

# MODEL **ADC** Oil Burner

## Instruction Manual

Type "F" air tube combinations



*Thank you for purchasing a Beckett burner. With proper care and regular maintenance, it will provide years of trouble-free service. Please take a few minutes to read the section entitled 'To the Owner' inside this manual. Then, keep the manual in a safe place where it can be easily located if needed by your professional service technician.*



**Beckett**

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## 1. Prepare before installing

### A. Verify specifications

<b>Capacity</b>	“F” heads Firing rate ..... 0.75 – 2.50 GPH Input..... 105,000 – 350,000 Btu/h
<b>Fuels</b>	<b>U. S. ....</b> No. 1 or No. 2 diesel fuel, or kerosene – No.1 or No. 2 heating oil (ASTM D396)
<b>Electrical</b>	Power supply ..... 13.5 VDC Operating load ..... 15 Amps w/ igniter on, 8-10 Amps w/ igniter turned off Motor ..... 13.5 VDC, 1/6 hp, 3450 rpm, 10 Amps (max.), NEMA “M” flange, rotation CCW when facing shaft end Ignition Secondary ..... 20KVpk 30mA . Interrupted duty OR optional continuous duty
<b>Pump</b>	Outlet pressure ..... Note 1
<b>Air tube</b>	ATC code..... See Table 1
<b>Dimensions</b>	Height (maximum) ..... 11 ½ inches Width (maximum)..... 14 ¾ inches Depth (chassis only) ..... 6 9/16 inches Air tube diameter ..... 4 inches
<b>Temperature</b>	150° Max air temperature
Note 1. See equipment manufacturer’s burner specifications for recommended outlet pressure. Pressure is 100 psig unless otherwise noted.	

Table 1 – Air Tube Combination (ATC) codes\*

Firing rate (gph) (min-max)	Head	Static plate size (inches)	ATC codes for usable air tube lengths: ("A" in inches; see Figure 2)			
			4 ½	5	5 ¾	6 5/8
0.40-0.75	F0	3 ¾ U	AF44XR	-	AF53XR	AF65XR
0.75-1.25	F3	2 ¾	AF44XN	-	AF53XN	AF65XN
0.85-1.35	F4	2 ¾	AF44WH	-	AF53WH	AF65WH
0.85-1.65	F6	2 ¾	AF44YB	-	AF53YB	AF65YB
1.10-2.00	F12	2 ¾	AF44XO	-	AF53XO	AF65XO
1.65-2.50	F22	2 ¾	AF44XP	-	AF53XP	AF56XP

### B. Be aware of hazard definitions

#### DANGER

Denotes presence of a hazard which, if ignored, **will** result in severe personal injury, death, or substantial property damage.

#### WARNING

Denotes presence of a hazard which, if ignored, **could** result in severe personal injury, death, or substantial property damage.

#### CAUTION

Denotes presence of a hazard which, if ignored, could result in minor personal injury or property damage.

#### NOTICE

Intended to bring special attention to information, but not related to personal injury or property damage.

### C. Notice special requirements

#### DANGER

- This equipment must be installed, adjusted and started only by a **qualified service agency** – an individual or agency, licensed and experienced with all codes and ordinances, who is responsible for the installation and adjustment of the equipment. **All oil burners should be installed in accordance with regulations of the latest revision of the National Fire Protection Association Standard NFPA 31 and in complete accordance with all local codes and authorities having jurisdiction. Regulation of these authorities take precedence over the general instructions provided in this installation manual. Note that this burner is NOT recommended for Residential use.**

- For recommended installation practice in Canada, refer to the latest version of CSA Standard B139.

#### WARNING

**Read all instructions before proceeding.** Follow all instructions completely. Failure to follow these instructions could result in equipment malfunction, causing severe personal injury, death or substantial property damage.

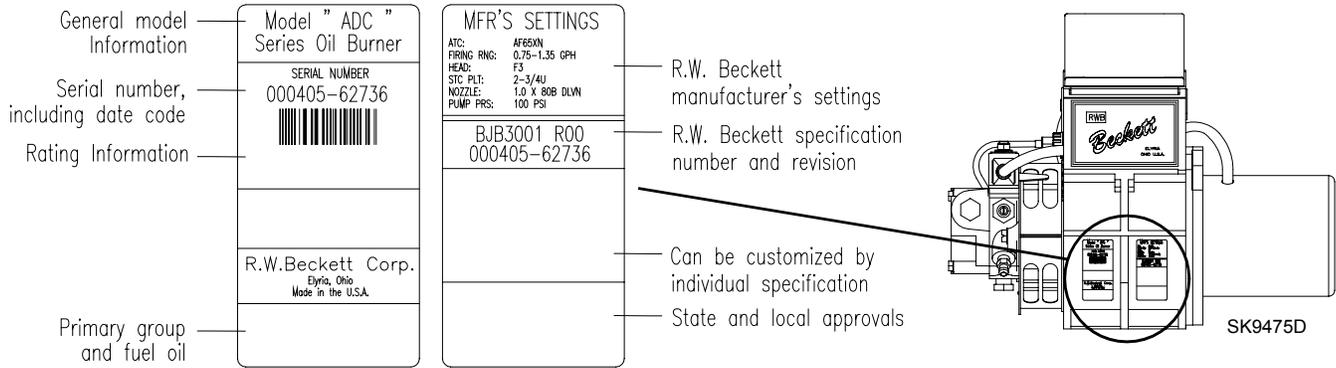
#### NOTICE

**Concealed damage** — If you discover damage to the burner or controls during unpacking, notify the carrier at once and file the appropriate claim.

#### NOTICE

When contacting Beckett for **service information** — Please record the **burner serial number** (and have available when calling or writing). You will find the serial number on the silver label located on the left rear of the burner. See illustration below.

**Figure 1 – Typical Burner Nameplates**



## 2. General information

Your burner was designed, installed and adjusted at the factory prior to shipment and should not require additional adjustments. Refer to the Troubleshooting section of this manual when experiencing a possible fault condition.

**DANGER**

**The Model ADC Burner requires a continuous supply of 11 to 16 volts DC at 15 amperes** measured at the burner during operation. An automotive or a small engine charging system that is capable of supplying the required continuous voltage/ampereage is recommended with certain road equipment, such as asphalt hot patchers and similar applications. This is especially true while maintaining nominal load temperatures during idle periods. A low or erratic power supply could result in impaired burner operation, severe delayed ignition or an explosion inside the heat exchanger resulting in a burn and/or asphyxiation hazard.

**WARNING**

If the burner is not supplied with a reliable combustion air source, the burner cannot properly burn the fuel. This would result in incomplete combustion, causing sooting and probable emission of carbon monoxide. Severe personal injury, death or substantial property damage could occur.

Burner head type	Low Firing Rate Baffle, if specified:
F0	up to 0.65 gph
F3	up to 0.85 gph
F4 or F6	up to 0.90 gph

### A. Equipment located in confined space

The confined space should have two (2) permanent openings: one near the top of the enclosure and one near the bottom of the enclosure. Each opening shall have a free area of not less than (1) one square inch per 1,000 BTU's per hour of the total input rating of all equipment within the enclosure. The openings shall have free access to the building interior, which should have adequate infiltration from the outside.

### B. Exhaust fans and other air-using devices

(Typically not used)

Size air openings large enough to allow for all air-using devices in addition to the minimum area required for combustion air. If there is any possibility of the equipment room developing negative pressure (because of exhaust fans, for example), either pipe combustion air directly to the burner or provide a sealed enclosure for the burner and supply it with its own combustion air supply.

### C. Clearances to burner and equipment

- Provide space around burner and equipment for easy service and maintenance.
- Check minimum clearances against those shown by the equipment manufacturer and by applicable codes.

### D. Exhausting Hazardous Fumes

An asphyxiation hazard could exist due to improper combustion levels that impair proper burner operation. Copious amounts of smoke and carbon monoxide could be produced in a confined area. Also, be conscious of any fumes produced by the materials that are being heated. Always ensure adequate ventilation to exhaust all fumes.

### E. Low Firing Rate Baffle

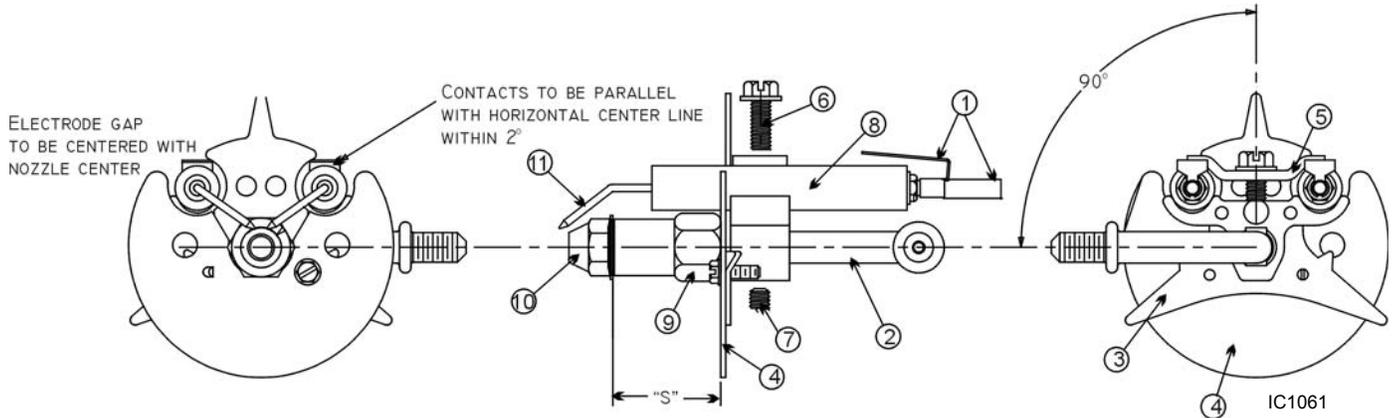
The Low Firing Rate Baffle (LFRB) (see Replacement Parts) reduces the air flow and pressure. The LFRB is **sometimes** used for firing rates under 1.00 GPH as listed in the table below. Refer to the equipment manufacturer's instructions. Do not omit the LFRB when specified. Omitting the baffle when specified or installing the baffle when not specified could result in poor burner performance.

## 3. Nozzle, Nozzle Line, & Electrode Maintenance

### A. Nozzle Maintenance

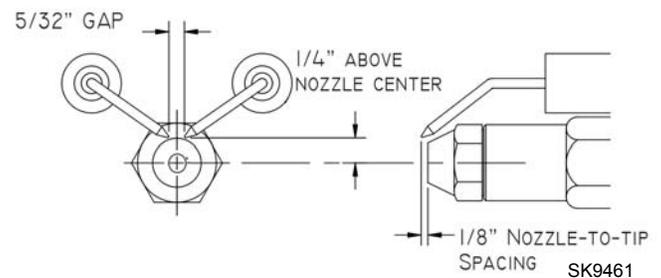
Refer to the following figure for nozzle, nozzle line and electrode familiarization.

Figure 2 – Nozzle, line & electrode assembly



Item #	Description
1	Electrode Contact (3" ATC or Extension over 3")
2	Nozzle Line
3	Spider Spacer Assembly
4	Static Plate
5	Electrode Clamp
6	Electrode Clamp Retaining Screws
7	Nozzle Line Setscrew
8	Electrode Insulator
9	Nozzle Adapter
10	Nozzle Tip
11	Electrode Tip

Figure 3 – Electrode Tip Settings



### B. Replace burner nozzle

#### WARNING

Make certain the correct nozzle is selected for the actual pump pressure. Nozzles are rated for 100 psig operation. For applications with pump pressure above 100 psig, the nozzle rated capacity will be lower than the equipment firing rate. Use only the specified spray pattern. Failure to use the correct nozzle size and type can result in unacceptable combustion, possibly causing severe personal injury, death or substantial property damage.

1. If applicable, remove the plastic plug protecting the nozzle adapter threads.
2. Place a 3/4" open-end wrench on the nozzle adapter. Insert the nozzle into the adapter and finger tighten. Finish tightening with a 5/8" open-end wrench.
3. If the nozzle is already installed, remove the nozzle line assembly to verify that the nozzle size and spray pattern are correct for the application (per equipment manufacturer's information). Verify that the electrode tip settings comply with Figure 3.

#### CAUTION

Use care when removing and installing oil nozzles:

- Inspect the nozzle adapter prior to installing the nozzle. If the sealing surface is grooved or scratched, replace the nozzle line assembly. If a damaged nozzle adapter is not replaced, oil could leak at the nozzle-adapter joint, causing serious combustion problems.
- Protect the nozzle orifice and strainer when installing a nozzle. If there is dirt in the orifice or it is scratched or damaged, the nozzle will not function properly.
- Do not over-torque the nozzle when installing. This will cause deep grooves in the nozzle adapter, preventing a seal when a new nozzle is installed.
- Use a wrench that secures the adapter or use 3/4" and 5/8" open-end wrenches. DO NOT attempt to remove or install a nozzle without securing the adapter. The nozzle alignment could be seriously damaged.
- Do not squeeze the electrodes too tightly when handling the nozzle line assembly. This could change the electrode tip settings or damage the ceramic electrode insulators.

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- Carefully check and realign electrode tips after replacing the nozzle, ensuring the electrode settings comply with Figure 3.

### C. Check/adjust electrodes

Check the electrode tip settings. Adjust if necessary to comply with the dimensions shown in Figure 3. To adjust, loosen the electrode clamp screw and slide/rotate electrodes as necessary. Securely tighten the clamp screw when finished.

### D. Igniter Maintenance

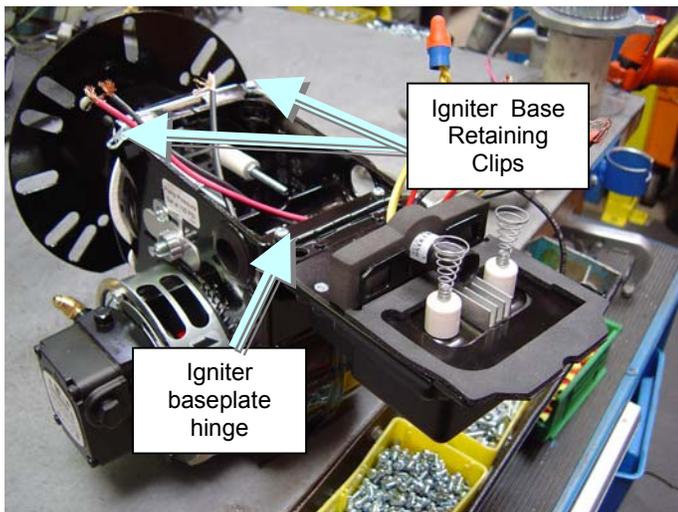
The igniter assembly does not require any adjustments beyond making sure the springs and the burner electrode rods make solid contact when the igniter is in the closed position. The sealing surfaces of the gaskets should be checked and replaced at the first signs of any damage or deterioration. Clean any dirt or residue from the porcelain bushings, springs, and baseplate.

The simplest way to check igniter operation is by supplying voltage to the input and checking to see whether an arc is produced. Check by either looking or listening to see if there is an arc across the electrodes while the burner is running and the igniter is energized.

The igniter must be grounded to the burner before checking the following. To check the igniter, insure that the burner is off, and use an ohmmeter to check the resistance between one of the springs and exposed metal on the burner (for example, a housing bolt). The meter should read less than 2000 ohms when measuring the spring-to-ground resistance at either spring.

The igniter should be replaced if the meter indicates an open circuit, the difference between the two spring-to-ground resistance readings is greater than 20%, or the spring-to-spring resistance does not read approximately twice the spring-to-ground reading.

**Figure 4 – Igniter hinge and retainer clips**



### E. Servicing nozzle line assembly

Before proceeding, turn off power to the burner.

- Disconnect the oil connector tube from the nozzle line.
- Referring to Figure 4, loosen the two screws securing the igniter retaining clips and rotate both clips to release the igniter baseplate. Then tilt the igniter back on its hinge.
- Remove the splined nut.
- Remove the nozzle line assembly from the burner, being careful not to damage the electrodes or insulators while handling. To ease removal of long assemblies (over 9 inches), rotate the assembly 180° from the installed position after pulling partially out of the tube.
- To replace the nozzle line assembly, reverse the above steps.

### F. Check/adjust "Z" dimension

Refer to Figure 5. The critical "Z" dimension is the distance from the face of the nozzle to the flat face of the head. This distance for **F heads** is 1 1/8". The "Z" dimension is factory set for burners shipped with the air tube installed but should always be verified during service and installation. If the "Z" dimension is out of adjustment, perform the following steps.

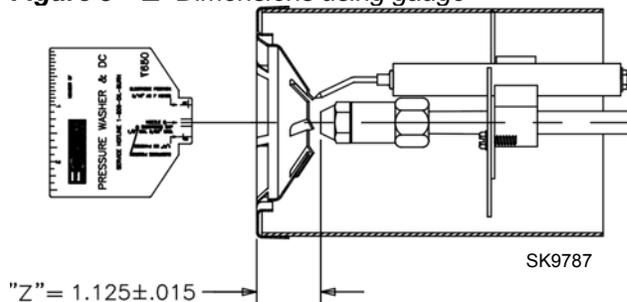
Before proceeding, turn off power to the burner.

- Disconnect the oil connector tube from the nozzle line.
- Referring to Figure 3, loosen the splined nut from the nozzle line. Loosen the hex head screw securing the escutcheon plate to the burner housing.
- A Beckett T650 gauge should be used to set the Z-dimension. Place the end of a ruler at the face of the nozzle and, using a straight edge across the head, measure the distance to the face of the head.
- Slide the nozzle line forward or back until this dimension for **F heads** is 1 1/8".
- Tighten the hex head screw to secure the escutcheon plate to the burner chassis. Then tighten the splined nut and attach the oil connector tube.
- Recheck the "Z" dimension periodically when servicing to ensure the escutcheon plate has not shifted. You will need to reset the "Z" dimension if you replace the air tube or nozzle line assembly.

#### NOTICE

The Beckett **Z gauge** (part number Z-2000) is available to permit checking the **F head "Z"** dimension without removing the burner.

**Figure 5 – Z- Dimensions using gauge**



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## 4. Fuel Supply Maintenance

### A. Connect fuel lines

For oil supply system specifications for tanks not mounted on machines, carefully follow the pump manufacturer's literature and the latest edition of NFPA 31. If this information is unavailable, use the following basic guidelines:

**NOTICE**

Pumps with automatic bypass do not require a bypass plug.

**WARNING**

The burner pump is shipped without the bypass plug installed. You must install this plug on two-pipe oil systems. If the unit is a one-pipe oil system DO NOT install the plug in the pump. Failure to comply could cause pump seal failure, oil leakage and the potential for a fire and injury hazard.

### B. Fuel supply level with or above burner

The burner may be equipped with a single-stage pump. If a one pipe system is installed, insure that a bypass plug is not installed in the pump, then connect the fuel supply to the burner with a single supply line. Note that manual bleeding of the pump is required on initial start-up. When connecting a two-pipe fuel supply, install the pump bypass plug.

**WARNING**

The oil supply inlet pressure to the pump cannot exceed 3 psi. Install a pressure-limiting device in accordance with NFPA 31.

### C. Fuel supply below level of burner

When the fuel supply is located below the level of the burner, a two-pipe fuel supply system is not necessary, but depending on the fuel line diameter and horizontal and vertical length, the installation may also require a two-stage pump. Consult the pump manufacturer's literature for lift and vacuum capability.

### D. Fuel line replacement (remote tank only)

When replacing fuel lines, continuous lengths of heavy wall copper tubing is recommended. To ensure a tight seal, always use flare fittings. Never use compression fittings.

Always install fittings in an accessible location. To avoid vibration noise, fuel lines should not run against the appliance or the ceiling joists.

**WARNING**

Never use Teflon tape on any fuel fitting. Tape fragments can lodge in fuel line components and the fuel pump, damaging the pump and preventing proper operation.

### E. Fuel line valve and filter

Shutoff valves should be located in the oil supply line, never the return line.

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## 5. Burner Maintenance & Wiring

### A. Burner Installed on Washer

Refer to appliance manufacturer's wiring diagram for electrical connections. Refer to Appendix A for burner maintenance procedures.

### B. Burner Replacement

Burner wiring may vary, depending on the actual primary control and furnished options. Refer to Figure 6 for typical burner wiring, showing CAD cell primary controls. Note that the relay and control, shown in the wiring diagram are optional features.

All wiring must be in accordance with the latest revision of National Electric Code NFPA 70 and all local codes and regulations.

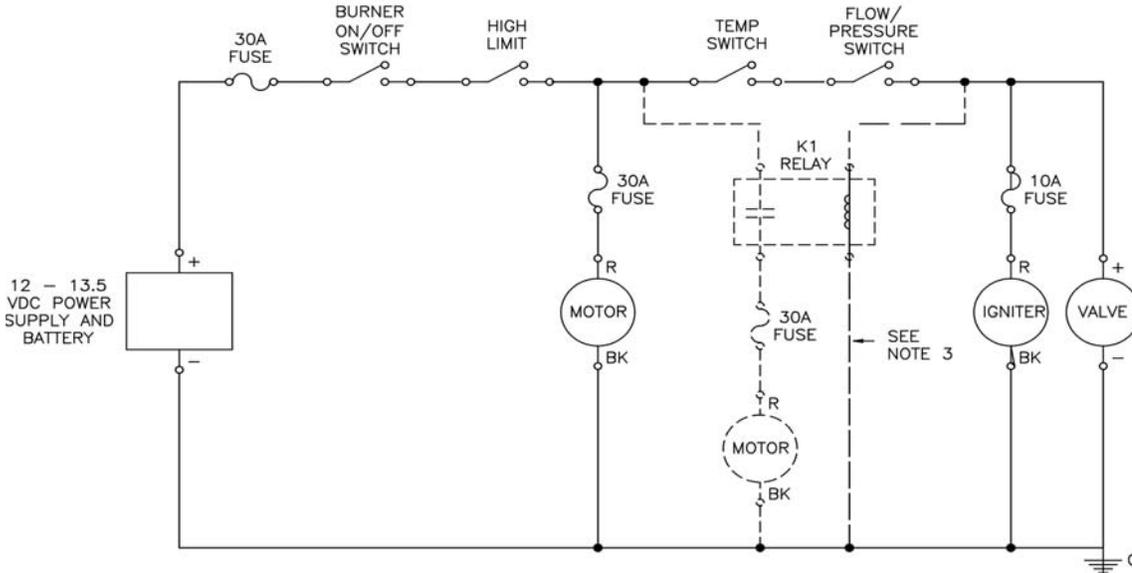
**NOTICE**

The wiring diagrams in this manual are for *general reference only*. Refer to the equipment manufacturer's literature or the diagrams supplied with the equipment. Failure to install correct wiring could result in severe personal injury, death or substantial property damage.

**WARNING**

Electrical shock hazard. Disconnect power before servicing.

**Figure 6A – Recommended Field Wiring**

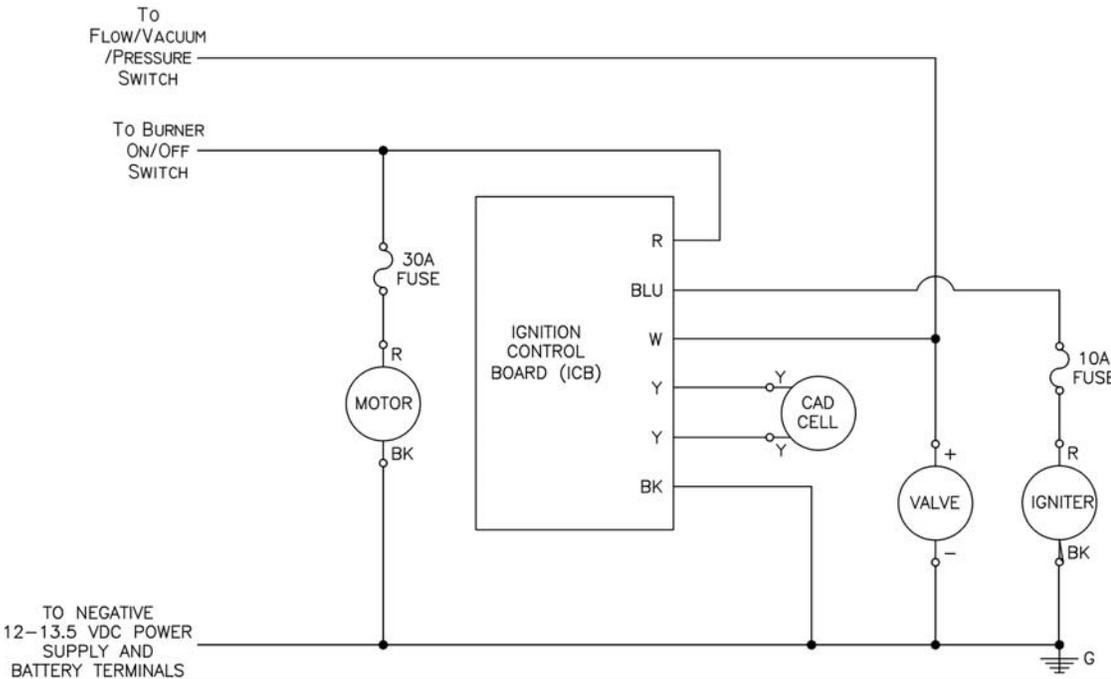


**NOTES:**

1. All wires are to be 14 GA. Minimum (18 GA. for valve & igniter) to prevent voltage drop between battery and burner.
2. Motor runs continuously in normal configuration.
3. Optional motor configuration shown in dashed lines cycles motor with trigger. K1 relay to be S.P.S.T. N.O. contacts with 25 A minimum current rating. (100 amp in-rush) @ 12 volts DC.

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**Figure 6B – Wiring with ICB**

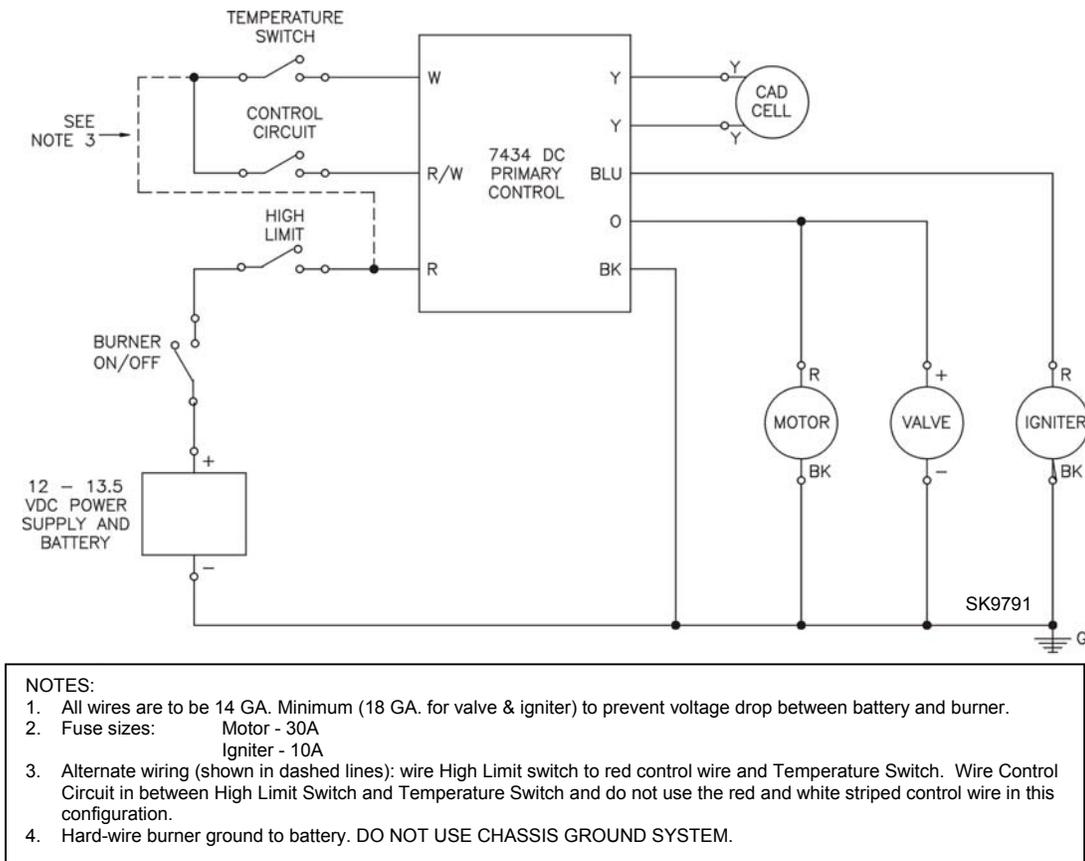


**NOTES:**

1. All wires are to be 14 GA. Minimum (18 GA. for valve & igniter) to prevent voltage drop between battery and burner.
2. Alternate wiring: white wire of 1CB may be wired to red wire of 1CB, and positive valve wire may be wired to flow or pressure switch.
3. Hard-wire burner ground to battery. DO NOT USE CHASSIS GROUND SYSTEM.

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Figure 6C – Wiring with 7434 Control



## 6. Drive component maintenance

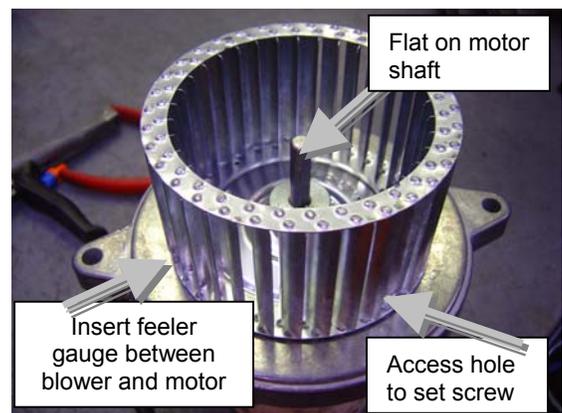
### A. Motor, blower wheel, and coupling replacement

The motor will require replacement if the proper voltage is measured at the motor input, and the motor will either not run, or the current draw with a free running pump exceeds 10% of the rated current.

To replace the burner motor, coupling and/or blower wheel perform the following steps.

1. Before servicing, turn off and/or disconnect all power to the burner.
2. Disconnect the burner motor wires.
3. Remove the bolts securing the motor to the burner housing.
4. Remove the motor, coupling, and blower wheel.
5. Loosen the set screw on the blower wheel to slide the existing wheel off the shaft.
6. Slide the new blower wheel onto the old shaft (after thoroughly cleaning housing) and/or slide the old blower wheel onto the new motor shaft.
7. Place a .030" ( $1/32" \pm 1/64"$ ) feeler gauge between the blower wheel and the motor housing.
8. Slide the blower wheel toward the motor until it contacts the feeler gauge.
9. Rotate the blower wheel until the setscrew is centered on the flat of the motor shaft. Tighten the setscrew to secure the wheel.

Figure 7. – Blower Wheel



10. Slide the motor coupling on the motor shaft then install the motor on the burner housing. Insure that the motor coupling fits between the motor shaft and the pump shaft inside the housing. Tighten the motor retaining screws. Reconnect the wires.
11. Restore power, start the burner and perform the combustion test described previously in this manual.

### B. Pump Maintenance

#### CAUTION

This Equipment must be installed, adjusted and started only by a qualified service technician. – an individual or agency, licensed and experienced with all codes and ordinances, who is responsible for the installation and adjustment of the equipment. The installation must comply with all local codes and ordinances and with the National Fire Protection Association Standard for Liquid Fuel Equipment, NFPA 31 (or CSA B139).

#### General pump information

Important information - Long or oversized inlet lines may require the pump to operate dry during initial bleeding period. In such cases, the priming may be assisted by injecting fuel oil in the pump gear set. Under lift conditions, lines and fittings must be air tight. To assure this, "Pipe Dope" may be applied to both the used and unused inlet and return fittings.

#### CAUTION

Do NOT use Teflon tape! Do NOT use compression fittings!

Mounting Position - Beckett CleanCut pump may be mounted in any position (except upside-down during single pipe installation).

Vacuum check - A Vacuum Gage may be installed in either of the 1/4" NPT inlet ports.

Pressure check- When a pressure check is made use the nozzle port. If the bleed port is used, the reading on the gauge should be approximately 5 psig higher than the pressure reading on the nozzle port.

Cutoff check - To check cutoff pressure dead head a pressure gage in the nozzle port. Run the burner for a short period of time. Shut the burner off. The pressure will drop and hold above zero.

#### CAUTION

Pressurized or gravity feed installations must not exceed 3 psi on inlet line or return line at the pump per NFPA 31. A pressure greater than 10 psi may cause damage to the shaft seal.

#### Mounting the pump

To install a CleanCut pump on a pre 2002 burner chassis with an existing shutter tab follow the instructions included with the pump.

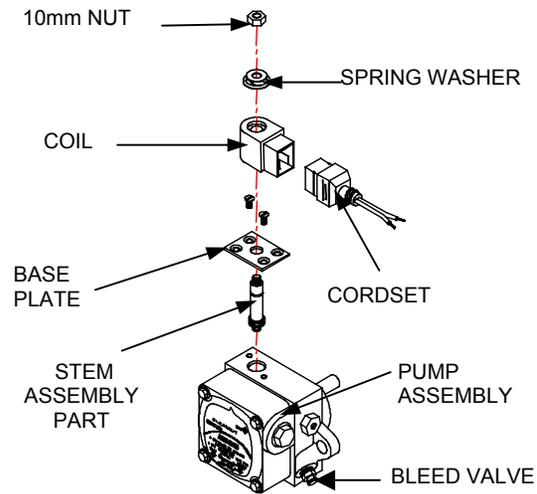
### C. Valve Coil and Stem Replacement

To determine if the valve coil requires replacement perform the following steps.

1. Remove the cord set from the valve.
2. Place the leads from an ohmmeter across the coil.

3. A 12 volt coil should measure between 15 and 25 ohms.
4. If the meter indicates an open circuit, replace the coil.

**Figure 8. – Pump and Valve assemblies**



To check pump operation perform the following.

1. Check the operating pressure by removing the copper tubing from the nozzle line and installing a pressure gauge in the line. With the motor running and the coil energized, check the gauge. The pressure should read 100 psig unless otherwise stated.
2. To check the cutoff function, deadhead the pressure gauge onto the copper connector tube attached to the nozzle port. Run the burner for a short period of time. Shut the burner off; the pressure should drop and hold.

To replace the coil and/or valve stem assembly perform the following steps.

1. Before servicing, turn off and/or disconnect all power to the burner.
2. Use the shut-off valve between the fuel tank and the pump to block oil from the burner.
3. Remove the copper Tube Assembly when replacing the pump or when removing the coil and the tube blocks the coil.
4. Using a flat tip screwdriver, press the flat tip into the spring washer to prevent it from rotating.
5. Using a 10mm wrench or adjustable wrench, remove the nut and spring washer.
6. Remove the coil by lifting it straight up.
7. Remove the two base plate screws, then the base plate by lifting straight up.
8. Remove valve stem assembly by pulling straight up.
9. To install the new stem and coil assemblies, follow the above steps in reverse order, tightening each part as you go.
10. Restore power, start the burner and perform the combustion test described previously in this manual.

## 7. Start up burner & Set combustion

### A. Basic burner operation

On the Beckett ADC Oil burner standard configuration, the motor and igniter operate continuously while the valve, that controls oil flow, is cycled by the switches on the power washer. The **motor** is used to drive the blower and pump. The rotational speed of the motor is determined by the voltage supplied and the load placed on the motor. Pump pressure and air settings are the main factors affecting the motor load. The **igniter** converts battery DC voltage into a high voltage spark to ignite the oil. The igniter is capable of running continuously as long as the blower wheel is circulating air across the igniter base. The **pump** and **solenoid valve** are used to control the flow of oil from the reservoir to the nozzle. The pump pressurizes the oil. When energized, the valve enables high pressure oil flow to the nozzle. An **optional control circuit** can also be supplied to reduce current draw on the charging system by turning the igniter off after a flame has been established. This option controls igniter operation based on a signal from a light sensing CAD cell. When light hits the cell the control will sense a decrease in resistance across the sensor. A few seconds delay will occur prior to the igniter switching off. As long as sufficient light is reaching the cell eye, the igniter will remain off. If light is removed from the sensor, the igniter will turn on until light is again sensed by the CAD cell.

Variations to the burner circuits may occur due to optional temperature, pressure, and vacuum switches that control burner operation. Note that when external switches are used to control the motor operation they must be sized correctly for the rated current or a relay should be installed to isolate the switches from the motor's full load current.

### B. Combustion set-up

#### WARNING

Do not attempt to start the burner if excess fuel or vapor has accumulated in the equipment. Starting the burner under these conditions could result in a puffback of hot combustion gases, high smoke levels, or hazardous operation.

Open all shutoff valves located in the oil supply line to the burner.

As soon as burner motor starts rotating **bleed all the air from the pump**. (Required with single-pipe systems)

To bleed the pump, attach a clear plastic hose over the vent fitting. Loosen the fitting and catch the oil in an empty container. Tighten the fitting when all air has been purged from the supply system. **Note:** If the burner stops after a flame is established, the unit probably requires additional bleeding. Continue to bleed the system until the pump is primed and a flame is established when the vent fitting is closed.

### C. Set combustion with instruments

#### WARNING

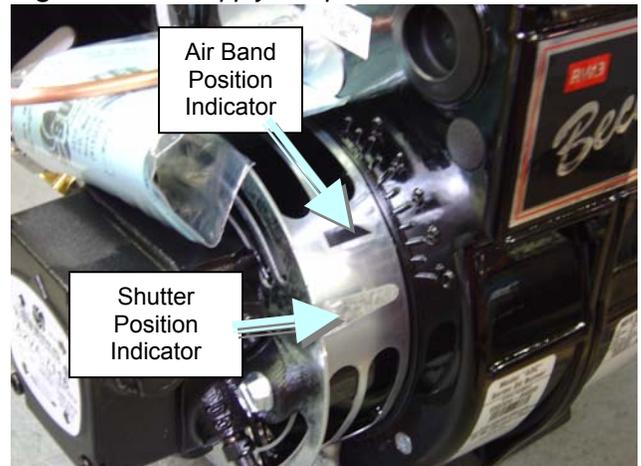
The combustion level should be adjusted using dedicated combustion test equipment. Failure to properly set the burner could result in inefficient operation, and/or conditions that could potentially cause severe personal injury, death or substantial property damage.

#### NOTICE

Combustion testing instruments can be purchased from most HVAC suppliers. If your usage does not warrant purchasing the equipment, contact a reputable HVAC contractor to perform a combustion test and adjustment.

1. Allow the burner to run for approximately 5 to 10 minutes.

Figure 9. – Air supply components



2. Follow these three steps to properly adjust the burner:
  - Step 1: Use a smoke tester to check for a clean flame. If necessary, adjust the air shutter and air band to obtain a trace to one smoke. See Figure 2.
  - Step 2: With the smoke level at a trace to one, measure the CO<sub>2</sub> (or O<sub>2</sub>). This will be the reference point for further adjustments.
  - Step 3: Increase the air to reduce smoke levels to zero or a trace. Recheck the CO<sub>2</sub> (or O<sub>2</sub>), it should be lower than the initial reading.
3. Once the combustion level is set, tighten the fasteners on the air band and air shutter.
4. Start and stop the burner several times to ensure satisfactory operation.
5. Test the equipment safety controls to verify that they function according to the manufacturer's specifications.

**Appendix A. Maintain & Service Burner****A. Owner's information****WARNING**

Have your equipment inspected at regular intervals by a qualified service agency to assure continued proper operation. The burner should be adjusted using dedicated combustion test equipment. Failure to properly set the burner could result in inefficient operation, and/or conditions that could potentially cause severe personal injury, death or substantial property damage.

The following could result in fire hazard, severe personal injury, death or substantial property damage. Read carefully.

- Never attempt to use gasoline in your burner.
- Never store gasoline or combustible materials near the burner.
- Never attempt to light the burner by throwing burning material into the fire chamber.
- Never attempt to use crankcase or waste oil or material other than the approved fuel oils in this burner.
- Never restrict the air inlet openings to the burner or the combustion air ventilation openings in the room.

**B. Owner service and maintenance**

Properly installed and maintained, your ADC burner will provide years of efficient, trouble-free operation. Please take care of your equipment by following the warnings provided and by doing the following (notify your qualified service agency if your burner is not operating properly):

**WARNING**

This equipment should be serviced only by a qualified service agency. The appropriate test instruments must be used. Failure to do so could result in burner or equipment failure, could potentially cause severe personal injury, death or substantial property damage.

**C. Daily**

Check the area around your burner/equipment to make sure:

- air ventilation openings are clean and unobstructed
- nothing is blocking the burner inlet air openings
- no combustible materials are stored near the equipment
- there are no signs of oil or water leakage around the burner or equipment

**D. Extended down time**

If the equipment will be stored for an extended period of time, insure that the fuel tank is full and add a fuel stabilizer to the tank.

**E. Regular Service/Maintenance**

Have your burner, power washer, crack sealer, etc. serviced annually by your qualified service agency.

The following components/assemblies should be checked/adjusted/replaced on a regular basis. Refer to the Replacement Parts exploded view for part locations.

- ❑ Replace the oil supply line filter if applicable. The line filter cartridge must be replaced to avoid contamination of the pump and nozzle.
- ❑ Inspect the oil supply system. All fittings should be leak-tight. The supply lines should be free of water, sludge and other restrictions.
- ❑ Remove and clean the pump strainer.
- ❑ Replace the nozzle with one having the same specifications from the same manufacturer.
- ❑ Clean and inspect the electrodes for damage, replacing any that are cracked or chipped.
- ❑ Check electrode tip settings. Replace electrodes if tips are rounded.
- ❑ Inspect the igniter spring contacts. Clean or replace if corroded.
- ❑ Clean the cad cell, if applicable.
- ❑ Make sure Low Firing Rate Baffle is in place if required for the burner application. Omitting the baffle can result in unacceptable burner combustion.
- ❑ Inspect all gaskets including the igniter base plate gasket. Replace any that are damaged or missing.
- ❑ Clean the blower wheel, air inlet, air guide, retention head and static plate of any dirt, asphalt or other material.
- ❑ Check motor current. The amp draw should not exceed the nameplate rating by more than 10%.
- ❑ Check all wiring for loose connections or damaged insulation.
- ❑ Check the pump pressure and cutoff function.
- ❑ Check primary control safety lockout timing if applicable. Refer to the information supplied by the control manufacturer for procedures.
- ❑ Check ignition system for proper operation.
- ❑ Inspect the exhaust system for soot accumulation or other restriction.
- ❑ Clean the equipment thoroughly according to the manufacturer's recommendations.
- ❑ Check the burner performance. Refer to Section 3.
- ❑ It is good practice to make a record of the service performed and the combustion test results.

## Appendix B. Burner Troubleshooting

Oil burners that are designed for use in pressure washers are built to take temperature extremes vibration and rough handling. When performing the following troubleshooting steps, we assume that the oil burner motor and ignition transformer operate continuously and the oil solenoid valve, which controls oil flow, is cycled by the trigger on the wand. We also assume that there is power to the burner, and fuel in the tank.

In addition to normal mechanic's tools, it is recommended to have the following equipment on hand. An electrical meter capable of measuring volts, ohms, and amps, an ignition transformer tester, a smoke pump tester, combustion analyzer and a zero to 200 psi oil pressure gauge.

### Troubleshooting Chart

Symptom	Possible cause	Additional info/Procedure
<b>Oil not igniting</b>	<p>If the burner is not igniting, the burner motor, drive coupling, and oil pump are operating and oil is flowing to the nozzle through the solenoid valve, check the following possibilities.</p> <ol style="list-style-type: none"> <li>1) Check the air shutter adjustment. If the air shutter is opened too far, the flow of air may prevent the igniter from reaching the oil spray. This may appear as a white vapor exhaust from the coil.</li> <li>2) The ignition system may have failed to supply an adequate arc to ignite the oil. Check the battery and charging system to insure a continuous supply of 11 to 16 volts DC (15 amps)</li> <li>3) Check the electrodes for wear and damage. Insure that the electrodes are adjusted properly.</li> </ol>	<ol style="list-style-type: none"> <li>1) Refer to Section 7, C.</li> <li>2) Refer to Section 2.</li> <li>3) Refer to Section 3, C.</li> </ol>
<b>No Flame</b>	<p>If there is no flame, the burner motor and ignition transformer operate continuously and the oil solenoid valve, which controls oil flow, is cycled by the trigger in the wand, check the following possibilities.</p> <ol style="list-style-type: none"> <li>1) Check for a plugged oil nozzle.</li> <li>2) If the coil on the solenoid valve is actuating, insure that the valve is opening.</li> <li>3) Check for sufficient fuel pressure. Pressure is 100psig unless otherwise noted.</li> <li>4) Check the pump pressure. Check for air in fuel lines.</li> <li>5) Check burner for broken motor coupling. If the coupling is broken check pump rotation prior to replacing the coupling.</li> <li>6) Check for contaminated fuel and/or partially plugged fuel filter.</li> </ol>	<ol style="list-style-type: none"> <li>1) Refer to Section 3, A.</li> <li>2) Refer to Section 6, C.</li> <li>3) Refer to Section 6, B.</li> <li>4) Refer to Section 6, B.</li> <li>5) Refer to Section 6, A.</li> <li>6) Refer to Section 4, E.</li> </ol>
<b>Motor not operating</b>	<p>If the blower motor is not operating, check the following possibilities.</p> <ol style="list-style-type: none"> <li>1) Check voltage at the motor to insure that switches and relays, in line with the motor, are operating properly.</li> <li>2) Check pump and motor shaft operation. They should work freely without binding.</li> <li>3) Check the fuse and/or breaker on the motor.</li> </ol>	<ol style="list-style-type: none"> <li>1) Refer to Section 2.</li> <li>2) Refer to Section 6, B.</li> <li>3) Refer to Section 6.</li> </ol>
<b>No oil spray</b>	<p>If the blower motor is operating, there is fuel in the reservoir, but oil does not spray out the end of the nozzle, check the following possibilities.</p> <ol style="list-style-type: none"> <li>1) Check for a broken or stripped coupling between the pump and the motor.</li> <li>2) Check the pump output for oil.</li> <li>3) Check operation of the oil valve.</li> <li>4) Check for a plugged nozzle</li> <li>5) Check for air in the oil line</li> <li>6) Check for fuel contamination or plugged filter</li> </ol>	<ol style="list-style-type: none"> <li>1) Refer to Section 6, A.</li> <li>2) Refer to Section 6, B.</li> <li>3) Refer to Section 6, B.</li> <li>4) Refer to Section 3, A.</li> </ol>

<b>Fluctuating or no pump pressure</b>	If the pump pressure, as determined by a pressure gauge, is erratic or does not exist, check the following possibilities. <ol style="list-style-type: none"><li>1) Check motor rotational speed. Low rpm's can cause erratic or no pump pressure.</li><li>2) Check for a broken or worn motor coupling</li><li>3) Check that the pump turns freely</li><li>4) Check for air leaks in the lines</li><li>5) Check for oil froth within the reservoir</li><li>6) Check voltage at the motor</li><li>7) Check for fuel contamination or partially plugged filter</li></ol>	<ol style="list-style-type: none"><li>1) Refer to Section 6, A.</li><li>2) Refer to Section 6, B.</li><li>3) Refer to Section 6, B.</li> <li>4) Refer to voltage rating on Nameplate.</li></ol>
<b>Slow motor rotation</b>	If the blower motor is not operating at the rpm's listed on the nameplate, check the following. <ol style="list-style-type: none"><li>1) Check the supply voltage to the motor.</li><li>2) Check for free operation of the motor shaft and pump assembly.</li></ol>	<ol style="list-style-type: none"><li>1) Refer to voltage rating on Nameplate.</li><li>2) Refer to Section 6, A &amp; B.</li></ol>

## Appendix C. Replacement Parts

For best performance specify genuine **Beckett** replacement parts

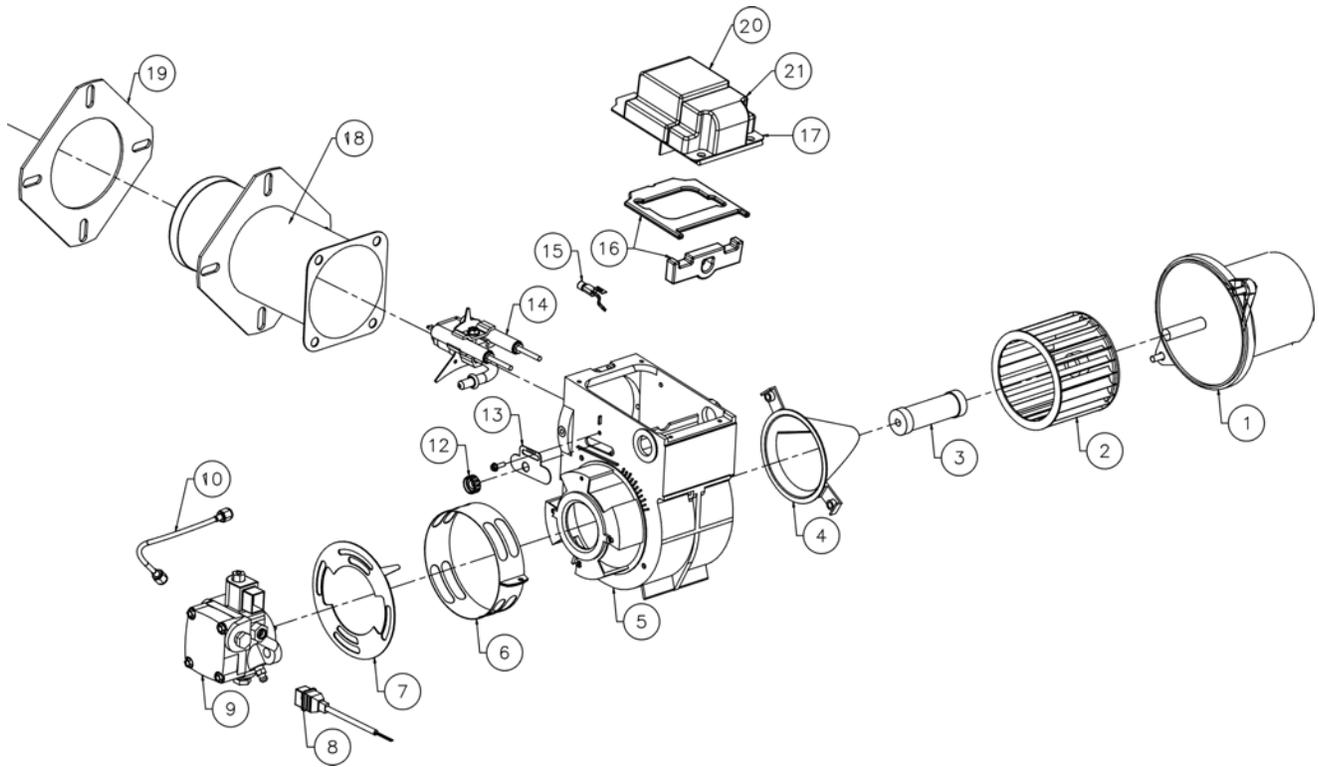


Illustration #	Description	Part#
1	DC Motor	21699UF
2	Blower Wheel	2140401
3	Coupling	21405
4	Air Guide	31231U
5	Burner Housing - Black- Gray-	5874BKU 5877
6	Air Band	5151501
7	Air Shutter 4 Slot Air Shutter 8 Slot	3709 3494
8	Cord set	21807
9	Pump (CleanCut)	218440ZU
10	Tube assembly	21877U

Illustration #	Description	Part#
11	12 volt Coil	21754U
12	Escutcheon plate spline nut	3666
13	Escutcheon plate	3493
14	Electrode kit	5700
15	Cad cell detector	7492/7006
16	Igniter gasket kit	51411
17	Igniter w/ICB Igniter w/o ICB	51776U 51777U
18	Air tube assemblies	Specify
19	Flange mounting gasket	
20	Ignitor only	7435U
21	Ignitor Control Board	51663

# Limited WARRANTY

## For Residential, Commercial and Specialty Burners

The R. W. BECKETT CORPORATION ("Beckett") warrants to persons who purchase its Beckett burners from Beckett for resale or for incorporation into a product for resale ("Customers") that its equipment is free from defects in material and workmanship under normal use and service for 60 months from the date of manufacture for Residential Burners and 18 months from the date of manufacture for Commercial and Specialty Burners. *Residential burner models include:* AF, AFG, AFII, NX, SF, SR and SMG. *Commercial burner models include:* CF375, CF500, CF800, CF1400, CF2300A, CF2500, CF3500A, CG10, CG15, CG25 and CG50. *Specialty burner models include:* ADC, ADCP, ARV, SDC and SM. The provisions of this warranty are extended to individual major burner components as follows:

- a) 60 months from date of manufacture for all Beckett-branded major components, except for 12 Vdc components.
- b) 18 months from date of manufacture for all non-Beckett-branded major components and Beckett branded 12 Vdc components.

Note: Normal service items found to be defective upon receipt by the customer are covered by this warranty.

**THIS WARRANTY DOES NOT EXTEND TO EQUIPMENT SUBJECTED TO MISUSE, NEGLIGENCE, OR ACCIDENT; NOR DOES THIS WARRANTY APPLY UNLESS THE PRODUCT COVERED BY IT IS PROPERLY INSTALLED BY A QUALIFIED, COMPETENT TECHNICIAN, WHO IS LICENSED WHERE STATE AND LOCAL CODES REQUIRE, AND WHO IS EXPERIENCED IN MAKING SUCH INSTALLATIONS, IN ACCORDANCE WITH THE LATEST EDITION OF NFPA NO. 31 OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE LATEST EDITION OF THE NATIONAL FUEL GAS CODE (NFPA NO. 54) AND IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND NATIONAL CODES HAVING JURISDICTIONAL AUTHORITY.**

Equipment, which is defective in material or workmanship and within the warranty period, may be returned for credit as follows:  
Beckett Burners, Beckett-branded major components and non-Beckett-branded major components that came as original equipment on a Beckett burner or were sold as a replacement part by Beckett should be returned, freight prepaid, to Beckett's home office. Credit will be issued to the customer unless the returned equipment is determined by Beckett to be out of warranty or damaged by user, in which case the equipment will be scrapped.  
Note: Beckett is not responsible for any labor cost for removal and replacement of equipment.

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

R.W. **BECKETT** CORPORATION

P.O. Box 1289 Elyria, Ohio 44036

Form No. 61545 R72906

## R.W. **BECKETT** CORPORATION

U.S.A.: P.O. Box 1289 • Elyria, Ohio 44036

Canada: R.W. Beckett Canada, Ltd. • Unit #3, 430 Laird Road • Guelph, Ontario N1G 3X7

Form Number 6104BADDC R805



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