



Direct Vent

Oil Fired Warm Air Furnaces

INSTALLATION, OPERATION & MAINTENANCE MANUAL

WARNING

Fire, explosion, asphyxiation and electrical shock hazard. Improper installation could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

NOTICE

Information contained in this manual pertains to oil fired direct vent furnaces equipped with manufacturer installed blocked vent safety control system (pressure switch).

ALL INSTALLATIONS MUST MEET ALL LOCAL, PROVINCIAL/
STATE, AND FEDERAL CODES WHICH MAY DIFFER FROM
THIS MANUAL



Manufactured by:
ECR International Inc.
2201 Dwyer Avenue, Utica, NY 13501
Tel. 800 253 7900
www.ecrinternational.com
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AND FEDERAL CODES WHICH MAY DIFFER FROM THIS MANUAL

Read and understand this manual before beginning
installation. Instructions must be kept with furnace
for future reference.

DIRECT VENT OIL FIRED WARM AIR FURNACE

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WARNINGS AND SAFETY SYMBOLS

DANGER

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

CAUTION

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

WARNING

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

NOTICE

Used to address practices not related to personal injury.

1. DIRECT VENTING OF OLSEN OIL FIRED FURNACES

- Installation shall be done by a "Qualified" Installer. "Qualified Installer" shall mean an individual who has been properly trained or is a licensed installer.
- The BCL-S, BFL, BML, HML, MPL and WML oil fired furnaces with the suffixes B2U for Beckett's AFII, and RBU for Riello's 40BF series Oil burners, are certified for venting through the wall using ducted outdoor air for combustion.
- The Direct Vent series is ideal for applications where a conventional chimney is unavailable, nor easily installed; an electrically heated home being retro-fit for oil forced air heating for example.
- The term Direct Vent refers to a sealed combustion system.
- Direct vented appliances require some foresight and planning, since the range of flue lengths is restricted, clearances are critical, and national and local codes are quite strict with respect to safety. Be sure that the furnace can be installed within the physical limitations of the home, and in accordance with local codes and regulations.
- Physical limitations include practical issues such as sufficient clearance to grade. It is advisable to install the vent termination in an area sheltered from winter prevailing winds. Avoid vent termination locations subject to frequent strong wind gusts.

Oil Burners:

Beckett AFII or Riello Balanced Flue (40BF)

The standard Beckett AF or AFG Series and Riello 40F series are not certified for use, or recommended for direct vent applications.

Venting Materials and Fittings:

For components available from Olsen, please see Figures 12-14.

2. VENT TERMINAL LOCATION

The through the wall termination shall be installed in accordance with the latest editions of CAN/CSA B-139 (Canada), NFPA-31 (United States), and / or any applicable local codes.

Please refer to Figure 2 below. In Canada, the vent terminal shall not terminate:

- Directly above a paved sidewalk or a paved driveway that is located between two buildings, and that serves both of them.
- Less than 7 feet (2.13 m) above any paved sidewalk or a paved driveway.
- Within 6 feet (1.80m) of a window, door, or mechanical air supply inlet to any building, including soffit openings.
- Above a gas / regulator assembly within 3 feet (1 m) horizontally of the center-line of the regulator.
- Within 6 feet (1.80 m) of any gas service regulator vent outlet or within 3 feet (1 m) of any oil tank vent or any oil tank fill inlet.
- Less than 1 foot (0.3 m) above grade level within 6 feet (1.80 m) of any combustion air inlet, unless the appliance is otherwise certified.
- Within 6 feet (1.80 m) of the property line.
- Underneath a verandah, porch, or deck.
- So flue gases are directed at combustible material or at any openings of surrounding buildings that are within 6 feet (1.80 m).

Figure 1 - Standard Vent Terminal Assembly

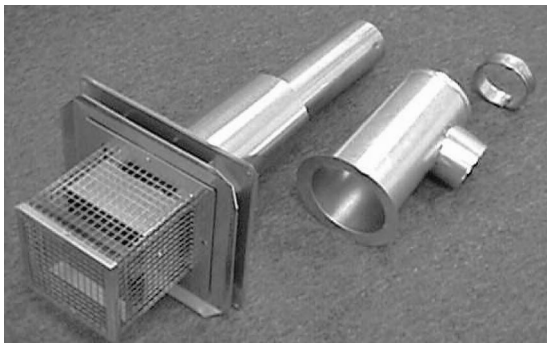
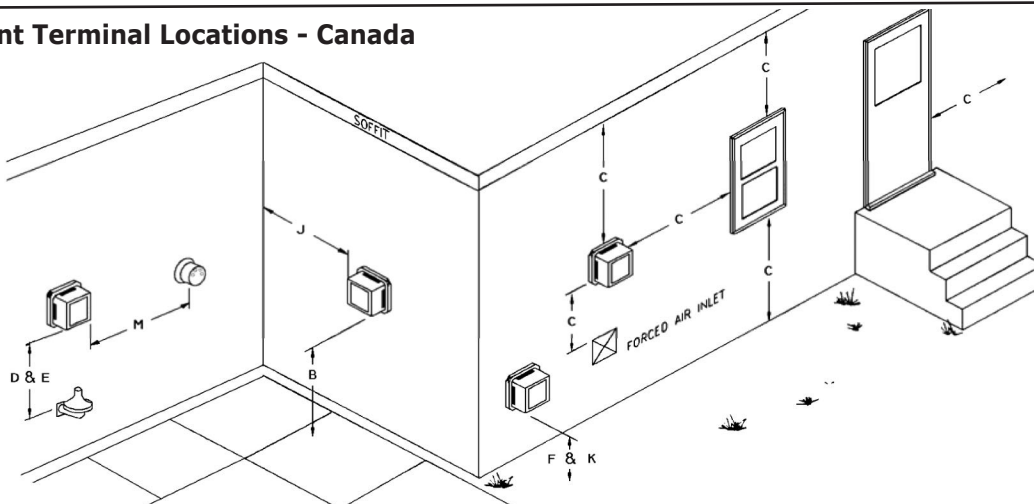


Figure 2 - Vent Terminal Locations - Canada



DIRECT VENTING OF OLSEN OIL FIRED FURNACES

- J. Less than 3 feet (1 m) from an inside corner of an L-shaped structure.
- K. So that the bottom of the vent termination opening is less than 1 foot (0.3 m) above any surface that may support snow, ice, or debris.
- L. So that the flue gases are directed towards bricks, siding, or other construction, in such a manner that may cause damage from heat or condensate from the flue gas.
- M. Within 4 feet (1.2 m) of a power venter.

Please refer to Figure 3 below. In the United States, a vent terminal shall not terminate:

- Less than 7 feet (2.13 m) above any adjacent public walkway.
- Less than 4 feet (1.22m) below, 4 feet horizontally, or 1 foot (0.3m) above a door, window, or gravity air inlet of the structure.
- Less than 1 foot (0.3m) above grade.
- Less than 1 foot (0.3m) from the soffit of the roof of the structure.
- Less than 3 feet (0.9m) from the inside corner of an L shaped structure.
- Less than 5 feet (1.6m) of a gas regulator vent outlet, or oil tank vent outlet.

Vent terminal can be installed in any wall having minimum thickness of 5", and maximum thickness of 10".

3. VENT TERMINAL INSTALLATION

This applies to the standard Direct Vent Oil Vent Terminal. Select the location of wall penetration that conforms to the code for exterior location, as close to the appliance as possible, maintains clearance to combustibles and where the minimum 1/4-inch per foot slope back to the appliance can be maintained.

- Cut a 6-1/2" diameter hole through the wall.
- Remove the Intake Air Sleeve from the Terminal.
- Insert the Terminal through the wall from outside, secure with 4 screws to the wall, and seal to wall with weatherproof sealant.

1. From inside the building, reattach the Intake Air Sleeve and secure the inner sleeve to the outer sleeve with 2 screws. Use 4 screws to secure Sleeve to the wall. Ensure that the Intake Air Connector is located

4. VENT TERMINAL RISER KIT

This Kit has been designed to increase the height of the Vent Terminal by approximately 3 feet, (see Figure 5 for typical Vent Riser setup). This is ideal where excessive snow build up could occur or where more flexibility is required to maintain minimum clearances to grade.

Figure 3 - Vent Terminal Locations - United States

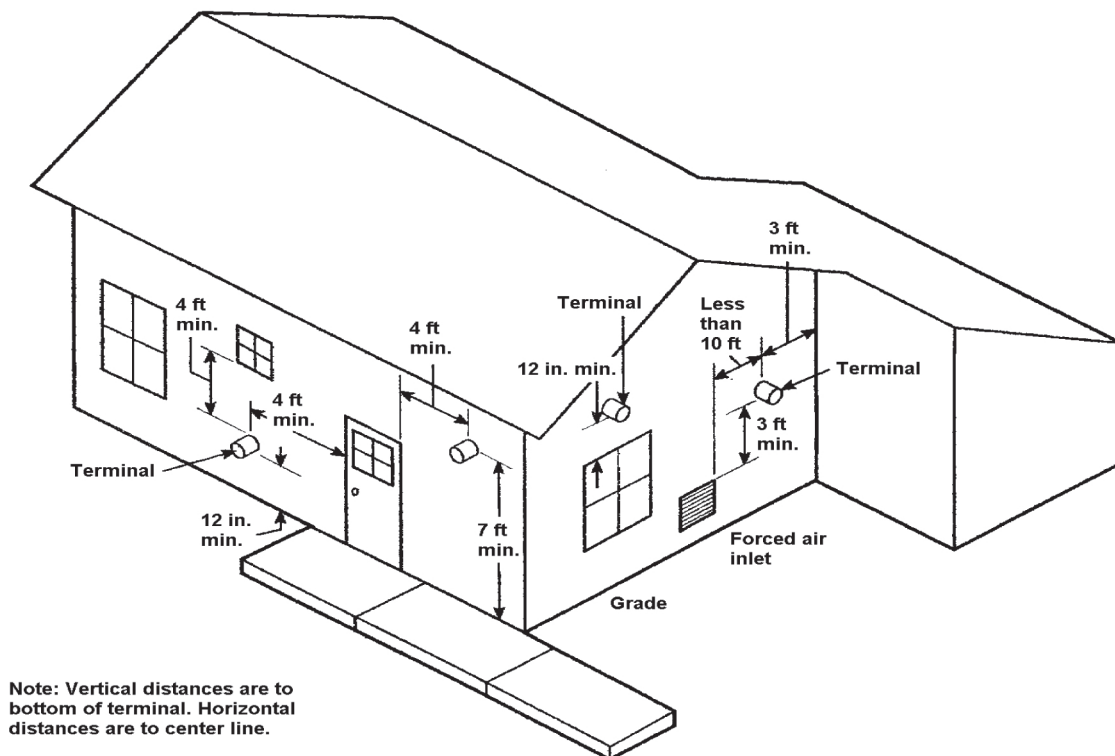


Figure 4 - Inside View of Vent Terminal



5. DIRECT VENT INTAKE AIR PIPE INSTALLATION

NOTICE

Flexible duct for combustion air use is not permitted.

IMPORTANT: OUTDOOR AIR FOR COMBUSTION MUST BE USED.

The oil burners approved for use with ducted outdoor air for combustion are the Beckett AFII and the Riello 40BF. All units obtain outdoor air by the following means:

Acceptable combustion air intake materials:

Beckett AFII Burner -

1. 4-inch "C" Vent (single wall galvanized).
2. 4 inch Rigid Aluminum pipe (0.030" wall thickness).

Riello 40BF Burner -

1. 4-inch "C" Vent (single wall galvanized).
2. 4-inch Rigid Aluminum pipe (0.030" wall thickness).

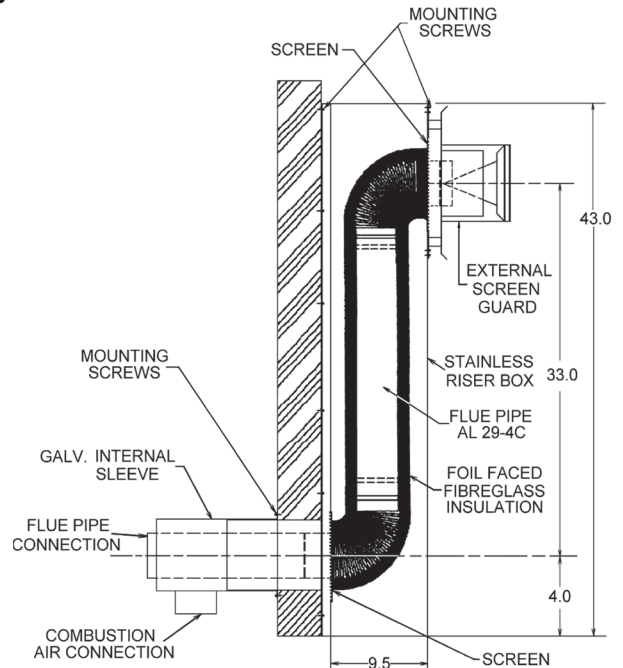
Note: 4-inch pipe should be used from the terminal to appliance where it will be reduced to 3 inch Pipe to attach to burner inlet collar.

IMPORTANT: Intake pipe and fittings should be sealed with foil tape, duct tape, or silicone caulking and attached mechanically with screws.

Maximum combustion air intake length is 25 feet using 8 90° elbows. Venting installation dictates the length from termination cannot be further than 20 feet; therefore any longer piping for combustion air intake would be unnecessary. Combustion air intake does not have minimum length.

Condensation may become a problem during some climatic conditions. It may be necessary to wrap a portion, or entire intake piping (particularly metal intake piping) with waterproof insulation material.

Figure 5 - Vent Riser



6. VENTING INSTALLATION - DIRECT VENT
VENT CLEARANCE TO COMBUSTIBLES: ONE (1) INCH.

WARNING

Fire, asphyxiation hazard. Do not enclose vent, Do not route vent through walls, floors or ceilings. Improper installation could result in death or serious injury.

INSTALLATION OF "INSULATED DOUBLE WALL FLEXIBLE VENT".

The inner pipe is constructed of 3 or 4 inch 316 stainless steel, with a two-ply aluminum outer pipe. High temperature insulation separates the inner and outer flex pipes. Refer to Figure 12.

IMPORTANT: The venting and vent terminal are dedicated to the furnace only; do not attempt to vent any other appliance through it.

Install venting as follows. Installation shall comply with CAN/CSA B139 Installation Code for Oil Burning Equipment (Canada) or NFPA 31 Standard for Installation of Oil Burning Equipment (United States), and / or with local codes and regulations.

- A. In as short and straight a run as possible without any unnecessary bends.
- B. There should not be any dips or sags throughout the full length of vent.
- C. Connector or vent should be sloped upwards from the appliance at least 1/4" per foot.
- D. Do not bend the connector or vent more than 90 degrees.
- E. Vent may be cut to minimum of 5 feet in length using fine tooth (24 teeth per inch) hacksaw blade.

Figure 6 - Pressure Tubing Connections

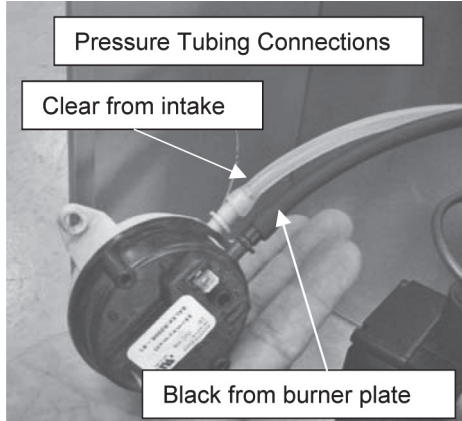


Figure 7 - Combustion Air Intake Connection

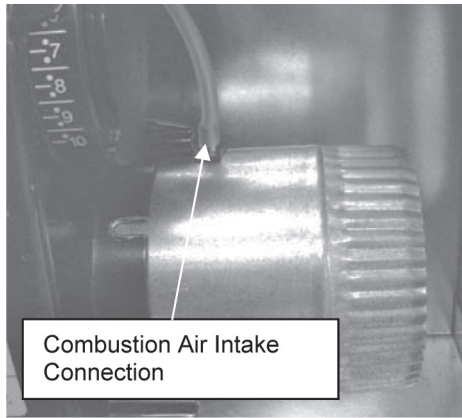


Figure 8 - Pressure Tubing Connection

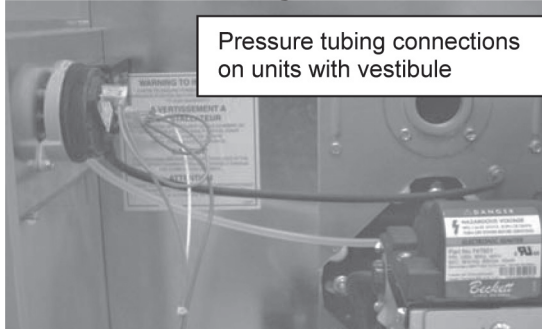
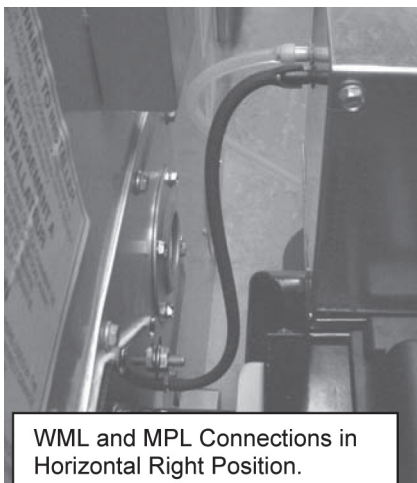


Figure 9 - Horizontal Right Connection



- F. Male and female ends of appliance adapters and connectors must be cleaned with residue free brake cleaner solvent.
- G. Apply minimum 1/4" bead of Si-Ultra Copper Sealant provided, onto outside of male end of vent to appliance connector. Fit connector to vent by threading it counter-clockwise until it stops. Ensure joint is not cross-threaded. Tighten gear clamp on outer sleeve.
- H. Apply minimum 1/4" bead of same sealant as mentioned above onto female end inside of connector. Slip connector over end of appliance collar until it stops. Tighten attached gear clamp.
- I. Support Vent every 36" to prevent sagging.
- J. Attach Terminal Connector as described in two steps listed above.
- K. Maximum vent length is 20 feet (using a 20 foot vent kit) Piecing vent kits together (i.e. using 2 ten foot kits is strictly prohibited).

CAUTION

Use appropriate safety precautions! Wear protective gloves. Thin metal edges are extremely sharp if not avoided, could result in minor or moderate injury.

This Double Wall Vent is available in kits, from your OLSEN / AIRCO Dealer. See venting components matching guide in this document.

High wind conditions can adversely affect combustion process; therefore, avoid locating terminal on walls facing prevailing winds.

7. BLOCKED VENT SAFETY SWITCH PRESSURE TUBING CONNECTIONS.

Connections should be checked on all furnaces prior to firing the unit. Tubing used to connect burner mounting plate to positive side of pressure switch is high temperature viton tubing, which is black in color. Care must be taken to ensure tubing slopes slightly toward burner mounting plate to ensure if condensation occurs, there is drainage to burner mounting plate.

On WML and MPL models tubing will require modification to ensure proper pitch of tubing. See following table for approximate lengths.

Furnace Position	Length of Tubing Viton or Black Tubing
Down Flow	5 1/2" - As Built
Horizontal Unit on Left Side	12" - Included
Horizontal Unit on Right Side	9" - Cut 12"

Tubing used on combustion air intake is clear silicone tubing and should not require any modifications.

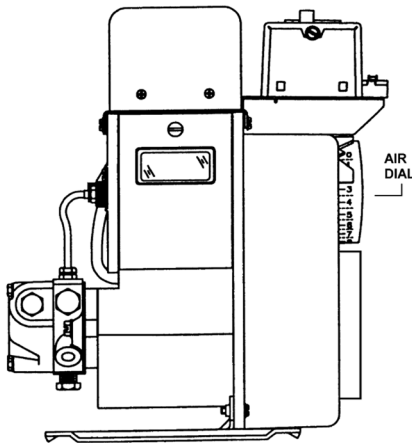
8. OPERATION OF OIL BURNERS

Once the furnace flue pipe and intake pipe are completely installed, use the following instructions to set the burner:

- Shut off the electrical power to the furnace.
- Install an oil pressure gauge to the pressure port on the oil pump. (Refer to the oil pump specification sheet included with the burner instructions & the Furnace Installation Instructions).
- Restore electrical power to the furnace.
- Start the furnace and bleed all air from the fuel oil lines.
- Set burner air settings for initial firing as indicated in the following sections for AFII or 40BF burners.
- Close the purge valve and fire the unit.
- Allow the furnace to warm up to normal operating temperatures. During this time, set the pump pressure in accordance with the data provided in Furnace Installation Manual.

When the furnace has reached "steady state" (after approximately 10 to 15 minutes), remove the bolt from the center of the Appliance Adapter to the furnace. Set the combustion air damper on the Burner to get a TRACE to ZERO smoke.

Figure 10 - BECKETT AFII BURNER AIR DIAL



BECKETT AFII BURNER

Using chart 1, select appropriate air dial setting according to required firing rate. Initial setting should be adequate to start burner. Final adjustments will be required once burner has been started.

FINAL ADJUSTMENTS

- Pull smoke spot reading to make sure it is no more than trace of smoke.
- Using suitable testing instruments for CO₂ (or O₂), measure combustion products. CO₂ in the stack should be minimum of 12% CO₂ (4.6% O₂) at trace of smoke. For clean operation of burner, open air control to introduce enough excess air into system to reduce CO₂ by 10% of the original trace point.

EXAMPLE: 12% CO₂ minus 1.2 (which is 10% of 12) equals 10.8% CO₂.

- When proper combustion & smoke spot readings are achieved, tighten locking screw on dial.
- Recheck draft, smoke and combustion.

RIELLO 40BF BURNER:

To adjust the initial air damper setting, remove the burner cover and turn the air damper adjustment screw (2) until the top edge of the air damper (3) is in alignment with the corresponding number from Chart 2.

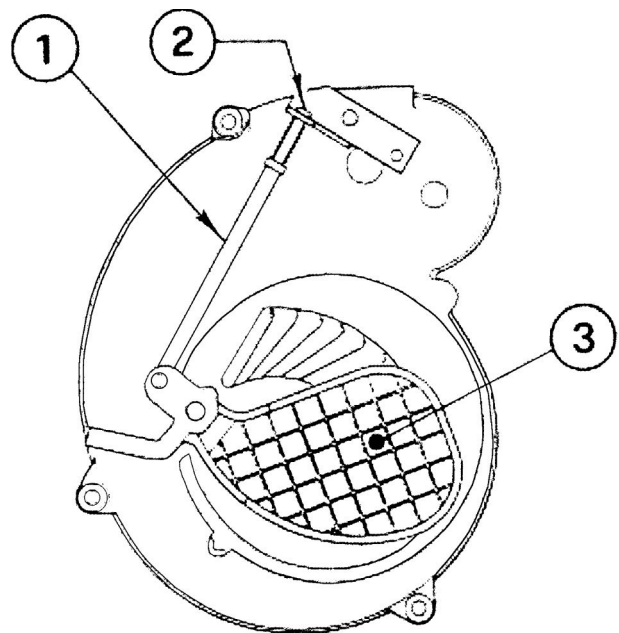
Further adjustments must be made with the burner cover in place by unscrewing the plug on the cover. Turn the screw clockwise to increase combustion air or counter clockwise to decrease combustion air.

- Final position of damper will vary on each installation. Use instruments to establish proper settings for maximum CO₂ and smoke spot reading of zero. When adjusted properly, reinsert plastic cap over air adjustment hole.
- Re-check draft, smoke and combustion.

NOTE: Variations in flue gas, smoke, CO₂ and temperature readings may be experienced when burner cover is put in place. Therefore, burner cover must be in place when making final adjustments to ensure proper test results.

NOTICE
Riello burner pressure gauge threads are British Parallel Thread design. Test gauge with NPT fitting will ruin pump body. Use Riello pressure gauge or adapter.

Figure 11 - RIELLO 40BF AIR DAMPER



9. FURNACE SET UP ADJUSTMENTS

1. Check system temperature rise.
2. Temperature rise is difference between return air temperature measured at point near return air inlet, and supply air temperature measured near furnace outlet. System temperature rise will typically range between 60°F and 85°F. If temperature rise is too high, airflow must be increased. If temperature rise is too low, airflow must be decreased.
3. Post purge is factory set at 30 seconds. This is recommended setting for typical installations.
4. Turn off burner. Observing duct thermometer in supply air stream, note temperature at which blower fan stops.
 - The United Technologies 1158-120 has an adjustable fan on time that is set by selecting the dipswitch combination displayed in the installation manual. This fan on delay can be set at 30, 60, 90 or 120 seconds. This provides a delay between the burner ignition and blower start-up to eliminate excessive flow of cold air when the blower comes on.
 - United Technologies 1158-120 has an adjustable fan off time of 2, 3, 4 or 6 minutes as displayed in installation manual. Fan off delay time starts when burner motor is de-energized at end of call for heat. Blower shutdown is delayed to remove any residual heat from heat exchanger and improve annual efficiency of furnace.
5. Electronic fan timer board works in conjunction with snap disc limit controls, which break power to oil burner primary control, shutting off burner if furnace over-heats. Limit control is thermally operated and automatically resets. The limit control is factory installed, pre-set and is not adjustable. If the limit control opens the circulating fan will be energized. When the limit closes the fan off timer will begin. At the end of the fan off time cycle the burner will resume normal operation.
6. To check the operation of the limit switch, shut off power to the furnace. Temporarily remove neutral wire from direct drive blower motor and set thermostat above room temperature. After three or four minutes of burner operation, limit control turns burner off. When limit function test is complete, shut off electrical power to furnace, replace neutral wire to blower fan motor, and restore power. Blower fan starts up immediately. Once temperature has dropped and limit control has reset, fan will operate until fan off time is achieved. Oil burner will then resume operation and continue until thermostat is satisfied. Restore thermostat setting to comfortable temperature.
7. Set the heat anticipator adjustment in the thermostat (if so equipped), by removing the "R" or "W" wire to the thermostat, then reading the amperage draw between the two wires.

Chart 1 - Beckett AFII Approximate Air Settings		
Firing Rate	Dial Setting	
	AF II 85	AF II 150
0.40 to 0.65	3	-
0.60 to 0.75	4	-
0.70 to 0.85	5	-
0.75 to 1.00	-	2
0.95 to 1.20	-	4.5

Chart 2 - Riello 40BF Approximate Air Settings		
Firing Rate	Air Damper Setting	
	40BF3	40BF5
0.50	3.2	-
0.60	3.8	-
0.75	4.4	-
0.80	5	-
0.95	7	-
0.70	-	3.3
0.80	-	3.6
0.90	-	3.8
1.00	-	4.2
1.20	-	4.5

Note: Furnace should be run through at least three full cycles before leaving installation, to ensure all controls are operating properly and as expected.

Note: All joints in any positive pressure venting system must be checked for leaks before leaving installation site.

10. BLOCKED VENT SAFETY SHUT OFF SYSTEM

Each direct vent furnace is equipped with a Blocked Vent Safety shut off system (BVS). This safety circuit will shut the burner off in the event of a combustion air blockage or venting blockage.

The components of this BVS consist of a pressure switch and bypass timer.

Beckett AFII - BVS is wired in series with the oil valve.

Riello 40BF - BVS is wired in series with L terminal on the 530SE control.

11A. SEQUENCE OF OPERATION BECKETT AFII

1. Room temperature drops, thermostat calls for heat.
2. Pre-purge begins, lasting 5 to 15 seconds.
3. Oil solenoid and BVS (bypass timer) are energized
4. Oil Solenoid opens allowing oil to reach the Burner Electrodes. Burner ignition begins.
5. Cad cell detects light from combustion, disconnects the primary control safety circuit, allowing combustion to continue.

6. 10 seconds after the bypass timer is energized, the pressure switch is permitted to control the oil solenoid valve.
7. After 15 to 45 seconds (depending on primary control characteristics), the electric spark across the electrode tips stops, combustion continues.
8. The United Technologies 1158-120 has an adjustable fan on time that is set by selecting the dipswitch combination displayed in the installation manual. This fan on delay can be set at 30, 60, 90 or 120 seconds.
9. Furnace continues to operate and will eventually reach "steady state", the point at which the system temperature stabilizes.
10. Room temperature rises, thermostat is satisfied, heating contacts open.
11. Oil Solenoid Valve closes, combustion stops, Burner Motor remains on to complete the Post Purge Cycle. Post Purge will continue up to 6 minutes depending on the control switch settings.
12. The United Technologies 1158-120 has an adjustable fan off time of 2, 3, 4 or 6 minutes as displayed in installation manual. The fan off delay time starts when the burner motor is de-energized at end of call for heat.
13. Furnace remains idle until next call for heat.

11B. SEQUENCE OF OPERATION RIELLO 40BF

1. Room temperature drops, thermostat calls for heat.
2. Pre-purge begins, lasting 5 to 15 seconds. BVS (bypass timer) is energized simultaneously.
3. Oil Solenoid opens allowing oil to reach the Burner Electrodes. Burner ignition begins.
4. Cad cell detects light from combustion, disconnects the primary control safety circuit, allowing combustion to continue.
5. 25 seconds after the bypass timer is energized, the pressure switch is permitted to control the oil solenoid valve.
6. After 15 to 45 seconds (depending on primary control characteristics), the electric spark across the electrode tips stops, combustion continues.
7. The United Technologies 1158-120 has an adjustable fan on time that is set by selecting the dipswitch combination displayed in the installation manual. This fan on delay can be set at 30, 60, 90 or 120 seconds.
8. Furnace continues to operate and will eventually reach "steady state", the point at which the system temperature stabilizes.
9. Room temperature rises, thermostat is satisfied, heating contacts open.
10. Oil Solenoid Valve closes, combustion stops, Burner Motor remains on to complete the Post Purge Cycle. Post Purge will continue up to 6 minutes depending on the control switch settings.

11. United Technologies 1158-120 has an adjustable fan off time of 2, 3, 4 or 6 minutes as displayed in installation manual. Fan off delay time starts when burner motor is de-energized at end of call for heat.
12. Furnace remains idle until next call for heat.

12. FINAL CHECK OUT

Before final test cycle, carefully examine complete vent system for leaks. Spraying soapy solution on all joints and watch for bubbles during pre-purge. Hot vent can be checked with lit taper for signs of air movement around joints or seams.

Verify all safety devices and electrical components have been set for normal operation. Verify all electrical connections are tight and wiring is secure.

IMPORTANT: Ensure homeowner is informed and understands:

1. where circuit breaker or fuse is located in main electrical panel.
2. where furnace switch is located, and switch "on" and "off" positions if not obvious.
3. where oil shut-off valve from oil storage tank is located.
4. to keep area around vent terminal free of snow, ice, and debris.
5. how to operate thermostat, and other related accessories.
6. how to operate manual reset button on primary control, and when not to push reset button.
7. how and where to visually inspect venting system for leaks or other problems.
8. how to inspect, clean and replace air filter, and other homeowner maintenance procedures.
9. who to call for emergency service and routine annual service.
10. terms and conditions of manufacturer's warranty and contractor's warranty.

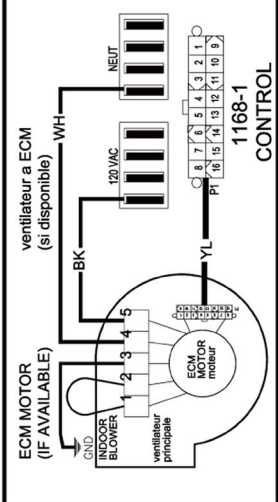
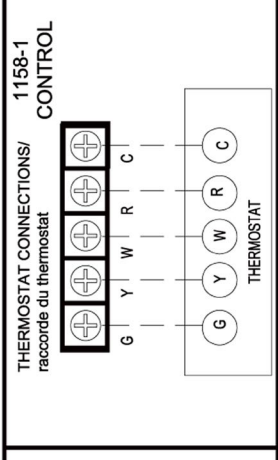
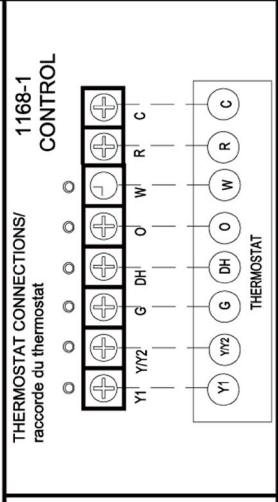
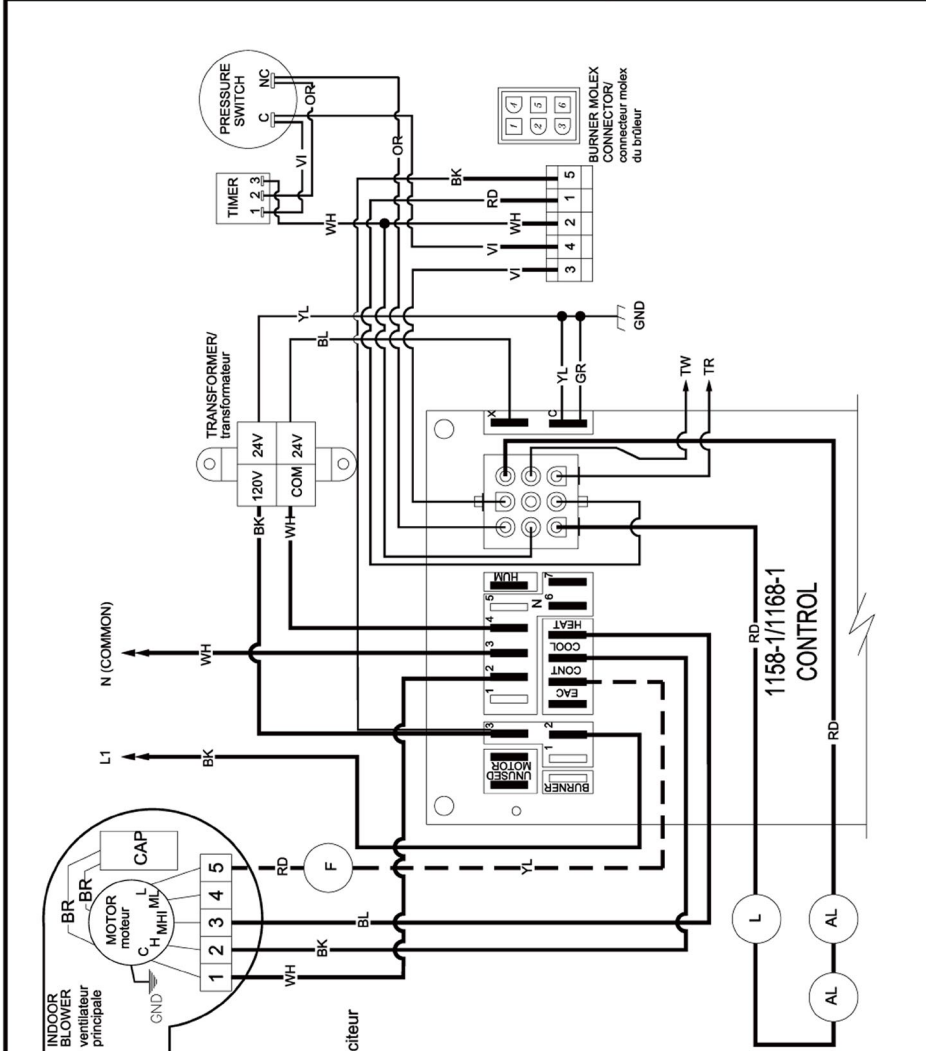
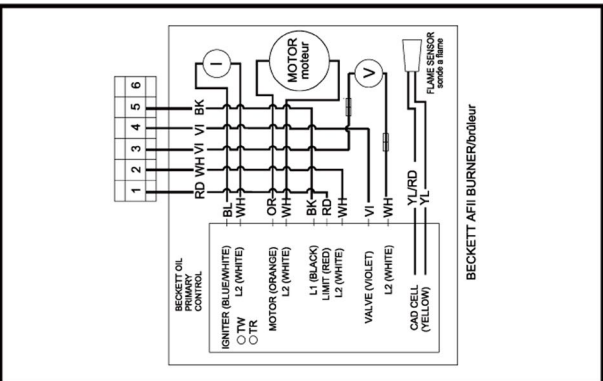
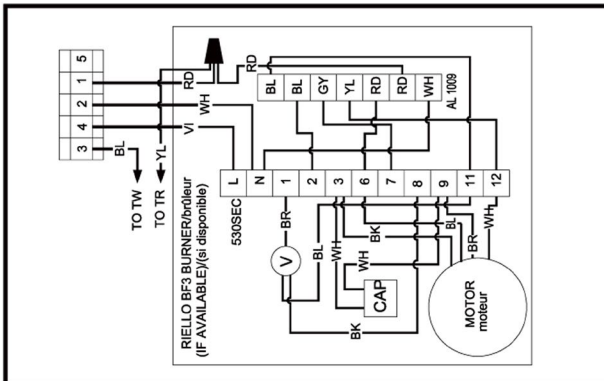
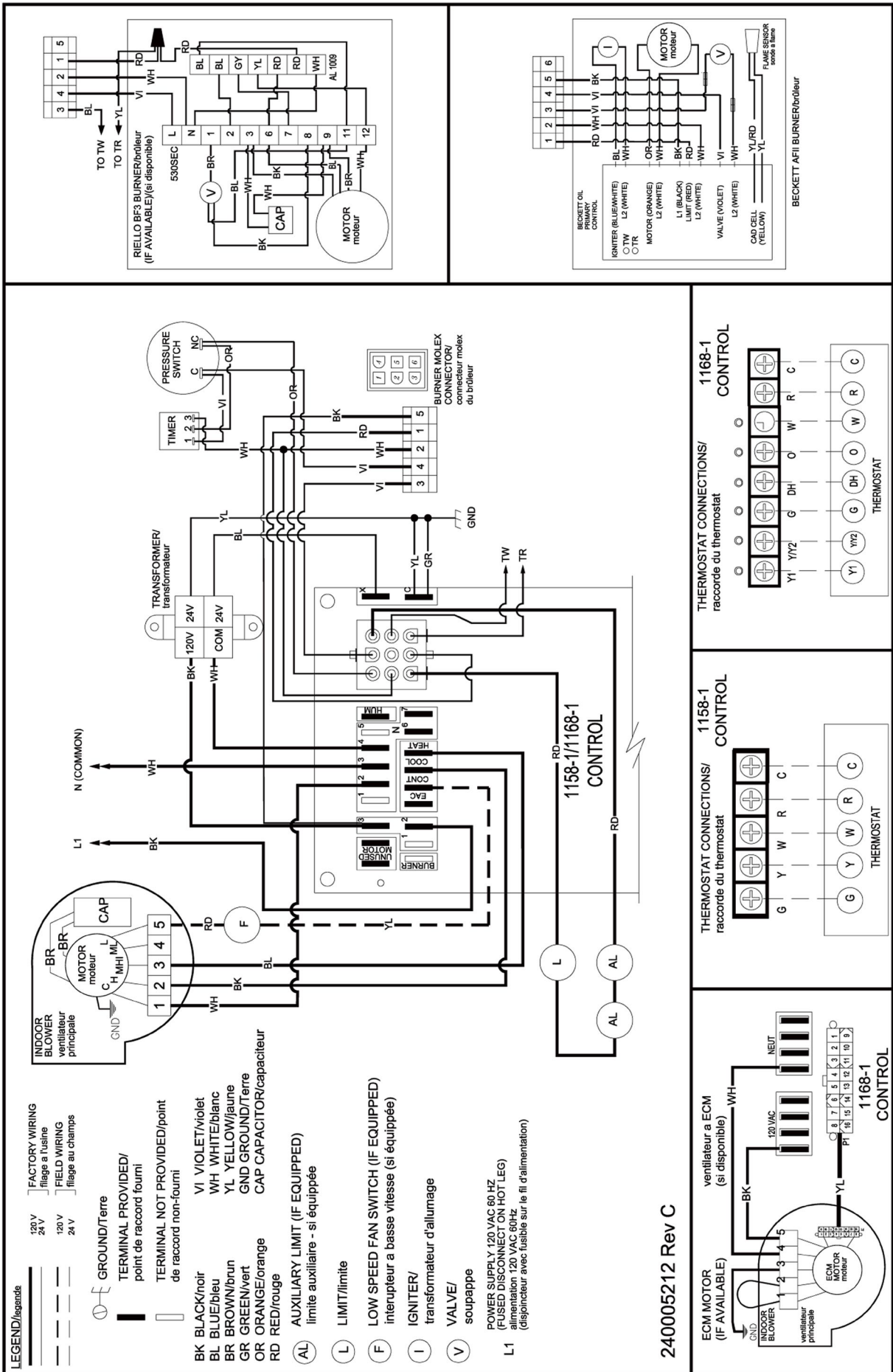
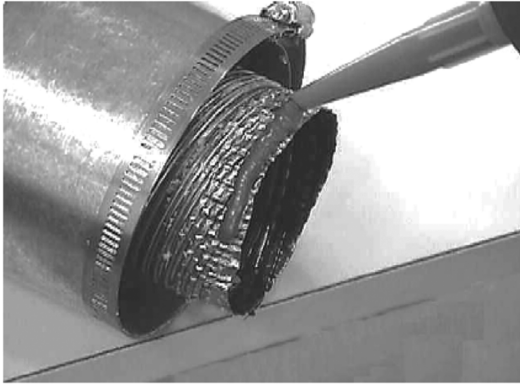


Figure 12 - VENTING COMPONENTS



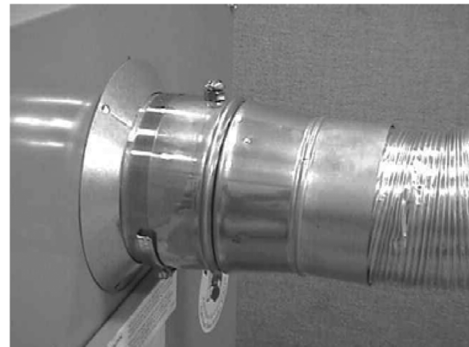
Applying bead of silicone to the male portion of the appliance / vent adaptor.



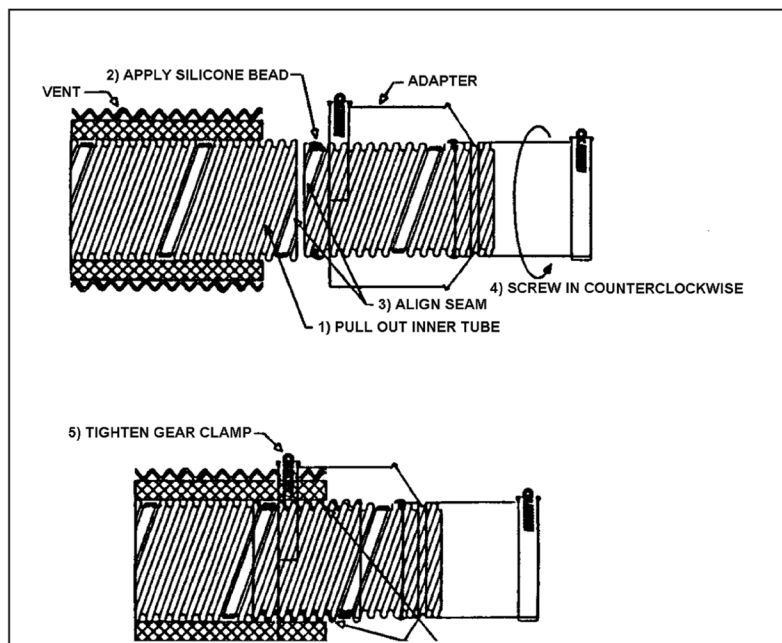
Applying bead of silicone to the female portion of the appliance / vent adaptor.



Typical Standard Vent Terminal Installation.



Typical Appliance Connector with test port.



VENTING COMPONENTS/MATCHING GUIDE

Figure 13 - Z-FLEX VENTING COMPONENTS / MATCHING GUIDE

MODEL	ITEMS INCLUDED WITH FURNACE		REQUIRED ITEMS ORDERED SEPARATELY				FIELD SUPPLIED COMPONENTS
			TERMINATION STD or RISER		YOUR CHOICE of		
	ITEM	P/N	ITEM	P/N	ITEM	P/N	
BCL	6" x 4" Appliance Adapter	240006905	Oil Vent Terminal	28972	4" x 10' Vent Kit	240006909	Combustion Air Piping
			or		4" x 15' Vent Kit	240006910	
			Oil Vent Riser	29231	4" x 20' Vent Kit	240006911	
BFL	Snorkel Assembly 6" x 4"	240008224	Oil Vent Terminal	28972	4" x 10' Vent Kit	240006909	Combustion Air Piping
	and		or		4" x 15' Vent Kit	240006910	
	4" x 4" Appliance Adapter	240006903	Oil Vent Riser	29231	4" x 20' Vent Kit	240006911	
BML	5" x 3" Appliance Adapter	240006904	Oil Vent Terminal	28972	3" x 10' Vent Kit	240006906	Combustion Air Piping
			or		3" x 15' Vent Kit	240006907	
			Oil Vent Riser	29231	3" x 20' Vent Kit	240006908	
HML	Snorkel Assembly 6" x 4"	240008224	Oil Vent Terminal	28972	3" x 10' Vent Kit	240006906	Combustion Air Piping
	and		or		3" x 15' Vent Kit	240006907	
	4" x 3" Appliance Adapter	240006902	Oil Vent Riser	29231	3" x 20' Vent Kit	240006908	
MPL	Snorkel Assembly 6 x 4	240008224	Oil Vent Terminal	28972	4" x 10' Vent Kit	240006909	Combustion Air Piping
	and		or		4" x 15' Vent Kit	240006910	
	4" x 4" Appliance Adapter	240006903	Oil Vent Riser	29231	4" x 20' Vent Kit	240006911	
WML	Snorkel Assembly 6 x 4	240008224	Oil Vent Terminal	28972	3" x 10' Vent Kit	240006906	Combustion Air Piping
	and		or		3" x 15' Vent Kit	240006907	
	4" x 3" Appliance Adapter	240006902	Oil Vent Riser	29231	3" x 20' Vent Kit	240006908	

Also included with furnace, as applicable.

Combustion Air Intake Collar, 4" for Beckett AFII Burner	Part Number 109005950
Combustion Air Intake Collar, 3" for Riello 40BF3 Burner (except WML)	Part Number 109006030
Combustion Air Intake Collar, 3" for Riello 40BF3 Burner (WML)	Part Number 240006318

Also included with vent kits:

Tube of Ultra Copper Sealant	
Vent Terminal Connector, as applicable	
3" Vent Terminal Connector (for BML, HML, WML)	Part Number 240006921
4" Vent Terminal Connector (for BCL, BFL, MPL)	Part Number 240006914

DIRECT VENT - PARTS IDENTIFICATION

Figure 14 - PARTS IDENTIFICATION

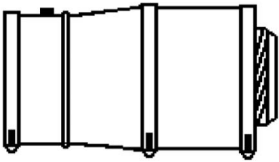
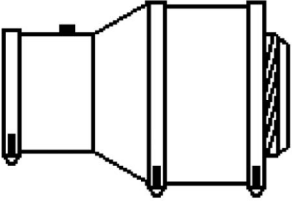
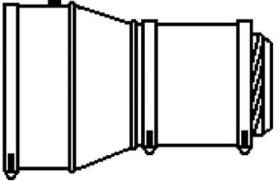
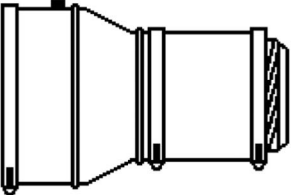
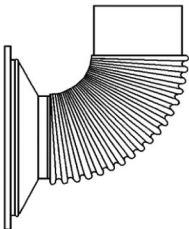
ILLUSTRATION	DESCRIPTION	PART NO.	USED WITH
	4" x 3" Appliance Adapter	240006902	HML, WML
	4" x 4" Appliance Adapter	240006903	BFL, MPL
	5" x 3" Appliance Adapter	240006904	BML
	6" x 4" Appliance Adapter	240006905	BCL
	6" x 4" Adapter Elbow Assy	240008224	BFL, HML, WML, MPL

Figure 15 - AFII BURNER WITH BLOCKED VENT SAFETY (BVS) OPERATION

EXTERNAL ACTION	APPLIANCE RESPONSE
Power applied to 7505P control	Internal safety check conducted. If no light or flame is detected and all internal conditions are correct, control enters idle mode.
Thermostat calls for heat.	<ol style="list-style-type: none"> 1. Contacts between T and T on 7505P are closed. 2. Primary Control Safety period (4 seconds) internal and external check for flame or light. If flame is detected, control remains in idle mode. 3. When flame is not present, 7505P will apply power to the burner motor and igniter, complete a 15 second valve on delay period and then apply power to the oil valve circuit. 4. When valve is energized, the bypass timer on the BVS is energized. <ol style="list-style-type: none"> A. Bypass timer contacts close, bypassing the pressure switch for 10 seconds. B. After 10 seconds, the bypass timer contacts open and the pressure switch contacts are in series with the oil solenoid valve. In the event of a vent or combustion intake air blockage the pressure switch, will open and shut the oil solenoid valve off. 5. Enters the trial for ignition period. <ol style="list-style-type: none"> A. Monitors burner for flame. B. When flame is not detected: <ol style="list-style-type: none"> i. Enters lockout mode after 15 seconds. ii. Shuts off valve, igniter and burner motor. iii. Flashes indicator light at 1 Hz (½ second on, ½ second off). iv. Depress reset button to return to power up sequence. C. When flame is detected, Carry-Over period begins: 6. Enters 10-second Ignition Carry-Over period. <ol style="list-style-type: none"> A. Turns on indicator light B. If flame is lost and lockout time has not expired, THE PRIMARY CONTROL returns to trial for Ignition period. C. If flame is lost and lockout time has expired, THE PRIMARY CONTROL enters Recycle Mode. 7. Carry-over time expires and igniter turns off. 8. Enters a run mode: <ol style="list-style-type: none"> A. Flame is monitored until call for heat ends or flame is lost. If flame is lost: <ol style="list-style-type: none"> i. Control enters Recycle Mode. ii. Recycle time starts (60 seconds). iii. Burner and valve are turned off. iv. Red Light Flash → Safety Lockout Red Light Solid → Hard Lockout v. Returns to Idle mode at end of Recycle mode.
Call for heat is satisfied.	<ol style="list-style-type: none"> 1. Oil valve circuit is de-energized and valve shuts off. 2. Burner motor runs for selected burner motor-off delay. 3. Burner motor turns off. <p>Returns to Idle mode</p>
Reset button pushed two times without device completing a call for heat.	<ol style="list-style-type: none"> 1. Enters restricted Hard Lockout. 2. Indicator light on continuously 3. Reset device by pressing and holding reset button for a minimum of 15 seconds. (Yellow Light Turns ON)

Figure 16 - BECKETT AFII BURNER TROUBLESHOOTING

Condition 1: Burner motor does not start when there is a call for heat.		
Procedure	Status	Corrective Action
1. Check that limit switches are closed and contacts are clean.	N/A	N/A
2. Check for line voltage power at the oil primary control. Voltage should be 120 Vac between the black and white lead wires on the oil primary control.	N/A	N/A
3. Check indicator light with burner off, no call for heat (no flame).	Indicator light is on.	Cad cell is defective, sees external light, or connections have shorted. Go to step 4.
	Indicator light is off.	Go to step 5.
4. Shield cad cell from external light.	Indicator light turns off.	Eliminate external light source or permanently shield cad cell.
	Indicator light stays on.	<ul style="list-style-type: none"> • Replace cad cell with new cad cell and recheck. • If indicator light does not turn off, remove cad cell lead wires from and recheck. • If indicator light is still on, replace control. • If the indicator light turns off, replace cad cell bracket assembly.
5. Verify that the oil valve is closed during the "valve on delay" period by observing the view port and verifying that no flame is present during the 15-second "valve on delay".	Indicator light is on.	If flame is present, replace the oil valve.
6. Jumper thermostat (T -T) terminals on 7505P IMPORTANT First remove one thermostat lead wire.	Burner starts.	Trouble is in thermostat circuit. Check thermostat-wiring connections. If connections are clean and tight, check thermostat wires for continuity.
	Burner does not start.	<ul style="list-style-type: none"> • Disconnect line voltage power and open line switch. • Check all wiring connections. • Tighten any loose connections and recheck. • If burner still doesn't start, replace 7505P.
		If burner still doesn't start, check the oil burner motor. It may be seized or burned out.

Figure 16 - BECKETT AFII BURNER TROUBLESHOOTING - continued

BECKETT AFII BURNER TROUBLESHOOTING		
Condition: Burner starts then locks out on safety with indicator light flashing at 1/2 second on, 1/2 second off.		
Procedure	Status	Corrective Action
1. Reset oil primary control by pushing in and releasing red reset button. Flash - 1 sec. / Solid - 1 sec.	Indicator light stops flashing.	Go to Step 2.
	Indicator light continues to flash at 1/2 second on, 1/2 second off rate.	Verify that the control is not in restricted mode. (See notes at end of this table.). If not in restricted mode, replace 7505P
2. Listen for spark after burner turns on (after 2 second delay).	Ignition is off	Spark igniter could be defective. Check for line voltage at igniter terminals. If line voltage is present, replace 7505P.
	Ignition is on.	Go to Step 3.
	Ignition is on but no oil is being sprayed into the combustion chamber.	Wait for "Valve ON" delay to complete. 1. Check oil supply. 2. Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds. 3. After 10-seconds, check pressure switch on BVS to ensure closed. a. Pressure switch open. i. Check pressure tubes for proper connection or possible obstructions. ii. Check venting for blockage. iii. Check combustion air intake for blockage. iv. Check pressure switch operation. 4. Check oil line valve. 5. Check for filter blockage or seized oil pump.
3. Check indicator light after flame is established, but before oil primary control locks out.	Indicator light is on until the control locks out and starts flashing during lockout.	Replace 7505P
	Indicator light stays off.	Go to step 4.
4. Check cad cell sighting for view of flame. a. Disconnect line voltage power and open line switch. b. Unplug cad cell and clean cad cell face with soft cloth. Check sighting for clear view of flame. Replace cad cell in socket. c. Reconnect line voltage power and close line switch. d. Start burner.	Burner locks out	Go to step 5.
	Burner keeps running.	System is OK.
5. Check cad cell. a. Disconnect line voltage power and open line switch. b. Remove existing cad cell and replace with new cad cell. c. Disconnect all wires from thermostat terminals to ensure that there is no call for heat. d. Reconnect line voltage power and close line switch. e. Expose new cad cell to bright light such as a flashlight.	Indicator light is on.	Remount control onto burner housing, go to step 6.
	Indicator light is off.	System is OK.
6. Check cad cell bracket assembly. a. Disconnect line voltage power and open line switch. b. Remove cad cell wires from quick connect connectors on the R7505P and leave control lead wires open. c. Apply power to device. d. Place jumper across cad cell terminals after	Indicator light is on.	Replace CAD cell bracket assembly.
	Indicator light is off.	Replace 7505P
NOTE: Hard Lockout : In order to limit the accumulation of unburned oil in the combustion chamber, the control can be reset only 5 times, after which, the control locks out. The reset count returns to zero each time a call for heat is successfully completed.		
To reset from Hard Lockout: press and hold the reset button for 15 seconds. When the Yellow LED flashes turns on, the device has reset.		
NOTE: Disable function: Pressing and holding the reset button will disable all functions until the button is released. The burner will restart at the beginning of the normal heat cycle on SAFETY CHECK.		

Figure 17 - BECKETT AFII: SYSTEM AND GENERAL TROUBLESHOOTING

BECKETT AFII: SYSTEM AND GENERAL TROUBLESHOOTING		
Problem	Possible Cause	Remedy
Furnace will not start.	Thermostat not calling for heat	Check thermostat and adjust. Also, check thermostat for accuracy; if it is a mercury switch type, it might be off level.
	No power to furnace.	Check furnace switch, main electrical panel furnace fuse or circuit breaker. Also look for any other hand operated switch, such as an old poorly located furnace switch, which was not removed during furnace replacement.
	Thermostat faulty.	Remove thermostat wires from oil primary control terminals T-T. Place a jumper across T-T. If furnace starts, replace thermostat, thermostat sub-base (if equipped), or both.
	Oil primary control faulty.	Check reset button on oil primary control. Remove thermostat wires from oil primary control terminals T1 - T2. Check for 24v across T -T. If no voltage is present, check for 115v to oil primary control. If 115v is present, go to Table C-3.
Furnace will not start.	Photo Cell wiring shorted or room light leaking into photo cell compartment	Check photocell (cad cell) wiring for short circuits. Also, check for room light leaking into cad cell compartment. Repair light leak if necessary. See Table C-3.
	Open safety switch.	Check for open limit or auxiliary limit. Also, check internal wiring connections; loose connectors, etc.
Furnace will not start without first pushing oil primary control reset button. (Happens on frequent basis)	Photo Cell (Cad Cell) defective	If call cell is dirty, clean it. (Determine why cad cell is getting dirty). If cad cell is poorly aimed, realign it. NOTE: The photocell should have a resistance of 100K Ω in absence of light; a maximum of 1500 Ω in the presence of light. Ensure that room light is not leaking into the cad cell compartment. (See diagnostic light section).
	No fuel oil	Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle	Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter	Replace oil tank filter or in-line filter if used.
	Blocked Vent Safety Circuit opening	Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds. After 10-seconds, check pressure switch on BVS to ensure closed. Pressure switch open: <ul style="list-style-type: none"> • Check pressure tubes for proper connection or possible obstructions. • Check venting for blockage. • Check combustion air intake for blockage. • Check pressure switch operation.
	Low oil pump pressure	Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective	Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
	Defective burner motor	Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary.

DIRECT VENTING OF OLSEN OIL FIRED FURNACES

Figure 17 - BECKETT AFII: SYSTEM AND GENERAL TROUBLESHOOTING - Continued

Problem	Possible Cause	Remedy
Furnace starts, but cuts out requiring manually resetting the oil protector reset button	No fuel oil.	Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle.	Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter.	Replace oil tank filter or in-line filter if used.
	Blocked Vent Safety Circuit opening.	Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds. After 10-seconds, check pressure switch on BVS to ensure closed. Pressure switch open. <ul style="list-style-type: none"> • Check pressure tubes for proper connection or possible obstructions. • Check venting for blockage. • Check combustion air intake for blockage. • Check pressure switch operation.
	Low oil pump pressure.	Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective.	Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
	Defective burner motor.	Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary.
	Water or contaminants in oil.	Drain fuel oil storage tank, replace fuel oil. (Consult with fuel oil supplier).
Oil burner sputtering at nozzle	Electrodes out of adjustment or defective.	Check electrode settings. Check electrodes for dirt build-up or cracks in porcelain.
	Poor transformer high voltage connections or defective transformer.	Check contacts between the igniter and electrodes. If OK, replace the igniter
	Fuel oil filter clogged.	Replace fuel oil storage tank filter and / or fuel oil in-line filter.
	Defective oil pump.	Check burner motor / fuel oil pump coupling. Check oil pump pressure. Replace fuel oil pump if necessary.
	Fuel oil line partially clogged or contains air.	Bleed air from oil line. If problem persists, replace oil line.
	Blocked Vent Safety Circuit opening intermittently.	Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds. After 10-seconds, check pressure switch on BVS to ensure it remains closed. Pressure switch open. <ul style="list-style-type: none"> • Check pressure tubes for proper connection or possible obstructions. • Check venting for blockage. • Check combustion air intake for blockage. • Check pressure switch operation.
Excessive fuel oil consumption.	System temperature rise too high.	System temperature rise ideally should not exceed 85°F. Check for clogged air filters. Check blower fan for excess dirt build-up or debris. Speed up blower fan if necessary.
	Poor "fan off" delay timing selection, (fan stops too soon).	Check "fan off" delay timing setting. Use a duct thermometer in the supply air plenum take-off or first few inches of the supply air trunk duct. Ideally, the fan will shut off at a temperature of 90° - 100°F. Manipulate the dip switch settings to come as close as possible to this "fan off" temperature.
	Fuel oil leak.	Check fuel oil line for leaks. Repair or replace if necessary.
	Stack temperature too high.	Check stack temperature. Stack temperatures will normally range from 350° to 450°F. Check draft regulator. Draft should be set to 0.02 in. w.c.
	Thermostat improperly adjusted or in poor location.	Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.

DIRECT VENTING OF OLSEN OIL FIRED FURNACES

Figure 17 - BECKETT AFII: SYSTEM AND GENERAL TROUBLESHOOTING - continued

Problem	Possible Cause	Remedy
Too much smoke.	Insufficient combustion air adjustment at oil burner, or improper draft pressure.	Adjust the oil burner combustion air band and draft regulator to gain the highest practical CO ₂ or lowest practical O ₂ content in the flue gases. See Burner Set Up.
	Heat exchanger partially clogged.	Check for soot build-up in heat exchanger flue passages, especially in the outer radiator.
Soot building up on blast tube (end coning).	Poor alignment between oil burner blast tube and fire pot.	Check alignment. Blast tube should be centered with fire pot burner opening. Oil burner head should be ¼ inch back from the inside surface of the fire pot.
	Flame impingement caused by Incorrect nozzle angle.	Check nozzle size and angle. (See Appendix A). Check distance from head to inside surface of the fire pot.
	Defective fire-pot	Check fire-pot. Repair or replace.
Furnace will not warm home to desired temperature	Airflow blocked or dirty air filter.	Clean or replace air filter.
	Thermostat adjustments or location	Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.
	Insufficient airflow.	Check all dampers. Open closed dampers including registers in unused rooms. Check system temperature rise. If temperature rise is too high, speed up blower fan.
	Defective high limit control.	Test high limit function of all limit switches. Use a duct thermometer to assess accuracy of limit control. Check for obstructions to airflow around limit switch bi-metal elements. Replace control if necessary.
	Under-sized nozzle.	Check nozzle. If problem is not caused by air flow problems, use larger nozzle, if permitted by rating plate.
	Blower fan motor stopping intermittently on overload.	Check blower fan motor amperage draw. Check motor ventilation ports, clean if necessary. Replace motor if necessary.
	Burner motor stopping intermittently on overload.	Check burner motor. Replace if necessary.
Home does not heat evenly	Improper distribution of heat.	This is not likely to be a furnace problem. Balance duct system.
Supply air temperature too hot.	Airflow blocked or dirty air filter.	Clean or replace air filter.
	Insufficient airflow.	Check all dampers. Open closed dampers including registers in unused rooms. Check system temperature rise. If temperature rise is too high, speed up blower fan.
Supply air temperature too cool.	Excess airflow.	Check system temperature rise. Slow down blower fan if necessary.
	Excessive duct losses.	Check supply air ductwork. Seal leaky joints and seams. Insulate ductwork if necessary.
Supply air temperature too cool during first moments of furnace cycle.	Fan control "fan on" setting too low.	Increase "fan on" dipswitch settings on EFT if control has this option.). Register air deflectors may help.
	Excessive duct losses.	Check supply air ductwork. Seal leaky joints and seams. Insulate ductwork if necessary

Figure 18 - RIELLO 40BF BLOCKED VENT SAFETY (BVS) OPERATION

EXTERNAL ACTION	APPLIANCE RESPONSE
Thermostat calls for heat.	1. Bypass timer is energized, bypass timer holding contacts close, bypassing normally closed pressure switch for 25 seconds. Note: Call for heat must be terminated and initiated again to reset bypass relay. 2. Burner enters pre-purge. 3. After pre-purge, oil valve is energized and burner lights off. 4. Burner operates in run mode. 5. Bypass timer holding contacts open and normally closed pressure switch monitors for vent or combustion air intake blockage.
Call for heat is satisfied.	1. Oil valve circuit is de-energized and valve shuts off. 2. Burner motor runs for duration of burner motor-off delay. 3. Burner motor turns off.
Pressure switch contacts open and cause burner to re-cycle	1. Bypass timer contacts not closing and bypassing pressure switch/ Shut appliance down and restart. 2. Check for vent blockage. 3. Check for combustion air intake blockage. 4. Ensure pressure tubes are connected properly and clear of obstructions. 5. Check burner set up.

Figure 19 - RIELLO 40BF BURNER TROUBLESHOOTING

Condition: Thermostat is calling for heat. Burner is not running.		
Problem	Possible Cause	Remedy
1. Reset control box.	Burner starts.	Go to step #4.
	Burner does not start	Go to step #2
2. Test for 120 Vac supply at sub-base between L (P) & N or terminals #3 and #5.	120 Vac present.	Go to step #3
	No voltage	<ul style="list-style-type: none"> • Check system fuse, breaker or ensure service switch is ON. • Verify all limits are closed. • If using switching relay, verify 24 Vac at T-T. • Verify BVS pressure switch is closed.
3. Turn off power supply- Remove control box and jumper terminals #5 and #6. Restore power.	Motor runs.	<ul style="list-style-type: none"> • Verify reduced voltage (42-52 Vac) between terminals #3 and #7. • Ensure good contact between control box spades and sub-base terminals. • Defective control box/ Replace.
	Motor does not run.	<ul style="list-style-type: none"> • Verify electrical connections. • Check for seized pump, motor, or fan against housing. • Defective motor capacitor. • Thermal overload (Hot motor).
4. Burner Starts	Burner stays in Pre-purge.	<ul style="list-style-type: none"> • Faulty CAD cell or seeing light before trial for ignition. • Coil wires on terminals #1 and #2 or #1 and #8 reversed. • Open coil circuit; terminals #2 and #8. • Open coil circuit; terminal #1 • Defective 42-52 Vac supply, terminals #3 and #7. • Defective control box/ Replace
	Burner continues to purge and light off with immediate flame dropout.	<ul style="list-style-type: none"> • Metal yoke for coil missing. • Coil wire #2 and #8 reversed. • Low resistance of coil holding circuit, terminals #1 and #2, (1350 ohms ± 10%). • Verify BVS bypass relay contacts close bypassing the pressure switch for 25 seconds. • Verify BVS pressure switch is remaining closed upon light off.
	Burner locks out after trial for ignition.	<ul style="list-style-type: none"> • Low resistance or no contact on starting circuit of coil, terminals #2 and #8. (1.3-ohm ± %) • No oil supply- tank empty, valve closed, dirty filter, damaged supply lines. • Defective or dirty oil valve stem, nozzle, or pump strainer. • Broken pump drive key, defective pump or no oil pressure. • Ignition electrodes shorted, cracked porcelain. • Burner motor not up to speed. • Excessive draft over fire. • Defective control box/ Replace.

Figure 20 - RIELLO 40BF BLOCKED VENT SAFETY SYSTEM (BVS) TROUBLESHOOTING

Condition: Thermostat is calling for heat. Burner is not running. .		
Problem	Possible Cause	Remedy
1. Test for 120 Vac supply at terminal #2 and #3 on bypass timer.	120 Vac present.	Go to step #2.
	No voltage	<ul style="list-style-type: none"> • Check system fuse, breaker or ensure service switch is ON. • Verify all limits are closed. • If using switching relay, verify 24 Vac at T-T.
2. Test BVS pressure switch contacts are closed	Contacts closed.	Go to step #3.
	Contacts open	<ul style="list-style-type: none"> • Verify pressure tubing is connected properly and clear of obstructions. • Verify vent is not obstructed. • Verify combustion air intake is not obstructed. • Replace.
3. Turn off power supply- Remove control box and jumper terminals #5 and #6. Restore power.	Motor runs.	<ul style="list-style-type: none"> • Verify reduced voltage (42-52 Vac) between terminals #3 and #7. • Ensure good contact between control box spades and sub-base terminals. • Defective control box/ Replace.
	Motor does not run.	<ul style="list-style-type: none"> • Verify electrical connections. • Check for seized pump, motor, or fan against housing. • Defective motor capacitor. • Thermal overload (Hot motor).
4. Burner Starts	Burner stays in Pre-purge.	<ul style="list-style-type: none"> • Faulty CAD cell or seeing light before trial for ignition. • Coil wires on terminals #1 and #2 or #1 and #8 reversed. • Open coil circuit; terminals #2 and #8. • Open coil circuit; terminal #1 • Defective 42-52 Vac supply, terminals #3 and #7. • Defective control box/ Replace
	Burner continues to purge and light off with immediate flame dropout.	<ul style="list-style-type: none"> • Metal yoke for coil missing. • Coil wire #2 and #8 reversed. • Low resistance of coil holding circuit, terminals #1 and #2, (1350 ohms ± 10%). • Verify BVS bypass relay contacts close bypassing the pressure switch for 25 seconds. • Verify BVS pressure switch is remaining closed upon light off
	Burner locks out after trial for ignition.	<ul style="list-style-type: none"> • Low resistance or no contact on starting circuit of coil, terminals #2 and #8. (1.3-ohm ± %) • No oil supply- tank empty, valve closed, dirty filter, damaged supply lines. • Defective or dirty oil valve stem, nozzle, or pump strainer. • Broken pump drive key, defective pump or oil pressure. • Ignition electrodes shorted, cracked porcelain. • Burner motor not up to speed. • Excessive draft over fire. • Defective control box/ Replace.

HOMEOWNER'S REFERENCE TABLE	
Model No.	
Serial No.	
Date Installed	
Contractor	
Contact	
Address	
Postal Code	
Telephone No.	
After Hours No.	
FUEL SUPPLIER	
Fuel Oil Supplier	
Contact	
Telephone No.	
After Hours No.	
IF DIFFERENT FROM INSTALLATION CONTRACTOR:	
Service Tech.	
Telephone No.	
After Hours No.	



2201 Dwyer Avenue, Utica, NY 13501
 Tel. 800 253 7900
www.ecrinternational.com

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