instructions.

Where appliance instructions differ from this manual, follow the appliance instructions.

Installation/service certificate

Installation data

Burner model	Serial number	Measured firing rate, Btuh	Gas orifice drill size	Inlet gas pressure, IWC
CO_2%	O_2%	Fuel (natural or propane)	Were all controls tested?	
Comments about installation/start-up:				
Installer's name:	Company name:		Company address:	Phone:

Service history

Date	Technician	Company/address	Describe work performed