

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, 2.3 or 2.5 amps |
| Ignition: | Carlin Model 41800 solid state ignitor |
| Control: | Carlin Model 60200FR microprocessor control |
| Agencies: |UL Listed (US and Canada) |



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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Installation video can be seen at
www.carlincombustion.com or www.youtube.com

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Carlin Combustion Technology, Inc.

126 Bailey Road
Phone 203-680-9401

North Haven, CT 06473
Fax 203-680-9403

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.

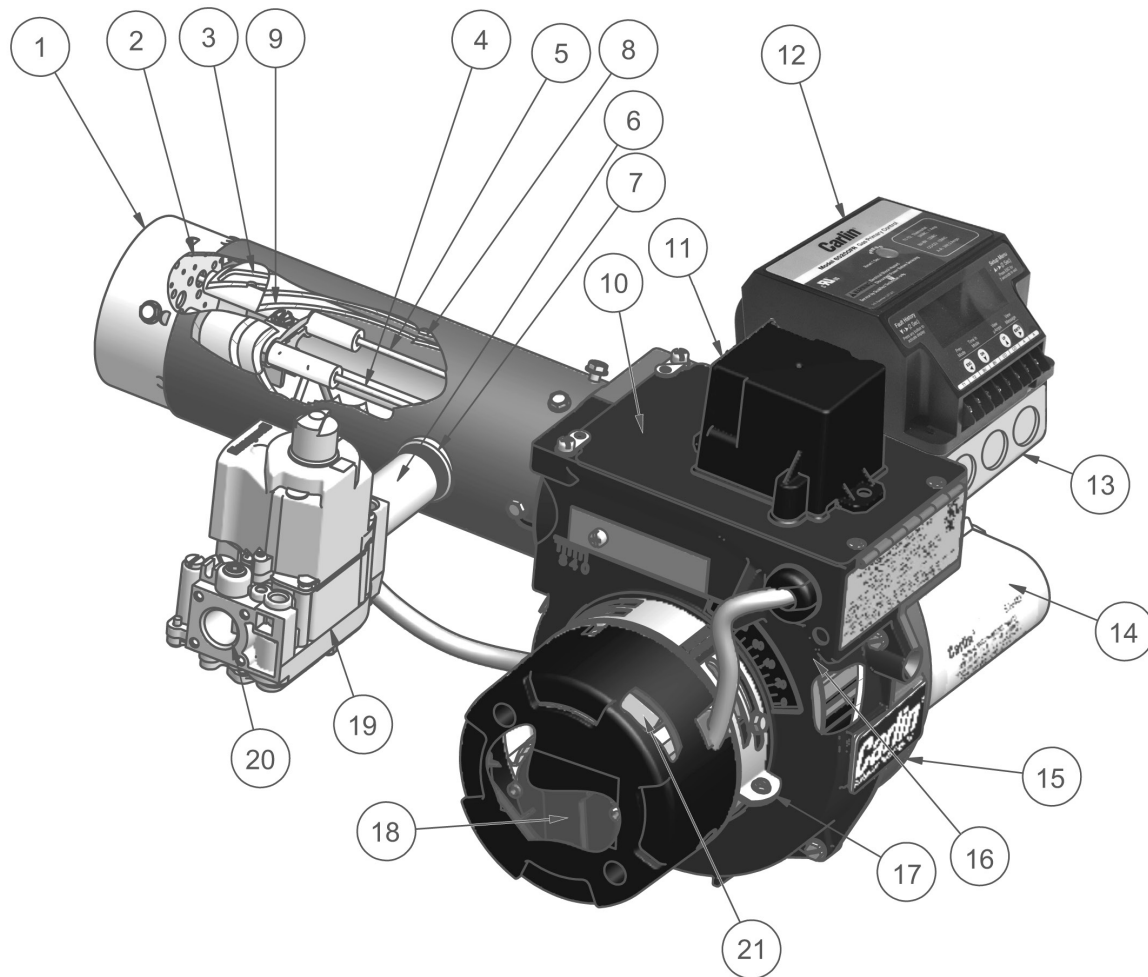
Burner listing

Carlin EZGas Pro 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.

EZGas Pro burner at-a-glance



- | | |
|---|--|
| 1 Air tube (flange omitted for clarity), with powder coat paint finish | 12 Primary control (Carlin Model 60200FR microprocessor-based interrupted ignition flame supervisory control, for use with flame rod flame rectification) |
| 2 Diffuser plate (interchangeable hole or slot pattern) | 13 Burner junction box |
| 3 Gas manifold (concentric cylinders swaged at ends) — Gas manifold delivers gas to gas openings on inner wall of manifold near the diffuser plate. | 14 Motor (Carlin PSC motor, with permanently-lubricated bearings and automatic thermal overload protection) |
| 4 Ignitor electrode | 15 Blower housing (cast aluminum), with powder coat paint finish |
| 5 Flame rod | 16 Blower wheel |
| 6 Gas orifice nipple — see pages 7 and 8 for orifice sizing requirements | 17 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) |
| 7 Gas inlet connection (gas entrance to gas manifold) | 18 Airflow proving switch — Prevents burner from firing if air is not moving |
| 8 Gas manifold outer wall | 19 Combination gas valve (with integral gas pressure regulation — set for 3½" w.c. outlet pressure) - 24V |
| 9 Gas manifold inner wall | 20 Gas supply entrance — ¼" NPT; 5" w.c. min; 14" w.c. max |
| 10 Hinged cover plate (for access to blower wheel & electrodes) | 21 24V Transformer |
| 11 Ignitor — Carlin Model 41800 solid state electronic ignitor — 9,000 volts, interrupted duty rated) | |

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.

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.

Chimney, chimney liner & exhaust vent system must be inspected and comply with all applicable local and national codes including National Fuel Gas Code (NFPA54 / ANSI Z223.1), ANSI Z21.8 or CAN/CGA B/49 Canada.

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

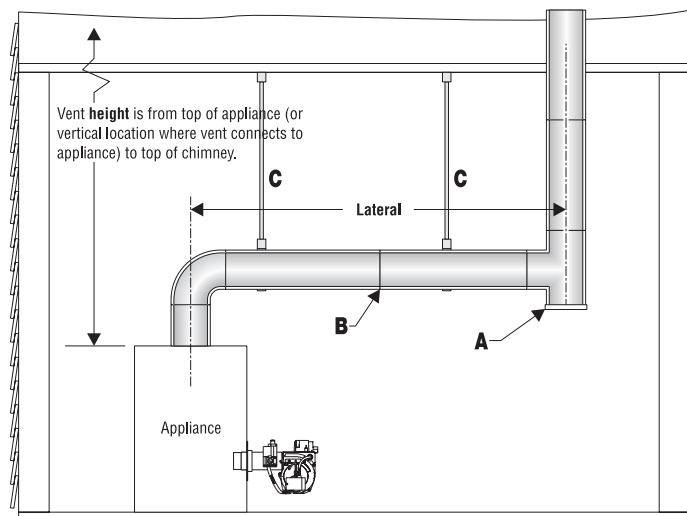
Vent/chimney sizing

- 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

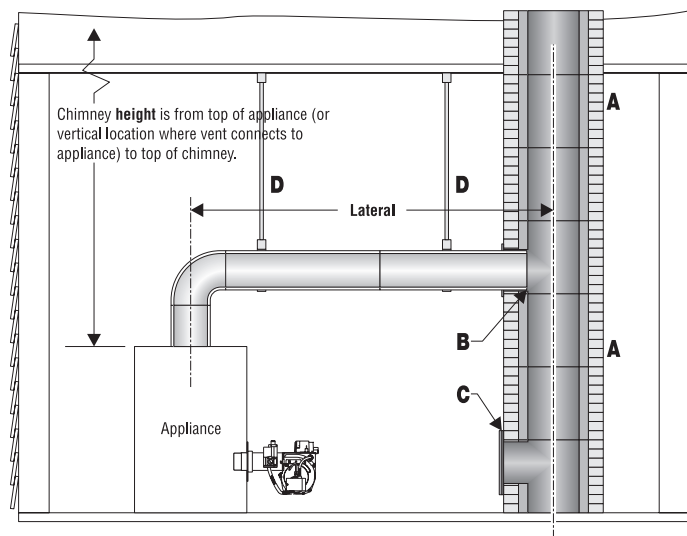
- Secure all metal vent joints with screws, following the vent manufacturer's instructions. Seal all joints in the vent system and chimney. Repair masonry chimney lining and repair all mortar joints as needed.
- Install a double-acting barometric draft regulator to the vent piping. (The damper must be located in the same space as the appliance.) Install a manual reset spill switch (blocked vent switch) per spill switch manufacturer's instructions. Wire the switch into the appliance limit circuit to shut off the appliance/burner if sustained downdraft or flue blockage should occur.
- For through-wall vented appliances, follow the venting recommendations provided by the appliance and power venter (if used) manufacturers.
- 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.

EZG0102

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.

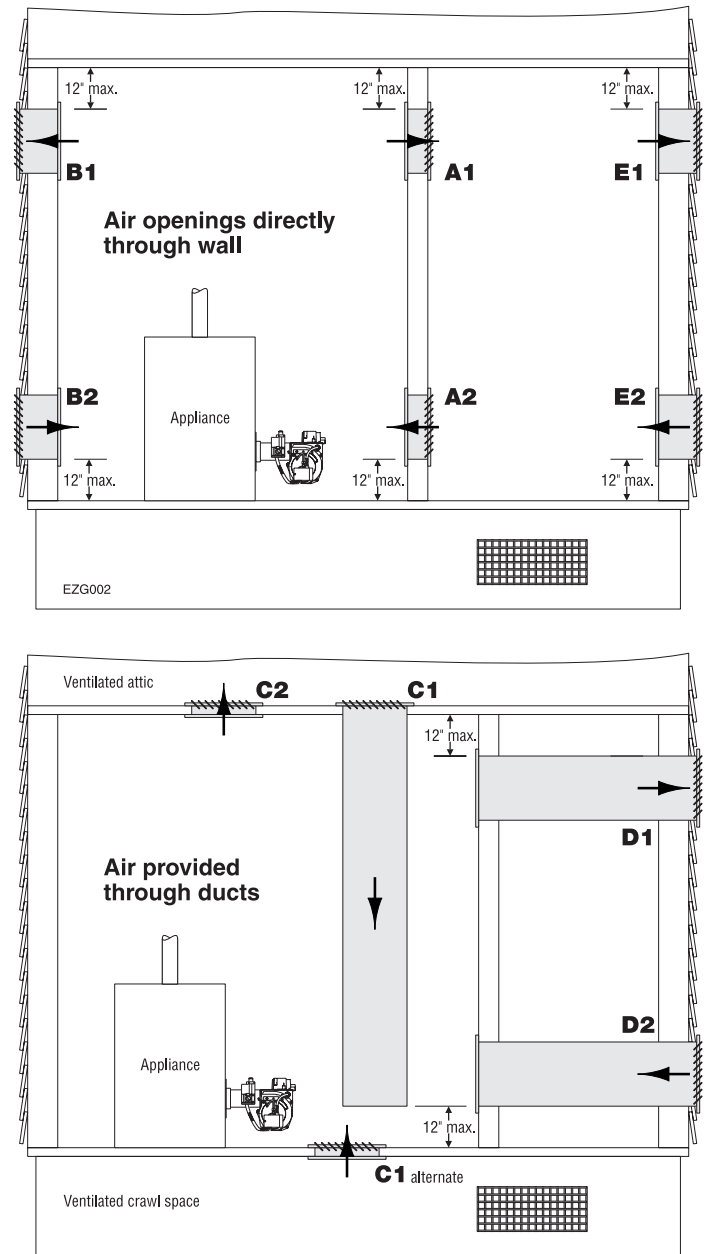
Optional outside air connection

For spaces not fitted with large enough air openings, you may be able to apply the optional burner cover kit (RESCVR5S) with Outside Air/Direct Vent kit (50433KIT) to provide outside combustion air to the burner. You must use a vent outlet/air inlet termination approved by the appliance manufacturer. Refer to the appliance and outside air kit manuals for instructions.

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 outside air kit, 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 $60 \div 0.7 = 85.7$ 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).

Seal the appliance: Seal all flue-gas containing joints. Seal all connections to the vent piping for breeching.

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 $\frac{1}{4}$ " of the inside face of the combustion chamber. If the space around the burner air tube is more than $\frac{1}{4}$ ", 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 (chrysothalites) 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 chrysothalites. 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 EZGas Pro burners is for firing chambers with negative or positive overfire pressure. The flange should be sealed with high temperature silicone. Failure to comply could result in severe personal injury, death or substantial property damage.

See page 19 for required dimensions and bolt locations.

Model EZGas Pro gas burner — Instruction manual

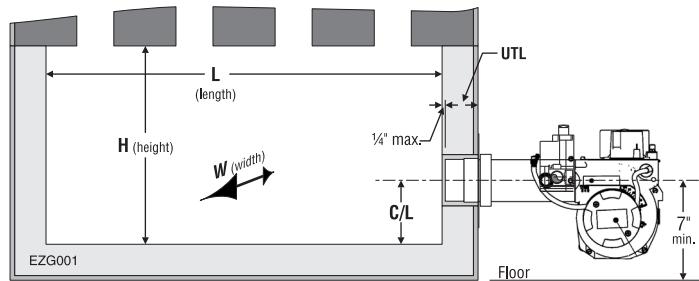
Where appliance instructions differ from this manual, follow the appliance instructions.

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 1/4 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 6, 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 EZGas Pro burners

| Appliance Input BTU | Orifice Drill Size | | Diffuser Plate | Air Band Type | Approx. Air Band Setting | | | Minimum Chamber Dimensions (in inches) (VC= min. diam. Of vertical cylinder chamber) | | | | | |
|---------------------|--------------------|---------|----------------|---------------|--------------------------|------------|------------|---|-------|----|----|-------|----|
| | Nat Gas | Propane | | | C Diffuser | B Diffuser | A Diffuser | 9-Slot Diff | C/L | L | W | H | VC |
| Note 1 | Note 2 | | Note 3 | | Note 4 | | | Notes 3, 4, 5 | | | | | |
| 50,000 - 75,000 | 5/32 | 1/8 | C | 1-Slot | 5% | | | 3 | 7 | 6 | 8 | 7 | |
| 75,000 - 100,000 | 3/16 | 9/64 | B or 9-Slot | 1-Slot | | 10% | 20% | 3 1/2 | 8 | 7 | 9 | 8 | |
| 100,000 - 125,000 | 7/32 | 11/64 | B or 9-Slot | 1-Slot | | 25% | 35% | 3 1/2 | 9 | 7 | 9 | 8 1/2 | |
| 125,000 - 150,000 | 1/4 | 13/64 | B or 9-Slot | 1-Slot | | 35% | 45% | 4 | 11 | 8 | 10 | 9 1/2 | |
| 150,000 - 175,000 | 9/32 | 7/32 | B or 9-Slot | 1-Slot | | 50% | 75% | 4 | 12 | 8 | 10 | 10 | |
| 175,000 - 200,000 | 5/16 | 1/4 | A or 9-Slot | 2-Slot | | | 35% | 50% | 4 1/2 | 14 | 8 | 11 | 12 |
| 200,000 - 225,000 | 5/16 | 1/4 | A or 9-Slot | 2-Slot | | | 40% | 65% | 4 1/2 | 15 | 9 | 11 | 13 |
| 225,000 - 250,000 | 11/32 | 9/32 | A | 2-Slot | | | 50% | 80% | 4 1/2 | 16 | 9 | 11 | 14 |
| 250,000 - 275,000 | 13/32 | 5/16 | A | 2-Slot | | | 60% | | 4 1/2 | 17 | 9 | 11 | 15 |

| | |
|--------|--|
| Note 1 | Firing rate should be within +/- 5% of rated input for the appliance. 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 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 | Once the orifice is drilled, minor adjustments to the firing rate can be achieved by adjusting the gas valve outlet pressure between 3.2" and 3.8" w.c. If the rate remains too low, re-drill the orifice with a 1/64" larger bit (for details, see Make Final Burner Adjustments in Section 4 of this manual.) |
| Note 3 | For BTU ranges that are covered by both the 9-Slot Diffuser Plate and the A or B Diffuser Plate, it is likely that either diffuser will work, but one may provide better combustion. The 9-slot's short flame pattern favors appliances with shorter combustion chambers. |
| Note 4 | Use this as the starting setting only. Adjust air band setting, if necessary, after performing combustion testing (see page 13). |

| Usable Tube Length for Insertion Depth | | |
|--|----------|----------|
| Burners with welded flange have fixed insertion depths. Verify the insertion depth is correct for the appliance. On burners with adjustable flanges, the Usable Tube Length (UTL) available for setting the insertion depth varies with air tube length: | | |
| Tube Length | UTL min. | UTL max. |
| 10" | 1 3/4" | 3 1/2" |
| 12" | 1 3/4" | 5 1/2" |
| 14" | 1 3/4" | 7 1/2" |

| | |
|--------|--|
| Note 3 | Some tested appliances may operate satisfactorily with dimensions less than those noted in the table. |
| Note 4 | Horizontal cylindrical chambers - diameter must be no less than column W. 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 of furnace, provided it is recommended by the appliance manufacturer. |

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

Verify and install diffuser plate

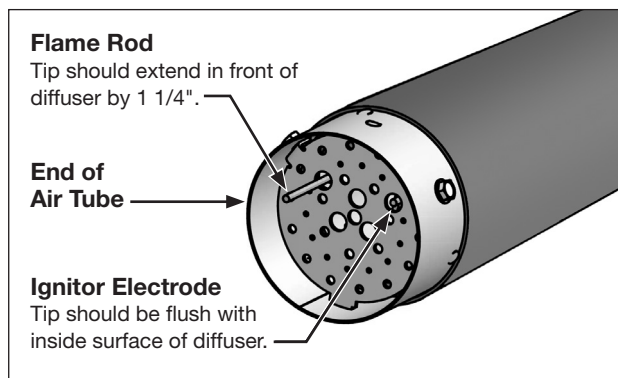
Each plate will be stamped on the face of the diffuser with a letter designating the diffuser type (Example A, B, C, 9S).

1. Install the diffuser on the air tube by placing the wide tab into the slot at the end of the air tube with the 90° bent tabs of the diffuser plate facing into the air tube.
2. Fasten diffuser plate to the air tube with the two screws provided.
3. Make sure the flame rod and electrode are not touching the diffuser plate.
4. If flame rod or electrode is making contact with the diffuser plate the burner will not prove flame and will enter a lockout condition

Flame rod and ignitor electrode

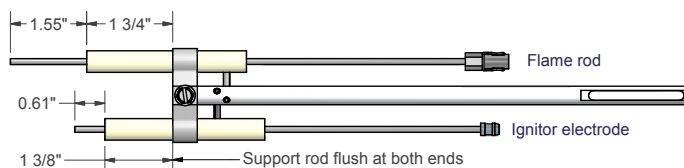
- Inspect the burner from air tube end. Flame rod should extend through the diffuser plate as shown in Figure 4. Ignitor electrode should be flush with inner face of diffuser plate as shown.
- Push rod completely forward.

Figure 4 Flame rod and ignitor placement



- 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 15 for removal instructions and verify dimensions per Figure 5). Bend the end of the flame rod or ignitor electrode as required. Replace assembly and check spacing again. Continue adjusting as necessary until neither flame rod nor electrode is closer than 1/16" to the diffuser.

Figure 5 Flame rod/ ignitor electrode assembly



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.

- Unplug wire harness from combination gas valve.
- Remove the combination gas valve (item 20, page 3) and the orifice nipple (item 6, 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).

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 all gas piping connections per Figure 6. The orifice nipple is installed between the gas valve and the burner connection. Make sure the arrow on the orifice nipple label points in the direction of gas flow.

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. Connect wire harness to valve.

NOTICE LP gas conversion kit not required when installing LP gas. Manifold gas pressure required for both natural gas and LP is 3.5" WC unless specified.

Inspect components and wiring

- Visually inspect all burner components and wiring.
- Verify that wiring is intact and connectors 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

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

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.

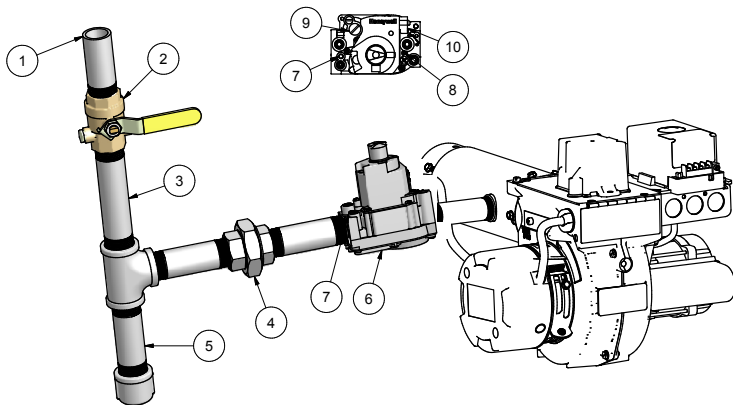
Do not hold gas valve with pipe wrench. Use crescent wrench or other smooth-jawed device. Do not over-tighten.

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

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) | | | | | |
| 1/2 | 92 | 63 | 50 | 43 | 38 |
| 3/4 | 190 | 130 | 105 | 90 | 79 |
| 1 | 350 | 245 | 195 | 170 | 150 |
| 1 1/4 | 730 | 500 | 400 | 350 | 305 |
| Natural gas @ .60 specific gravity, pressure drop 0.5 in. w.c. (note 1) | | | | | |
| 1/2 | 120 | 82 | 66 | 57 | 50 |
| 3/4 | 250 | 170 | 138 | 118 | 103 |
| 1 | 465 | 320 | 260 | 220 | 195 |
| 1 1/4 | 950 | 660 | 530 | 460 | 400 |
| Propane gas @ 1.55 specific gravity, pressure drop 0.3 in. w.c. | | | | | |
| 1/2 | 57 | 39 | 31 | 27 | 24 |
| 3/4 | 118 | 81 | 65 | 56 | 49 |
| 1 | 217 | 152 | 121 | 105 | 93 |
| Propane gas @ 1.55 specific gravity, pressure drop 0.5 in. w.c. | | | | | |
| 1/2 | 74 | 51 | 41 | 35 | 31 |
| 3/4 | 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

- 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 EZGas Pro burners | | | |
|---|-----------------|-----------------|-----------------|
| Motor--> | 1/15 HP | 1/7 HP | 1/6 HP |
| During ignition | 2.5 AMPS | 2.8 AMPS | 3.0 AMPS |
| Steady operation | 2.0 AMPS | 2.3 AMPS | 2.5 AMPS |

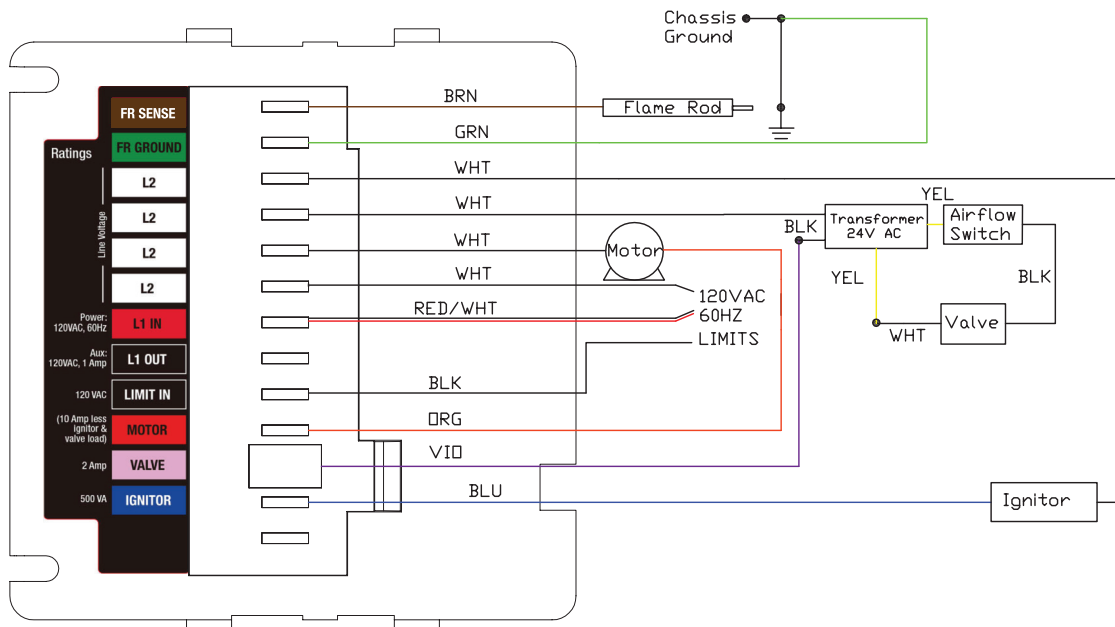
- The 120 VAC power connections to the black and red/white wires of the 60200FR must be the same polarity **from the same power source**. DO NOT attempt to supply separate power sources. Check the power from the heat exchanger with a voltmeter. Verify that the supply to the black and red/white wires are from the 120 VAC HOT side and that the power is no less than 102 VAC nor more than 132 VAC. Also verify that the voltage between neutral and ground does not exceed 3 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 not sense flame and go into a lockout condition).

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. When the EZGas is properly set up, the flame signal strength is typically 2 microamps or greater.

Figure 7 Wiring diagram — EZGas Pro 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

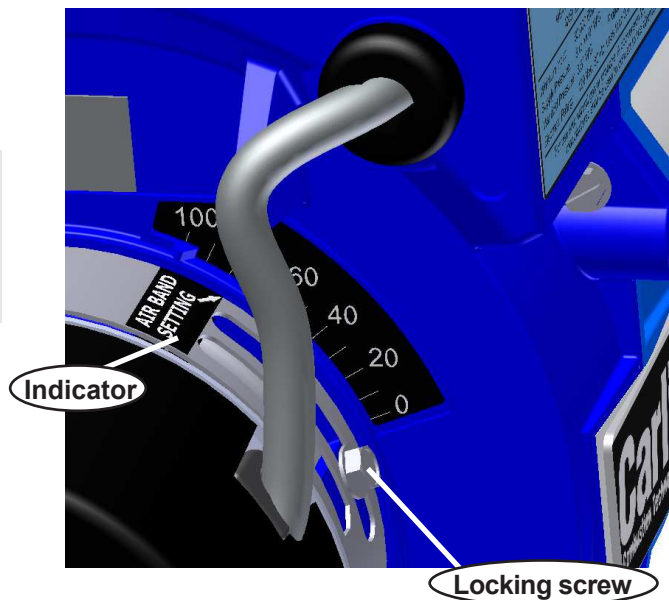
See Figure 8. Loosen air band locking screw. Then rotate band until indicator points to setting given in Table 1, page 7. Tighten air band locking screw.

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 three seconds 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 close the Alarm contacts relay.

WARNING If lockout does not occur, replace the 60200FR control.

6. Reset the limit to stop the call for heat. Reset the 60200FR from lockout.

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.

Programming and Setup

Definitions:

Call for Heat (C.F.H.): TT on + Limit In on + BV on + CO on

Pre-Purge: Time period the motor is on prior to T.F.I.

Trial for Ignition: (T.F.I.): Burner Flame Establishing period

Post-Purge: Time period the motor is on after a Call for Heat has been satisfied

Post-Purge Interrupt: If selected is Time at which the 120 second Post-purge will be interrupted if a C.F.H. occurs during the Post-purge.

Allowed Recycles: Number of Recycles allowed during a single C.F.H. prior to lockout due to flame loss.

TT Used: Select “NO” when not using TT, select “YES” when using TT

Baseline Reset: Resets the baseline statistics used by the fault history

Factory Default: Resets ALL settings to the “Factory Defaults”

| Pre-Purge* | T.F.I.* | Post-Purge* | Post-Purge Interrupt* | Allowed Recycles | TT Used | Reset Baseline | Factory Default |
|------------|---------|-------------|-----------------------|------------------|---------|----------------|-----------------|
| | | 120 | | | | | |
| | | 60 | | | | | |
| 90 | | 30 | | | | | |
| 30 | | 15 | | 3 | | | |
| 10 | 6 | 10 | 60 | 1 | Yes | Yes | Yes |
| 0 | 4 | 0 | Never | None† | No | No | No |

Shaded box = default settings

*In seconds

†MA code (“N” models) are non-recycling and will lock out on flame failure

WARNING Do not start the burner if the combustion chamber contains gas.

Button Functions

Reset

1. Return to Standby from other operating states. Press for ½ second
2. Reset control from Lockout. Press for 1 second
3. Reset control from Latch-up. Press for 30 second

Display Control

ESC / ◀

- Display previous Operating State from Operating screen.
- Exit Log or Setup screen to Operating screen with 3 second press.
- Scroll through recent fault in Log screen.
- Scroll to previous parameter in Setup screen.
- Reject parameter change from Setup screen. Displays UNCHANGED on line 2 then after 2 sec, displays parameter with unchanged value.

DN / ▼

- Display Time on line 2 of Operating screen.
- Scroll down when in Log or Setup screen.

UP / ▲

- Display Flame Rod – μAmps on line 2 of Operating screen.
- Scroll up when in Log or Setup screen.

ENTR / ▶

- Display status/fault messages on line 2 from Operating screen.
- Move to less recent fault in Log screen.
- Move to next parameter in Setup screen.
- Accept parameter change from Setup screen. Displays ENTERED on line 2 then after 2 sec, displays parameter with changed value.

UP / ▲ & ENTR / ▶ for 3 seconds

- Enter Setup screen.

DN / ▼ & ENTR / ▶ for 3 seconds

- Enter Fault History screen.

DN / ▼ & UP / ▲ for 3 seconds

- Enter Diagnostic screen to display Load Current sensed and Line voltage.

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

Screen Information

The first line on the LCD screen shows the controls Firmware version at power up then will show the operating state. The screen turns off after 30 minutes and will turn on if the control goes to lockout or if any button is pushed

Power On: Open all manual gas valves. Close the line switch.

The screen displays the firmware version for 5 seconds

- “Version” • Display program version info for 5 seconds
- “Startup” • 3 sec of self-tests to verify internal operation, including a flame rod calibration (when the circuit looks at the flame rod signal at standby and uses this value to compare to when the control knows that the flame should be present). Once the tests pass, the control goes to “Standby”
- “Standby” • Normal state, wait for a CFH.
• If fault message “BV Switch Open” or “CO Switch Open” is displayed, control will remain in standby even if there is a call for heat

Call for Heat (CFH): Set the Thermostat (TT) to Call for Heat, The BV, CO and Limit In must be closed to initiate a call for heat

- “Pre-Purge” • Turn on the burner motor
• Motor on, Ignitor & Valve off
- “Pre-Ignition” • Ignitor turns on to establish spark prior to the gas valve(s) opening
• Motor on, ignitor on, valve off
- “Trial for Ignition” • Motor on, Ignitor on, Valve(s) on
• The ignitor turns off at the end of the TFI time and the flame rod must sense flame. Lockout if no flame detected
- “Flame Proven” • Maintain the burner on until the CFH is satisfied
• Motor on, Ignitor off, Valve(s) on
- “Post-Purge” • Enter from Flame Proven when the CFH is satisfied.
• TT or HV-Limit open.
• Or if flame is lost during flame proven
• Motor on, Ignitor off, Valve(s) off
- “Recycle” • Occurs on flame loss in flame proven
• Motor off, Ignitor off, Valve(s) off for 60 sec. or lockout if the recycle limit has been reached (see setup)
- “Lockout” • Motor off, Ignitor off, Valve off, Alarm on
• No flame detected at the end of TFI
• Flame is detected during Pre-purge, Pre-ignition or Post-purge
• CO input not detected during Pre-purge, Pre-ignition, TFI or Post-purge
• BV input not detected after 30 second delay during Pre-purge, Pre-ignition, TFI or Post-purge
• Motor, ignitor or valve relay weld detected
• If the control is miswired causing voltage to be detected on the outputs terminals, motor, ignitor or valve, when not expected
• Recycle limit count has been reached

When a lockout occurs, the screen turns on, the fault icon flashes and a fault message is displayed. The screen will cycle every 4 seconds between 2 displays, one giving the fault message and one giving the amount of time in the lockout state. For example, if the cause was loss of the CO input the fault icon would flash and the message would read “CO detected.” After 4 seconds, the time in the lockout state “secs or mins” will be displayed. This cycle will continue until the fault is resolved.

| <i>Fault Message</i> | <i>Possible causes</i> | <i>Fault Message</i> | <i>Possible causes</i> |
|----------------------|---|----------------------|---|
| NO FLAME | No flame detected. Cause unknown. | FLAME IN PREPURGE | Flame detected in prepurge |
| RECYCLE LIMIT | Exceeded “Recycles” setpoint limit | NO MOTOR POWER | Motor has no power (no 120volts present when there should be) |
| MOTOR POWERED | Motor relay welded or miswired | NO IGNITOR POWER | Ignitor has no power (no 120volts present when there should be) |
| IGNITOR POWERED | Ignitor relay welded or miswired | NO VALVE POWER | Valve has no power (no 120volts present when there should be) |
| VALVE POWERED | Valve relay welded or miswired | FLAME IN PREIGN | Flame detected in preignition |
| CO SWITCH OPEN | CO switch detected open indicating CO detected | FLAME DETECTED | Flame detected in postpurge or recycle |
| BV SWITCH OPEN | BV switch detected open after 30 second delay indicating a blocked vent | | |

To Reset from Lockout, press and hold the reset button for 1 second

- “Latch-up” If the control locks out 3 times during a single call for heat, latch-up occurs. The control may be reset from latch-up by holding the reset button down for 30 seconds, unless in permanent latch-up.
A permanent latch-up occurs when a relay weld is detected and cannot be corrected. When this occurs, the display will read “Latchup Replace Control”.

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

Operating and Fault History

The 60200FR stores operating history

The first line contains the parameter listed below.
The second line contains the Value and Units if appropriate.
Lines starting with “Total” are not reset by Baseline Reset.
All other lines are reset using “Reset Baseline” setpoint.

“Fault Cycles”

- Number of fault cycles in log (50 max, then oldest is discarded)

“Total Cycles”

- Total Number of CFH cycles since control was put into service

“Total Run Time” (Motor on)

- Total Motor on time since control was put into service

“Total Burn Time” (Valve on)

- Total Valve on time since control was put into service

“Total On time”

- Total time since control was put into service

The 60200FR stores information from the last 50 fault cycles in a fault log with 1 being the latest fault

Fault Message

- The message that accompanied this fault
- If it was a Lockout message, the cycle is faulted

End State

- The last operating state before returning to Standby
- If not Post Purge or Flame Proven, the cycle is faulted

Flame Rod μ A

- The FR current on entry to Lockout or Standby
- If the FR current is outside its limits, the cycle is faulted

Line Volts

- Running average of detected Line Volts at end of CFH cycle
- If <102 or >132, cycle is faulted

Motor Current

- “ - ” if current has not been determined yet
- “Ok” if current is known and above limit
- “Low” if current is known and below limit
Low current causes the cycle to be faulted

Ignitor Current

- “ - ” if current has not been determined yet
- “Ok” if current is known and above limit
- “Low” if current is known and below limit
Low current causes the cycle to be faulted

“Baseline time”

- Elapsed time since baseline was reset

“Max Line Volts”

- Highest line volts recorded since baseline reset

“Min Line Volts”

- Lowest line volts recorded since baseline reset

“Recycles”

- Total Recycles since baseline reset

“Run Time” (Motor on)

- Total Motor on time since baseline reset

“Burn Time” (Valve on)

- Total Valve on time since baseline reset

“CFH Cycles”

- Number of CFH cycles since baseline was reset

Valve Current

- “ - ” if current has not been determined yet
- “Ok” if current is known and above limit
- “Low” if current is known and below limit
Low current causes the cycle to be faulted

Recycle

- “Yes” if a recycle occurred in CFH cycle
A recycle causes the cycle to be faulted
- “No”

Run time

- Time motor output is on during this cycle

Burn time

- Time valve output is on during this cycle

CFH Cycle, enter at this row on column change

- The CFH cycle during which this fault occurred
- “1” if first cycle after baseline was reset

Status Icons

Line 1 Inputs

“POWER”

- On if 120 VAC power detected
- Flash if Voltage is over 132 VAC or less than 102 VAC

“HV-LIM”: High Voltage Limit string input

- On if an input detected on the High Voltage Limit input terminals

“BV”: Blocked Vent, Low Voltage Limit string input

- On if BV input detected on the Low Voltage Limit input terminals

“T-T”: Thermostat input

- On if the T-T current is above the TT closed threshold
- Turn on if T-T used “NO” is selected

“FLAME”: Detected using Flame Rod

- On if DC μ Amps in flame rod is at or above the flame detect threshold >0.8 μ A

Line 2 Outputs

“FAULT”

- Fault detected, alarm output on. Always flashes when activated

“MOTOR”

- On with Motor output
- Flash if running and Low current detected
- Flash if suspected motor fault

“IGNITOR”

- On with Igniter output
- Flash if running and Low current detected
- Flash if suspected Igniter fault

“VALVE”

- On with Valve output
- Flash if running and Low current detected
- Flash if suspected Valve fault

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

Service & Troubleshooting

Burner (control) will not come on**No power to control**

- Check line voltage to the control (at least 102 VAC).
- Check all electrical connections.

Control is in lockout

- Press the reset button for 1 second.

Other no start problems

- Line voltage <90 VAC. Check line voltage. >132VAC
- Motor relay welded. If valve/ignitor has no voltage, and line voltage OK, the issue is a welded motor relay. Replace the control.
- Reversed 120 VAC polarity – make sure hot and neutral lines are not reversed on incoming lines.
- Check T-T, BV, CO and HV limit inputs.

Repeated flame failures**Check for:**

- Excessive airflow or draft causing flame to leave burner head- check for proper air band setting and draft.
- Excessive back pressure causing flame to be erratic – check appliance and flue for sooting/plugging.
- Defective flame rod assembly.

Control locks out at end of TFI**Check for:**

- No gas to burner – check gas supply. Verify gas pressure is no higher than allowed for gas valve (usually 1/2 psig or 14" water column).
- Shorted electrodes (shorted to burner head or diffuser) – inspect for cracked porcelain and replace as needed.
- Poor spark – check electrode spacing and condition per burner manual. Replace or realign if necessary.
- Airflow too high – check air band setting.
- Ignitor module defective – replace if no spark.
- Check wiring connections.
- Flame rod shorted to ground or defective.

FROZEN PIPES/WATER DAMAGE

This is not a freeze protection device. Suitable freeze protection monitoring or other precautions are recommended to protect against ruptured pipes/water damage caused by fuel outage, safety related fault conditions or equipment failure.

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 11)?

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 (an LP conversion kit is not required when firing propane).

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). See instrument warning below.

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: $INPUT = (3600 \times \text{Btu per cubic foot}) \div (\text{number of seconds for one cubic foot})$, 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: $INPUT \text{ example} = (3600 \times 1050) \div (30.2) = 125,200 \text{ Btuh}$. Firing rate should be within $\pm 5\%$ 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.

- Insert test probe into vent above appliance to sample flue products. The results should show CO₂ or O₂ as follows:

| 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% |

- 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 CO₂ (or O₂) are acceptable.

WARNING After CO₂ (O₂) 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 13 to reset control.
- Check operation of airflow switch. Remove cover from left side of burner. Remove two flag terminals from pressure switch. Before initiating call-for-heat, measuring resistance across the two airflow switch connections should indicate infinity (overload). During prepurge, zero ohms should be measured.

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 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 and nylon washer securing the housing end of the assembly support rod.
 3. Remove the access cover (page 5) 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).
 - Place the support rod slot over support rod mounting stud. Slide the assembly forward. When back of slot reaches mounting stud, replace the nylon washer and locking nut on the mounting stud and tighten.
 - Replace the access cover (page 5) 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 ignitor 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

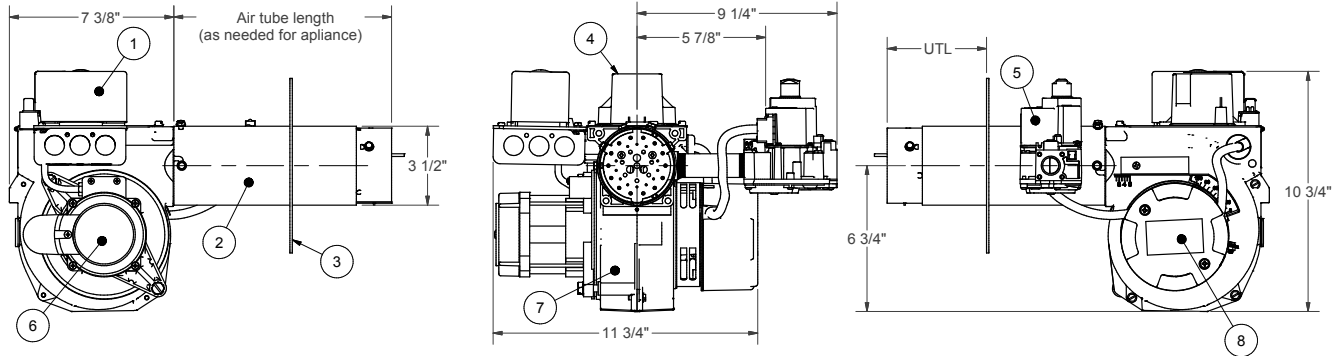
| Problem | Possible Cause | Corrective Action |
|--|--|--|
| WARNING | | |
| Burner motor will not start | 120 VAC power circuits | Check voltage and polarity at entrance to appliance and burner. Check fuse or breaker protecting circuit. Check appliance limit circuit – are controls calling for heat? Check electrical connections. |
| | Primary control is in Lockout | When a Lockout occurs, the screen turns on, the fault icon flashes and a fault message is displayed. The screen will cycle every 4 seconds between 2 displays, one giving the fault message and one giving the amount of time in the lockout state. For example, if the cause was loss of the CO input the fault icon would flash and the message would read “CO detected.” After 4 seconds, the time in the lockout state “secs or mins” will be displayed. This cycle will continue until the fault is resolved. |
| | Primary control is in Latch-up | When Latch-up occurs, the fault icon will flash and the screen will show “Latch-up” along with time spent in Latch-Up state. See page 15 for the procedure to handle this condition. When resetting the 60200FR 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 and TT input is closed 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. unless specified. |
| | 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 lock up. Check voltage to gas valve. Is gas valve receiving 24 VAC? If gas valve is receiving 24 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 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 | 60200FR must display at least 0.8 micro amps. 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 5 and 6, page 8 for more information. Check flame rod position in burner per Figures 5 and 6, page 8. 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. unless specified. |
| | 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. |
| Flame rod wire | Check to make sure connections are tight at the electrode and at the terminal on the 60200FR control. | |

8. Dimensions and mounting information

Figure 9 Dimensional data



- 1- Carlin 60200FR microprocessor control
- 2- Air tube
- 3- Flange (selected to meet appliance requirement)
- 4- Carlin 41800 solid state ignitor

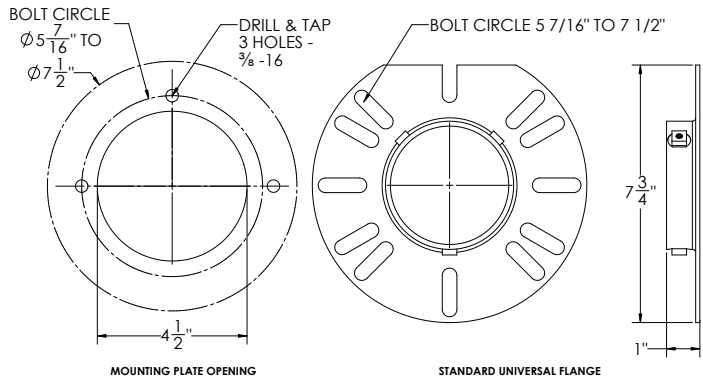
- 5- Combination gas valve
- 6- Carlin PSC motor
- 7- Cast aluminum blower housing
- 8- Transformer and Air flow proving switch

Mounting burner to appliance

WARNING The universal flange can be used as supplied for firing chambers with negative overfire pressure. For pressurized firing, the entire space where the airtube meets the flange must be sealed with a high temperature silicone sealant rated for at least 400°F. 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 mounting flange



Model EZGas Pro gas burner — Instruction manual

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

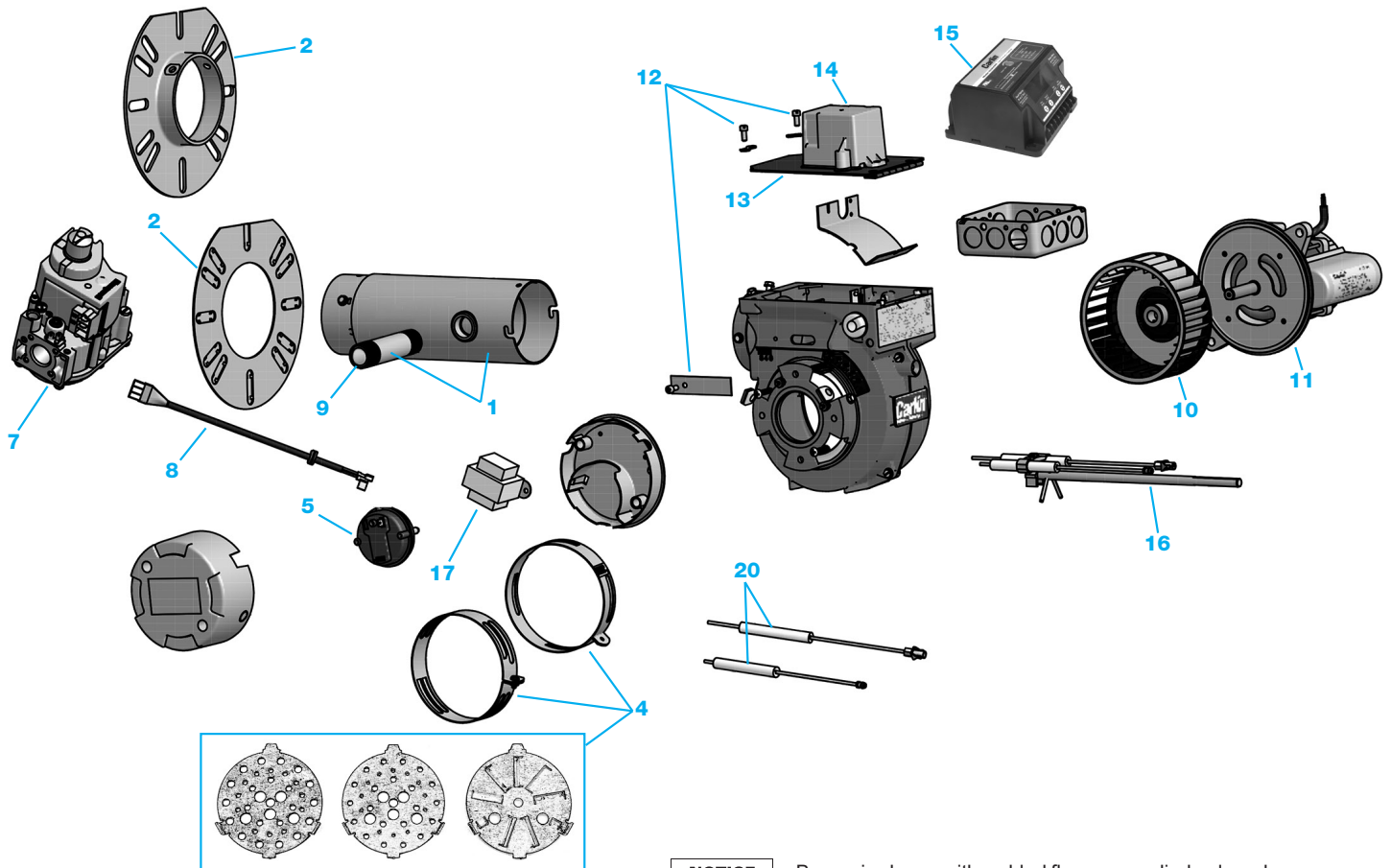
9. Replacement parts

| ITEM | PART NO. | DESCRIPTION |
|------|------------|--|
| 1 | 99392AKITS | 10" Air Tube Kit, A Diffuser w/ Field Drilled Orifice |
| | 99392BKITS | 10" Air Tube Kit, B Diffuser w/ Field Drilled Orifice |
| | 99392CKITS | 10" Air Tube Kit, 9-Slot Diffuser w/ Field Drilled Orifice |
| | 99392DKITS | 12" Air Tube Kit, A Diffuser w/ Field Drilled Orifice |
| | 99392EKITS | 12" Air Tube Kit, B Diffuser w/ Field Drilled Orifice |
| | 99392FKITS | 12" Air Tube Kit, 9-Slot Diffuser w/ Field Drilled Orifice |
| | 99392GKITS | 14" Air Tube Kit, A Diffuser w/ Field Drilled Orifice |
| | 99392HKITS | 14" Air Tube Kit, B Diffuser w/ Field Drilled Orifice |
| | 99392NKITS | 14" Air Tube Kit, 9-Slot Diffuser w/ Field Drilled Orifice |
| | 99392SKITS | 16" Air Tube Kit, A Diffuser w/ Field Drilled Orifice |
| | 99392PKITS | 16" Air Tube Kit, B Diffuser w/ Field Drilled Orifice |
| | 99392MKITS | 18" Air Tube Kit, A Diffuser w/ Field Drilled Orifice |
| | 99392KKITS | 18" Air Tube Kit, B Diffuser w/ Field Drilled Orifice |
| 2 | 50833AS | Flange/Gasket Kit |
| 3 | 50821AS | Gasket Kit – Includes 50821 & GSKTKIT1 (not shown) |
| 4 | 50808KITS | Full Firing Rate Kit – A,B & 9S Diffuser + 2 Airbands |
| 5 | 98522S | Air Flow Switch 120 Volt |
| | 50806S | Air Flow Switch 24 Volt |
| 6 | 98554S | Blower sensing lines kit – Only used on EZGAS 120V version (not shown) |
| 7 | 50824S | Gas valve 24 volt |
| | 98523S | Gas valve 120 volt |
| 8 | 50819AS | Gas valve power harness (EZGas Pro only) |
| 9 | 9938440XX | Field drilled orifice |
| 10 | 77933S | Blower wheel |
| 11 | 98629S | Motor PSC 1/15HP |
| | 98022S | Motor PSC 1/6HP (Can be used on gas same as oil) |

| ITEM | PART NO. | DESCRIPTION |
|------|--------------|---|
| 12 | 98282AS | Hardware kit for EZGAS/EZGAS PRO |
| 13 | 98498S | Hinged cover plate for Ignitor |
| 14 | 4180002S1 | Ignitor for EZGAS & EZGAS PRO |
| 15 | 602002FR363S | Primary Control Microprocessor Flame Rod |
| 16 | 98572AS | Ignitor electrode/flame rod assembly 10" |
| | 98572BS | Ignitor electrode/flame rod assembly 12" |
| | 98572CS | Ignitor electrode/flame rod assembly 14" |
| | 98572DS | Ignitor electrode/flame rod assembly 16" |
| | 98572ES | Ignitor electrode/flame rod assembly 18" |
| 17 | 50822S | Transformer EZGAS PRO |
| 18 | GPROTOTES | EZGAS PRO Burner Service kit Tote for PRO burners (not shown) |
| | EZGASTOTES | EZGAS Burner Service kit Tote for 120V burners (not shown) |
| 19 | 99017S | Test Kit – Includes FR Test Jack & Spark Tester (not shown) |
| 20 | 50873AS | Electrode/ Flame Rod for 10" EZGAS |
| | 50873BS | Electrode/ Flame Rod for 12" EZGAS |
| | 50873CS | Electrode/ Flame Rod for 14" EZGAS |
| | 50873DS | Electrode/ Flame Rod for 16" EZGAS |
| | 50873ES | Electrode/ Flame Rod for 18" EZGAS |
| 21 | EZGFRWIRES | EZGas Flame Rod Wire (not shown) |

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

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 2).

Installation/service certificate

Installation data

| | | | | | | | |
|--------------|--|---------------|--|----------------------------|------------------------|-------------------------|----------------------------|
| Burner model | | Serial number | | Measured firing rate, Btuh | Gas orifice drill size | Inlet gas pressure, IWC | Manifold gas pressure, IWC |
|--------------|--|---------------|--|----------------------------|------------------------|-------------------------|----------------------------|

| | | | | | | | |
|------------------|-------------------|--------|-------------|---------------------------|---------------------------|--|--|
| O ₂ % | CO ₂ % | CO PPM | FlameSignal | 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 |
|------|------------|-----------------|-------------------------|
| | | | |
| | | | |
| | | | |
| | | | |