❑ Fuel unit 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).

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.

❑ One-pipe oil system by-pass loop

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.

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.

❑ 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

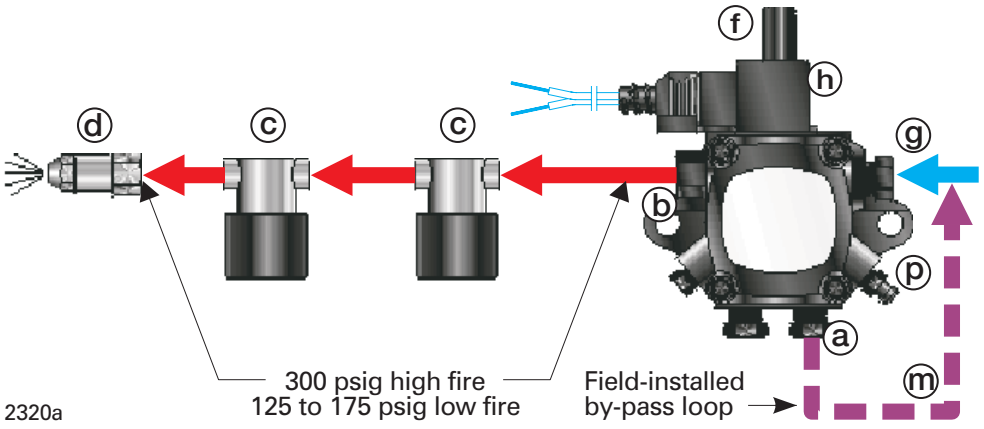
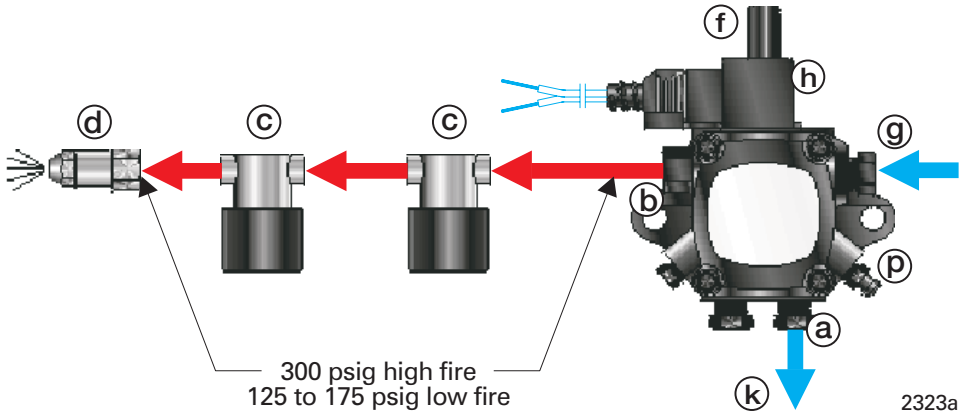


Figure 10 – Two-pipe oil flow with "B" pump



Legend (figure 9 & 10)

a	Return port
b	Nozzle port
c	Oil valves
d	Nozzle & adapter
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

- **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 firing rate. Do not change this pressure unless directed to do so by the appliance manufacturer.

Wire the burner — R7184B

WARNING **Electrical Shock Hazard**

Electrical shock can cause severe personal injury or death.

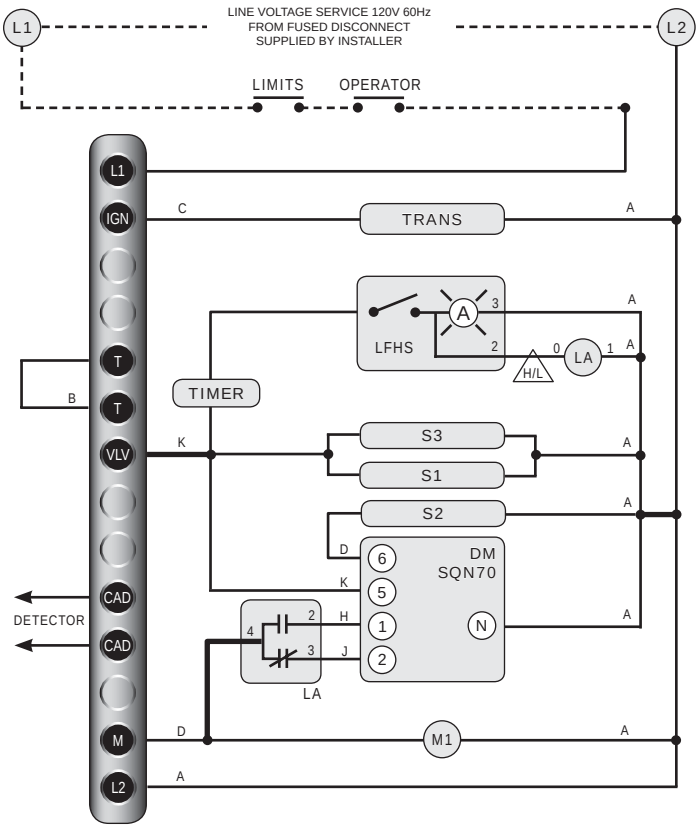
- Disconnect electrical power before installing or servicing the burner.
- Provide ground wiring to the burner, metal control enclosures and accessories. (This may also be required to aid proper control system operation)
- Perform all wiring in compliance with the National Electric Code ANSI/NFPA 70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

CC	Flame sensor, cad cell typical
DM	Damper motor
FD	Fused Disconnect, by others
F-F	Cad cell flame sensor terminals
H/L	Low/high control wiring tag
LFHS	Low fire hold switch
LM	Limit controls, by others
M1	Burner motor
OP	Operating controls, by others
PR	Oil primary control, R7184 typ.
S2	High/low valve
S1, S3	On/off valve
TR	Ignition transformer
T-T	24-volt thermostat/limit terminals

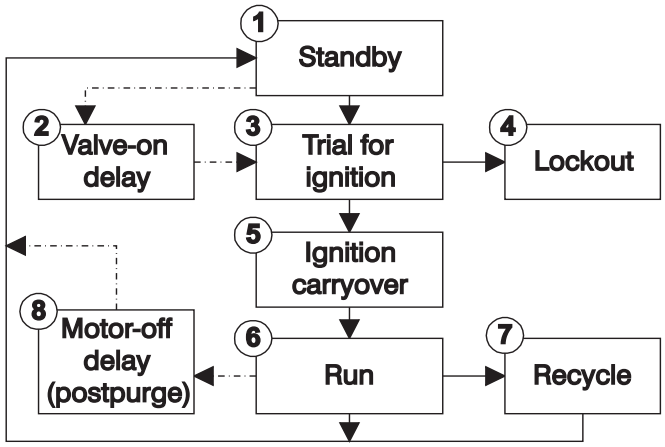
Sequence of operation — typical

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.



Resetting to OHM

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

Prepare the burner for start-up

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.

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 – 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)

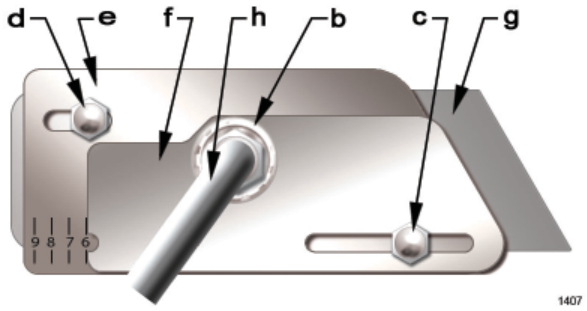
Make sure spline nut (item **b**) and bottom acorn nut (item **c**) are loose before proceeding to next section.

❑ 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 ***Figure 13*** and ***Tables 4a*** or ***4b*** for this procedure.

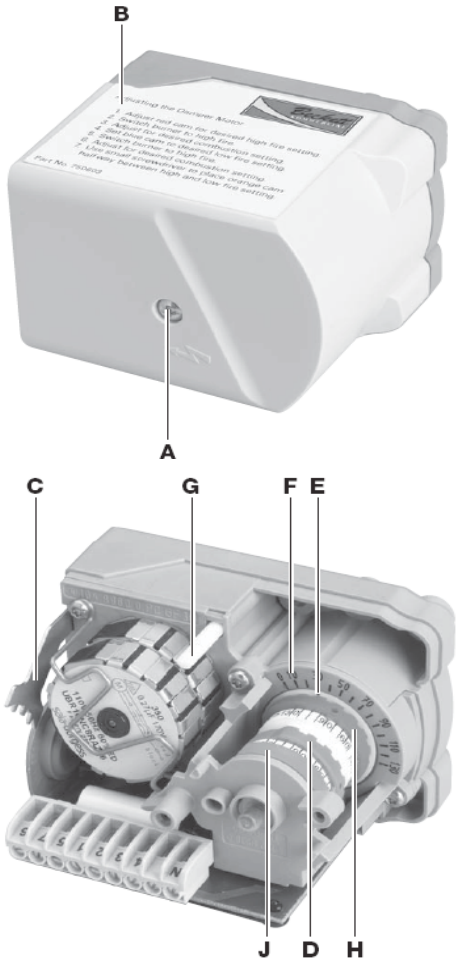
1. Remove the cover screw (**A**) then the cover (**B**) and place to one side.
2. Using the wrench (**C**) supplied with the damper motor, adjust the blue low fire cam (**D**) to the initial setting listed in ***Tables 4a*** or ***4b***.
3. Using the same wrench, adjust the red high fire cam (**H**) 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 13 - Damper Motor



Legend (figure 13)

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

❑ 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

- 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

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 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.

❑ Start burner and vent air from oil line

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.

❑ 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 check

- While the burner is firing, and after the ignition has been turned off, press and release the reset button (hold 1/2 second or less) to check the cad cell resistance. The LED will flash 1 to 4 times, depending on the cad cell resistance (refer to the table below).

Number of LED flashes	Cad Cell Resistance (ohms)
1	Normal (0 to 400)
2	Normal (400 to 800)
3	Normal (800 to 1600)
4	Limited (1600-Lockout)*

** Lockout can occur above 4000 ohms.*

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

❑ Operating the burner

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.

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.

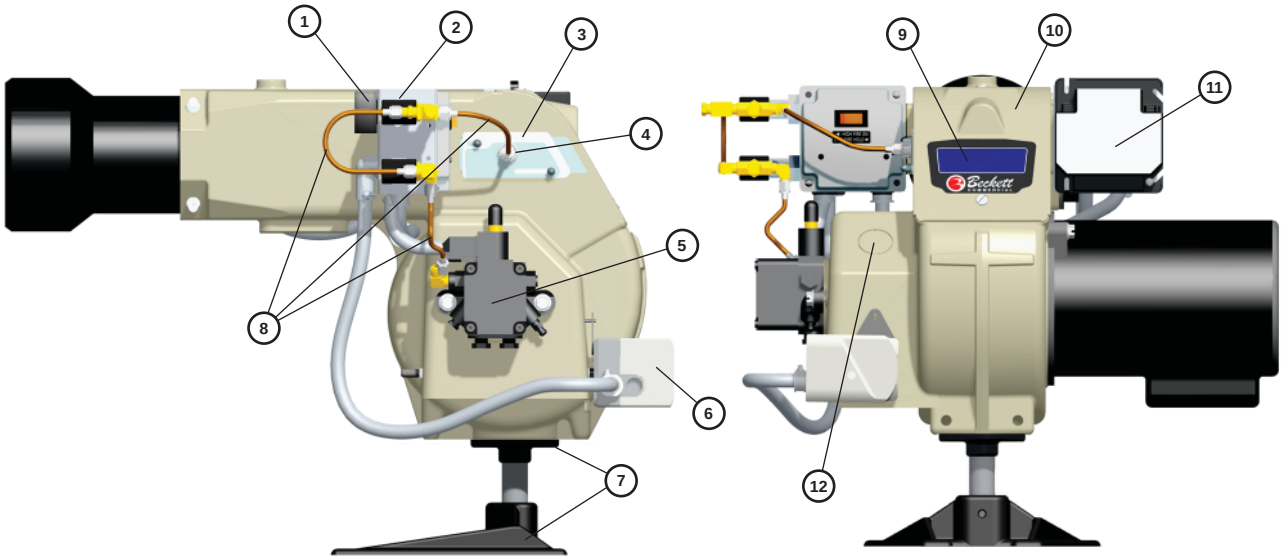
See next page for Beckett replacement parts ▶

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



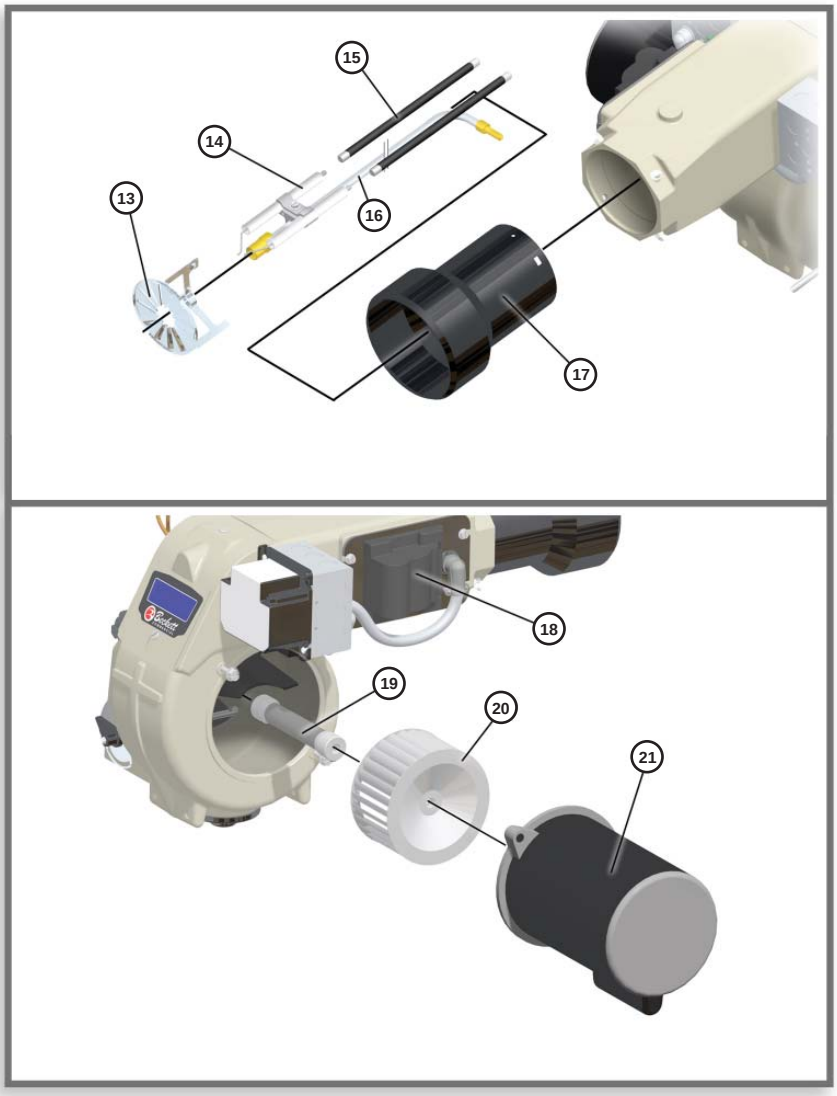
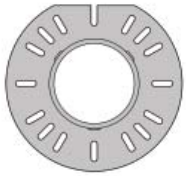
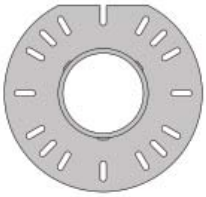


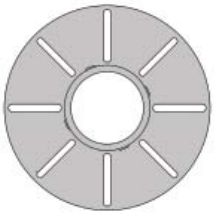
Figure 15 – Adjustable mounting plates



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
U.S.A.: P.O. Box 1289 · Elyria, Ohio 44036
www.beckettcorp.com
Canada: R.W. Beckett Canada, Ltd. · Unit #3, 430 Laird Road · Guelph, Ontario N1G 3X7

INSTALLATION INFORMATION

SUNTEC industries incorporated

MODEL A SINGLE STAGE TWO-STEP
MODEL B TWO-STAGE TWO-STEP FUEL UNITS AND
MODEL B TWO-STAGE HIGH PRESSURE FUEL UNITS

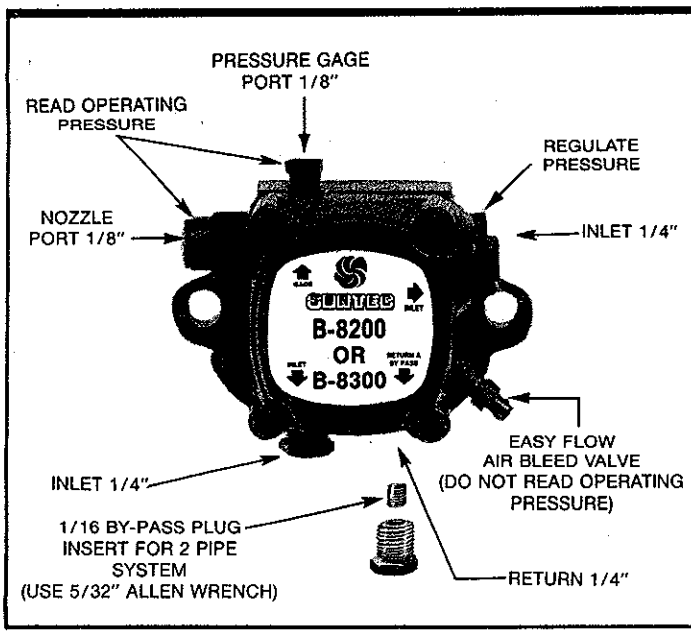


FIGURE 1

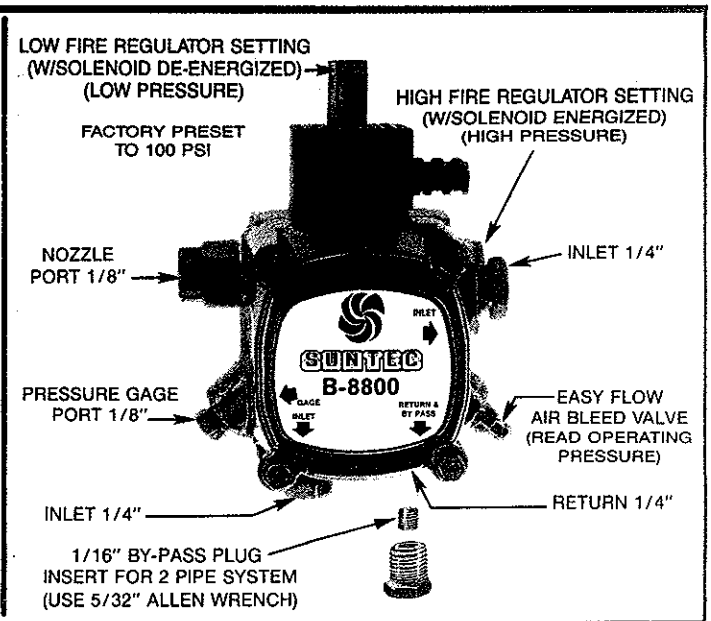


FIGURE 2

ONE-PIPE SYSTEM • FIGURE 3

DO NOT INSTALL BYPASS PLUG! Connect inlet line to pump inlet. Start burner. Arrange primary burner control for continuous operation during purging. Open easy flow bleed valve 1 turn CCW. Bleed unit until all air bubbles disappear — HURRIED BLEEDING WILL IMPAIR EFFICIENT OPERATION OF UNIT. Tighten easy flow bleed valve securely.

TWO-PIPE SYSTEM • FIGURE 4

REMOVE 1/16" BY-PASS PLUG FROM PLASTIC BAG ATTACHED TO UNIT. Remove 1/4" plug from return port. Insert by-pass plug (See Figure 1 or 2), tighten plug. Attach return and inlet lines. Start burner — Air bleeding is automatic. Opening Easy Flow Air Bleed Valve will allow a faster bleed if desired. Return line must terminate 3-4" above supply line inlet. (See Figure 4). Failure to do this may introduce air into the system and could result in loss of prime.

TWO STEP PUMPS • FIGURE 2

MODEL SHOWN IS RIGHT HAND ROTATION; ALL PORTS ARE REVERSED FOR LEFT HAND ROTATION.

SOLENOID WIRING Refer to burner manufacturer's manual for instructions.

NOTE: Wiring of the solenoid in parallel with the safety control circuit will bypass the low fire regulator.

REGULATOR SETTING Install pressure gage in gage port (remove after adjustment) with proper nozzle in nozzle line

- Low Fire — Factory preset to 100 PSI with rated nozzle.
- High Fire — With solenoid energized adjust high fire regulator to desired pressure. (Range 200 to 300 PSI)

NOTE: EXTERNAL CUTOFF VALVE (120V MAXIMUM) IS REQUIRED.

GENERAL INFORMATION • ALL SYSTEMS

IMPORTANT INFORMATION Long or oversized inlet lines may require the pump to operate dry during initial bleeding period. In such cases, the priming may be assisted by injecting fuel oil into the pump gearset. Under lift conditions, oil lines and fittings must be air tight. To assure this, "Pipe Dope" may be applied to both the used and unused inlet and both return fittings. DO NOT USE TEFLON TAPE!! DO NOT USE COMPRESSION FITTINGS!!

MOUNTING POSITION Model "A" Single Stage Fuel Unit may be mounted in any position. Model "B" Two Stage Fuel Unit may be mounted in any position except upside down (1/8" ports pointed down).

VACUUM CHECK A Vacuum Gage may be installed in either of the 1/4" inlet ports or in the 1/8" return port (on single pipe installations), whichever is most convenient. The Model "A" pump should be used where the vacuum does not exceed 6" hg. single pipe and 12" hg. two pipe. The Model "B" should be used where vacuum does not exceed 17" hg. Running vacuum is the total of all pressure drops (ΔP) from the tank to the inlet of the pump.

CAUTION

Pressurized or gravity feed installations must not exceed 10 P.S.I. on inlet line or return line at the pump. A pressure greater than 10 P.S.I. may cause damage to the shaft seal.

ONE-PIPE SYSTEM • MODEL A

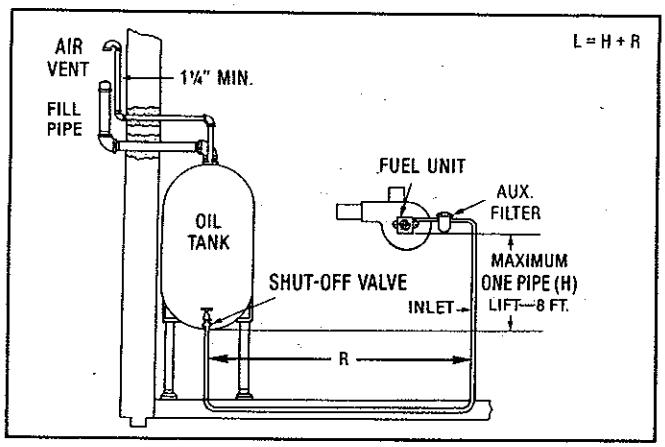


FIGURE 3

The SUNTEC MODEL "A"-70 FUEL UNIT may be installed ONE-PIPE with Gravity Feed or Lift.

The maximum allowable lift is 8 ft. — See Figure 3.

IMPORTANT: One-pipe installations must be absolutely air tight or leaks or loss of prime may result. Bleed line and fuel unit completely. **Bleed for 15 seconds after last air is seen from easy flow to be certain lines are air free.**

L = Line Length in Feet H = Head in Feet Q = Firing Rate in GPH

3/8" line $L = \frac{6 - .75H}{.0086\ Q}$ 1/2" line $L = \frac{6 - .75H}{.00218\ Q}$

If tank is above pump change - to +. Fittings, valves, and filters will reduce total length allowed.

TWO-PIPE SYSTEM • MODEL A AND B

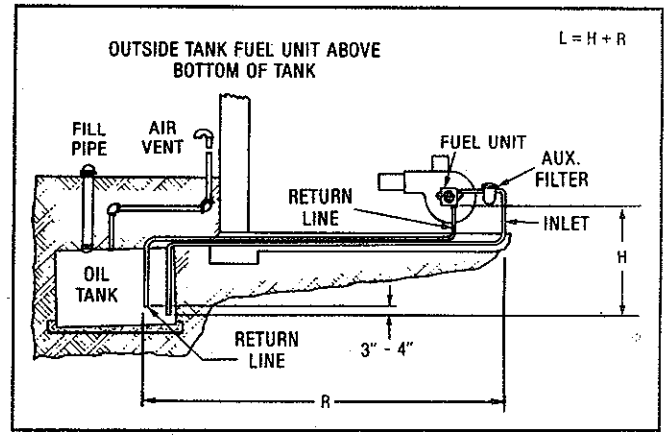


FIGURE 4

Always terminate return line as shown in Figure 4. Line lengths include both vertical and horizontal lengths.

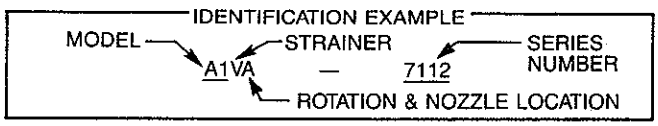
MODEL A SINGLE-STAGE TWO-STEP • TWO-PIPE MAXIMUM LINE LENGTH (H + R)

Lift "H" Figure 4	3450 RPM					
	3/8" OD Tubing		1/2" OD Tubing			5/8" OD Tubing
	10 GPH	16 GPH	10 GPH	16 GPH	23 GPH	23 GPH
0'	33'	29'	100'	100'	72'	100'
1'	31'	27'	100'	100'	66'	100'
2'	28'	25'	100'	98'	59'	100'
3'	25'	23'	100'	89'	53'	100'
4'	23'	20'	92'	80'	46'	100'
5'	21'	18'	82'	72'	40'	100'
6'	18'	16'	72'	63'	34'	100'
7'	16'	14'	62'	55'	27'	88'
8'	13'	12'	52'	46'	20'	72'
9'	11'	9'	43'	37'	14'	56'
10'	—	—	33'	29'	8'	39'

MODEL B TWO-STAGE TWO-STEP AND TWO-STAGE HIGH-PRESSURE • TWO-PIPE MAXIMUM LINE LENGTH (H + R)

Lift "H" Figure 4	3450 RPM					
	3/8" OD Tubing		1/2" OD Tubing			5/8" OD Tubing
	10 GPH	16 GPH	10 GPH	16 GPH	23 GPH	23 GPH
0'	70'	60'	100'	100'	100'	100'
2'	64'	55'	100'	100'	100'	100'
4'	58'	50'	100'	100'	100'	100'
6'	52'	44'	100'	100'	100'	100'
8'	45'	39'	100'	100'	100'	100'
10'	39'	34'	100'	100'	100'	100'
12'	33'	28'	100'	100'	94'	100'
14'	27'	23'	100'	91'	76'	100'
16'	21'	18'	81'	70'	59'	100'
18'	—	—	57'	49'	41'	100'

PUMP USAGE IDENTIFICATION



STRAINER TYPE	UL Strainer Rating (GPH)* #2 Fuel Oil
V	3
Y	7
T	23
G	34

*Max. firing rate not to exceed max. nozzle capacity or strainer rating whichever is LESS. A greater firing rate requires a suitable external strainer.

ALL INSTALLATIONS SHOULD BE MADE WTH LOCAL AND NATIONAL CODES.

SUNTEC industries incorporated

GLASGOW, KY 42142-5000

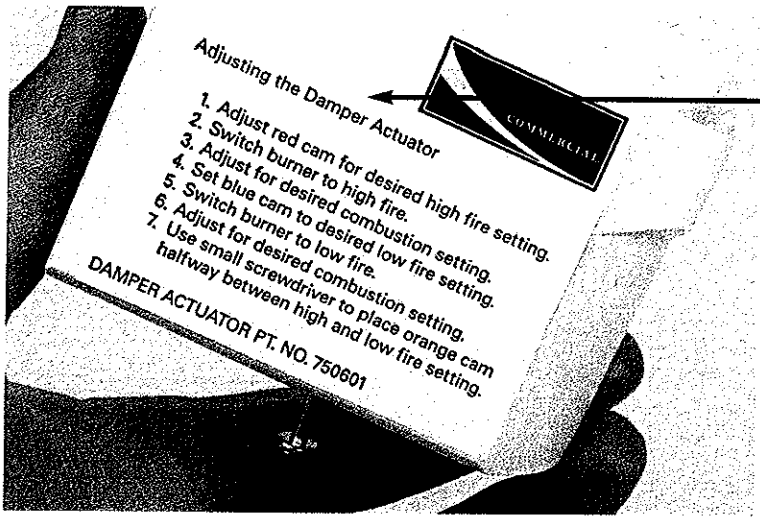
... working harder to serve you even better.

Form No. 2130
December 1995

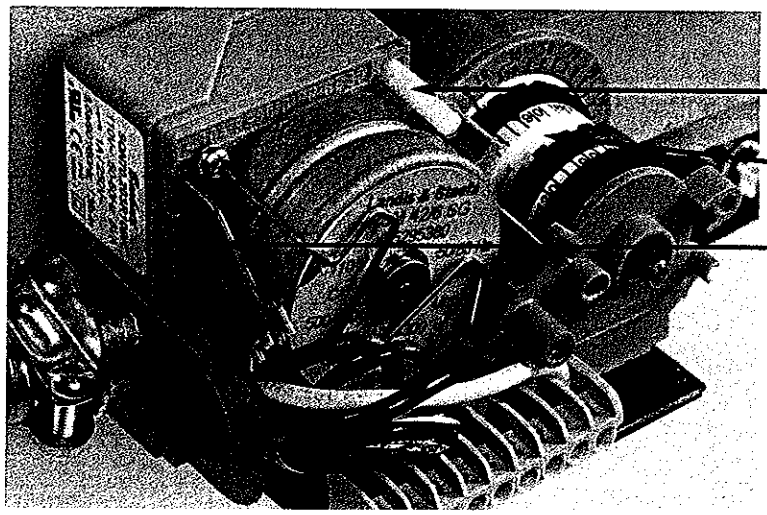
Beckett

Damper Actuator

For Commercial Two-Stage Burners
Adjustment Instructions



Adjustment Instructions Printed on Cover



Disengaging Pin in the Engaged (out) Position

Cam Stack

Adjustment Wrench

The **Disengaging Pin** allows the Damper and Cam Stack to be rotated by hand.

The **Disengaging Pin** *must be in the engaged position (out) when the burner is operating.*

Damper Position Indicator (Notch in White Ring)

Damper Position Scale

Red High Fire Cam with White Adjustment Scale

Blue Low Fire Cam with White Adjustment Scale

Transition Cam shares Adjustment Scale

Beckett

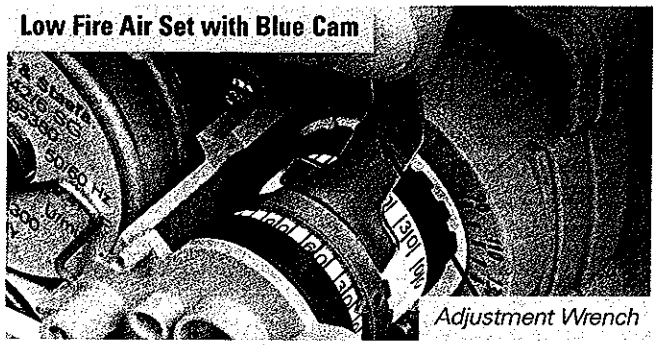
Damper Actuator

For Commercial Two-Stage Burners

Adjustment Instructions

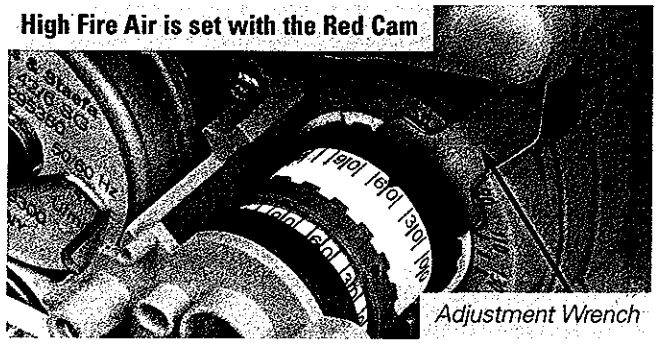
Setting the High Fire Air and Low Fire Air

Low Fire Air Set with Blue Cam



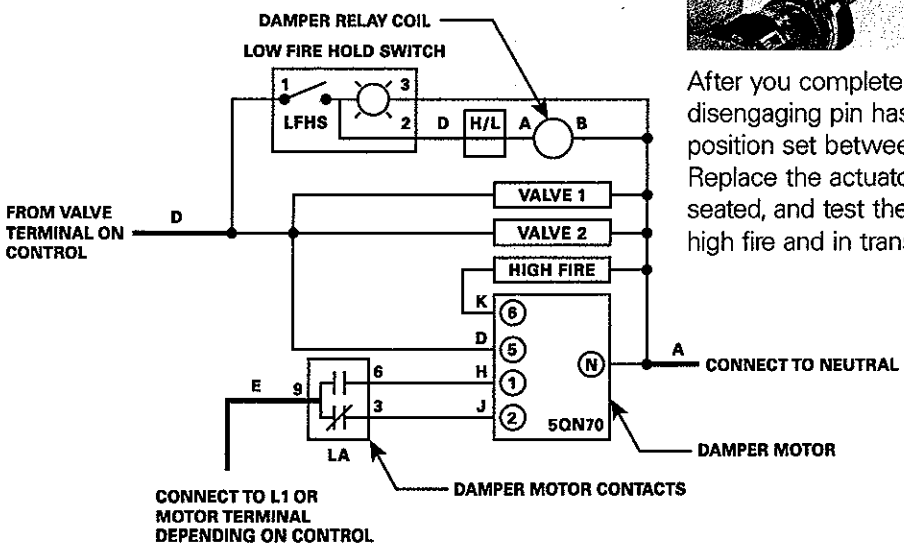
Adjustment Wrench

High Fire Air is set with the Red Cam



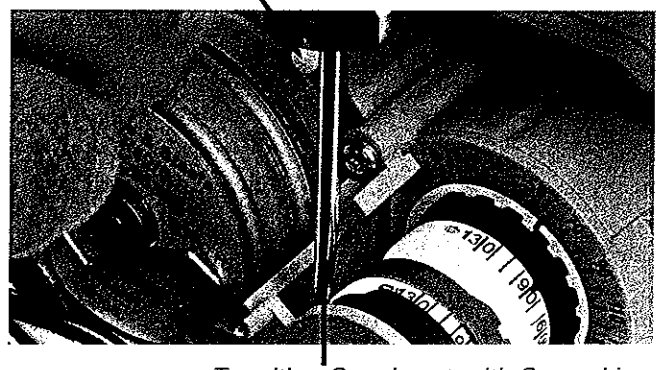
Adjustment Wrench

An old air setting specification of 7 is equal to 70° on the damper position scale of this new damper actuator.
If adjusting the air settings while the burner is operating, it is necessary to cycle the burner from High to Low Fire or Low to High by using the lighted low fire hold switch.



Setting the Transition

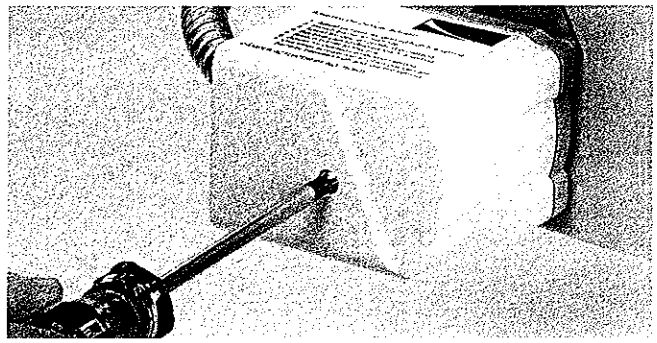
Cam is disengaged



Transition Cam is set with Screwdriver

The **ORANGE CAM** sets the transition point between Low Fire Oil and High Fire Oil.

It should be set halfway between the settings of the RED Cam and the BLUE Cam.



After you complete your adjustments make certain the disengaging pin has been reengaged with the damper position set between the high fire and low fire limits. Replace the actuator cover, making sure it is correctly seated, and test the burner for proper firing at low fire, high fire and in transition between low and high.

For more information, contact: **www.beckettcorp.com**

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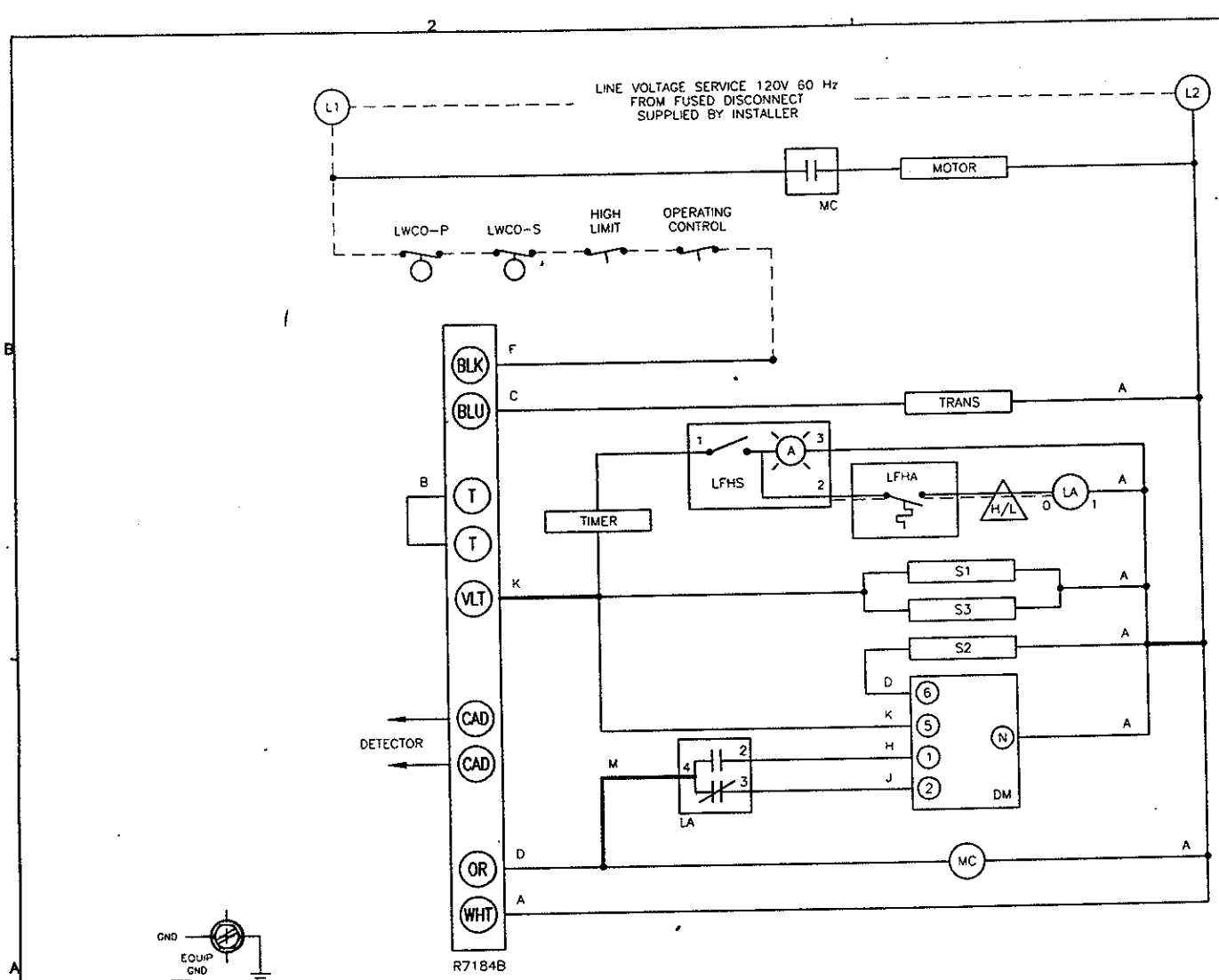
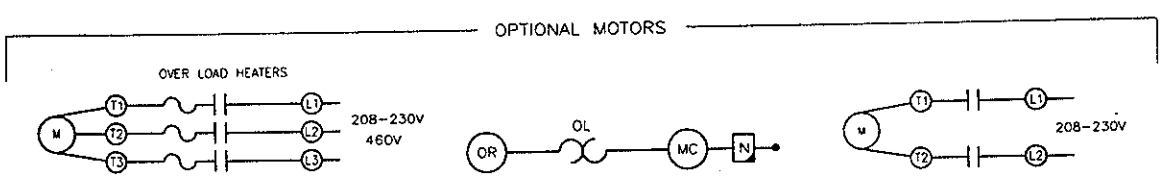
R.W. Beckett Canada Ltd. • Unit 3 - 430 Laird Road • Guelph, Ontario, Canada N1G 3X7 • (800) 665-6972 • FAX (519) 763-5656

Form No. 61578 09/04
Printed in U.S.A.





KEY

DM = DAMPER MOTOR
H/L = LO/HI CONTROL WIRING TAG
LA = LOW FIRE AIR RELAY
LFHA = LOW FIRE HOLD AQUASTAT
LFHS = LOW FIRE HOLD SWITCH
LWCO-P = LOW WATER CUTOFF - PRIMARY
LWCO-S = LOW WATER CUTOFF - SECONDARY (IF USED)
M = MOTOR
MC = MOTOR CONTACTOR
S1, S3 = ON/OFF VALVE
S2 = HIGH/LOW VALVE
TRANS = IGNITION TRANSFORMER

LEGEND

= CONTACT/DAMPER COIL
= LIGHT
= WIRING SUPPLIED BY INSTALLER
= CROSSOVER WIRES
= FACTORY JUMPER, TO BE CUT FOR FIELD WIRING TIE-IN

WIRE COLOR

A - WHITE
B - BLACK
C - BLUE
D - ORANGE
E - BROWN/RED
F - RED
G - BROWN
H - RED/WHITE
J - BLUE/WHITE
K - VIOLET
L - BLACK/RED
M - BLACK/WHITE
P - GREEN

MOTOR WIRE - 14GA.
ALL OTHER WIRE - 16 GA.

UNSPECIFIED WIRE COLORS BASED ON COMPONENTS

LIGHT COLOR

R = RED
G = GREEN
A = AMBER

NOTES

1. LOCATE HIGH/LOW OPERATOR BETWEEN DAMPER MOTOR AND LFHS.

DESCRIPTION: CF1400 / CF2300 LOW/HIGH/OFF R7184B CONTROL			Beckett COMMERCIAL
DRAWN/REV. BY: TB	CHECKED BY: RM	DRAWN/REV. DATE: 12/07/06	REVISION: 1
LAST CHANGE: ADDED OPTIONAL AQUASTAT			SCHEMATIC NO.: 6998004