CF1000

Oil Burner Manual

Beckett™
COMMERCIAL PRODUCTS

⚠ WARNING **Potential for Fire, Smoke and Asphyxiation Hazards**

Incorrect installation, adjustment, or misuse of this burner could result in death, severe personal injury, or substantial property damage.

To the Homeowner or Equipment Owner:

- Please read and carefully follow all instructions provided in this manual regarding your responsibilities in caring for your heating equipment.
- Contact a professional, qualified service agency for installation, start-up or service work.
- Save this manual for future reference.

To the Professional, Qualified Installer or Service Agency:

- Please read and carefully follow all instructions provided in this manual before installing, starting, or servicing this burner or heating system.
- The Installation must be made in accordance with all state and local codes having jurisdiction.

To the Owner:

Thank you for purchasing a Beckett burner for use with your heating appliance. Please pay attention to the Safety Warnings contained within this instruction manual. Keep this manual for your records and provide it to your qualified service agency for use in professionally setting up and maintaining your oil burner.

Your Beckett burner will provide years of efficient operation if it is professionally installed and maintained by a qualified service technician. If at any time the burner does not appear to be operating properly, **immediately contact your qualified service agency** for consultation.

We recommend annual inspection/ service of your oil heating system by a qualified service agency.

Daily – Check the room in which your burner/appliance is installed. Make sure:

- Air ventilation openings are clean and unobstructed
- Nothing is blocking burner inlet air openings
- No combustible materials are stored near the heating appliance
- There are no signs of oil or water leaking around the burner or appliance

Weekly

- Check your oil tank level. Always keep your oil tank full, especially during the summer, in order to prevent condensation of moisture on the inside surface of the tank.

Contents

General Information

Hazard Definitions

DANGER **Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.**

WARNING **Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.**

CAUTION **Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.**

Within the boundaries of the hazard warning, there will be information presented describing consequences if the warning is not heeded and instructions on how to avoid the hazard.

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

Agency Approvals

c UL us

- UL certified to comply with ANSI/UL296 and tested to CSA B140.0.
- Accepted by N.Y.C. M.E.A.
- Other approvals may be available and must
- be specifi ed at time of order.

WARNING **Owner's Responsibility**

Incorrect installation, adjustment, and use of this burner could result in severe personal injury, death, or substantial property damage from fire, carbon monoxide poisoning, soot or explosion. Contact a professional, qualified service agency for the installation, adjustment and service of your oil heating system. This work requires technical training, trade experience, licensing or certification in some states and the proper use of special combustion test instruments.

Please carefully read and comply with the following instructions:

- Never store or use gasoline or other flammable liquids or vapors near this burner or appliance.
- Never attempt to burn garbage or refuse in this appliance.
- Never attempt to light the burner/appliance by throwing burning material into the appliance.
- Never attempt to burn any fuel not specified and approved for use in this burner.
- Never restrict the air inlet openings to the burner or the combustion air ventilation openings in the room.

CAUTION **Frozen Plumbing and Water Damage Hazard**

If the residence is unattended in severely cold weather, burner primary control safety lockout, heating system component failures, power outages or other electrical system failures could result in frozen plumbing and water damage in a matter of hours. For protection, take preventive actions such as having a security system installed that operates during power outages, senses low temperature and initiates an effective action. Consult with your heating contractor or a home security agency.

NOTICE 50 Hz Motors - The burner ratings, air settings and nozzle ratings are based on standard 60 Hz motors (at 3450 rpm). Derate all ratings 20% when using 50 Hz motors. Consult factory for specific application data.

NOTICE High altitude installation - Accepted industry practice requires no derate of burner capacity up to 2000 feet above sea level. For altitudes higher than 2000 feet, derate burner capacity 2% for each 1000 feet above sea level.

Owner's Responsibility:

⚠ WARNING **Follow these instructions exactly.**

Failure to follow these instructions, misuse, or incorrect adjustment of the burner could result in asphyxiation, explosion or fire.

Contact a professional, qualifi ed service agency for the installation, adjustment and service of your oil burning system. Thereafter, have your equipment adjusted and inspected at least annually to ensure reliable operation. This work requires technical training, trade experience, licensing or certifi cation in some states and the proper use of special combustion
test instruments.

- Never store or use gasoline or other flammable liquids or vapors near this burner or appliance.
- Never attempt to burn garbage or refuse in this appliance.
- Never attempt to light the burner by throwing burning material into the appliance.
- Never attempt to burn any fuel not specified and approved for use in this burner.
- Never restrict the air inlet openings to the burner or the combustion air ventilation openings in the room.

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⚠ WARNING **Impaired Burner Performance & Fire Hazard**

Do NOT operate the burner beyond specifications outlined in the table on this page.

- For applications beyond these limits, consult Beckett Technical Services at 1-800-645-2876.
- NOTE: Some packaged appliances with burners may be agency listed as a unit to operate beyond these limits. Consult the appliance manufacturer's specifications and agency approvals for verification.

Service Agency Responsibility:

⚠ WARNING **Follow these instructions exactly.**

Failure to follow these instructions could result in asphyxiation, explosion or fire.

- Please read all instructions before proceeding. Follow all instructions completely.
- This equipment must be installed, adjusted and started by a qualified service agency that is licensed and experienced with all applicable codes and ordinances and responsible for the installation and commission of the equipment.
- The installation must comply with all local codes and ordinances having jurisdiction and the latest editions of the NFPA 31 and CSA-B139 & B140 in Canada.

Specifications

Fuels	U.S. #1 or #2 heating oil only (ASTM D396) Canada #1 stove oil or #2 furnace oil only **⚠ CAUTION** **DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OIL CONTAINING GASOLINE.**
Firing Range	4.0 to 10.0 GPH
Motor	½ HP 3450 RPM 120/60 Hz standard 6.5 amps @ 120 VAC Optional voltages:(60 Hz or 50 Hz) • 240 VAC/1-PH • 208/240/480 VAC/3-PH
Ignition Trans.	Continuous Duty, 120V/12,000V
Housing	Cast aluminum
Fuel Unit	100 - 300 PSIG
Oil Nozzle	45° - 70° solid
Shipping Weight	75 lbs.
Dimensions	See ***Figure 8***.

Pre-installation Checklist

Combustion Air Supply

⚠ WARNING **Adequate Combustion and Ventilation Air Supply Required**

Failure to provide adequate air supply could result in asphyxiation, explosion or fire hazards.

- The burner cannot properly burn the fuel if it is not supplied with a reliable combustion air source.
- Follow the guidelines in the latest editions of the FPA 31 and CSA-B139 regarding providing adequate air for combustion and ventilation.

- The burner requires combustion air and ventilation air for reliable operation. Assure that the building and/or combustion air openings comply with National Fire Protection Standard for Oil-Burning Equipment, NFPA 31.
- For appliance/burner units in confined spaces, the room must have an air opening near the top of the room plus one near the floor, each with a free area at least one square inch per 1,000 Btu/hr input of all fuel burning equipment in the room.
- For other conditions, refer to NFPA 31 (CSA B1139-M91 in Canada). If there is a risk of the space being under negative pressure or of exhaust fans or other devices depleting available air for combustion and ventilation, the appliance/burner should be installed in an isolated room provided with outside combustion air.

Clearances

- With the burner installed in the appliance, there must be adequate space in front of and on the sides of the burner to allow access and operation. Verify that the clearance dimensions comply with all local codes and with the appliance manufacturer's recommendations.

Fuel Supply

⚠ CAUTION **Oil Supply Pressure Control Required**

Damage to the filter or pump seals could cause oil leakage and a fire hazard.

- The oil supply inlet pressure to the burner cannot exceed 3 psig.
- Do not install valves in return line.
- Insure that a pressure limiting device is installed in accordance with the latest edition of NFPA 31.
- Gravity Feed Systems: Always install an antisiphon valve in the oil supply line or a solenoid valve (RWB Part # 21789) in the pump/nozzle discharge tubing to provide backup oil flow cut-off protection.

- The fuel supply piping and tank must provide #1 or #2 fuel oil at pressure or vacuum conditions suitable for the fuel unit (oil pump) on the burner. Refer to fuel unit literature in the literature envelope in the burner carton to verify allowable suction pressure.

If fuel supply is level with or higher than fuel unit -

- When the fuel unit is not required to lift the oil, the installation is usually suitable for either a one-pipe or two-pipe oil system. The oil pressure at the inlet of the fuel unit must not exceed 3 psig.
- See ***Figure 9*** for one-pipe fuel supply installations. See ***Figure 10*** for two-pipe fuel supply installations.

If fuel supply is below the fuel unit -

- Use a two-pipe oil system when the fuel unit must lift the oil more than 8 feet, The return line provided by the two-pipe system is needed to purge the air from the fuel lines and minimize the likelihood of air-related problems during operation.

Nozzle Pressure

⚠ WARNING **Correct Nozzle and Flow Rate Required**

Incorrect nozzles and flow rates could result in impaired combustion, under-firing, over-firing, sooting, puff-back of hot gases, smoke and potential fire or asphyxiation hazards.

Use only nozzles having the brand, flow rate (gph), spray angle and pattern specified by the appliance manufacturer.

Follow the appliance manufacturer's specifications for the required pump outlet pressure for the nozzle, since this affects the flow rate.

- Nozzle manufacturers calibrate nozzle flow rates at 100 psig.
- This burner utilizes pressures higher than 100 psig, so the actual nozzle flow rate will be greater than the gph stamped on the nozzle body. (Example: A 8.00 gph nozzle at 150 psig = 9.80 gph and at 300 psig = 13.86 gph)

For typical nozzle flow rates at various pressures refer to ***Table 1***.

- The fuel unit nozzle port pressure is factory set at 300 psig. Some original equipment manufacturer burner applications may call for a lower pressure to obtain a required firing rate. Do not change this pressure unless directed to do so by the appliance manufacturer.

Electrical Supply

- Verify that the power connections available are correct for the burner. Refer to ***Figure 1***. All power must be supplied through fused disconnect switches.

Vent System

- The flue gas venting system must be in good condition and must comply with all applicable codes.

Verify Burner Components

- Burner nameplate (***Figure 1***), Model CF1000
- Air tube assembly
- Mounting flange kit
- Pedestal mounting assembly kit (recommended)
- Oil nozzle, per ***Table 1*** — Only 45° to 70° solid pattern nozzles are recommended unless otherwise specified by appliance manufacturer. (See specific appliance recommendation sheet or refer to OEM Spec Guide). Find the required firing rate in the 300 psig column (factory-set fuel unit pressure). Select the corresponding nozzle from column 1 (Rated gph @ 100 psig).

  (Example: 5.00 gph nozzle @ 300 psig = 8.66 gph)

Verify Firing Input Range

- Refer to appliance manufacturer's instructions (if available) for firing rate and nozzle selection. Otherwise, the maximum recommended firing rate for the burner is limited by the length of the firing chamber and the distance from the burner center to the chamber floor. Verify that the chamber dimensions are at least as large as the minimum values given in ***Figure 2***. If the appliance dimensions are smaller than recommended, reduce the firing rate accordingly.

Table 1 - Nozzle Capacities (GPH)

Rated gph @ 100 psig	Pressure - pounds per square inch						
	125	150	175	200	250	275	300
2.00	2.24	2.45	2.65	2.83	3.16	3.32	3.46
2.25	2.52	2.76	2.98	3.18	3.56	3.73	3.90
2.50	2.80	3.06	3.31	3.54	3.95	4.15	4.33
2.75	3.07	3.37	3.64	3.90	4.35	4.56	4.76
3.00	3.35	3.67	3.97	4.24	4.74	4.97	5.20
3.50	3.91	4.29	4.63	4.95	5.53	5.80	6.06
4.00	4.47	4.90	5.29	5.66	6.32	6.63	6.93
4.50	5.04	5.51	5.95	6.36	7.11	7.46	7.79
5.00	5.59	6.12	6.61	7.07	7.91	8.29	8.66
5.50	6.15	6.74	7.28	7.78	8.70	9.12	9.53
6.00	6.71	7.35	7.94	8.49	9.49	9.95	10.39
6.50	7.27	7.96	8.60	9.19	10.28	10.78	11.26
7.00	7.83	8.57	9.26	9.90	11.07	11.61	12.12
7.50	8.39	9.19	9.92	10.61	11.86	12.44	12.99
8.00	8.94	9.80	10.58	11.31	12.65	13.27	13.86

Verify Air Tube

Note: The information in this section may be disregarded if the air tube is supplied by the appliance manufacturer.

- Air tube arrangement –
  Tube A — 4.0 to 10.0 GPH per ***Figure 2***.
- Maximum firing capacity depends on the firebox pressure, see ***Table 2***.
- See ***Figure 2*** to verify the correct air tube length and air tube combination code.

Figure 1 - Typical Nameplate

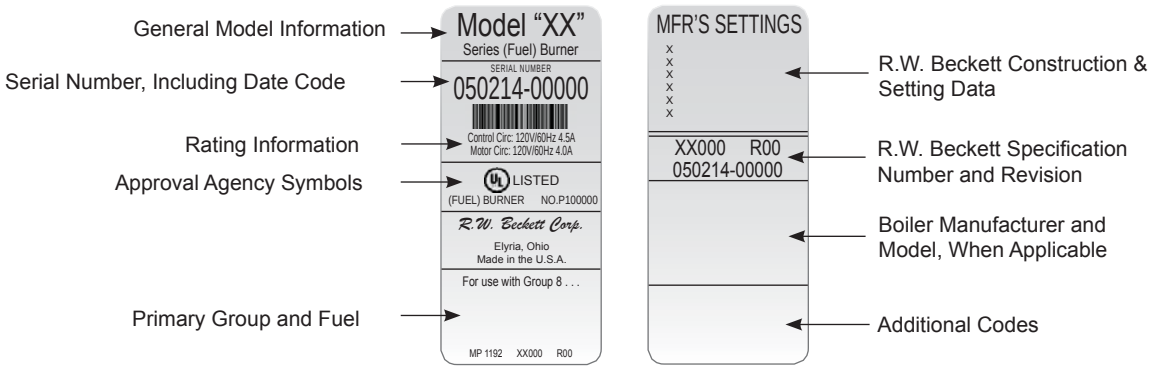
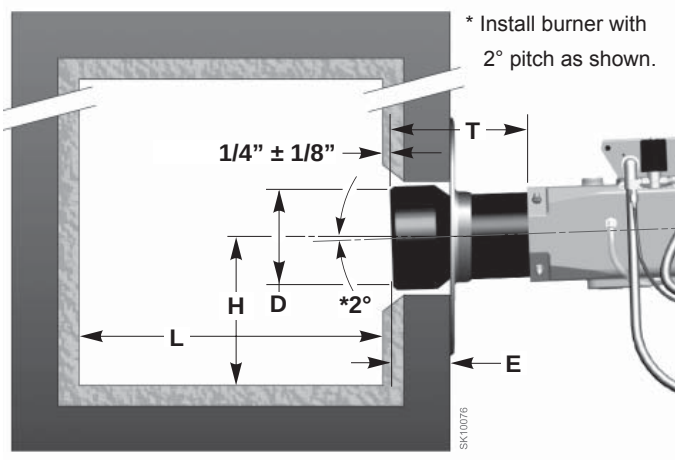


Figure 2 - Dimensions: Minimum Combustion Chamber and Air Tube Mounting.



Firing Rate	Minimum Dimensions			
	(refractory-lined)		(wet-base boilers)	
	H	L	H	L
0 to 5 gph	7.0"	25.0"	7.0"	25.0"
5 to 10 gph	8.0"	35.0"	8.0"	40.0"

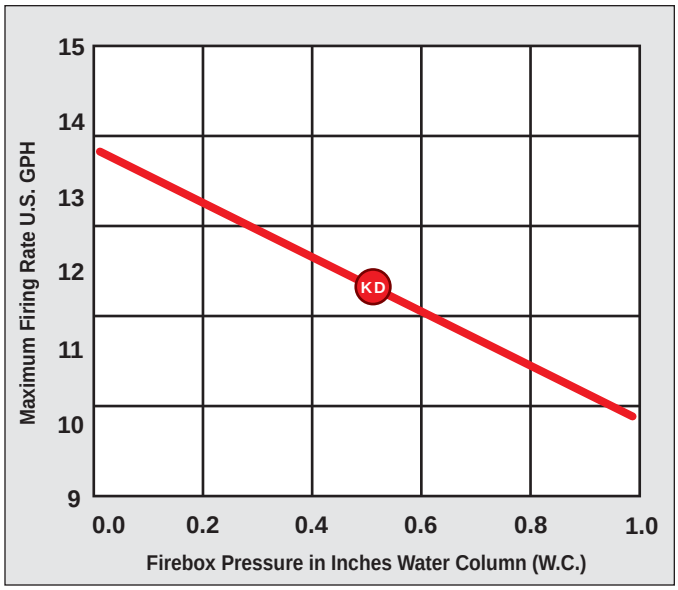
Air Tube Length (Dimension T)	Minimum Insertion Depth (Dimension E)	A.T.C. Codes (A.T.C. = Air Tube Combination)
		Tube A (Dim. D = 5.5")
6.75"	2.94"	CF66KD
10.25"	2.94"	CF102KD
13.75"	2.94"	CF136KD
17.75"	2.94"	CF176KD

Table 2 - Air Tube Capacity (GPH) vs. Firebox Pressure

Firebox Pressure (In W.C.)	No Reserve Air	10%Turndown (GPH)
0.0	11.0	10.00
0.2	10.5	9.45
0.4	10.1	9.10
0.6	9.6	8.64
0.8	9.2	8.30
1.0	8.7	7.83

Note: 10% turndown indicates sufficient reserve air to reduce the CO_2 in the flue to 90% of its value.
Note: The above ratings may vary 5% due to variations in actual job conditions.

Figure 3 - Firebox Pressure: CF1000 with no Reserve Air



NOTICE

Stray Light

Protect Against Stray Light Lockout. Failure to follow these instructions could cause loss of burner operation resulting in no heat, an unplanned process interruption, work stoppage and the potential for frozen plumbing or other cold weather property damage.

- The control must detect a dark, no-flame condition in order to start the burner or it will hold in the stray light lockout mode.
- Shield the burner view window from direct exposure to intense light.

Dust and Moisture

⚠ WARNING

Protect Against Dust and Moisture

Wet, dusty environments could lead to blocked air passages, corrosion damage to components, impaired combustion performance and result in asphyxiation, explosion or fire.

- This burner is designed for clean, dry installations.
- Electrical controls are not protected against rain or sprayed water.
- Keep the installation clear of dust, dirt, corrosive vapors, and moisture.
- Protective covers and more frequent maintenance may be required.

Mount the Burner

⚠ CAUTION **Protect the air tube from overheating.**

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

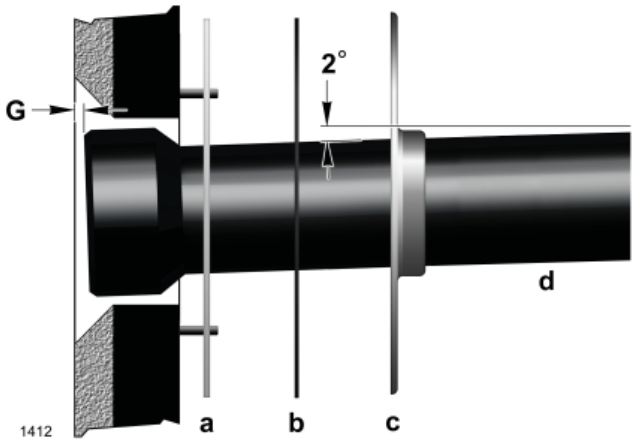
- The end of the air tube must not extend into the combustion chamber unprotected unless it has been factory-tested and specified by the appliance manufacturer.
- Position the end of the air tube 1/4” back from flush with the refractory inside entry wall to prevent damage from overheating.

Mount Flange on Air Tube

Note: This section does not apply to burners with welded flanges.

- Do not install air tube on burner.
- For non-pressure firing flange, refer to ***Figure 4***: Install gasket (item **a**) and flange (item **c**). Ignore the next paragraph.
- For pressure-firing flange, refer to ***Figure 4***: Slide gasket (item **a**) onto the air tube, making sure the top of the air tube is up. Pre-drill holes in the pressure firing plate (item **b**) to match the appliance studs. Slide the pressure firing plate (item **b**) and flange (item **c**) onto the air tube as shown. Wrap ceramic fiber rope around the air tube and press tightly into the inside diameter of the flange (item **c**).
- Slide the air tube (item **d**) into position in the appliance front. Tighten the flange-mounting stud nuts. Set the insertion of the air tube so dimension **G** is 1/4” nominal.
- Pitch the air tube at 2° from horizontal as shown and secure the flange to the air tube.

Figure 4 - Mount Flange on Air Tube



Mount Air Tube to Burner

- Remove the rear access door from the back of the burner for improved access to the interior.
- Attach the air tube to the burner with the bolts and acorn nuts provided. The acorn nuts must go on the outside of the burner, with the bolts inserted from the inside.

Install Nozzle

See ***Figure 5***. Install the oil nozzle in the nozzle adapter. Use a 3/4” open-end wrench to steady the nozzle adapter and a 5/8” open-end wrench to turn the nozzle. Tighten securely but do not over-tighten.

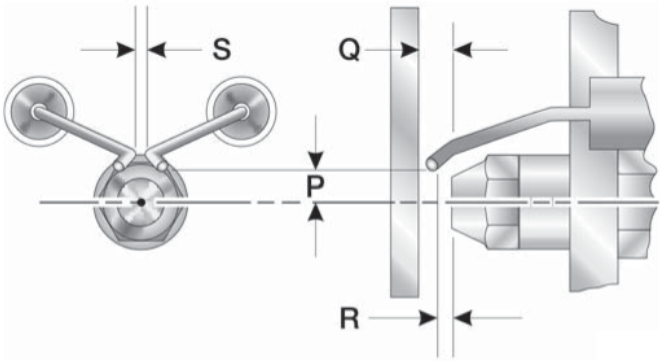
Check Electrode Settings

⚠ WARNING **Maintain Electrode Specifications**

Failure to properly maintain these specifications could cause ignition malfunction, puff-back of hot gases, heavy smoke, asphyxiation, explosion and fire hazards.

Check, and adjust if necessary, the critical dimensions **P, Q, R** and **S** shown in ***Figure 5***. Verify that the oil tube assembly and electrodes are in good condition, with no cracks or damage.

Figure 5 - Nozzle and Nozzle Line Assembly



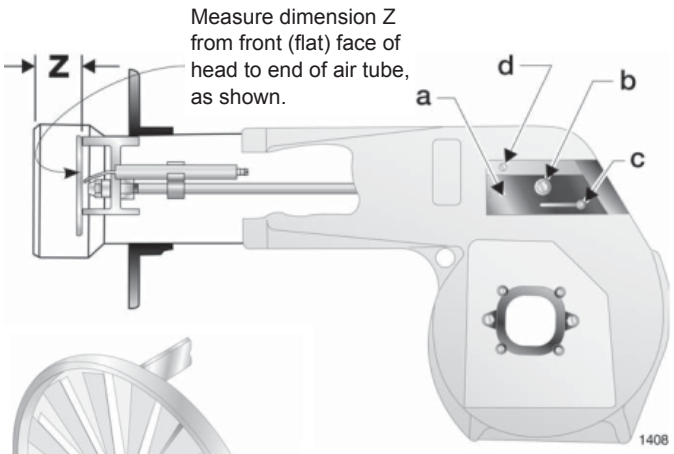
Legend (*Figure 5*)

P Nozzle centerline to electrode tip = 1/4”
Q Nozzle to head = 1/4”
R Nozzle face to electrode tip = 1/8”
S Electrode spacing = 3/32”

Install Nozzle Line Assembly

- Insert the nozzle line assembly into the burner air tube as in ***Figure 6***.
- See ***Figures 6*** and ***7***. Assemble the adjusting plate assembly per the instructions in the assembly packet.
- Slide the secondary adjusting plate (item **f**) completely to the left on the indicator adjusting plate (item **e**). Finger tighten acorn nut c to secure the two plates together. Slide both plates completely to the left on the primary adjusting plate (item **g**) and finger -tighten acorn nut **d**.
- Slide the completed adjusting plate assembly over the nozzle line end. Move the plate assembly and the nozzle line so the plate assembly fits into position as shown in ***Figure 6***.
- Install the spline nut (***Figure 6***, item **b**) on the end of the nozzle line, leaving the nut loosely placed so the plates can be moved.
- Connect the high-voltage leads from the ignition transformer to the electrodes.

Figure 6 - Nozzle Line Assembly in Burner



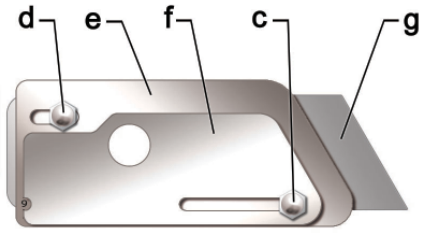
Measure dimension Z from the flat surface between (not on) the raised fins.

Z = 1-3/4" ± 1/16"

Legend (*Figures 6 & 7*)

a	Adjusting plate assembly
b	Spline nut
c	Bottom acorn nut
d	Top acorn nut (for setting dim. Z only
e	Indicator adjusting plate
f	Secondary adjusting plate
g	Primary adjusting plate

Figure 7 - Adjusting Plate Assembly



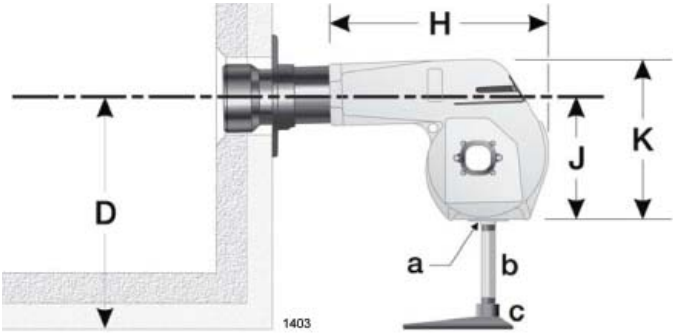
Set Dimension Z

- Replace the rear access door on the burner, making sure that the adjusting plate assembly is now securely held in place.
- Loosen acorn nut **d** in ***Figure 6***. Slide the nozzle line and plate assembly until dimension Z (from end of air tube to flat area of front face of head) is 1-3/4" ± 1/16". When dimension Z is correctly set, tighten acorn nut **d**. Verify that the adjusting plate assembly is properly seated in the adjusting groove.
- Attach the oil line from the oil valve to the nozzle line end. Tighten securely.
- Before proceeding, check dimension Z once again. Loosen acorn nut d if necessary to reposition the nozzle line. Once dimension Z is set, do not loosen acorn nut d again. For the setting of acorn nut **c**, refer to Adjusting Plate Assembly procedure under 'Start the Burner' Section of this manual.

Insert Burner

- Position the burner in the front of the appliance and loosely tighten the nuts on the mounting studs. The burner should be pitched downward 2° as shown in ***Figures 3*** and ***4***.
- See ***Figure 8***. Install the pedestal support kit (recommended) by attaching the ¾" NPT flange (item a) to the bottom of the burner using the (4) #10 screws provided. Cut and thread (one end only) a ¾" pipe nipple (item b) with length 10 inches less than dimension **D** in ***Figure 8***. Thread the pipe into the flange.
- Secure the burner to the appliance by tightening the nuts on the burner flange mounting studs.

Figure 8 - Burner Installed in Appliance Front



Legend (*Figure 8*)

H Housing total length — 18"
J Center to bottom of housing — 10-7/8"
K Overall housing height — 13-3/8"

Fuel Unit By-pass Plug

⚠ WARNING

Do Not Install By-pass Plug with 1-Pipe System

Failure to comply could cause immediate pump seal failure, pressurized oil leakage and the potential for a fi re and injury hazard.

- The burner is shipped without the by-pass plug installed.
- Install the by-pass plug in two-pipe oil supply systems ONLY.

Oil Supply/Return Lines

⚠ WARNING

Install Oil Supply To Specifications

Failure to properly install the oil supply system could cause oil leakage, equipment malfunction, puff-back of hot gases, heavy smoke, asphyxiation, explosion and fire hazards.

- Carefully install the oil supply lines, fittings and components using the guidelines provided in this section.
- The oil supply must comply with the latest edition of NFPA 31 (Canada CSA B139) and all applicable codes.
- Do NOT install valves in the return line.
- If the oil supply inlet pressure to the pump exceeds 3 psig or for gravity feed systems, install an oil safety or pressure reducing valve (Webster OSV, Suntec PRV or equivalent).

Table 3 - Fuel Unit Gearset Capacities

Fuel Unit Model Number	Gearset Capacity (Gallons Per Hour)
B2TA8245	21

- Install the oil tank and oil lines in accordance with all applicable state and local codes.
- Size the oil supply and return lines using the guidelines given in the fuel unit literature included in the literature envelope. Oil line flow rate will equal the burner rate for one-pipe systems. For two-pipe systems, refer to ***Table 3*** for the fuel unit gearset capacity - the rate at which fuel is recirculated when connected to a two-pipe system. Size two-pipe oil lines based on this flow rate.
- Use continuous lengths of heavy-wall copper tubing, routed under the floor where possible. Do not attach fuel lines to the appliance or to floor joists if possible. This will reduce vibration and noise transmission problems.
- Install an oil filter sized to handle the fuel unit gear set flow capacity ***(Table 3)*** for ***two-pipe systems***. Size the filter for the firing rate for ***one-pipe systems***. Locate the filter immediately adjacent to the burner fuel unit.
- Install two high-quality shut-off valves in accessible locations on the oil supply line. Locate one valve close to the tank. Locate the other valve close to the burner, upstream of the fuel filter.

Burner Fuel Flow

- **One-pipe systems** – See ***Figure 9*** for the fuel flow path.
  - Oil supply connects to one of the fuel unit inlet ports.
- **Two-pipe systems** – See ***Figure 10*** for the fuel flow paths for two-pipe oil systems.
  - Oil supply connects to one of the fuel unit inlet ports. Oil return connects to the fuel unit return port. Do NOT install valves in the return line. ***(Install the by-pass plug in the fuel unit for two-pipe systems.)***
- **Nozzle pressure** – The fuel unit nozzle port pressure is factory set at 300 psig. Some original equipment manufacturer burner applications may call for a lower pressure to obtain a required fi ring rate. Do not change this pressure unless directed to do so by the appliance manufacturer.

Figure 9 - One-pipe Oil Flow with "B" Pump

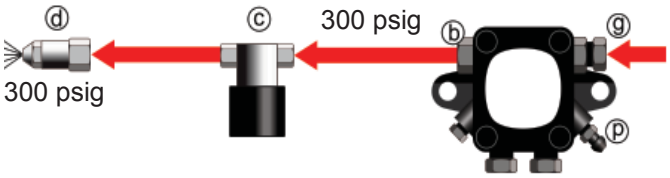
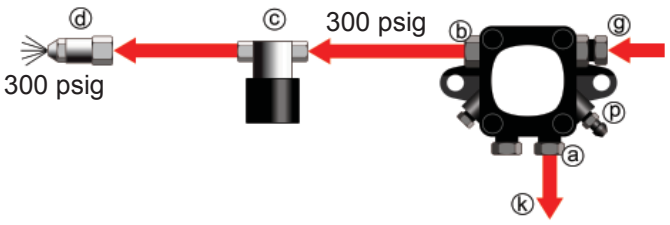


Figure 10 - Two-pipe Oil Flow with "B" Pump



Legend (*Figures 9 & 10*)

a	Return port	g	Inlet port
b	Nozzle port	k	Return line to oil tank
c	Oil valve	p	Air bleed valve
d	Nozzle & adapter		

Burner Controls

Typical Burner Sequence of Operation - GeniSys 7505

Refer to the appliance manufacturer's wiring diagram for actual specifications.

1. **Standby:** The burner is idle, waiting for a call for heat.
2. **Valve-On Delay:** The igniter and motor are on while the control delays turning on the oil solenoid valve for the programmed time.
3. **Trial For Ignition:** The oil solenoid valve is energized. A flame should be established within the factory set trial for ignition time (lockout time).
4. **Lockout:** The control has shut down for one of the following safety reasons:
   a. The trial for ignition (lockout) time expired without flame being established.
   b. The cad cell detected flame at the end of the Valve On Delay state.

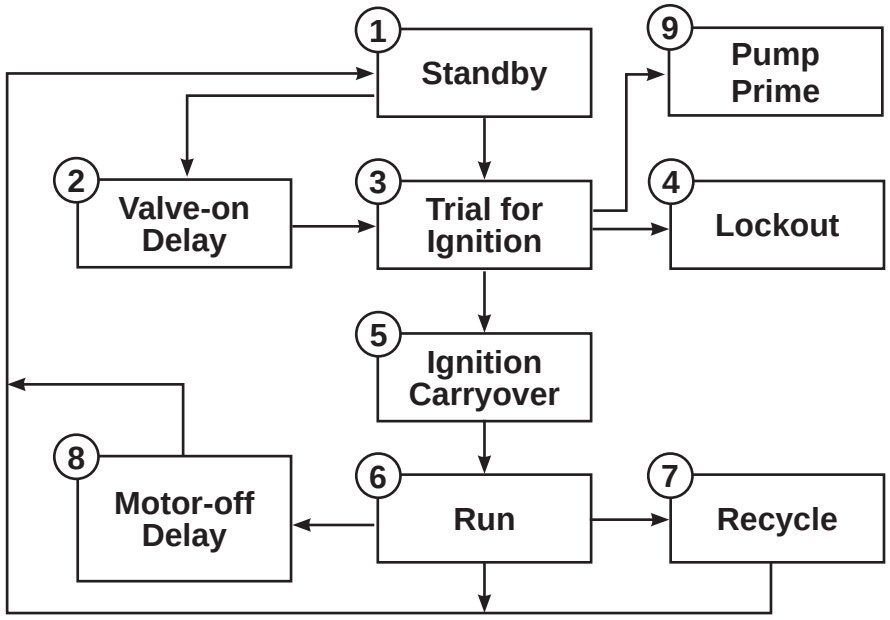
   To reset the control from lockout click the button 1-second.

   NOTE: A recurrence of the above failure modes or a failed welded relay check could cause the control to enter a Hard Lockout state that must be reset only by a qualified service technician.

   To reset from Hard Lockout, hold the reset button for 15 seconds until the yellow light turns on.
5. **Ignition Carryover:** Once flame is established, the igniter remains on for 10 additional seconds to ensure flame stability.
6. **Run:** The flame is sustained until the call for heat is satisfied. The burner is then sent to Motor-Off Delay, if applicable, or it is shut down and sent to Standby.
7. **Recycle:** If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. The control will continue to Recycle each time the flame is lost, until it reaches a pre-set time allotment. The control will then go into Hard Lockout instead of recycle. This feature prevents excessive accumulation of oil in the appliance firing chamber.
8. **Motor-Off Delay:** If applicable, the oil solenoid valve is turned off and the control delays turning the motor off for the set motoroff delay time before the control returns to standby.
9. **Pump Prime:** The igniter and motor are on with the oil solenoid valve energized for 4 minutes. During Pump Prime mode, the cad cell is disregarded, allowing the technician to prime the pump without having to jumper the cad cell.

   Cad Cell Resistance Measurement: (Refer to the instructions on Page 19.)

Figure 11 - Typical Burner Sequence of Operation - 7505



Wire the Burner (GeniSys 7505)

⚠ WARNING **Electrical Shock Hazard**

Electrical shock can cause severe personal injury or death.

- Disconnect electrical power before installing or servicing the burner.
- Provide ground wiring to the burner, metal control enclosures and accessories. (This may also be required to aid proper control system operation)
- Perform all wiring in compliance with the National Electric Code ANSI/NFPA 70 (Canada CSA C22.1).

⚠ CAUTION **Incorrect Wiring Will Result in Improper Control Operation**

- GeniSys 7505 Control wiring label colors may not match the wire colors of the burner or other manufacturers' controls.
- The GeniSys Control should be wired according to the appliance manufacturer's instructions.

Install the burner and all wiring in accordance with the National Electrical Code and all applicable local codes or requirements.

Wire the burner in compliance with all instructions provided by the appliance manufacturer. Verify operation of all controls in accordance with the appliance manufacturer's guidelines.

See ***Figure 13*** (7505P) for a typical wiring diagram (for reference purposes only).

⚠ WARNING **Fire or Explosion Hazard**

Can cause severe injury, death, or property damage.

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

Figure 12 - GeniSys 7505 Control with Optional Components

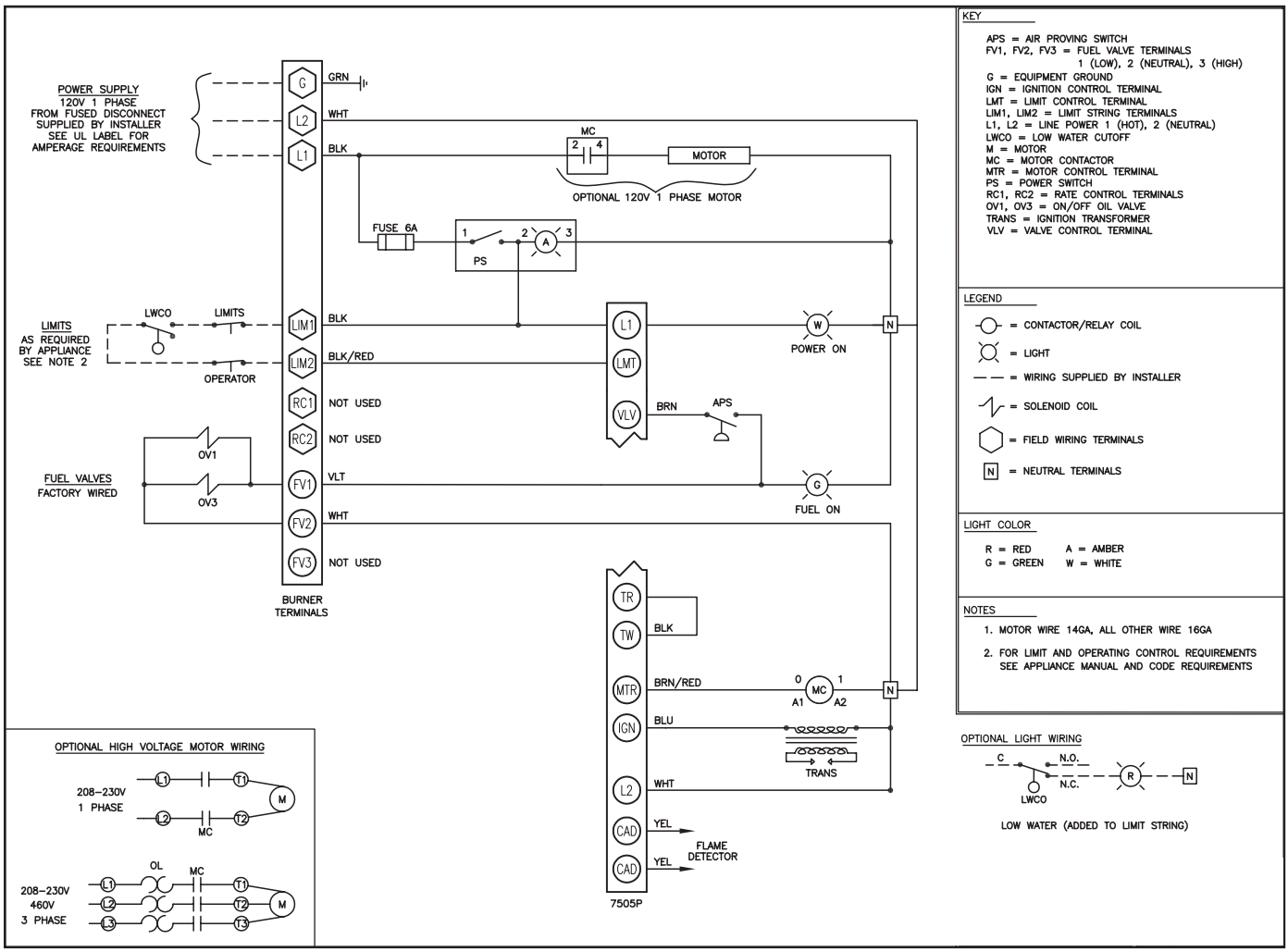
Optional Components:

Contractor's Tool:
Hand-held device for programming and diagnostics

Display Module:
Permanent device for programming and diagnostics

Alarm Module:
For adding isolated low voltage alarm contacts to the base control. See Alarm Module Instructions for specifications.

Figure 13 - Typical Wiring (7505P)



Typical Burner Sequence of Operation - Honeywell 7184

1. **Standby** — The burner is idle, waiting for a call for heat. When a call for heat is initiated, there is a 3-10 second delay while the control performs a safe start check.
2. **Valve-on delay** — As applicable, the ignition and motor are turned on for a 15-second prepurge.
3. **Trial for ignition (TFI)** — The fuel valve is opened, as applicable. A flame should be established within the 15-second lockout time.
4. **Lockout** — If flame is not sensed by the end of the TFI, the control shuts down on safety lockout and must be manually reset. If the control locks out three times in a row, the control enters restricted lockout. Call a qualified service technician.
5. **Ignition carryover** — Once flame is established, the ignition remains on for 10 seconds to ensure flame stability. It then turns off.
6. **Run** — The burner runs until the call for heat is satisfied. The burner is then sent to burner motor-off delay, as applicable, or it is shut down and sent to standby.
7. **Recycle** — If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60-second recycle delay, and then repeats the ignition steps outlined above. If the flame is lost three times in a row, the control locks out to prevent continuous cycling with repetitious flame loss caused by poor combustion.
8. **Burner motor-off delay** — If applicable, the fuel valve is closed and the burner motor is kept on for the selected postpurge time before the control returns the burner to standby.

Cad Cell Resistance Indicator: During the burner run state, click the reset button (less than 1 second) to check the cad cell resistance range. The yellow light will flash 1 to 4 times, depending on the amount of light detected by the cad cell.

Restricted Lockout

If the control locks out three times in a row without a complete heat cycle between attempts, the lockout becomes restricted. A qualified service technician should be called to inspect the burner.

Wire the Burner (R7184)

⚠ WARNING **Electrical Shock Hazard**

Electrical shock can cause severe personal injury or death.

- Disconnect electrical power before installing or servicing the burner.
- Provide ground wiring to the burner, metal control enclosures and accessories. (This may also be required to aid proper control system operation)
- Perform all wiring in compliance with the National Electric Code ANSI/NFPA 70 (Canada CSA C22.1).

Install the burner and all wiring in accordance with the National Electrical Code and all applicable local codes or requirements.

Wire the burner in compliance with all instructions provided by the appliance manufacturer. Verify operation of all controls in accordance with the appliance manufacturer's guidelines.

See ***Figure 15*** for a typical wiring diagram, with R7184 oil primary, for reference purposes only.

Figure 14 - Typical Burner Sequence of Operation - 7184

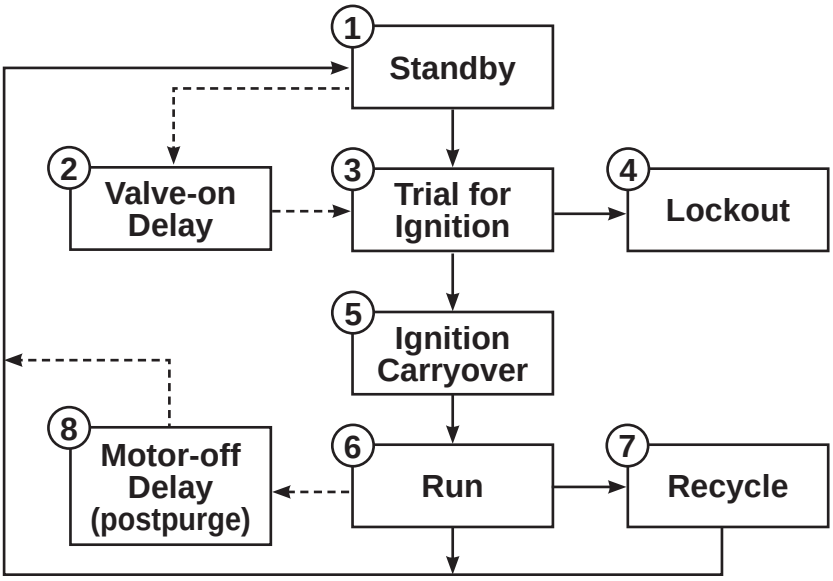
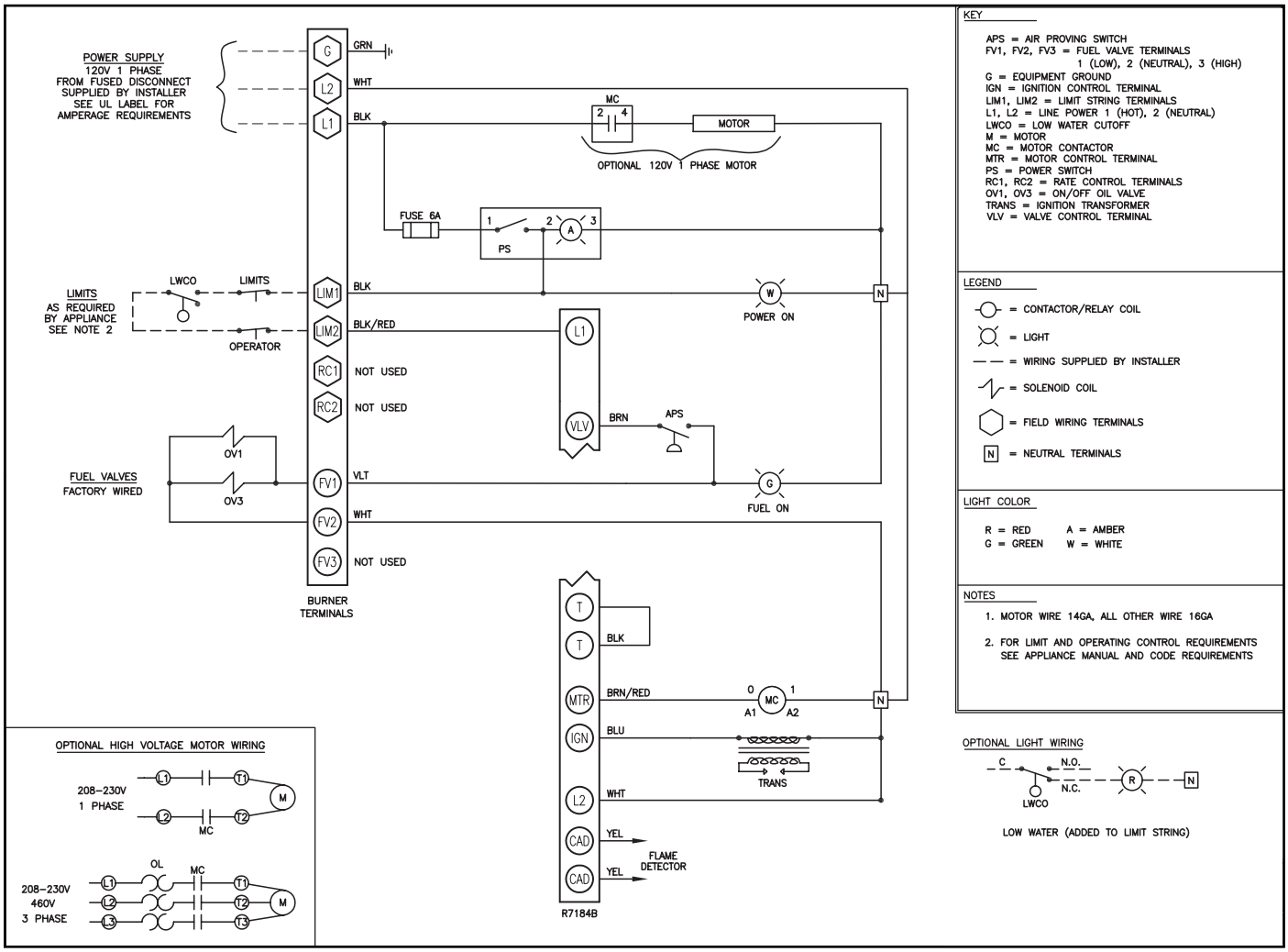


Figure 15 - Typical Wiring (R7184)



Prepare the Burner for Start-up

⚠ WARNING

Professional Installation and Service Required

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

- This burner must be installed and prepared for start-up by a qualified service technician who is trained and experienced in commercial oil burner system installation and operation.
- Do not attempt to start the burner unless you are fully qualified.
- Do not continue with this procedure until all items in the “Prepare the burner for start-up” section have been verified.
- Carefully follow the wiring diagrams, control instruction sheets, flame safeguard sequence of operation, test procedures and all appliance manufacturer’s directions that pertain to this installation.
- If any of these items are not clear or are unavailable, call Beckett at 1-800-645-2876 for assistance.

⚠ WARNING

Do Not Bypass Safety Controls

Tampering with, or bypassing safety controls could lead to equipment malfunction and result in asphyxiation, explosion or fire.

- Safety controls are designed and installed to provide protection.
- Do not tamper with, or bypass any safety control.
- If a safety control is not functioning properly, shut off all main electrical power and fuel supply to the burner and call a qualified service agency immediately.

⚠ CAUTION

Keep Service Access Covers Securely Installed

These covers must be securely in place to prevent electrical shock, damage from external elements, and protect against injury from moving parts.

- All covers or service access plates must be in place at all times except during maintenance and service.
- This applies to all controls, panels, enclosures, switches, and guards or any component with a cover as part of its design.

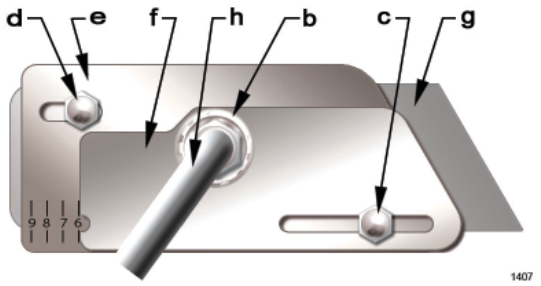
Start-up Checklist

- ☐ Combustion air supply and venting have been inspected and verified to be free of obstructions and installed in accordance with all applicable codes.
- ☐ Oil nozzle has been selected correctly and securely installed in the nozzle adapter.
- ☐ Fuel unit by-pass plug has not been installed for one-pipe oil system.
- ☐ By-pass plug has been installed for two-pipe oil system.
- ☐ Fuel connection to nozzle line assembly is secure.
- ☐ Dimension Z has been set per the ‘Set Z Dimension’ instructions detailed earlier in this manual. The top acorn nut (***Figure 12***, item **d**) should never be loosened once the Z dimension in initially set.
- ☐ Fuel supply line is correctly installed, the oil tank is sufficiently filled, and shut-off valves are open.
- ☐ Burner is securely mounted in appliance, with pressure firing plate and gasket installed for pressurized chamber application.
- ☐ Appliance has been filled with water (boilers) and controls have been operationally checked.
- ☐ Burner has been installed in accordance with appliance manufacturer’s instructions (when available).
- ☐ Also refer to appliance manufacturer’s instructions (when available) for start-up procedures.

Z Dimension

Should be set according to the instructions given previously in this manual. The top acorn nut (***Figure 16***, item **d**) should never be loosened once the Z dimension is initially set.

Figure 16 - Adjusting Plate Initial Setting, Typical



b - Spline nut for securing nozzle line

c - Bottom acorn nut (for head adjustment)

d - Top Acorn nut (for setting dimension Z only) Do not loosen after setting dimension Z

e - Indicator adjusting plate

f - Secondary adjusting plate

g - Primary adjusting plate

h - Copper oil line from oil valve to nozzle line

Adjusting Plate Assembly

Make sure spline nut (item **b**) and bottom acorn nut (item **c**) are loose (***Figure 16***).

Table 4 - Initial Indicator Adjustment Plate Settings (Head Position)

Approximate head settings	Firing rate, gph
	Tube "A"
0	4.00
1	4.50
2	5.00
3	6.00
4	7.00
5	7.50
6	8.00
7 - 10	10.00

NOTE: These settings are approximate, and can vary depending on actual job conditions and overfire pressure.

Initial Head Position

*(See **Figure 16**)*

- The indicator plate assembly (item **e**) markings correspond to head position settings. Slide the secondary adjusting plate (item **f**) toward the rear of the burner until the number on the indicator plate corresponds to the initial head setting given in ***Table 4*** for the desired firing rate.
- ***Figure 16*** shows a typical example, with a head setting of 6.
- When the head position has been set, tighten the bottom acorn nut (item **c**) and the spline nut (item **b**).

Initial Air Settings

*(See **Figure 17**)*

- Loosen the screw holding the air adjusting plate (item **L**). Set the air to the desired rate. (The numbers on this plate correspond to the approximate fi ring rate settings given in ***Table 5***.)
- Rotate the air adjusting plate until the stop tab on the air adjusting plate is in line with the number from ***Table 5*** corresponding to the desired firing rate.
- This initial setting should be adequate for starting the burner. Tighten the screw to secure the adjusting plate. Once the burner is in operation, the air setting will be adjusted for best performance as discussed later in this manual.
- Follow the procedures given later in this manual for fine-tuning the air settings.

Table 5 - Initial Air Adjusting Plate Settings (Damper Position)

Approximate adjusting plate setting	Firing rate, gph
	Tube "A"
0	-
1	-
2	4.00
3	6.00
4	7.00
5	8.00
6	10.00
7 - 12	-

NOTE: These settings are approximate, and can vary depending on actual job conditions and overfire pressure.

Set Appliance Limit Controls

- Set the appliance limit controls in accordance with the appliance manufacturer's recommendations.

Prepare the Fuel Unit for Air Venting

- To vent air from one-pipe oil systems, attach a clear hose to the pump air bleed valve (***Figure 9***) on the fuel unit. Provide a container to catch the oil. Loosen the pump air bleed valve.
- Vent the air as described under Starting the Burner and Venting Air.

Start the Burner

⚠ WARNING **Explosion and Fire Hazard**

Failure to follow these instructions could lead to equipment malfunction and result in heavy smoke emission, soot-up, hot gas puff-back, fire and asphyxiation hazards.

- Do not attempt to start the burner when excess oil has accumulated in the appliance, the appliance is full of vapor, or when the combustion chamber is very hot.
- Do not attempt to re-establish flame with the burner running if the flame becomes extinguished during start-up, venting, or adjustment.
- **Vapor-Filled Appliance**: Allow the unit to cool off and all vapors to dissipate before attempting another start.
- **Oil-Flooded Appliance**: Shut off the electrical power and the oil supply to the burner and then clear all accumulated oil before continuing.
- If the condition still appears unsafe, contact the Fire Department. Carefully follow their directions.
- Keep a fire extinguisher nearby and ready for use.

⚠ WARNING **Professional Service Required**

Incorrect installation, adjustment, and use of this burner could result in severe personal injury, death, or substantial property damage from fire, carbon monoxide poisoning, soot or explosion.

Please read and understand the manual supplied with this equipment. This equipment must be installed, adjusted and put into operation only by a qualified individual or service agency that is:

- Licensed or certifi ed to install and provide technical service to oil heating systems.
- Experienced with all applicable codes, standards and ordinances.
- Responsible for the correct installation and commission of this equipment.
- Skilled in the adjustment of oil burners using combustion test instruments.

- The installation must strictly comply with all applicable codes, authorities having jurisdiction and the latest revision of the National Fire Protection Association Standard for the installation of Oilburning Equipment, NFPA 31 (or CSA B139 and B140 in Canada).
- Regulation by these authorities take precedence over the general instructions provided in this installation manual.
- Do not proceed unless all prior steps in this manual have been completed.

Starting the Burner and Venting Air

⚠ WARNING **Hot Gas Puff-back and Heavy Smoke Hazard**

Failure to bleed the pump properly could result in unstable combustion, hot gas puff-back and heavy smoke.

- Do not allow oil to intermittently spray into a hot combustion chamber while bleeding.
- Install a gauge in the nozzle discharge port tubing or fully open the pump bleed valve to prevent oil spray from accumulating in the combustion chamber when venting air from the fuel pump.
- Ensure that all bubbles and froth are purged from the oil supply system before tightening the pump air bleed valve.

Priming the Pump

1. Verify that the air adjusting cam (***Figure 16***, item **L**) has been set to the initial low-fi re air setting as described under the 'Initial Air Settings' section.
2. Open the oil shutoff valves in the oil supply line to the burner.
3. Set the thermostat (or operating control) to call for heat.
4. Close the line switch to the burner. The burner motor should start immediately.
5. If the burner motor does not start, reset the motor overload switch (if so equipped) and press the reset switch of the burner primary control.
6. Vent the fuel unit as soon as the burner motor starts rotating. (For GeniSys 7505 control refer to the Control manual for Priming the Pump procedure.) To vent:
   a. Attach a clear plastic tube to the air bleed valve (***Figure 9*** or ***10*** as applies, item **p**).
   b. Place the end of the tube in a container to catch the oil. Then loosen the fuel unit air vent valve.
   c. Tighten the air vent valve after all air has been purged.
7. IF burner stops during venting —
   a. The burner primary control will lockout if flame is not established within its time limit. This is typically 15 seconds for R7184B primary controls, but may be less for other flame supervisory controls.
   b. The burner may lockout several times during the period needed to purge all the air. To extend air venting time, press the red reset button for 1/2 second during the prepurge cycle to continue purging.
8. IF burner stops after flame is established — additional venting is probably required. Repeat the air venting procedure.

Disable Function

Any time the motor is running, press and hold the reset button to disable the burner. The burner will remain off as long as the button is held and will return to standby when released.

Cad Cell Resistance Measurement:

If the Beckett 7505 control is equipped with the GeniSys Display Module, part 52067U, the cad cell resistance can be selected and read on the LCD screen. Also, the GeniSys Contractor Tool, part 52082U, can be used for this purpose.

If these are not available, the cad cell leads can be unplugged from the control and the resistance measured with a meter in the conventional way.
Conduct these tests with flame present.

Table 6 - 7505 Flame Detection

Flame Detection Range
Normal = 0 to 1600 ohms
Limited = 1600 ohms to lockout

Table 7 - 7184 Status Light Explanation

LED Indicator	Status
On	Flame sensed
Off	Flame not sensed
Flashing (1/2 sec off - 1/2 sec on)	Lockout/ Restricted Lockout
Flashing (2 sec off - 2 sec on)	Recycle

Table 8 - 7505 Status Light Explanation

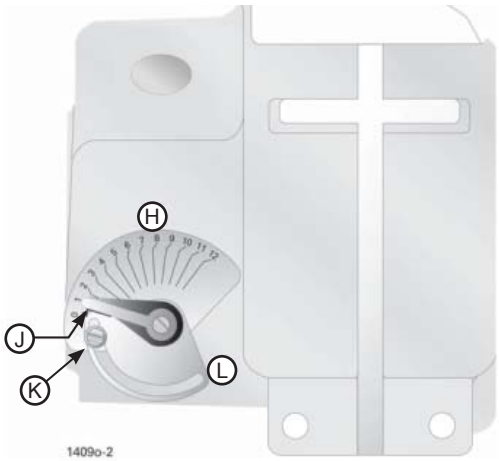
Light Color	On Continuously	Flashing
Red	Restricted (Hard) Lockout	Soft Lockout
Green	Flame Sensed during normal operation (Could be stray light during standby)	Recycle
Yellow	Control is in Pump Prime mode ***or*** Reset button currently held for 15+ seconds.	N/A

Set Air Adjusting Plate

See (***Figure 17***)

1. Allow the burner to run until the appliance has warmed sufficiently.
2. Visually check the flame. The flame should not be dark orange or smoky. If the flame appears to be smoking, increase the amount of air by re-adjusting the damper indicator to a higher number.
3. Once the appliance has warmed, the air setting can be checked and adjusted.
4. Use combustion test instruments to adjust the burner.
   a. Adjust the air until a trace of smoke is achieved with CO2 level as high as possible (lowest possible O2).
   Example: 13.5% CO2 (2.5% O2) with a trace of smoke.
   b. Increase the air to reduce CO2 by 2 percentage points at a zero smoke level. (Increase O2 by 3 percentage points at a zero smoke level.)
   Example: Reduce CO2 from 13.5% to 11.5%, with zero smoke (or increase O2 from 2.5% to 5.5%).
   c. This procedure provides a margin of reserve air to accommodate variable conditions.
5. Check the breech draft pressure against the appliance manufacturer's recommended setting (typically + 0.1" W.C.).
6. If the breech pressure is higher or lower than recommended level, adjust the appliance breech damper to achieve the specifi ed setting. Recheck the smoke and CO2 (or O2) levels. Adjust burner air if necessary and tighten the air adjusting plate screw securely.

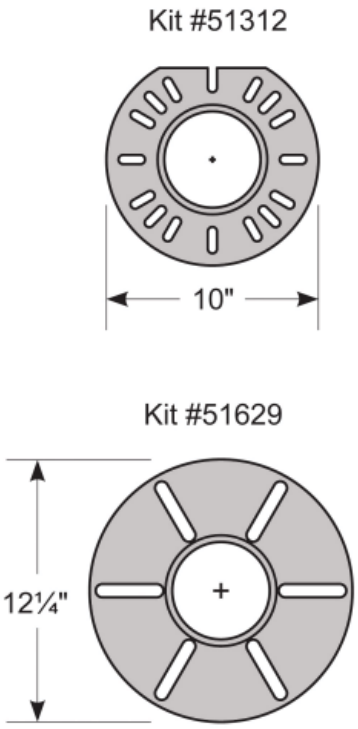
Figure 17 - Air Damper Assembly



Legend

H - Damper label - position indicator for air adjustment plate
J - Damper indicator - permanently attached to damper
L - Air adjusting plate - sets air position
K - Air adjusting plate screw - locks plate position

Figure 18 - Adjustable Mounting Plates for CF1000



Maintenance and Service

WARNING

Annual Professional Service Required

Tampering with or making incorrect adjustments could lead to equipment malfunction and result in asphyxiation, explosion or fire.

- Do not tamper with the burner or controls or make any adjustments unless you are a trained and qualified service technician.
- To ensure continued reliable operation, a qualified service technician must service this burner annually.
- More frequent service intervals may be required in dusty or adverse environments.
- Operation and adjustment of the burner requires technical training and skillful use of combustion test instruments and other test equipment.

Annual Service — by qualified service technician

Have the burner inspected, tested and started at least annually by a qualified service technician. This annual test/inspection should include at least the following:

- ☐ Replace the oil supply line filter. The line filter cartridge must be replaced to avoid contamination of the fuel unit 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 if applicable.
- ☐ Replace the used nozzle with a new nozzle that conforms to the appliance manufacturer's specifications.
- ☐ 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 the cad cell lens surface, if necessary.
- ☐ Inspect all gaskets. Replace any that are damaged or would fail to seal adequately.
- ☐ Inspect the combustion head and air tube. Remove any carbon or foreign matter. Replace all damaged units with exact parts.
- ☐ Clean the blower wheel, air inlet, air guide, and burner housing of any lint or foreign material.
- ☐ If motor is not permanently lubricated, oil motor with a few drops of SAE 20 non detergent oil at each oil hole. DO NOT over oil motor. Excessive oiling can cause motor failure.
- ☐ Check motor current. The amp draw should not exceed the nameplate rating.
- ☐ Check all wiring for secure connections or insulation breaks.
- ☐ Check the pump pressure and cutoff function.
- ☐ Check primary control safety lockout timing.
- ☐ Check ignition system for proper operation.
- ☐ Inspect the vent system and chimney for soot accumulation or other restriction.
- ☐ Clean all flue passages and flue pipe. Replace corroded or damaged pipes.
- ☐ Clean the appliance thoroughly according to the manufacturer's recommendations.
- ☐ Check the burner performance. Refer to the section "Set combustion with test instruments".
- ☐ It is good practice to make a record of the service
- ☐ performed and the combustion test results.

Monthly Maintenance — by owner

- ☐ Observe combustion air openings and vent system for integrity. Openings must be clean and free of obstructions.
- ☐ Check oil lines and fittings to verify there are no leaks.
- ☐ Observe burner ignition and performance to verify smooth operation.
- ☐ Shut the system down if you observe abnormal or questionable operation. Call a qualified service agency for professional inspection and service.

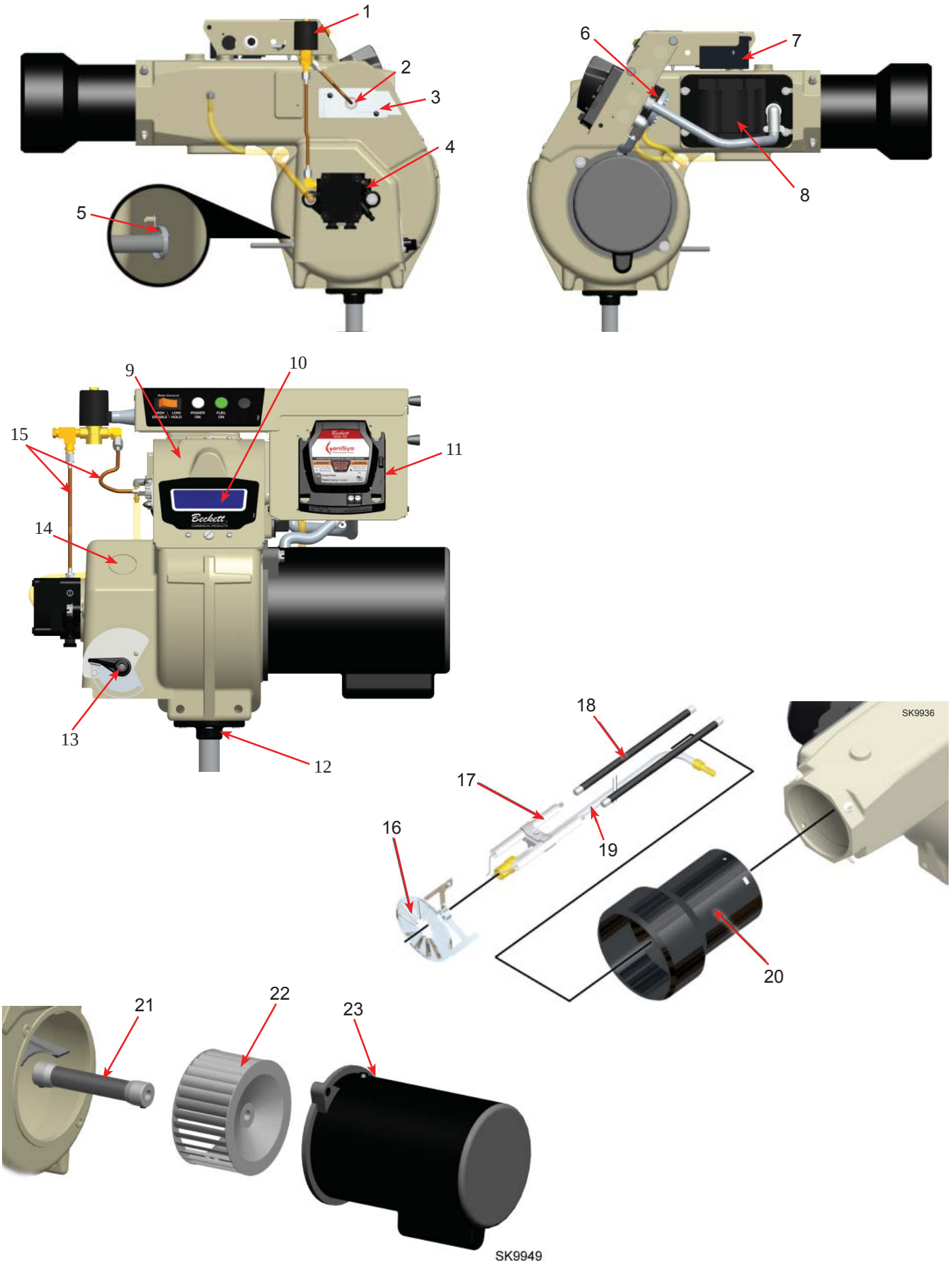
Replacement Parts

for best performance specify genuine Beckett replacement parts

Item	Part Name	Description	Part Number
1	Oil Valve	Mounted on Junction Box	21789U
2	Knurled Nut	All Models	3666
3	Adjusting Plate Assembly	CF10-2300 Kit	51213U
4	Fuel Pump	B2TA-8245	21313U
5	Damper Spring	All models	4339
6	Air Proving Switch	2" W.C.	22181U
7	Timer	Nozzle Valve Delay	21295U
8	Transformer	12,000 volt	51214
9	Rear cover door assembly	w/Cast aluminum door* w/Stamped sheet-metal door*	5994U 5201301U
10	Sight Glass	All Models	31346
11	Control	Specify	-
12	Pedestal kit	All models	51193
13	Damper indicator	All models	5985BK
14	Coupling Hole Plug	Use with threaded hole	32439U
15	Fuel lines	Specify length	-
16	Head assembly	CF1000 combustion	5978P
17	Electrode assembly	All models	51212
18	Ignition leads	8-1/4" long 11-3/4" long 15-1/4" long 19-1/4" long	5990082 5990116 5990152 5990192
19	Nozzle line assembly	Refer to *Figure 5*	
20	Air tube	Refer to *Figure 2*	
21	Coupling	B pump	21290
22	Blower wheel	CF1000 5.59" x 3.09"	21268U
23	Motor	120/208-230V single phase 208/230-460V three phase	21401U 21638U
	Motor relay (not shown)	120V Single phase 208V Single phase Three Phase	752804 7300 2194301
	Adjustable flange	Refer to *Figure 18*	

* These doors are NOT interchangeable. Please specify when ordering.

Figure 19 - Replacement Parts



Limited Warranty Information

The R. W. BECKETT CORPORATION ("Beckett") warrants to persons who purchase its "Products" from Beckett for resale, or for incorporation into a product for resale ("Customers"), that its equipment is free from defects in material and workmanship. To qualify for warranty benefits, products must be installed by a qualified service agency in full compliance with all codes and authorities having jurisdiction, and used within the tolerances of Beckett's defined product specifications.

To review the complete warranty policy and duration of coverage for a specific product, or obtain a written copy of warranty form 61545, please choose one of the following options:

1. Visit our website at: www.beckettcorp.com/warranty
2. Email your request to: rwb-customer-service@beckettcorp.com
3. Write to: R. W. Beckett Corporation, P. O. Box 1289, Elyria, OH 44036

NOTE: Beckett is not responsible for any labor cost for removal and replacement of equipment.

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

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