



MODEL EZ-66

Advanced

Oil/Bio Burner

Instruction Manual

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WARNING Installer/servicer — Except where specifically stated otherwise, this manual must be used only by a qualified service technician. Failure to comply with this or other requirements in this manual could result in severe personal injury, death or substantial property damage.

WARNING User — 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.

NOTICE The National Oilheat Research Alliance (NORA) recommends single pipe oil systems and high-quality filtration for all fuel types. This should include at least a 10 micron Spin-on filter. Double filtration provides even greater assurance clean fuel will get to the pump. Contaminants in the tank that enter the fuel supply to the burner can cause pump sticking/seizing. These contaminants may increase in the early stages of transitioning to modern fuels (Ultra Low Sulfur and Bio Blends). High quality filtration adds protection against pump sticking



Ratings EZ-66

Input:0.50 to 3.00 GPH
Fuels:	U.S..... No. 1 or No. 2 Fuel oil or bio blends not exceeding B20 (U.S. Only)
	Canada No. 1 Stove oil or No. 2 Heating oil
Electrical:	Power..... 120V/60 Hz/1-Phase
	Motor..... Carlin PSC, 1/6 HP, 3450 RPM
	Current..... Approx. 2.5 amps
Ignition: Carlin Model 45000 electronic, 19,000 volts
Control:	U.L. Group I or II primary safety control
Agencies:	UL Listed (US and Canada)



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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, the primary control data sheet and the appliance manual. Verify the burner is correct for the appliance being used and for all applicable codes/standards.

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. This information can be helpful when troubleshooting or obtaining replacement parts.

WARNING**Should overheating occur:**

- (1) Shut off the oil supply to the burner.
- (2) Do not shut off the control switch to the circulator or blower.

Optional Burner Cover with air intake adapter

- Carlin's optional burner cover is available on all residential burner models firing under 3 GPH.
- Combustion air can be taken from the room or can be piped to the burner cover when the optional air intake adapter is installed. (Requires Field CAS-1 combustion air system.)
- See separate instructions provided with the cover for installation and special instructions required with the cover

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* page 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 and the appliance instructions see *User's information*.
- To keep this manual at or near the burner/appliance for ready access by the user and service technician.
- To contact the service technician or oil dealer if he encounters problems with the burner/appliance.
- 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.

NOTICE

When using a burner with a nozzle, it is the installer's responsibility to verify correct nozzle is installed and properly tightened.

Codes and standards

Certification

EZ-66 burners are U.L. listed for the U.S. and Canada, certified to comply with ANSI/UL 296, for use with #1 or #2 heating oil, per standard ASTM D396 (U.S. and Canada), and bio blends not exceeding B20 (U.S. Only)

Burner labels list compliance, when required, with special local, state or provincial approvals.

NOTICE

Install this burner in accordance with all local codes and authorities having jurisdiction. Regulations of these authorities take precedence over the general instructions provided in this manual.

United States installations

Burner/appliance installations in the United States must comply with the latest editions of NFPA 31 (Standard for the Installation of Oil-Burning Equipment), ANSI/NFPA 70 (National Electrical Code), and all applicable local codes.

Canadian installations

Burner/appliance installations in Canada must comply with the latest editions of CSA B139 (Installation Code for Oil Burning Equipment), CSA standard C22, Part 1 (Canadian Electrical Code), and all applicable local codes.

2. Prepare Site • Assemble Burner • Mount Burner

Inspect/repair/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.
- Do not install or use an existing manual damper in the breeching (vent connector) or chimney.
- 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.

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 barometric draft regulator in the vent piping if specified in the appliance manual. (The damper must be located in the same space as the appliance.)
- Provide support for the vent piping. Do not rest the weight of any of the vent piping on the appliance flue outlet.

Combustion/ventilation air openings

Check appliance manual and applicable codes for required sizing/design/placement of combustion/ventilation air openings. You can use the following general guidelines, taken from NFPA 31, provided they meet all local requirements.

Louvers/screens

- Air opening sizes are always given in free area. This means after deduction for louver obstruction. If you can't find the louver reduction for the grilles used, assume free area is 20% of total for wood louvers, or 60% of total for metal louvers.
- Screens can be no finer than 1/4-inch mesh, and must be accessible for cleaning.

Residential installations

Unconfined spaces (at least 7,000 cubic feet per GPH)

- An unconfined space means a room with at least 7,000 cubic feet volume for each GPH input (or 50 cubic feet per MBH) of all appliances in the room. Example: For each 1 GPH oil input, the room must have 7,000 cubic feet (875 square feet with an 8-foot ceiling height.)
- Open basements and crawl spaces are usually large enough, and will generally allow enough air infiltration so special provisions will seldom be required.
- If the building is tightly constructed, you will have to provide outside air openings into the building. The total free area of the openings must be

at least 1 square inch per 5,000 BtuH (28 square inches per GPH) of all appliances in the space.

- See Table 1 for summary.

Confined spaces (less than 7,000 cubic feet per GPH)

- Air taken from inside building —
 - Provide two openings — one near floor, the other near ceiling. Provide free area of 140 square inches per GPH input. If building is tightly constructed, provide air opening(s) into building providing 30 square inches per GPH as well.
- Air taken from outside —
 - Direct through outside wall or vertical ducts: Provide two openings — one near floor, the other near ceiling. Provide free area of 35 square inches per GPH input.
 - Through horizontal ducts: Provide two openings — one near floor, the other near ceiling. Provide free area of 70 square inches per GPH input.
- Ventilation air from inside/combustion air from outside
 - Size openings to interior to provide 140 square inches free area per GPH input. Size outside air duct to provide 28 square inches free area per GPH.
- See Table 1 for summary.

Table 1 Minimum combustion/ventilation air openings

Source of air	Minimum free area of opening(s)	Total grill area, typical (sq. in.) for firing rates of:					
		1 GPH		2 GPH		3 GPH	
		Wood	Metai	Wood	Metai	Wood	Metai
Residential installations , unconfined spaces (7,000 cu. ft. volume per GPH)							
From inside building, typical construction		No special openings required if natural infiltration is sufficient.					
From inside building, tight construction	1 or more grilles 30 Sq. in./ GPH	150	50	300	100	450	150
Residential installations , confined spaces							
From inside building through interior walls	2 openings, each 140 Sq. in./ GPH	700	234	1400	467	2100	700
From outside building direct through outside wall	2 openings, each 35 Sq. In./ GPH	175	59	350	117	525	175
From outside building through vertical ducts	2 openings, each 35 Sq. In./ GPH	175	59	350	117	525	175
From outside building through horizontal ducts	2 openings, each 70 Sq. In./ GPH	350	117	700	234	1050	350
Ventilation through interior walls, with an opening to outside	2 Int. openings, each 140 Sq. In./ GPH 1 Exterior opening 28 Sq. In./ GPH	700	234	1400	467	2100	700
		140	47	280	94	420	140
Commercial installations							
From outside building direct through adjacent outside wall	One opening through outside wall, providing free area of at least 28 Square inches per GPH input						
Other conditions	Size openings per local codes/jurisdictions						

2. Prepare Site • Assemble Burner • Mount Burner (continued)

Combustion/ventilation air checklist

- 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 and chemicals, such as laundry products, paint, thinner, varnish, etc.
- Confirm with the building owner that the area will be kept free of these materials at all times and that air openings will be kept unobstructed.

Inspect burner and components

- Check the air tube length. Verify the usable length of the tube UTL will be long enough (see Figure 1).
- 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.

WARNING

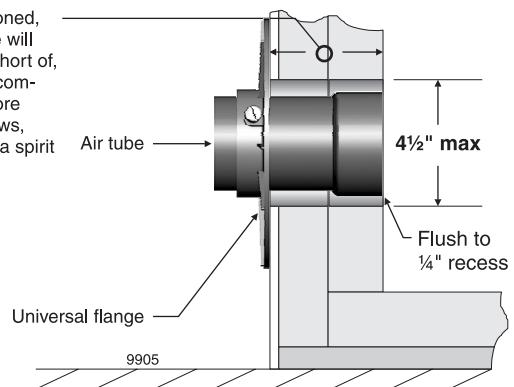
Do not install or operate the burner if any component is damaged or if burner does not comply with the specifications of Table 1, page 4, and other guidelines of this manual and the appliance manual.

Welded-flange burners

1. Verify the bolt pattern on the appliance chamber matches the flange pattern.
2. Verify the insertion depth (UTL) matches the depth of the appliance opening (so the end of the air tube is flush with, or slightly short of, the inside surface of the combustion chamber) (see Figure 1).

Figure 1 Airtube insertion depth

When correctly positioned, the end of the air tube will be flush with, or just short of, the inside wall of the combustion chamber. Before tightening flange screws, level the air tube with a spirit level.



NOTICE – EZ-66 burners firing above 2.25 GPH

1. EZ-66 burners are shipped with the blank air shutter (behind fuel pump) installed. This shutter is suitable only for firing rates up to 2.25 GPH.
2. For firing rates over 2.25 GPH, obtain an open type air shutter from your Carlin dealer. Remove the blank shutter and replace with the open shutter.
3. The optional open air shutter is suitable for firing rates from 1.50 to 3.00 GPH.
4. To change air shutters, remove the burner fuel pump. (The fuel pump holds the shutter in place.) Install the correct shutter and replace the fuel pump.

WARNING

It is the installer's responsibility to verify correct nozzle is installed and properly tightened.

3. Prepare Burner

Removing/installing head assembly

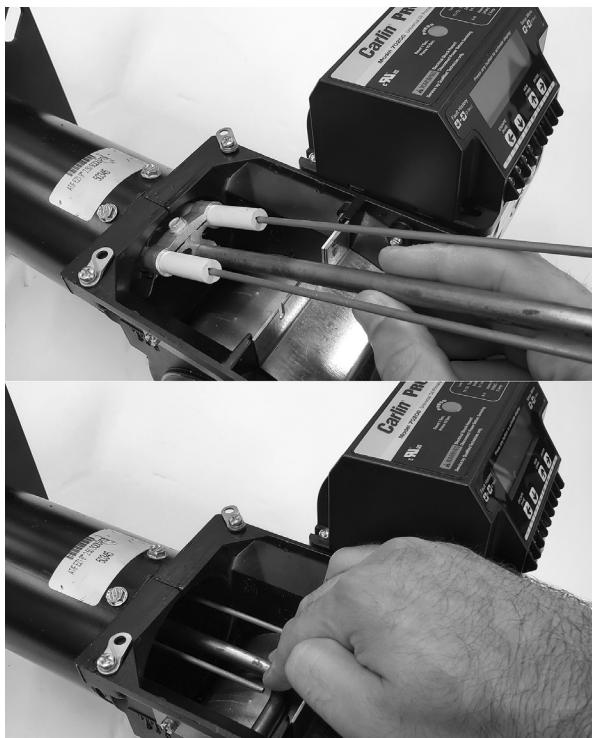
WARNING

Use care when handling burner components after the burner has been firing. Components can be hot and could cause severe personal injury.

You will need to remove the combustion head assembly for inspection of the assembly, replacement of the oil nozzle or adjustment of electrodes. To remove the assembly:

1. Loosen, and then rotate the hold down tabs securing the ignitor in place. Swing the ignitor plate open.
2. See Figure 2. Remove the blower shield by loosening the retaining screw on its front edge if needed for easier removal or insertion of the combustion head assembly.
3. Unscrew the oil line fitting and thumb nut at the burner housing.
4. Pull the threaded end of the oil tube into the blower housing.
5. See Figure 2. Before removing, confirm the electrodes are upside down (electrode insulators on top) for easy removal.
6. Remove the combustion head assembly by pulling the assembly up and out of the housing.
7. Handle the assembly with care to avoid bending/moving the electrodes, or damaging the electrode ceramic insulators.
8. Inspect the gasket on the bottom of the ignitor plate. The gasket prevents air from escaping from the housing. Replace the gasket if not in good condition.
9. Inspect the ignitor contact clips. Clean or replace if necessary to ensure reliable contact with the electrodes.

Figure 2 Removing/inserting combustion head assembly



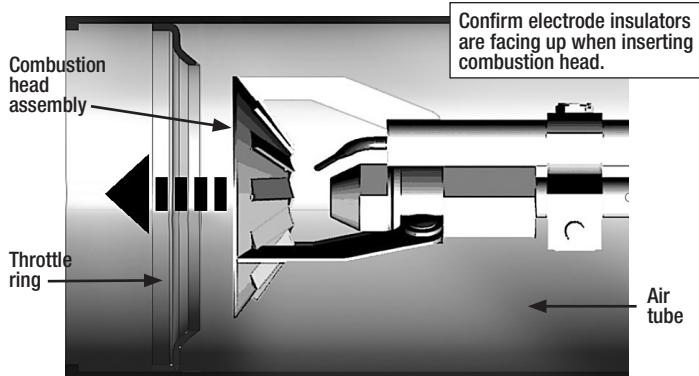
To replace the combustion head assembly, reverse the sequence.

- Remember to put the assembly in upside down, so the electrode insulators are out of the way. Remove, then replace, the blower shield if necessary for easier removal/insertion of the assembly.
- Lift the end of the assembly to guide it through the throttle at the end of the air tube. DO NOT FORCE.

CAUTION

Use care when tightening the oil line fitting to oil tube extension. Tighten securely. Do not cross-thread or over-tighten.

Figure 3 Inserting combustion head assembly



Install nozzle/check electrodes

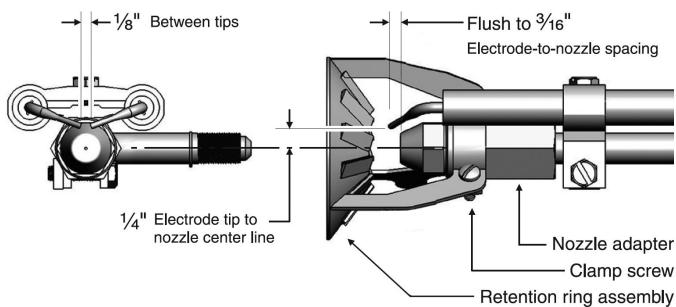
1. Loosen the clamp screw on the retention ring assembly (see Figure 5, page 7). Slide the retention ring assembly off of the nozzle adapter. Then loosen electrodes to rotate out of the way.
2. Install and tighten the nozzle shown in Table 1, page 4, for retrofit applications. Install the nozzle given in the appliance manual when application information for the EZ-66 oil burner is given.
3. Hold the nozzle adapter securely when removing or replacing the nozzle (Figure 4). Take care not to damage the electrode insulators or to bend the electrodes in the process.

Figure 4 Carefully support the nozzle adapter when installing or removing nozzle



3. Prepare Burner (continued)

Figure 5 Combustion head/nozzle/electrode settings



WARNING

Inspect the nozzle adapter before replacing the nozzle. If the threads have been damaged or show score marks, replace the nozzle line/adapter assembly.

- Replace the retention ring assembly by slipping one of the riveted arms through the gap between the electrode tips. Align this arm straight up, with the ring clamp firmly against the nozzle adapter shoulder (see Figure 5). Then tighten the clamping screw.
- Reposition and check the electrode settings. Position the electrodes as shown in Figure 5. These settings are critical in ensuring a reliable ignition. Once the electrodes are set, check all clamps to be sure they are securely tightened.
- Insert the combustion head/nozzle assembly in the burner.

Set initial burner air settings

Combustion head

- The combustion head adjusting slide controls the spacing between the retention ring and throttle ring (or air cone), regulating how much air passes around the retention ring.
- Loosen the oil line thumb nut and adjusting slide locking screw. Use a $\frac{5}{32}$ " Allen wrench to rotate the adjusting screw until the lead edge of the slide aligns to the number given in Table 2, page 8. Lock in place by first tightening the oil line thumb nut, then tightening the locking screw.

Air shutter

- The air shutter is fixed for all EZ-66 burners. See page 5 for the correct air shutter type. (Some EZ-66 burners may be equipped with 3-slot air shutters.)

Air band

- The air band is marked in percent opening. Loosen the air band locking screw and move the air band until the pointer (on shutter) lines up with the percent opening given in Table 2, page 8.

Final adjustments

- The burner is now adjusted to the approximate air settings for the firing rate chosen. When you check combustion with instruments during start-up or servicing, you may have to make slight adjustments to

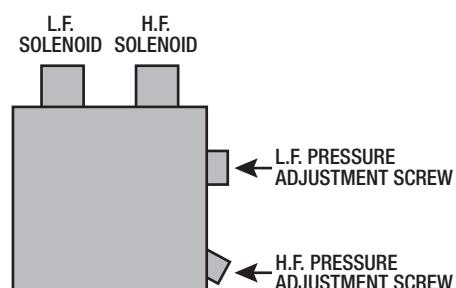
the air-band to achieve desired combustion results. The head bar can be adjusted to additionally optimize combustion (Figure 6). (Note that pressure overfire will reduce air flow, requiring more air.) The head bar can be adjusted to additionally optimize combustion (see Fig. 6).

Figure 6 Head bar/air band adjustment



Fuel Pump Operation

The included Fuel Pump features two adjustable pump settings for pressure. Low Fire is the light off point, adjustable to field conditions (via low fire pressure adjusting screw). Using a timer, the pump will then transition to high fire after 2 seconds (see included burner supplement for pressure settings)



3. Prepare Burner (continued)

Figure 7 Combustion head/air tube combinations, typical

EZ-66 Wrapped-shield air tube

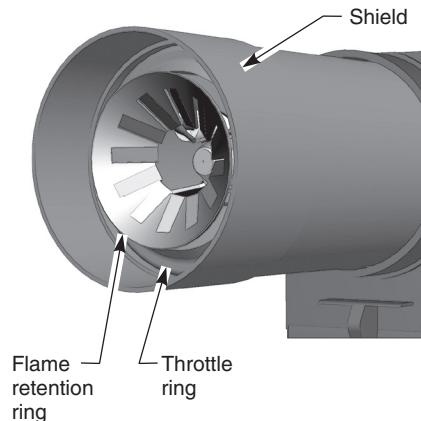


Table 2 Approximate air band and combustion head settings

EZ-66 (wrapped-shield air tube)				Firing rate GPH @ 100 PSI	
Blank air shutter		Open air shutter			
Air band	Head	Air band	Head		
% open	Dim. "A"	% open	Dim. "A"		
15	0	—	—	0.50	
15-20	0	—	—	0.60	
20	0	—	—	0.65	
25	1	—	—	0.75	
30	1-2	—	—	0.85	
40	2	—	—	1.00	
40	2-3	—	—	1.10	
45	3	—	—	1.20	
50	3	—	—	1.25	
55	3-4	—	—	1.35	
60	4	0	4	1.50	
65	5	5	4-5	1.65	
70	5	10	5	1.75	
100	6	45	6	2.00	
100	8	65	7	2.25	
—		100	9	2.50	
—		100	11	2.75	
—				3.00	

3. Prepare Burner (continued)

Inspect/install fuel supply

CAUTION

Inspect the oil supply system. Ensure that the fuel lines are correctly sized and installed and that the fuel flow is unobstructed, the oil tank is clean and only # 1 or # 2 heating oil are supplied. Failure to supply a reliable oil flow could result in loss of heat and potential severe equipment damage.

General guidelines:

- When installing oil lines, use continuous runs of heavy-wall copper tubing if possible.
- Check fuel pump data sheet for recommended line sizing, lift limitations and maximum length.
- Check all connections and joints to ensure they are air-tight.
- Use flare fittings. Do NOT use compression fittings.
- Never use pipe sealing tape. Fragments can break off and plug fuel line components.
- Install a shut-off valve at the tank and one near the burner. (Use fusible handle design valves when possible or when required by codes.)
- Install a large capacity fuel filter (rated for 50 microns or less) near the burner.

Fuel pump bypass plug

WARNING

The fuel pump is shipped with its bypass plug not installed, intended for a one-line oil system. Install the bypass plug only if connecting to a two-line oil system. Operating with the plug in place on a one-line system will damage the fuel pump and could lead to oil leakage and fire hazard.

WARNING

If the fuel line or fuel supply is above burner, never exceed 3 PSIG pressure at the fuel pump inlet. Install a suitable OSV to reduce the pressure. Operating the fuel pump with higher inlet pressure could result in fuel pump seal damage, oil leakage and potential fire hazard.

NOTICE

The National Oilheat Research Alliance (NORA) recommends single pipe oil systems and high-quality filtration for all fuel types. This should include at least a 10 micron Spin-on filter. Double filtration provides even greater assurance clean fuel will get to the pump. Contaminants in the tank that enter the fuel supply to the burner can cause pump sticking/seizing. These contaminants may increase in the early stages of transitioning to modern fuels (Ultra Low Sulfur and Bio Blends). High quality filtration adds protection against pump sticking

Nozzle line heater (optional)

- Oil burners often operate in spaces where temperatures tend to be cool, typically 60°F or lower. Cool oil has higher viscosity, which can affect atomization, ignition, combustion and fuel consumption. The nozzle line heater avoids this problem by heating the nozzle line oil to between 120°F and 130°F, resulting in smoother ignition and improved combustion.
- The nozzle line heater needs power when the burner is in standby (no call for heat from the appliance). Make sure the nozzle line heater is powered directly from the 120 VAC HOT line, not through the appliance operating control circuit. The nozzle line heater wiring should be shown on the wiring diagram supplied with the appliance/burner unit.
- The nozzle line heater is supplied with an electrical disconnect harness, allowing removal of the combustion head assembly without disconnecting wires. Position the heater harness disconnect in the rear of the blower housing, above the blower access cover. The wire leads to the disconnect route through the side of the housing into the junction box.

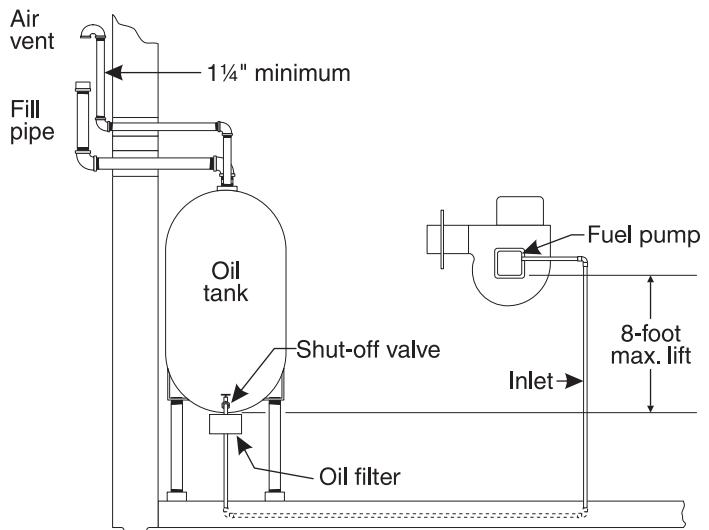
NOTICE

When first starting the burner, or after the service switch has been off for some time, the heater requires about 15 minutes to bring the oil to operating temperature.

One-line fuel system requirements

See Figure 8. The standard burner fuel pump is a single-stage, 3450-RPM oil pump. Apply this fuel pump only on one-line systems where the fuel supply is on the same level with, or higher than, the burner. This ensures oil flow by gravity. Also make sure the total lift does not exceed 8 feet (height difference from bottom of oil tank to fuel pump). For other conditions, you must provide a two-line fuel system. You may also have to change the fuel pump to a two-stage type.

Figure 8 One-line fuel system



3. Prepare Burner (continued)

Two-line fuel system requirements

See Figure 9 and Table 3. Use Table 3 only for burners equipped with Suntec fuel pumps. For burners using other fuel pumps, read the fuel pump manufacturer's data sheet to determine maximum lengths and lifts.

The standard burner fuel pump is a single-stage, 3450-RPM oil pump. Use this fuel pump only on two-line oil systems that do not exceed the total tubing lengths allowed in Table 3 (for Suntec fuel pumps only). For longer systems (or where lift exceeds 10 feet), replace the one-stage fuel pump with a two-stage pump.

Always size fuel lines using an oil flow rate based on the fuel pump gearset capacity, not the burner firing rate. See fuel pump data sheet for information.

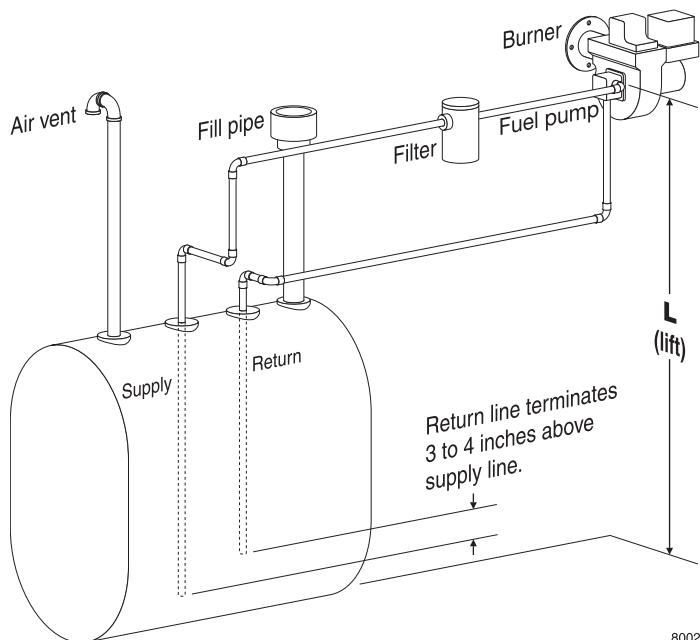
NOTICE

Install the fuel pump bypass plug when connecting to a two-line system. The plug is shipped in a bag attached to the fuel pump, along with a fuel pump data sheet.

Table 3 Two-line fuel system maximum lengths for 3/8" and 1/2" OD copper tubing distribution. Use only for burners equipped with Suntec fuel pumps. See fuel pump data sheet for any other fuel pump.

Lift (feet)	Max. total length of tubing, feet (including both horizontal and vertical)			
	Single-stage fuel pump		Two-stage fuel pump	
	3/8" tubing	1/2" tubing	3/8" tubing	1/2" tubing
0	84	100	93	100
2	73	100	85	100
4	63	100	77	100
6	52	100	69	100
8	42	100	60	100
10	31	100	52	100
12	NOT recommended – use two-stage fuel pump.		44	100
14			36	100
16			27	100
18			-	76

Figure 9 Two-line fuel system



8002

Perform checkout procedures

Verify before starting burner:

WARNING Should overheating or an emergency occur, immediately:

- Shut off oil supply line valve.
- Under some circumstances power should remain on for water pumps or blowers. Determine proper response before attempting start-up.
- If burner fails ignition on several attempts, use burner blower to purge appliance chamber before restart.

Checklist

- Burner/appliance installed per appliance instruction manual?
- Burner nozzle and head positioning bar verified against Table 1, page 4, or appliance manufacturer's instructions?
- Burner/appliance installed per all applicable codes?
- Installation site has adequate combustion/ventilation air openings and vent system?
- Fuel supply line in good condition and sized/designed correctly?
- Oil tank has oil and oil line valves are open.
- Wiring installed per burner/appliance instructions?
- Burner, appliance and all components inspected and in good condition?

4. Adjustment and Verification

Perform combustion test

WARNING
COMBUSTION MUST BE VERIFIED WITH THE (OPTIONAL) BURNER COVER IN PLACE —

Remove the burner cover if installed. Set up and adjust the burner using the following procedure. Replace the burner cover, allow the burner/appliance to run at least 15 minutes, then check combustion again. Readjust the burner if necessary. The CO₂ will increase when the cover is put on, particularly if combustion air is piped to the burner.

WARNING

If air is ducted to an (optional) air adapter, combustion must be set based on the air inlet temperature. Air temperature variations will change how much air enters the burner, so the combustion must be set to anticipate the variations. Follow the guidelines below.

5. Use combustion test equipment to verify that the burner is properly set up for your installation. Appliances with positive pressure in the chamber may require a wider air opening. See appliance instructions for details. Verify/adjust settings by testing with instruments.

- With the burner equipped with the correct positioning bar, oil nozzle and initial air band setting, the flue products will usually contain between 11½% and 12½% CO₂ (5.9% and 3.8% O₂) and zero smoke. (Based on air inlet temperature of 70°F — see Table 4 for the proper values at other air temperatures for burners with ducted combustion air.)
- Depending on length of air piping (when used) and on air temperature, CO₂ may change one per cent or more with the cover in place.
- Check smoke. It should be zero on the Bacharach scale.
- Set the appliance flue damper or barometric draft regulator so the draft or pressure in the vent complies with the appliance manufacturer's instructions.

Adjust burner using test instruments

- Operate burner for 15 minutes before making final adjustments using test equipment.
- Check for leaks in fuel piping.

WARNING

Inspect fuel piping system for leaks. Repair any leaks to avoid fire hazard from oil leakage or combustion problems due to air infiltration into oil.

- Inspect flame

- Look at flame through appliance combustion chamber observation port. The flame should be well-defined and should not impinge on any appliance surface. (If you make air or gas pressure changes later, inspect the flame again.)

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 to sample flue products.

WARNING

Heating units designed for natural draft operation are normally set for a slightly negative pressure, usually -0.01 to -0.02 inches w.c. draft at the combustion chamber test port. Appliances designed for forced draft (positive pressure in the chamber) must be air-tight to prevent exfiltration of harmful combustion products. Failure to properly set draft for the appliance could result in severe personal injury or death.

Re-install (optional) burner cover and check combustion again

- Allow the burner to operate with the cover on for at least 15 minutes. (Insert a temperature probe to measure incoming combustion air temperature if combustion air is ducted to the burner.)
 - Retest CO₂ (or O₂) and smoke again. The values will change when the cover is installed. Depending on length of air piping and on air temperature, CO₂ may change one per cent or more with the cover in place.
 - Make sure the CO₂ (or O₂) values are in the range given in Table 4 for the inlet air temperature measured. IF NOT, remove the cover and adjust the air band more open to decrease CO₂ (increase O₂) or close the air band slightly to increase CO₂ (decrease O₂).
 - Tighten air band clamping screw.

WARNING

All installations should be checked after one to two weeks of operation to ensure the appliance/burner units are operating correctly.

Table 4 **Burners using inside air for combustion — Use "65°F or higher" row in table below.**

Burners with ducted combustion air — MEASURE incoming combustion air temperature and set the CO₂ (or O₂) using the following chart:

Incoming combustion air temperature during setup	CO ₂ min	CO ₂ max	O ₂ max	O ₂ min
-20°F to 0°F	10.2%	11.0%	7.0%	5.8%
5°F to 30°F	11.0%	11.5%	5.8%	5.5%
35°F to 60°F	11.5%	12.2%	5.5%	4.2%
65°F or higher	12.0%	12.5%	4.6%	3.9%

4. Adjustment and Verification

Adjust burner using test instruments

1. Operate burner for 15 minutes before making final adjustments using test equipment.
2. Check for leaks in fuel piping.

WARNING

Inspect fuel piping system for leaks. Repair any leaks to avoid fire hazard from oil leakage or combustion problems due to air infiltration into oil.

3. Inspect flame

- Look at flame through appliance combustion chamber observation port. The flame should be well-defined and should not impinge on any appliance surface. (If you make air changes later, inspect the flame again.)

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.

1. Insert test probe into vent sample opening to sample flue products.
2. With the EZ-66 burner equipped with the correct oil nozzle, head setting and air band setting, the flue products will usually contain between 11½% and 12½% CO₂ (5.9% and 3.8% O₂) and zero (Bacharach) smoke.
3. Use combustion test equipment to verify that burner is properly set up for your installation, within the range listed in Table 3. Appliances with positive pressure in the chamber may require a wider air opening. See appliance instructions for details. Verify/adjust settings by testing with instruments.
 - a. Check smoke. It should be zero on the Bacharach scale.
 - b. Set the appliance flue damper or barometric draft regulator so the draft or pressure in the vent complies with the appliance manufacturer's instructions.

WARNING

Heating units designed for natural draft operation are normally set for a slightly negative pressure, usually -0.01 to -0.02 inches w.c. draft at the combustion chamber test port. Appliances designed for forced draft (positive pressure in the chamber) must be air-tight to prevent exfiltration of harmful combustion products. Failure to properly set draft for the appliance could result in severe personal injury or death.

- c. Check percent of CO₂ (or O₂). Fine tune the burner, if necessary, by slightly adjusting the head position for more or less air.
- d. Recheck smoke (should be zero) and flue or chamber pressure/draft (adjust if necessary and retest).

WARNING

All installations should be checked after one to two weeks of operation to ensure the appliance/burner units are operating correctly.

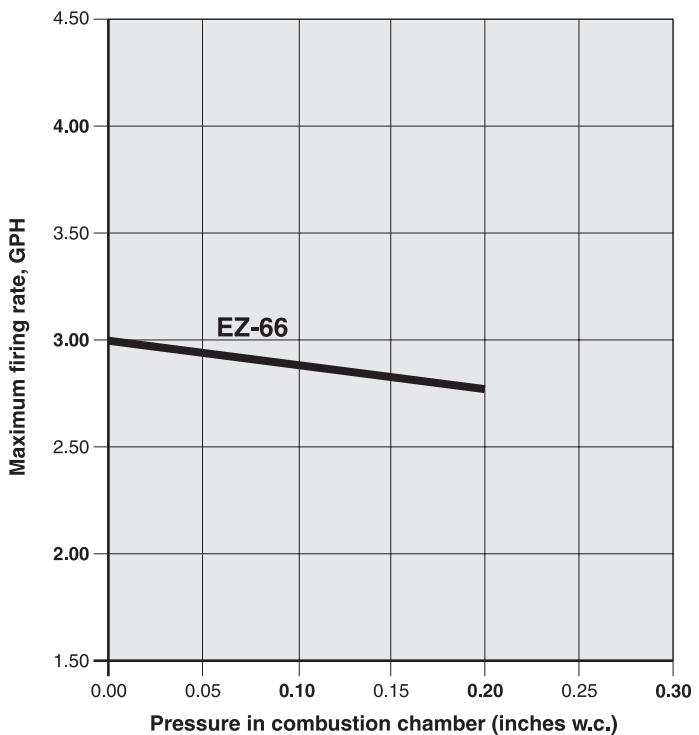
Firing against positive overfire pressure

1. Burner rating maximum inputs are based on operation with zero to slightly negative pressure overfire, typically 0.01 to 0.03 inches w.c.
2. When a burner is applied to an appliance that operates with a higher pressure overfire, the maximum firing rate decreases because the maximum available air flow from the burner blower decreases.
3. Read the graph below in Figure 10 to find the maximum burner firing rate at positive overfire pressures.

WARNING

Do not apply a EZ-66 burner at a pressure higher than listed in Figure 10 unless the application has been factory pretested.

Figure 10 Maximum firing rate decreases as overfire pressure increases



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EZ-66

(Do not fire at overfire pressure greater than 0.20 inches w.c. without factory pretesting.)

4. Adjustment and Verification (cont.)

Verify burner/appliance operation

Check burner/appliance/controls operation

- Test operating and limit controls on appliance as specified in appliance instructions.
- Check operation of the primary control by forcing lockout to occur. For primary controls that enter latch-up after multiple lockouts, force latch-up to occur as well. Reset primary control per control data sheet instructions after each test.
- Start and stop the burner several times, allowing the primary control to sequence through normal operation. Verify correct operation of burner and primary control throughout.

Verify vent system operation

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

Combustion/ventilation air

- Verify combustion/ventilation air openings are not/will not be obstructed.
- Verify air opening louvers are full open.
- If louvers are motor-operated, verify motor and end switch are interlocked with appliance/burner wiring to prevent operation of the burner if the air louvers are not fully opened.

Prepare burner for normal operation

- Cycle burner off with appliance controls.
- Turn off power to the appliance.
- Seal the appliance flue damper test opening.
- Verify all components and wires are in place and burner is ready for operation.
- Restore power to the appliance.

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 back cover of this manual (and the appliance manual) with the user.
- Verify the user is aware of all procedures specified in the manuals.
- Verify user will not store or use combustible liquids or materials or contaminants in the vicinity of the burner/appliance.

5. Annual Start-up and Service

Perform the following

WARNING

This burner must 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.

- 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.
- Review proper operation of the appliance/burner unit with the user.
- Turn off power to appliance.
- Remove combustion head assembly to clean and adjust if necessary. (See procedure on page 6.)
- If the inside surface of the air tube and/or retention ring need to be cleaned, clean them with a vacuum cleaner with brush attachment while the combustion head assembly is out of the burner.
- Replace the oil nozzle with the correct size specified in Table 1, page 4.
- Inspect and adjust the ignition electrodes and insulators per instructions on page 9 of this manual. Replace if proper spacing cannot be achieved or if components are damaged.
- Close the housing cover plate and secure in place.
- Inspect the fuel line oil filter. Replace if necessary.

NOTICE

The National Oilheat Research Alliance (NORA) recommends single pipe oil systems and high-quality filtration for all fuel types. This should include at least a 10 micron Spin-on filter. Double filtration provides even greater assurance clean fuel will get to the pump. Contaminants in the tank that enter the fuel supply to the burner can cause pump sticking/seizing. These contaminants may increase in the early stages of transitioning to modern fuels (Ultra Low Sulfur and Bio Blends). High quality filtration adds protection against pump sticking.

- Perform the complete checkout procedures of pages 11 to 17, including system inspection and checks.
- Inform the user of any problems found.

6. Maintenance Procedures

Maintenance/service procedures

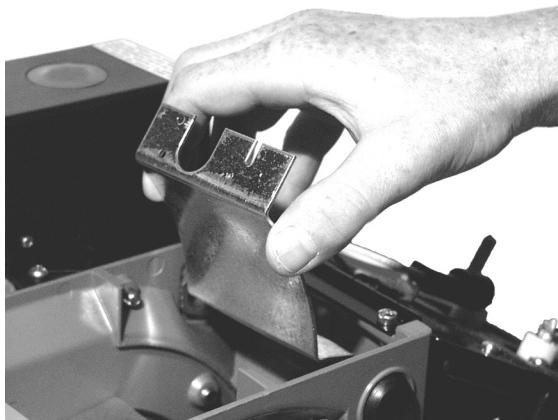
WARNING

Turn off power to appliance when servicing burner. Failure to comply could result in severe personal injury, death or substantial property damage.

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.
 - Inspect the blower wheel by removing the blower wheel access cover. See Figure 11.
 - To remove the cover, open the ignitor plate and loosen the blower wheel access cover screw about three turns.
 - Inspect the blower wheel to see if it needs to be cleaned. Dirt and lint on the wheel reduce air flow, and must be removed if the burner is to operate correctly.
2. To clean blades, remove the two bolts securing the motor to blower housing.
 - a. Slide the motor out and rotate to remove and access blower wheel.
 - b. Use a brush and vacuum to clean each blade and the blower housing interior.
 - c. Replace motor/wheel in blower housing and secure with the two bolts.
 - d. Push wire slack back into junction box.

Figure 11 Remove blower access cover to inspect blower wheel



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 space between the blower wheel and the motor face. This space must be 3/64".
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.
- 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.

Checking ignitor

WARNING

Never test an ignitor by placing a screwdriver (or other metallic object) across the high voltage clips. Check 40700 & 40900 ignitors only by observing spark at appliance ignition electrodes, with fuel supply OFF. Using any other method could cause ignitor damage and severe personal injury.

1. Checking 45000 ignitors only:
 - Disconnect electrical power to burner.
 - Remove hold down clips or screws. Lift ignitor mounting plate to the full-open position. Set high voltage clips to a 1/2" to 3/4" gap.
 - Carefully energize ignitor and check for spark arcing at the high voltage terminals. If spark jumps the gap, ignitor is good.

Ceramic fiber materials

WARNING

The appliance may contain ceramic fiber and/or fiberglass materials. Ceramic fiber materials, such as chamber liners, may contain carcinogenic particles (chrysotile asbestos) 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 chrysotile asbestos. 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.

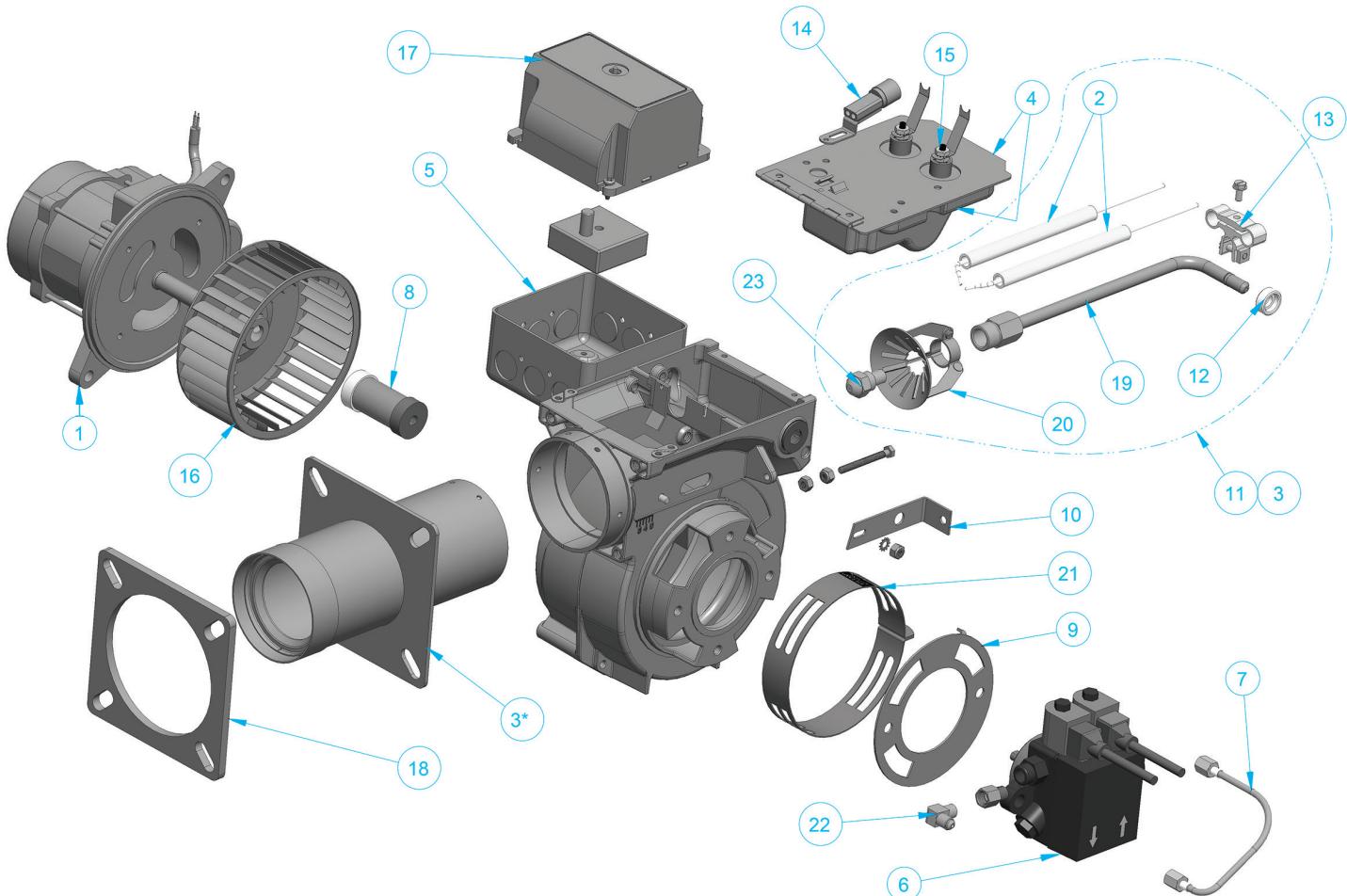
NIOSH First aid procedures:

Eye exposure — irrigate immediately

Breathing — fresh air.

7. Repair Parts

For parts not shown or listed, contact factory and/or check separate documentation supplied with appliance/burner unit.



Item	Part #	Description
1	J98022	1/6HP PSC Motor 115/1/60
2	76158	Electrode Set 7"
3	51663	AT/F EZ66 7WS REV 4.00 BLK
4	41013	Ignitor Baseplate
5	33902	JBOX 4 x 4 x 1 1/2
6	50050B20	Fuel Pump OT245A 120/60
7	34470	Oil Line, Pump to Chassis
8	75564	Coupling
9	98109	Air Band Shutter
10	51593S	Head positioning slide bar kit
11	51854	Combustion Head Assembly 7"
12	62885A	Thumb Nut, Nozzle Line

Item	Part #	Description
13	60103	Electrode Bracket
14	1440700K	CAD Cell
15	50666	Ignitor Terminal Kit
16	28605	Blower Wheel 5 1/4 OD x 2W
17	70200	70200 Primary Control
18	40162	Gasket, Mounting Flange
19	51590C	Nozzle Line/Adaptor Assembly 7"
20	54981	Retention Ring
21	98085	Air Band
22	29926	Elbow 3/16 FL
23	51662	Nozzle (consult setup guide or included supplement)

Carlin®
Combustion Technology



WARNING The burner must be cleaned, tested and adjusted annually by a qualified oil burner service technician.

WARNING **Should overheating occur:**

- (1) shut off the oil supply to the burner.
- (2) DO NOT shut off the control switch to the circulator or blower.
- (3) contact your oil dealer or service technician and the fire department (if needed).

EZ-66 Oil/Bio Fuel Burner

User care and maintenance

WARNING

Refer only to the information on this page, intended for your use. The remainder of this manual is intended only for your service technician. Failure to comply could result in severe personal injury, death or substantial property damage.

For other than routine maintenance, contact a qualified service company. Perform the following as needed.

- Keep the area around the burner clear and free from combustible vapors and liquids.
- Do not obstruct the flow of combustion and ventilating air.
- Most motors currently used on residential type burners use permanently-lubricated bearings, and do not require field lubrication. Read the label on the motor to determine oiling needs, if any. Do not over-lubricate. This can cause as much trouble as not lubricating at all.

WARNING

Never attempt to use gasoline as a fuel for this burner, as it is more combustible and could result in a serious explosion. Never attempt to burn refuse or use any fuel other than # 1 or # 2 heating oil and bio blends not exceeding B20 (U.S. Only) (ASTM D396).