Beckett
COMMERCIAL

CF1400
CF2300

OIL BURNER MANUAL

Operation: Low/High
Rate: CF1400: 4.0 to 13.6 GPH
CF2300: 7.0 to 19.9 GPH

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.

Table of Contents

General Information

Before you begin . . .

The following resources will give you addional information for your installation. We suggest that you consult these resources whenever possible. Pay particular attention to the appliance manufacturer's instructions.

Appliance manufacturer's instructions -Always follow the appliance manufacturer's instructions for burner installation, equipment and set-up.

1–800–OIL–BURN - Beckett's technical services hot-line.
www.beckettcorp.com - Beckett's website.

Hazard definitions

DANGER **Indicates an imminently hazardous situation, which, if not avoided, will result in death, serious injury, or property damage.**

WARNING **Indicates a potentially hazardous situation, which, if not avoided, could result in death, severe personal injury, and/or substantial property damage.**

CAUTION **Indicates a potentially hazardous situation, which, if not avoided, may result in personal injury or property damage.**

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

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

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 burner.

Your 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 gas heating system by a qualified service agency.

Specifications

Fuels	#1 or #2 Fuel Oil
Firing Range	BCF1400 - 4.0 to 13.6 gph BCF2300 - 7.0 to 19.9 gph
Motor (CF1400)	1/2 HP 3450 rpm 120/60 Hz Standard 6.5 amps @ 120 VAC
Motor (CF2300)	3/4 HP 3450 rpm 120/60 Hz Standard 12.5 amps @ 120 VAC Optional Voltages: 240 VAC/1-PH, 208, 240, 480 VAC/3-PH, 50 Hz
Ignition Trans.	Continuous Duty
Housing	Cast aluminum
Fuel Unit	100 to 300 psig
Oil Nozzle	45º to 70º Solid
Dimensions	Refer to Figure 7.

Owner's Responsibility:

WARNING

Follow These Instructions Exactly

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

Contact a professional, qualified 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 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 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.

Professional Installer/Service Agency Responsibility:

WARNING

Follow These Instructions Exactly

Failure to follow these instructions could lead to equipment malfunction and 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.

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.

Pre-installation checklist

❑ Combustion air supply

WARNING

Adequate Combustion and Ventilation Air Supply Required

Failure to provide adequate air supply could seriously affect the burner performance and result in damage to the equipment, 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 NFPA 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***.
- Insure that a pressure limiting device is installed in accordance with the latest edition of NFPA 31.
- Gravity Feed Systems: Always install an anit-siphon 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.

When fuel supply is level with or higher than burner 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.

The fuel unit is shipped with the by-pass plug installed. ***Leave the by-pass plug installed for all low/high firing burners, regardless whether one-pipe (with by-pass loop) or two-pipe***. See ***Figure 9*** for installation of the ***by-pass loop*** required for one-pipe fuel supply installations. See ***Figure 10*** for connections to the fuel unit for two-pipe fuel supply installations.

When fuel supply is below the burner 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 minimize the effects 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)

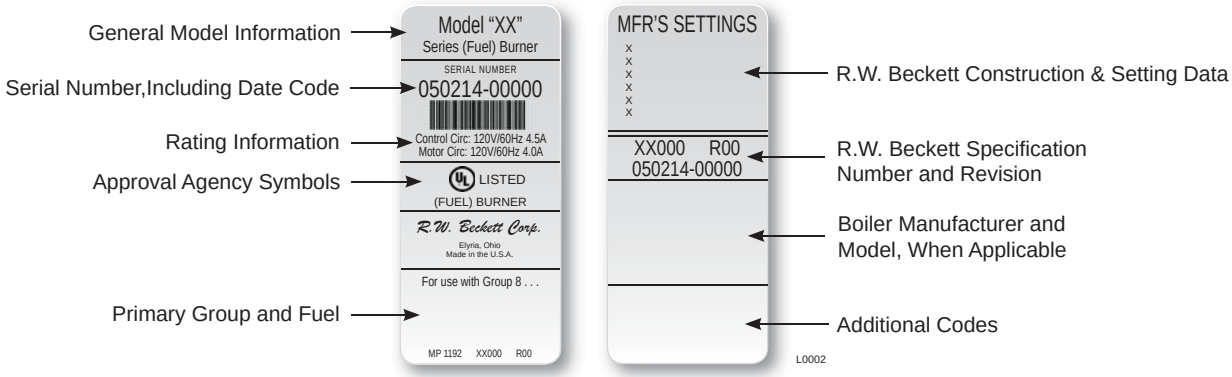
For typical nozzle flow rates at various pressures see accompanying chart.

- 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.

Figure 1 – Typical Nameplate



❑ Vent system

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

❑ Verify burner components —

- Burner box, Model CF1400 or CF2300A
- Air tube assembly
- Mounting flange kit
- Pedestal mounting assembly kit (recommended)
- Oil nozzle, per ***Table 1*** — Use only 45° to 70° solid pattern nozzles unless otherwise shown by appliance manufacturer or on the burner nameplate rating label.

Find the required firing rate in the 300 psig column (high fire rate).
Select the corresponding nozzle from column 1 (***Rated gph @ 100 psig***).

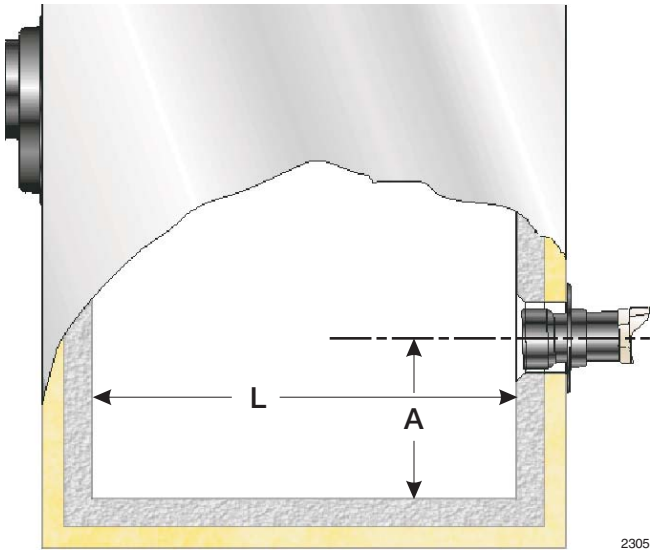
❑ Verify firing rate

Refer to appliance manufacturer's instructions (if available) for firing rate and nozzle selection. Otherwise, the maximum recommended firing rate for the burner depends on 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

Rated gph @ 100 psig	Pressure - Pounds per square inch							
	125	140	150	175	200	250	275	300
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	5.32	5.51	5.95	6.36	7.11	7.46	7.79
5.00	5.59	5.92	6.12	6.61	7.07	7.91	8.29	8.66
5.50	6.15	6.51	6.74	7.27	7.78	8.70	9.12	9.53
6.00	6.71	7.10	7.35	7.94	8.49	9.49	9.95	10.39
6.50	7.26	7.69	7.96	8.60	9.19	10.28	10.78	11.26
7.00	7.82	8.28	8.57	9.25	9.90	11.07	11.61	12.12
7.50	8.38	8.87	9.19	9.91	10.61	11.86	12.44	12.99
8.00	8.94	9.47	9.80	10.58	11.31	12.65	13.27	13.86
8.50	9.50	10.06	10.41	11.27	12.02	13.44	14.10	14.72
9.00	10.06	10.65	11.02	11.91	12.73	14.23	14.93	15.59
9.50	10.60	11.24	11.64	12.60	13.44	15.02	15.75	16.45
10.00	11.18	11.83	12.25	13.23	14.14	15.81	16.58	17.32
10.50	11.74	12.42	12.86	13.89	14.85	16.60	17.41	18.19
11.00	12.30	13.02	13.47	14.55	15.56	17.39	18.24	19.05
12.00	13.42	14.20	14.70	15.88	16.97	18.97	19.90	20.79

Figure 2 – Chamber Dimensions



Model	Firing Rate (gph)	Minimum Dimensions			
		Refractory Lined		Wet-based Boilers	
		A	L	A	L
CF1400	0 to 5	7.0”	25.0”	7.0”	25.0”
	5 to 10	8.0”	35.0”	8.0”	40.0”
CF2300	5 to 10	8.0”	35.0”	8.0”	40.0”
	10 to 15	9.0”	40.0”	9.0”	50.0”
	15 to 20	11.0”	55.0”	11.0”	60.0”

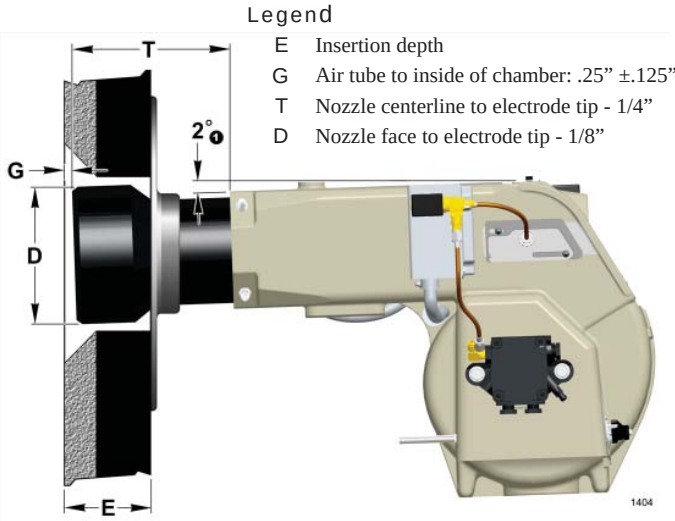
❑ Verify air tube

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

- On the **CF1400**, there are two tube arrangements available –
  Tube A — 4.0 to 11.0 GPH per Table 2
  Tube B — 7.0 to 13.6 GPH per Table 2
- The **CF1400** maximum firing capacity depends on the firebox pressure. Use ***Table 2*** to verify the correct air tube type for the firing rate required. Use Tube B only when Tube A cannot provide the firing rate required.

- On the **CF2300**, there are two tube arrangements available –
  Tube A — 7.0 to 19.9 GPH per Table 2
  Tube B — 10.0 to 19.9 GPH per Table 2
- The **CF2300** maximum firing capacity depends on the firebox pressure. Use ***Table 2*** to verify the correct air tube type for the firing rate required. Use Tube B only when Tube A cannot provide the firing rate required.
- See ***Figure 3*** to verify the correct air tube length and air tube combination code.

Figure 3 – Air tube mounting dimensions



Note: Install the burner with a 2° pitch as shown.

Air Tube Combination Codes					
Model	Tube	Dimention T	Dimention D	Code	Dimension E
CF1400	A	6.75"	5.5"	CF 66 KD	-
		10.25"	5.5"	CF 102 KD	-
		13.75"	5.5"	CF 136 KD	-
		17.75"	5.5"	CF 176 KD	-
	B	6.75"	5.75"	CF 66 KE	-
		10.25"	5.75"	CF 102 KE	-
		13.75"	5.75"	CF 136 KE	-
		17.75"	5.75"	CF 176 KE	-
CF2300	A	6.75"	6.5"	CF 66 KG	2.94"
		10.25"	6.5"	CF 102 KG	2.94"
		13.75"	6.5"	CF 136 KG	2.94"
		17.75"	6.5"	CF 176 KG	2.94"
	B	6.75"	8.125"	CF 66 KS	3.69"
		8.375"	8.125"	CF 86 KS	3.69"
		11.0"	8.125"	CF 110 KS	3.69"
		14.5"	8.125"	CF 144 KS	3.69"
		18.5"	8.125"	CF 184 KS	3.69"

Table 2 - Air tube capacity Versus firebox pressure

Air Tube Capacity vs Firebox Pressure				
Model	Tube	Firebox Pressure (In W.C.)	No Reserve Air	10% Turndown (GPH)
CF1400	A	0.0	-	11.0
		0.2	-	10.5
		0.4	-	10.1
		0.6	-	9.6
		0.8	-	9.2
		1.0	-	8.7
	B	0.0	13.6	12.2
		0.2	13.1	11.7
		0.4	12.5	11.2
		0.6	12.0	10.8
		0.8	11.4	10.3
		1.0	10.9	9.8
CF2300	A	0.0	19.9	19.9
		0.2	19.2	19.1
		0.4	18.5	18.3
		0.6	17.9	17.6
		0.8	17.2	16.8
		1.0	16.5	16.0
	B	0.0	19.9	19.9
		0.2	19.7	19.6
		0.4	19.5	19.3
		0.6	19.4	19.1
		0.8	19.2	18.8
		1.0	19.0	18.5

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.

❑ Stray light

CAUTION

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

❑ Mount flange(s) on air tube

CAUTION

Protect the Air Tube From Overheating

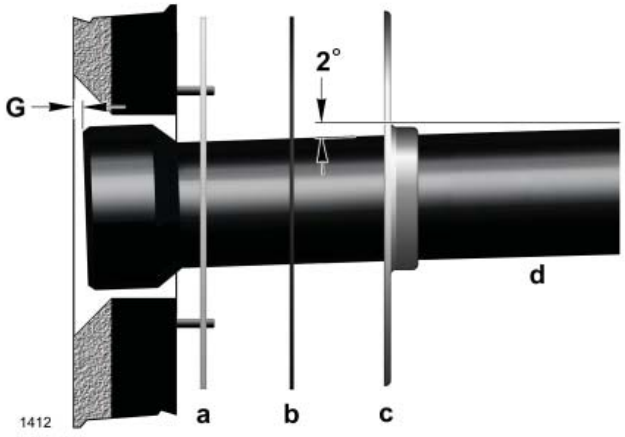
Overheating could cause damage to the air tube and other combustion components leading to equipment malfunction and impaired combustion performance.

- 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.

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. Predrill holes in the pressure firing plate (item **b**) to match the appliance studs. Slide the pressure firing plate (item **b**) and flange (item **d**) onto the air tube as shown. Wrap ceramic fiber rope (not shown) 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(s) 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 overtighten.
Check, and adjust if necessary, the critical dimensions **P**, **Q**, **R** and **S** shown in the drawing. Verify that the oil tube assembly and electrodes are in good condition, with no cracks or damage.

❑ 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.

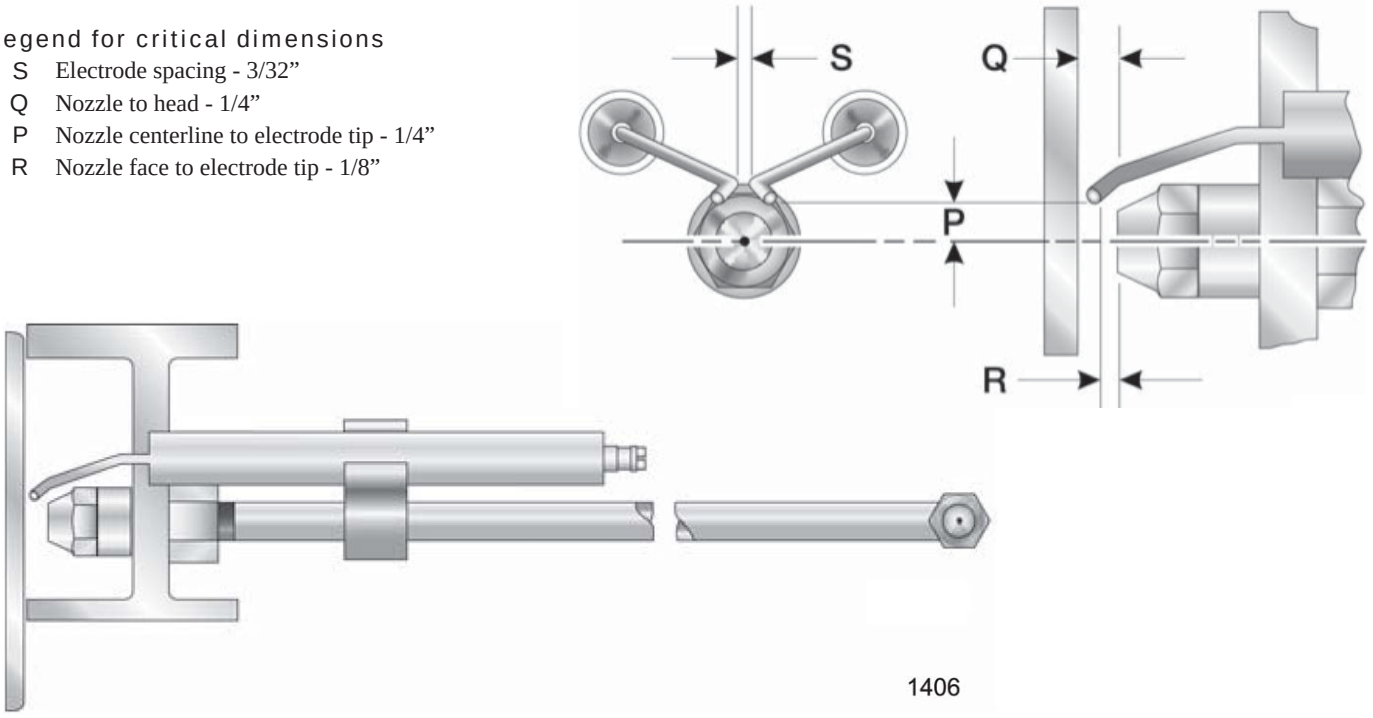
- Adjust the electrode gap and position in relation to the nozzle to the specifications shown in ***Figure 5***.

Check, and adjust if necessary, the critical dimensions 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 for critical dimensions

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



❑ 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 (item **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 (item **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.

❑ Set dimension Z

- Replace the rear access door on the burner, making sure that the adjusting plate assembly is now securely in the groove.
- Loosen acorn nut (item **d**) in ***Figure 5***. Slide the nozzle line and plate assembly until dimension Z in ***Figure 5*** is **1-3/4 ±1/16”** (CF1400 and CF2300). When dimension Z (from end of air tube to flat area of front face of head) is correctly set, tighten acorn nut (item **d**). Verify that the adjusting plate assembly is properly seated in the 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 (item **d**) if necessary to reposition the nozzle line. Once dimension Z is set, **do not loosen acorn nut** (item **d**) again.

Figure 6 – Nozzle line assembly in burner

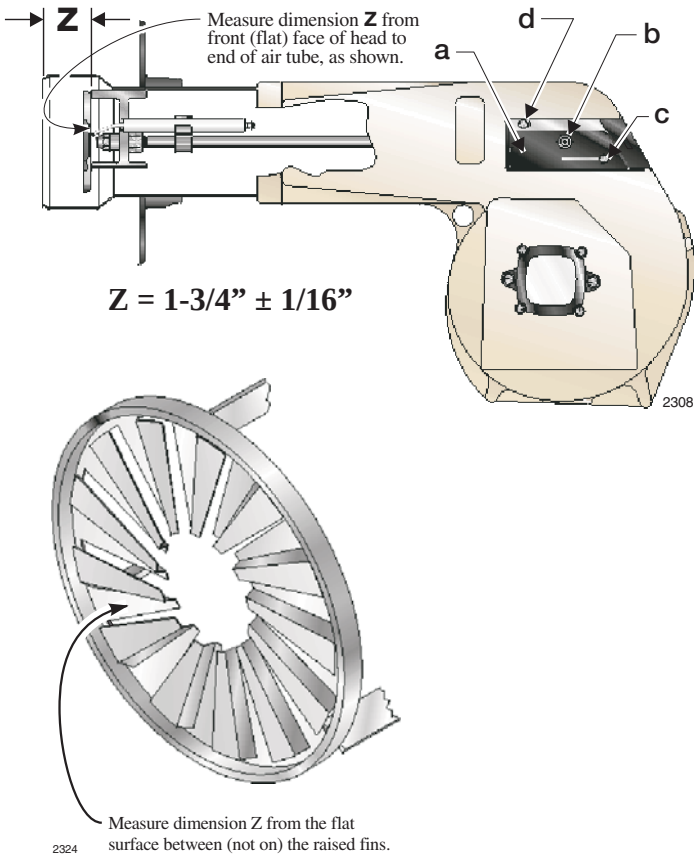
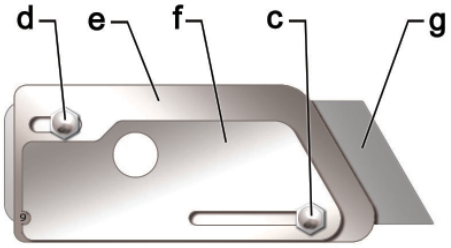


Figure 7 – Adjusting plate assy.



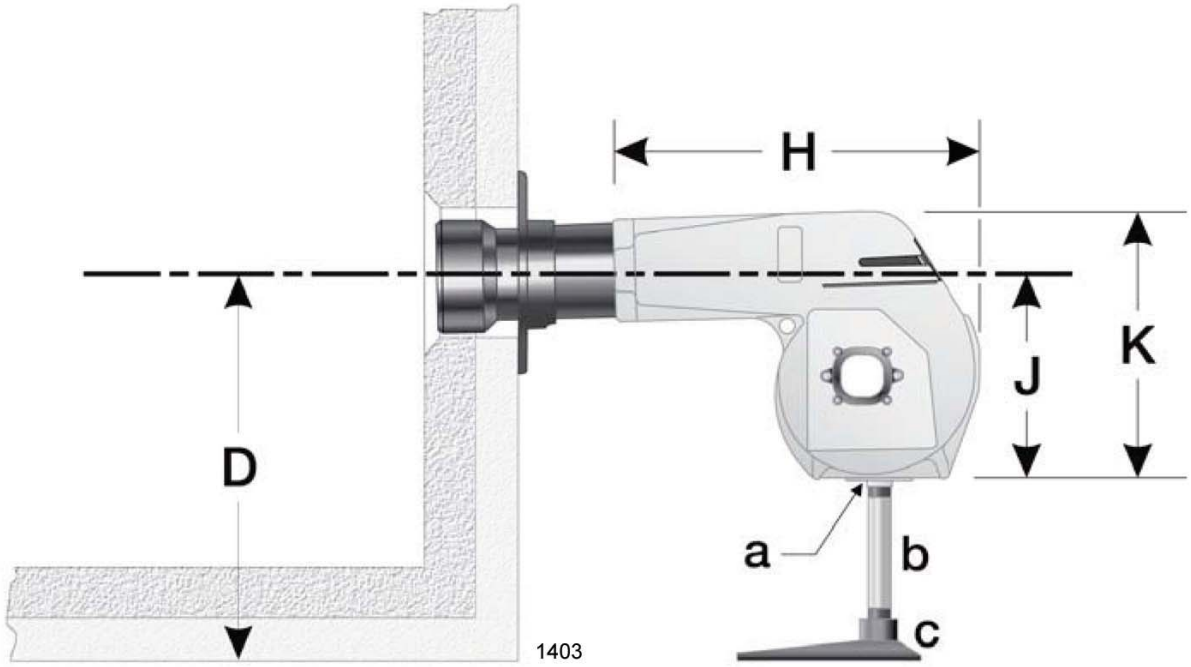
Legend (figure 6 & 7)

a	Adjusting plate assembly
b	Spline nut for securing nozzle line
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

❑ 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 4 and 8***.
- See ***Figure 8***. Install the pedestal support kit (recommended) by attaching the **3/4"** npt flange (item **a**) to the bottom of the burner using the (4) #10 screws provided. Cut and thread (one end only) a **3/4"** pipe nipple (item **b**) **with length 11 inches less than dimension D** in ***Figure 8***. Thread the pipe into the flange. Then slip the pipe end into the floor flange (item **c**).
- Secure the burner to the appliance by tightening the nuts on the burner flange mounting studs. Then secure the pedestal support floor flange set screw to the pipe.

Figure 8 – Burner installed in appliance front



Legend

H	Housing total length
J	Center to bottom of housing
K	Overall housing height

Dimension	CF 1400	CF 2300
H	18"	18-1/2"
J	10-7/8"	10-1/2"
K	13-5/8	15-5/8"

Connect fuel lines

❑ Fuel unit by-pass plug

The burner is shipped with a by-pass plug installed in the fuel unit. For low/high operation, the by-pass plug must be left in the fuel unit, regardless of the fuel system used (one-pipe with by-pass loop or two-pipe). Do not remove the by-pass plug.

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

- 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).

❑ One-pipe oil system by-pass loop

Refer to ***Figure 9*** (item **m**). Note the addition of a field-installed by-pass loop (use 3/8" copper tubing) from the fuel unit Return port to the Inlet port. This line is required for low/high operation. It simulates the flow of a two-pipe system at the fuel unit.

WARNING

Factory-Installed Pump Bypass Plug

Failure to follow these guidelines will cause the fuel pump seals to rupture and result in oil leakage, burner malfunction and potential fire and injury hazards.

- Models CF1400 and CF2300 are shipped with the pump bypass plug installed.
- Do not remove the bypass plug from the pump. It is required for step-firing (Lo/Hi) operation.
- Do not operate the burner unless a return line or bypass loop is installed or the pump seal will rupture.
- Carefully comply with the following instructions provided in this section of the manual.

❑ Oil supply/return lines

- Install the oil tank and oil lines in accordance with all applicable 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 reduces vibration and noise transmission problems.
- Install an oil filter sized to handle the fuel unit gearset flow capacity (***Table 3***) for two-pipe systems. However, 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 shutoff 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 paths for high-fire and low-fire operation. The low-fire by-pass regulation is done internally for type **B** fuel units. Oil supply connects to one of the fuel unit Inlet ports.

Two-pipe systems – See ***Figure 10*** for the fuel flow paths for high-fire and low-fire operation. The low-fire by-pass regulation is done internally for type B fuel units. Oil supply connects to one of the fuel unit Inlet ports. Oil return connects to the fuel unit Return port.

Low-fire/high-fire operation – The fuel unit nozzle port pressure is factory set at 300 psig.

- At high fire, full pressure (300 psig) is applied at the oil nozzle, causing full input.
- At low fire, the by-passing is done inside the fuel unit when the by-pass valve operates.
- This by-passing of oil reduces the oil pressure at the nozzle (to between 125 psig and 175 psig), reducing the input.

Figure 9 – One-pipe oil flow with "B" pump

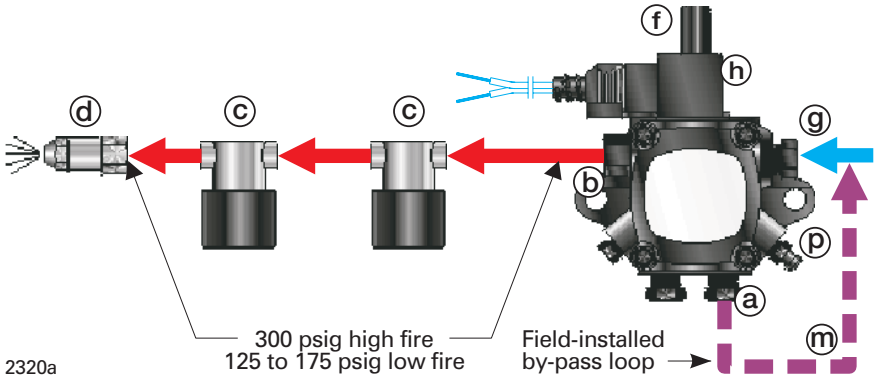
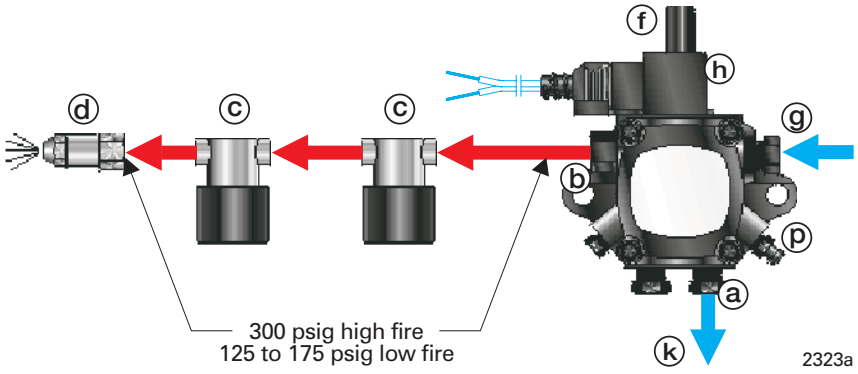


Figure 10 – Two-pipe oil flow with "B" pump



Legend (figure 9 & 10)

- a Return port
- b Nozzle port
- c Oil valves
- d Nozzle & adapter
- e By-pass valve ("H pump)
- f By-pass pressure regulator
- g Inlet port
- h By-pass valve ("B" pump)
- k Return line to oil tank
- m One-pipe by-pass loop, 3/8"
- p Air bleed valve

Table 3 – Fuel unit gearset capacities

Model	Fuel Unit Model Number	Gearset Capacity (gph)
CF1400	B2TA-8245	21
CF2300	B2TA-8852	39

Wire the burner — R7184B

WARNING **Electrical Shock Hazard**

Electrical shock can cause severe personal injury or death.

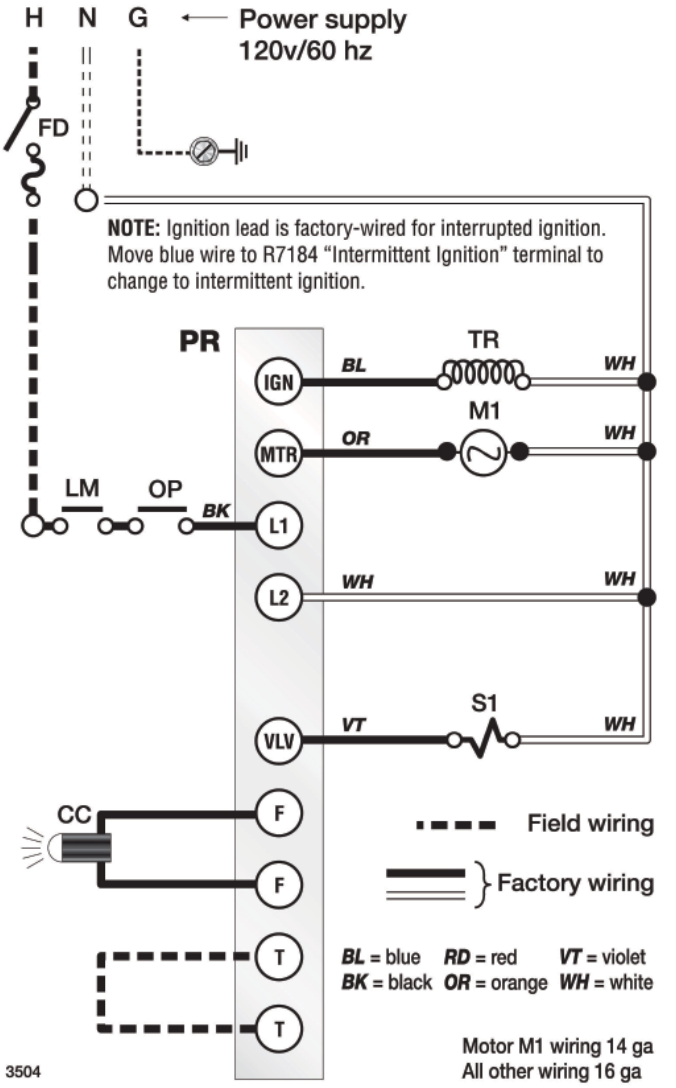
- Disconnect electrical power before installing or servicing the burner.
- Provide ground wiring to the burner, metal control enclosures and accessories. (This may also be required to aid proper control system operation)
- Perform all wiring in compliance with the National Electric Code ANSI/NFPA 70 (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 11*** for a typical wiring diagram, with R7184 oil primary, for reference purposes only.

Figure 11. - Typical wiring (R7184B)



Legend

FD	Fused Disconnect, by others	TR	Ignition transformer
LM	Limit controls, by others	M1	Burner motor
OP	Operating controls, by others	S1	Oil valve
PR	Oil primary control, R7184 typ.	T-T	24-volt thermostat/limit terminals
CC	Flame sensor, cad cell typical	F-F	Cad cell flame sensor terminals

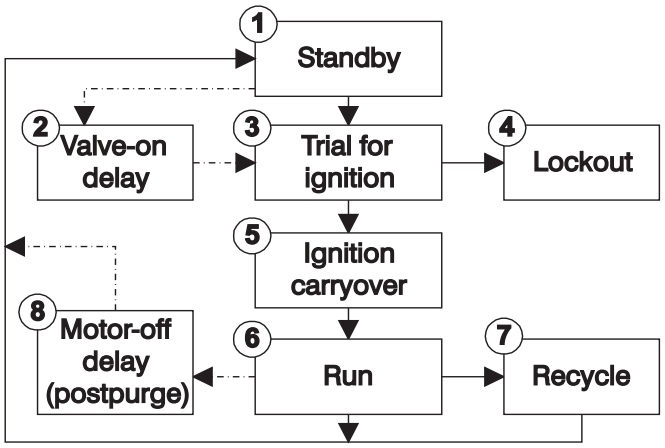
Sequence of operation — typical

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.

Sequence of operation — typical

1. **Standby** — The burner is idle, waiting for a call for heat. When a call for heat is initiated, there is a 3- to 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 (30-second lockout time is available).
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.



Prepare the burner for start-up

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.

WARNING **Professional Installation and Service Required**

Incorrect installation and mishandling of start-up 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.

Start-up checklist – Verify the following before attempting to start burner.

- ☐ 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 this instruction manual.
- ☐ 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 per these instructions (see **page 10**). The top acorn nut (***Figure 12***, item **d**) should never be loosened once the Z dimension is initially set.

❑ Adjusting plate assembly (Figure 12)

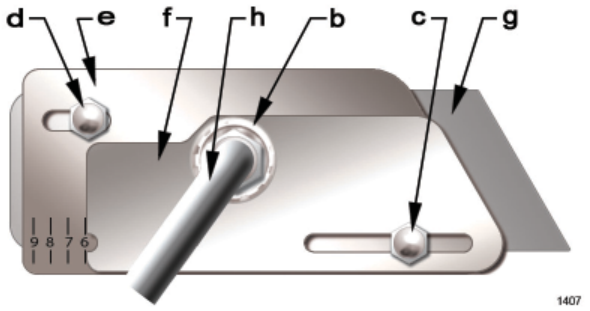
Make sure spline nut (item **b**) and bottom acorn nut (item **c**) are loose before proceeding to next section.

❑ Initial head position (Figure 12)

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 ***Tables 4a*** and ***4b*** for the desired firing rate and burner (high-fire).
- ***Figure 12*** 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**).

Figure 12 – Adjusting plate initial setting, typical



Legend

- b Spline nut for securing nozzle line
- c Bottom acorn nut (for head adjustments)
- d Top acorn nut (for setting dim. Z only - do not loosen after setting Z)
- e Indicator adjusting plate
- f Secondary adjusting plate
- g Primary adjusting plate
- h Copper oil line from oil valve to nozzle line

Table 4a. CF1400 Initial indicator adjustment plate settings

	Tube	Head Position		Damper Position	
		Approximate Head Setting	Firing Rate (gph)	Approximate Air Damper Setting	Firing Rate (gph)
CF1400	A	0	4.00	0	--
		1	4.50	10	--
		2	5.00	20	4.00
		3	6.00	30	5.00
		4	7.00	40	7.00
		5	7.50	50	8.00
		6	8.00	60	10.00
		7	9.00	70	11.00
		8	9.50	80	--
		9	10.00	90	--
		10	11.00	100	--
		--	--	110	--
		--	--	120	--
	B	0	7.00	0	--
		1	7.50	10	--
		2	8.00	20	--
		3	9.00	30	--
		4	10.00	40	7.00
		5	10.50	50	8.00
		6	11.00	60	10.00
		7	12.00	70	11.00
		8	13.00	80	12.00
		9	13.25	90	12.50
		10	13.60	100	13.00
		--	--	110	13.25
		--	--	120	13.60

Table 4b. CF2300 Initial indicator adjustment plate settings

	Tube	Head Position		Damper Position	
		Approximate Head Setting	Firing Rate (gph)	Approximate Air Damper Setting	Firing Rate (gph)
CF2300	A	0	11.0	0	--
		1	12.0	10	7.0
		2	13.0	20	10.0
		3	14.0	30	13.0
		4	15.0	40	14.0
		5	16.0	50	15.0
		6	17.0	60	16.0
		7	18.0	70	17.0
		8	19.0	80	18.0
		9	20.0	90	19.0
		--	--	100	20.0
	B	0	12.5	0	--
		1	13.0	10	10.0
		2	14.0	20	13.0
		3	15.0	30	14.0
		4	16.0	40	15.0
		5	17.0	50	16.0
		6	18.0	60	17.0
		7	18.5	70	18.0
		8	19.0	80	18.5
		9	20.0	90	19.0
		--	--	100	20.0

❑ Initial air settings

The following steps outline the procedure for initially setting the damper. Refer to ***Figures 13A*** and ***13B*** and ***Tables 4a*** or ***4b*** for this procedure.

1. Remove the cover screw (**A**) then the cover (**B**) and place to one side.

2. Using the wrench (**C**) supplied with the damper motor, adjust the blue low fire cam (**D**) to the initial setting listed in ***Tables 4a*** or ***4b***.

3. Using the same wrench, adjust the red high fire cam (**H**) to the initial settings listed in ***Tables 4a*** or ***4b***.

4. Ensure the damper plate is in the correct position. The cam notch (**E**) should align with the low fire setting on the damper motor scale (**F**).

5. If the damper plate is not in the correct position, disengage the motor by pushing in on the motor pin (**G**), then rotating the damper plate until the cam notch and motor scale setting are aligned. Re-engage the pin.

6. To adjust the high fire transition, use a small straight edge screw driver, turn the white adjustment screw, located in the orange transition cam, either clockwise or counterclockwise until the cam indicator is half way between the high and low settings on the scale.

    - Rotate the air adjusting plate until the lower edge of the pointer is opposite the number from ***Tables 4a*** or ***4b*** corresponding to the desired low fire rate.
    - This initial setting should be adequate for starting the burner at low fire. Once the burner is in operation, the air setting will be adjusted for best performance as discussed later in this manual.
    - Follow the procedures described later in this manual to fine tune the air settings.

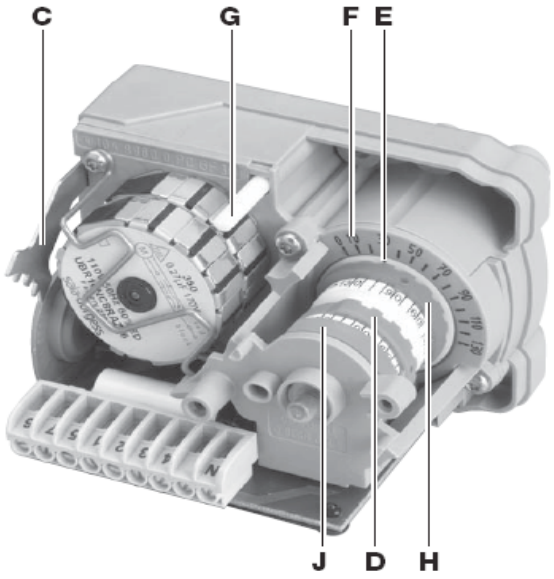
NOTICE

The damper plate is attached by screws to its shaft, and bears against a flat on the shaft for alignment. The shaft is secured to the damper motor by a sleeve coupling with two setscrews bearing against the damper shaft and two more against the motor shaft. The motor shaft has a flat matching the one on the damper shaft. The flats on the damper shaft and the motor shaft should be aligned so that the position indicator in the damper motor reads accurately. The best way to align the flats is to tighten the setscrews that bear against the flats on the shafts first, and then tighten the ones that bear against the round surface of the shafts afterward.

The test for proper alignment is to disengage the damper motor from its shaft using the disengaging pin (Item **G** in ***Figure 13B***) and rotate the damper plate to its full closed position. The position indicator should point to 0° within + 5° tolerance.

Figure 13A. Damper Motor with Cover

Figure 13B. Damper Motor



Legend (figure 13A & 13B)

A	Cover screw
B	Cover
C	Wrench
D	Low fire cam (blue)
E	Cam notch
F	Damper motor scale
G	Disengaging pin
H	High fire cam (red)

❑ Set appliance limit controls

- Set the appliance limit controls in accordance with the appliance manufacturer's recommendations.
- Move the low-fire hold switch (not shown) to the low fire hold position. This will hold the burner in low fire during initial start-up.

❑ Prepare the fuel unit for air venting

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.

- To vent air from one-pipe oil systems, attach a clear hose to the vent plug on the fuel unit. Provide a container to catch the oil. Loosen the vent plug.
- Vent the air as described under 'Start the Burner'.

Start the burner

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 certified 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 Oil-burning 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.

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.

❑ Start burner and vent air from oil line

1. Move the **low-fire hold** switch to the **low fire hold** position (to hold burner in low fire when started).
2. Verify that the air adjusting cam (***Figure 13b***, item **d**) has been set to the initial low-fire air setting as described under Initial air settings.
3. Open the oil shutoff valves in the oil supply (and return) line(s) to the burner.
4. Set the thermostat (or operating control) to call for heat.
5. Close the line switch to the burner. The burner motor should start immediately.
6. 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.
7. Vent the fuel unit as soon as the burner motor starts rotating. To vent —

   - Attach a clear plastic tube to the air bleed valve (***Figure 9 or 10*** **as applies, item p**).
   - Place the end of the tube in a container to catch the oil. Then loosen the fuel unit air vent valve.
   - Tighten the air vent valve after all air has been purged.
   - **IF burner stops during venting** —
     - 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.
     - 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.
   - **IF burner stops after flame established** —
     - Additional venting is probably required. Repeat the air venting procedure.
8. Once flame is steady, proceed to Set high-fire air.

❑ Set high-fire air

1. Allow the burner to run at **low fire** 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 readjusting the damper indicator to a higher number.
3. Once the appliance has warmed, the **high-fire** setting can be checked and adjusted.
4. Locate the approximate air adjusting plate setting for **high fire** in ***Table 4a*** **or** ***4b***.
5. Place the **low-fire hold** switch in the **high-fire position**. The damper motor will begin to rotate after four seconds.
6. Use combustion test instruments to adjust the burner.
   a. Adjust the air by moving the red cam to a lower number until a trace of smoke is achieved with CO_2 level as high as possible (lowest possible O_2). **Example**: 13.5% CO_2 (2.5% O_2) with a trace of smoke.
   b. Increase the air by increasing the red cam number to reduce CO_2 by 2 percentage points at a zero smoke level. (Increase O_2 by 3 percentage points at a zero smoke level.)
   Example: Reduce CO_2 from 13.5% to 11.5%, with zero smoke (or increase O_2 from 2.5% to 5.5%).
   c. A margin of reserve air has been added to accommodate variable conditions.
7. Check the breech draft pressure against the appliance manufacturer's recommended setting (typically + 0.1" W.C.).
8. If the breech pressure is higher or lower than recommended level, adjust the appliance breech damper to achieve the specified setting. Recheck the smoke and CO_2 levels. Adjust burner air if necessary.
9. Once all settings are complete and satisfactory, proceed to 'Set low-fire air'.

❑ Set low-fire air

1. Move the **low-fire hold** switch from the **"High Fire position"** to the **"Low Fire Hold"** position.
   a. The damper will return to the **low-fire** air setting.
2. Check the smoke and CO_2 (O_2) levels.
   a. Pull a smoke sample from the flue.
   b. The sample should be clean (zero smoke level).
   c. Check the CO_2 (O_2) level:
   CO_2 should be at 11 to 12% (O_2 at 5.9 to 4.5%).
   If the CO_2 is less than 11% (O_2 more than 5.9%), decrease the air and check the smoke level.
3. Operate the burner from **low fire** to **high fire** and back to verify operation.
4. Turn the burner off. Wait one or two minutes (for chamber to clear) and then turn on again to verify starting characteristics.
5. Perform limit circuit performance test specified by appliance manufacturer to verify operation of burner/appliance combination.

Perform Regular Maintenance

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

- ❒ 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 nozzle with the exact brand, pattern, gph, flow rate and spray angle.
- ❒ 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, burner housing and static plate of any lint or foreign material.
- ❒ If motor is not permanently lubricated, oil motor with a few drops of SAE 20 nondetergent 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 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

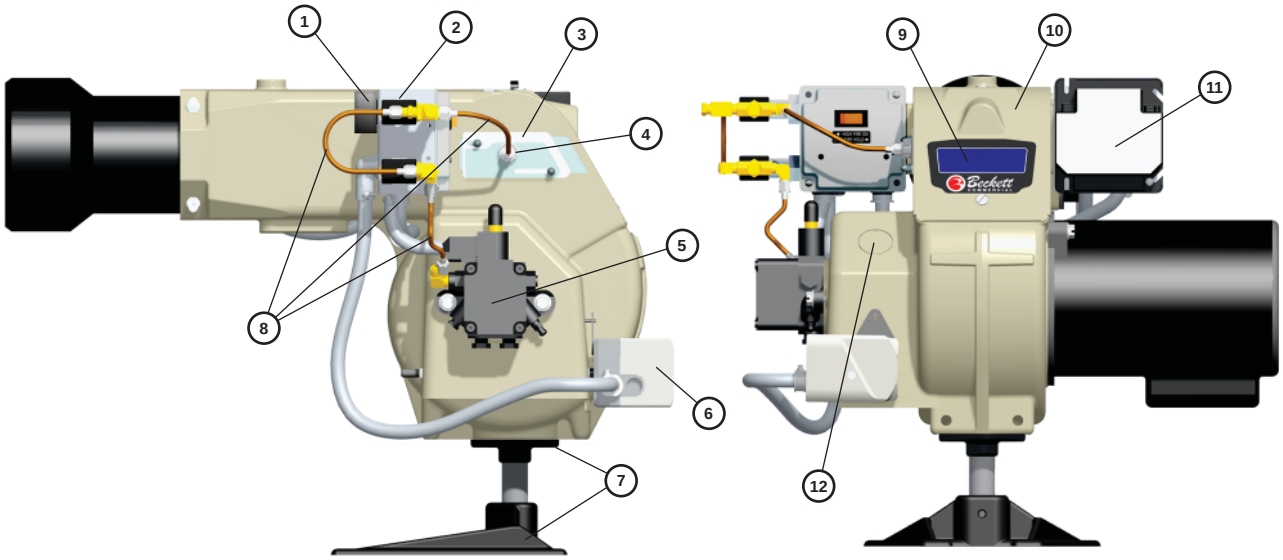
- ❒ Observe combustion air openings and vent system for integrity. Openings must be clean and free of obstructions.
- ❒ Check oil lines and fittings to verify there are no leaks.
- ❒ Observe burner ignition and performance to verify smooth operation.
- ❒ Shut the system down if you observe abnormal or 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 No.
1	Timer	Nozzle valve delay		21295U
2	Oil Valve	Box mounted		21789U
3	Knurled Nut	All models		3666
4	Adjusting plate assembly	w/ cast aluminum door w/ stamped sheet-metal door		5994U 5201701U
5	Fuel pump	B2TA-8245 H3PAN-C150H		21313U 21309U
6	Damper motor	2-stage		750601U
7	Pedestal kit	All models		51193
8	Fuel lines	Specify length		-
9	Sight glass	All models		31346
10	Rear cover door assembly	w/ cast aluminum door* w/ stamped sheet-metal door*	CF1400 CF2300 CF1400 CF2300	5994U 51204U 5201301U 5201302U
11	Control	Specify		-
12	Coupling hole plug Coupling access door	use with threaded hole use with rectangular opening		32439U 16703GY
13	Head assembly	CF1400 CF2300		5978 51203
14	Electrode assembly	All models		51212
15	Ignition leads	8-1/4” long 11-3/4” long 15-1/4” long 19-1/4” long		5990082 5990116 5990152 5990192
16	Nozzle line assembly	Refer to ***Figure 5, Page 9***		
17	Air tube	Refer to ***Figure 4, Page 8***		
18	Transformer	12,000 volt		51214
19	Coupling	B pump H pump		21290 21308
20	Blower wheel	CF1400 - 5.59” x 3.09” CF2300 - 6.75” x 3.13”		21268U 21267U
21	Motor	120/208-230 single phase 208-230/460 three phase	CF1400 CF2300 CF1400 CF2300	21401U 21402U 21638U 21499U
	Motor relay (not shown)	120V single phase 208V single phase three phase		7273 7300 2194301
	Adjustable flange	see ***Figure 15*** on opposite page		

Figure 14 – Burner Replacement Parts



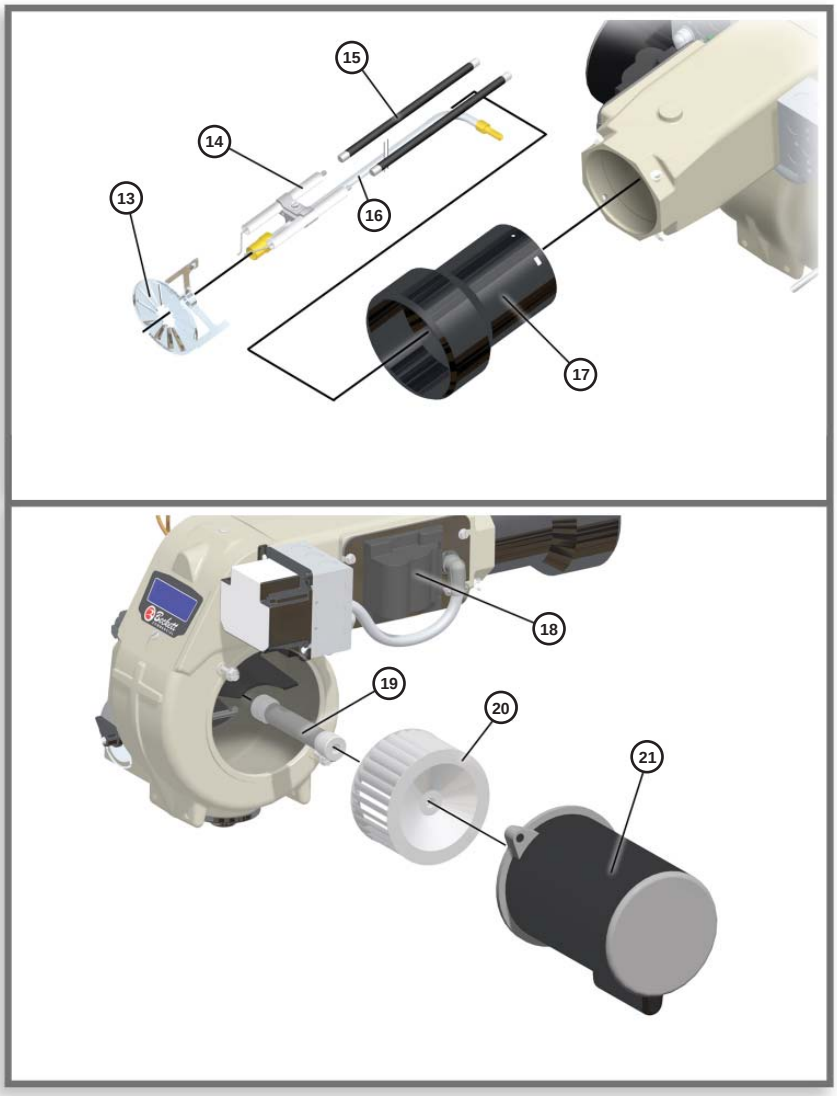
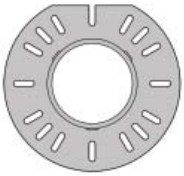
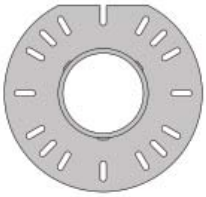


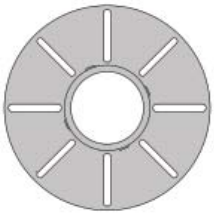
Figure 15 – Adjustable mounting plates



Flange A



Flange B



Flange C

Model	Flange **A**	Flange **B**	Flange **C**
CF1400	51312 (10.00" DIA.)	n/a	51629 (12.25" DIA.)
CF2300	51313 (12.44" DIA.)	51498 (13.92" DIA.)	51630 (16.00" DIA.)

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, NEGLECT, 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 R72905

The Oilheat Manufacturers' Association supports the use of low sulfur fuels as defined by ASTM D396, Grades No. 1 Low Sulfur and No. 2 Low Sulfur, as the preferred heating fuel for the following reasons:

- Low sulfur fuels reduce deposits on heat exchanger surfaces, extending the service interval between cleanings.
- The reduced deposits increase the efficiency of the appliance.
- Low sulfur fuels reduce particulate emissions.
- Low sulfur fuels reduce oxides of nitrogen emissions.

R.W. BECKETT CORPORATION

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