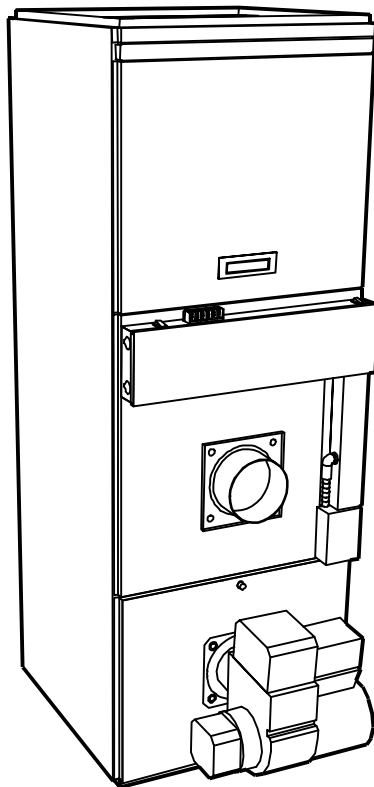


# Installation instructions and homeowners manual



## WARM AIR FURNACE

Save these instructions for future reference.

**Model:**

**OCF105A12A**

### TABLE OF CONTENTS

Part 1, installation.....	3
Part 2, operation.....	19
Part 3, maintenance.....	23
Part 4, information.....	26
Technical specifications.....	27
Wiring diagram.....	29
Parts list.....	30

Manufactured by:

**ICP Corporation (Canada)**

3400 Blvd Industriel Sherbrooke PQ Canada

**Caution : Do not tamper with  
the unit or its controls.  
Call a qualified service  
technician.**

# PART 1 INSTALLATION

## SAFETY CONSIDERATIONS

INSTALLATION OF OIL FIRED HEATING UNITS SHALL BE IN ACCORDANCE WITH THE REGULATION OF AUTHORITIES HAVING JURISDICTION AND THE CAN/CSA B139 OR USA/NFPA NO.31-1992 INSTALLATION CODE FOR OIL BURNING EQUIPMENT.

DO NOT OPERATE FURNACE IN A CORROSIVE ATMOSPHERE CONTAINING CHLORINE, FLUORINE OR ANY OTHER DAMAGING CHEMICALS.

DO NOT STORE OR USE GASOLINE, OR OTHER FLAMMABLE VAPOURS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

### 1) SAFETY LABELLING AND SIGNAL WORDS

#### 1.1) Danger, Warning and Caution:

The signal words **DANGER**, **WARNING** and **CAUTION** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used in product labels to signify an immediate hazard. The signal words **WARNING** and **CAUTION** will be used on product labels and throughout this manual and other manuals that may apply to the product.

#### 1.2) Signal Words:

**DANGER** – Immediate hazards which **WILL** result in death or serious injury.

**WARNING** – Hazards or unsafe practices which **COULD** result in death or injury.

**CAUTION** – Hazards or unsafe practices which **COULD** result in personal injury or product or property damage.

#### 1.3) Signal Words in Manuals:

The signal word **WARNING** is used throughout this manual in the following manner:

## **WARNING**

The signal word **CAUTION** is used throughout this manual in the following manner:

## CAUTION

### 2) SAFE INSTALLATION REQUIREMENTS

## **WARNING**

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation **MUST** conform with codes or, in the absence of local codes, with codes of the country having jurisdiction.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

**Failure to carefully read and follow all instructions in this manual can result in furnace malfunction, property damage, personal injury and/or death.**

**NOTE:** It is the personal responsibility and obligation of the customer to contact a qualified installer to ensure that the installation is adequate and conforms to governing codes and ordinances.

## **WARNING**

### Fire hazard

The furnace must be installed in a level position, never where it will slope to the front.

If the furnace were installed in that position, oil could drain into the furnace vestibule and create a fire hazard, instead of draining properly into the combustion chamber.

- a. This furnace is NOT approved for installation in mobile homes, trailers or recreation vehicles.
- b. You must have a sufficient supply of fresh air for combustion and ventilation to the area in which the furnace is located.
- c. Do **NOT** use this furnace as a construction heater or to heat a building that is under construction.
- d. Use only the Type of fuel oil approved for this furnace (see **Rating Plate** on unit). Overfiring will result in failure of heat exchanger and cause dangerous operation.
- e. Visually check all oil line joints for signs of wetness, which would indicate a leak.
- f. Connect furnace to a side-wall terminal or chimney.
- g. The points in Part 2 "Operation" are vital to the proper and safe operation of the heating system. Take the time to be sure they are all done.
- h. Follow the rules of the NFPA Pamphlet No.31 (for USA) and B-139 (for Canada) or local codes for locating and installing the oil storage tank.
- i. Follow a regular service and maintenance schedule for efficient and safe operation.
- j. Before servicing, allow furnace to cool. Always shut off electricity and fuel to furnace when servicing. This will prevent electrical shock or burns.
- k. Seal supply and return air ducts.
- l. The vent system **MUST** be checked to determine that it is the correct type and size.
- m. Install correct filter type and size.
- n. Unit **MUST** be installed so electrical components are protected from direct contact with water.

potentially dangerous fire or smoke, you should have fire and smoke detectors listed by Underwriters Laboratories installed and maintained in the building or dwelling (see Note below).

**NOTE:** The manufacturer of your furnace does not test any detectors and makes no representations regarding any brand or type of detector.

**CAUTION**

Insure that the area around the combustion air intake terminal is free of snow, ice and debris.

**CAUTION**

The air pressure switch **MUST** be used when the furnace is vented by the side-wall.

**CAUTION**


Do not use any commercially available soot remover. This furnace has fiber type refractory combustion chamber. Normal servicing of this unit does not require cleanings of the combustion chamber. Use extreme care if for any reason you have to work in the area of the combustion chamber.

## 2.1) Safety Rules:

Your unit is built to provide many years of safe and dependable service providing it is properly installed and maintained. However, abuse and/or improper use can shorten the life of the unit and create hazards for you, the owner.

- a. The U.S. Consumer Product Safety Commission recommends that users of oil-burning appliances install carbon monoxide detectors. There can be various sources of carbon monoxide in a building or dwelling. The sources could be gas-fired clothes dryers, gas cooking stoves, water heaters, furnaces, gas-fired fireplaces, wood fireplaces, and several other items. Carbon monoxide can cause serious bodily injury and/or death. Therefore, to help alert people of potentially dangerous carbon monoxide levels, you should have carbon monoxide detectors listed by a nationally recognised agency (e.g. Underwriters Laboratories or International Approval Services) installed and maintained in the building or dwelling (see Note).
- b. There can be numerous sources of fire or smoke in a building or dwelling. Fire or smoke can cause serious bodily injury, death, and/or property damage. Therefore, in order to alert people of

## 2.2) Freezing Temperatures and Your Structure:

 **WARNING**

**Freeze warning.**

**Turn off water system.**

**If your unit remains shut off during cold weather the water pipes could freeze and burst, resulting in serious water damage.**

Your unit is equipped with safety devices that may keep it from operating if sensors detect abnormal conditions such as clogged exhaust flues.

If the structure will be unattended during cold weather you should take these precautions.

- a. Turn off main water supply into the structure and drain the water lines if possible. Open faucets in appropriate areas.
- b. Have someone check the structure frequently during cold weather to make sure it is warm enough to prevent pipes from freezing. Suggest they call a qualified service agency, if required.

**2.3) Installation regulation:**

Installation MUST conform with local building codes or in the absence of local codes, with the National Electrical Code, ANSI/NFPA No.70-1990 or current edition and Installation of Oil Equipment, NFPA No.31.

**3) LOCATING THE FURNACE**

**CAUTION**

Check carefully your furnace upon delivery for any evidence of damage that may have occurred during shipping and handling. Any claims for damages or lost parts must be made with the Transport Company.

**3.1) Location:**

Locate the furnace as closely as possible to the chimney or vent terminal, providing ample clearance to permit easy accessibility for cleaning the inside of the furnace, the removal of filters, blower, motors, controls and flue connections.

The OCF is certified for reduced clearances to combustibles, which means it can be installed in an alcove, closet, or crawl space by obeying the clearances specified on the rating plate.

In the downflow position, the OCF is certified for use on combustible floors only when the accessory No CFB-1 "Combustible Floor Base" is used in the installation.

In the horizontal (air left or right) position, the OCF is certified for use on combustible floors only when the accessory No. HFB-1 "Horizontal Floor Base" is used in the installation.

In the horizontal (air left or right) position, the OCF can be suspended using an angle iron frame with threaded rod hangers provided the weight of the frame and furnace are considered in the support calculations.

For an attic installation, keep the building at least 12" away from any openings in the furnace enclosure as some insulations can be easily combusted.

Do not install furnace directly on carpeting, tile or other combustible material.

The furnace must be installed level for safe quiet operation.

**CAUTION**

Do **NOT** operate furnace in a corrosive atmosphere containing chlorine, fluorine or any other damaging chemicals. Refer to Part 1, section 5.2.

**TABLE # 1**  
**Minimum Installation clearances from combustible materials (Chimney installation\*)**

LOCATION	APPLICATION	OCF105
Sides	Furnace	1"
	Supply plenum, warm air duct within 6 ft of furnace	1"
Back	Furnace	1"
Top	Furnace casing or plenum	1"
Bottom	Furnace – combustible floor **	0" **
Front	Furnace	24"

\* See Part 1 section 4.3 for Direct Vent application clearance.  
 \*\* Combustible floor requires accessory bases CFB-1 or HFB-1.

**4) VENTING**

**4.1) General:**

The furnaces can be vented in several ways:

**Chimney Vented:**

Using the Beckett AFG or Riello 40-F burner, the furnaces can be chimney vented with or without a barometric damper. The unit will be operated at a **negative** over fire draft and stack draft.

**! WARNING**

**Poison carbon monoxide gas, fire and explosion hazard.**

**Read and follow all instructions in this section.**

**Failure to properly vent this furnace can result in property damage, personal injury and/or death.**

**Side-wall Vented:**

Using the Beckett AFII or Riello 40-BF burner with the integral pre and post purge controls, the system can be side-wall vented with the new DV-2000™ venting system for maximum efficiency, and without the use of a side-wall power ventor. The unit will be operated at a **positive** overfire draft and stack draft.

**! WARNING**

**Poison carbon monoxide gas hazard**

**Never co-vent the furnace with another combustion appliance when side-wall venting.**

**To do so may result in asphyxiation and death to the occupants**

**4.2) Chimney installations:**

The oil furnaces, when set up for chimney venting, are certified for use with L-vent, A-vent, tile-lined and metal-liner-tile-lined chimneys, and can be vented both with and without a barometric draft damper. However, the furnace has not been certified without the barometric damper when it is to be co-vented with another oil-fired appliance, such as a water heater.

When a damper is used, the basement air entering the damper reduces the possibility of vent condensation. However, if the barometric damper is not used, a chimney liner with insulation must be employed.

**With a barometric damper:**

The appliance may be installed in a chimney of the proper size and adequate chimney base temperature as

specified in the Installation Code. The relevant excerpt from the code is found in this section - Use it as a guide when local or national codes do not exist.

**Without a barometric damper:**

Due to the lack of dilution air that would ordinarily be drawn into the barometric damper, the dew point of the flue gasses is raised. To offset the increased tendency for vent condensation, the chimney must be lined. Additionally, the liner must be insulated according to the insulating procedure recommended by the manufacturer of the liner.

**! WARNING**

**Poison carbon monoxide gas hazard**

**Never install a hand operated damper in the vent pipe. However, any Underwriters Laboratories listed electrically operated automatic type vent damper may be installed if desired. Be sure to follow instructions provided with vent damper. Read and follow all instructions in this section.**

**Failure to properly vent this furnace or other appliances can result in property damage, personal injury and/or death.**

**Vent connectors:**

For installations without a barometric damper, the vent connector should be as short as possible and either be of double wall construction, or be of single wall construction insulated with 1" of insulation. It should rise a minimum of 1/4" per foot from the furnace to the chimney. Field fabricated connectors should be a minimum of 28 gauge. The joints must be mechanically secure and there must be no flue product leakage at the joints.

**CAUTION**

When the furnace (chimney installation) is co-vented with other combustion appliances such as a water heater, the allowable venting materials (i.e. L-Vent etc.) for use with those appliances should also be investigated.

**Flue pipe sizing:**

The following table is an excerpt installation code and indicates permitted flue sizes and minimum base temperatures for circular flues in chimney with thermal resistance less than R6 (6 ft<sup>2</sup> •hr •°F / Btu). Where a new appliance, burner, or chimney is installed, chimney vent sizes and maximum flue-gas temperatures (measured at the chimney connector with the barometric damper shut, after 5 minutes of operation) shall comply with the table #2.

insulation between liner and masonry (e.g. 2 in. of expanded mica or 1 3/8 in. of high density glass fibreboard.)

**Applying the Table:**

If a furnace with 0.60 USGPH nozzle is to be connected to a 20 ft. tall clay-lined masonry chimney, the thermal resistance of this chimney type is R2, which is less than R6. The actual firing rate at 156 psig is 1.25 x .60 = .75. Therefore this table shall apply as:

**Notes:** Thermal resistance values for typical chimneys are as follows:

- R2 (2 ft<sup>2</sup> •hr •°F / Btu): clay-lined masonry, A-vent
- R3 (3 ft<sup>2</sup> •hr •°F / Btu): metal liner in clay-lined Masonry
- R6 (6 ft<sup>2</sup> •hr •°F / Btu): metal or clay-lined masonry with R4.5 (4.5 ft<sup>2</sup> •hr •°F / Btu)

The minimum size permitted shall be 4 in. inside diameter.

The maximum size permitted shall be 5 in. inside diameter.

The minimum base temperature shall be about 320°F.

**TABLE # 2**

Total input rating of all connected appliances			Flue inside diameter (in)		Minimum base temperature (°F) for chimney height (ft) of :			
kW	kBtu/h	USGPH	Min.	Max.	11	20	28	36
21	70	0.50	3	5	300	400	535	725
27	91	0.65	3	5	275	340	430	535
31	105	0.75	4	5	260	320	380	475
36	119	0.85	4	5	250	300	355	430
41	140	1.00	4	6	225	300	365	430
51	175	1.25	4	6	240	275	320	365

**4.3) Side-wall venting, DV-2000™ Direct Vent System:**

The furnace can be side-wall vented without the use of a side-wall power ventor using the new DV-2000™ venting system with the high static pressure Beckett AFII and Riello 40-BF oil burners. **Outdoor combustion air must be directly connected to the burner or the DV-2000™ venting system will not function.**

The standard terminal is designed for a wall thickness up to 14", and the deep wall terminal for wall thickness up to 25".

The DV2000 system incorporates a vent blockage safety shutdown system. If the vent or intake opening ever becomes partially or fully blocked, the burner will shut down before a #1 smoke occurs.

The notable characteristics of the DV-2000™ system are as follows:

The intake and vent circuits within the terminal can be accessed for cleaning.

Certified to use the following materials for ducting the intake air from the terminal to the burner; Schedule 40 PVC DWV, Schedule 40 ABS DWV, And ASTM 2729 Sewer Pipe.

There are 3 main components to the DV-2000™ system; the VTK vent terminal kit, the IFV insulated flexible venting material and the field-supplied 3" PVC or ABS intake piping.

**Vent terminal kits – DV-2000™:**

One hole of minimal size (6") is required to be cut in the side-wall, and the terminal is designed to fit through a minimum 2 X 8-joist space.

The certified standard vent terminal kit is Model No. VTK-1 or VTK-2, and is suitable for installation in walls up to 14" thick. An alternate kit, Model VTK-1-DW or VTK-2-DW is available to accommodate walls up to 25"

thick. Both kits contain the following items to complete the hook-up to the venting and furnace:

- 1 Terminal
- 2 Sealing Clamps
- 1 Side-wall Venting Breech Plate
- 2 Sealing Strips
- 1 Inner Wall Plate
- 1 Pressure Control with Tubing
- 2 Insulated Quick-connect Terminals
- 3 Stainless Steel Screws
- 6 Self tapping stainless steel screws

**Insulated flexible venting - DV-2000™:**

The certified venting materials come in 3 lengths, Model No. IFV3-15, IFV3-23 and IFV3-30 (or IFV-4-15, IFV4-23 and IFV4-30 for 160 models) are corresponding to 15', 23' and 30' continuous lengths of vent. The vent construction is coaxial and incorporates a stainless steel corrugated flexible liner surrounded by a thick insulation blanket and covered with an outer layer of flexible corrugated aluminium sleeve to protect the insulation. Splicing vent lengths together is prohibited. The maximum and minimum continuous vent lengths permitted for installation are:

5 feet minimum 30 feet maximum

**⚠ WARNING**

Poison carbon monoxide gas hazard

Even though the flexible venting is insulated, it cannot be run through an unheated space.

To do so could cause residual condensation inside the stainless steel liner, which may eventually perforate the liner and allow vent gasses to enter the dwelling, which can result in property damage, personal injury and/or death.

**TABLE # 3**  
**Side-wall venting clearances to combustibles**

PORTION OF VENT	CLEARANCES
Vent pipe, up to vent terminal*	3"
Vent terminal	ZERO

\*Do not enclose venting

**Installation considerations - DV-2000™:**

Select a location for the vent terminal in accordance with all local and national codes. The following requirements shall be considered to be minimum requirements that can be overridden by stricter local and national codes.

**The vent shall not terminate:**

- a. directly above a paved sidewalk or paved driveway that is located between two buildings, and that serves both buildings;
- b. less than 7 feet above any paved driveway;
- c. within 6 feet of a window or door, or mechanical air supply inlet to any building, including soffit openings;
- d. above a gas meter/regulator assembly within 3 feet of a vertical centerline of the regulator;
- e. within 6 feet of any gas service regulator vent outlet, or within 3 feet of an oil tank vent, or an oil fill inlet;
- f. within less than 1 foot above grade level;
- g. 6 feet of any other combustion air inlet;
- h. within 6 feet of a property line;
- i. underneath a veranda, porch or deck;
- j. so that the flue gases are directed at combustible material or any openings of surrounding buildings that are within 6 feet;
- k. less than 3 feet from an inside corner of an L-shaped structure;
- l. so that the bottom of the vent termination opening is less than 1 foot above any surface that may support ice, snow, or debris;
- m. so that the flue gases are directed toward brickwork, siding or other construction, in such a manner that may cause damage from heat or condensation from flue gases.

**CAUTION**

Most codes have a notwithstanding clause that states that products of combustion shall not enter the dwelling under any circumstances, even if all other code requirements as to construction and location have been complied with. The installer is ultimately responsible to do whatever is necessary to ensure that flue gasses do not enter the dwelling.



FIGURE # 1.1



FIGURE # 1.2



FIGURE # 1.3



FIGURE # 1.4



FIGURE # 1.5



FIGURE # 1.6





## Installation considerations - DV-2000™:

### **WARNING**

Cuts and abrasion hazard.

Always wear protective gloves and eye protection when handling the vent material

The process of cutting and fitting the flexible venting material exposes the installer to sharp edges that could cause severe cuts to the skin.

### Connection to the furnace breech - DV-2000™:

1. Remove the standard breech plate by removing the brass nuts.
2. Determine which direction the venting will be routed from the furnace and then install the special side-wall venting breech plate provided in the VTK Series vent kit so that the breech plate test port will be accessible after vent installation. However, do not install the breech plate with the test port pointing downward. Tighten the brass nuts.
3. The flexible venting has 4 pieces of corrugated spin sleeving that has been temporarily screwed on over top of it. Remove the spin sleeving completely by unscrewing it in a counter-clockwise direction.
4. Using tin snips, cut the aluminium outer sleeve back by 5" for the IFV Series vent (see figure #1.1). Ensure the snips are well adjusted and sharp or the cut end of the venting will be too jagged to start the threads of the spin sleeve (see figure #1.1).
5. Prepare the furnace breech end of the insulated flex vent by first screwing the spin sleeve onto the corrugated aluminium jacket (see figure #1.2) until the trailing edge of the spin sleeve is about 12" from the end of the vent (see figure #1.3).
6. Pull the insulation back to expose the corrugated stainless steel core.
7. Cut the corrugated stainless steel core back by 3" for the IFV Series vent. You should now have about 3" of insulation hanging out past the stainless steel core (see figure #1.4).
8. Push the stainless steel core onto the breech pipe as far as it will go (see figure #1.5) and mechanically attach the vent to the breech using three of the #8 X 1/2" self-drilling screws provided

with the VTK Series kit. The screws should be equally spaced around the circumference of the stainless steel core, starting with the first screw at top dead center. Start the drill point of the screws in the valleys of the corrugations at 3/8"-5/8" back from the end of the stainless steel core, so the screw heads can be properly sealed in the forthcoming operations (see figure #1.6).

9. With the stainless steel core now firmly attached to the breech, tear off one green gum-sealing strip from the backing strip. Wrap the seal strip around the joint, always keeping the centerline of the seal strip over the line where the corrugated stainless steel core makes the transition to the smooth outer surface of the breech pipe. In other words, the seal strip must be centered over the joint. After wrapping the seal strip around once, allow 1/2" overlap and tear off the residual length (see figure #1.7).
10. Break the residual length of seal strip in to 3 equal parts and stuff them onto the screw heads of the stainless steel self-drilling screws so that the screw heads are completely covered.
11. Two stainless steel band clamps are provided in the VTK Series kits. Position one stainless steel band clamp over the gum seal joint so that the edge of the clamp closest to the breech lines up with the edge of the gum seal that is closest to the breech. Ensure that the band will close with an action of one strip sliding over the other - not under the gearhead of the draw clamp (see figure #1.8). Tighten the band clamp with considerable torque to cause the gum seal be squeezed into all crevices and to ooze out of the end of the clamp closest to the breech (see figure #1.9). The gum will eventually become rubbery.
12. The seal is permanent and should never need to be disconnected as the breech plate can be removed for cleaning and inspection using the 4-bolt joint.
13. Tuck the vent insulation into the breech collar.
14. Screw the spin sleeve tightly into the breech collar for a finished appearance. Wrap the other end of the spin sleeve with aluminium tape to cover any metal burrs that may be present (see figure #1.10).
15. Bend the venting into the desired radius coming off the breech.

### Connection to the vent terminal - DV-2000™:

1. Prepare the terminal end of the insulated flex vent by first screwing the spin sleeve onto the corrugated aluminium jacket until the trailing edge of the spin sleeve is about 10" from the end of the vent.

FIGURE # 1.7



FIGURE # 1.8



FIGURE # 1.9

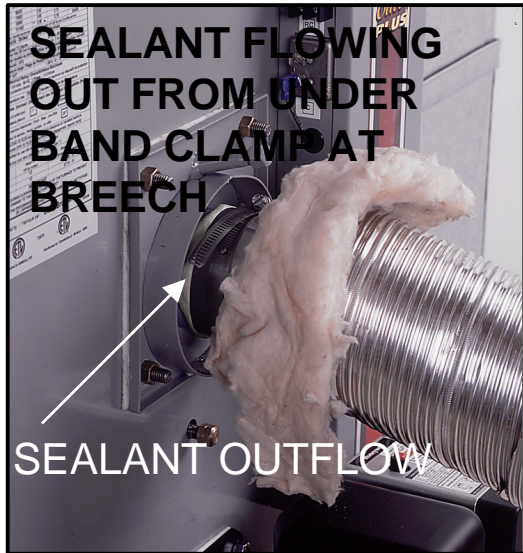
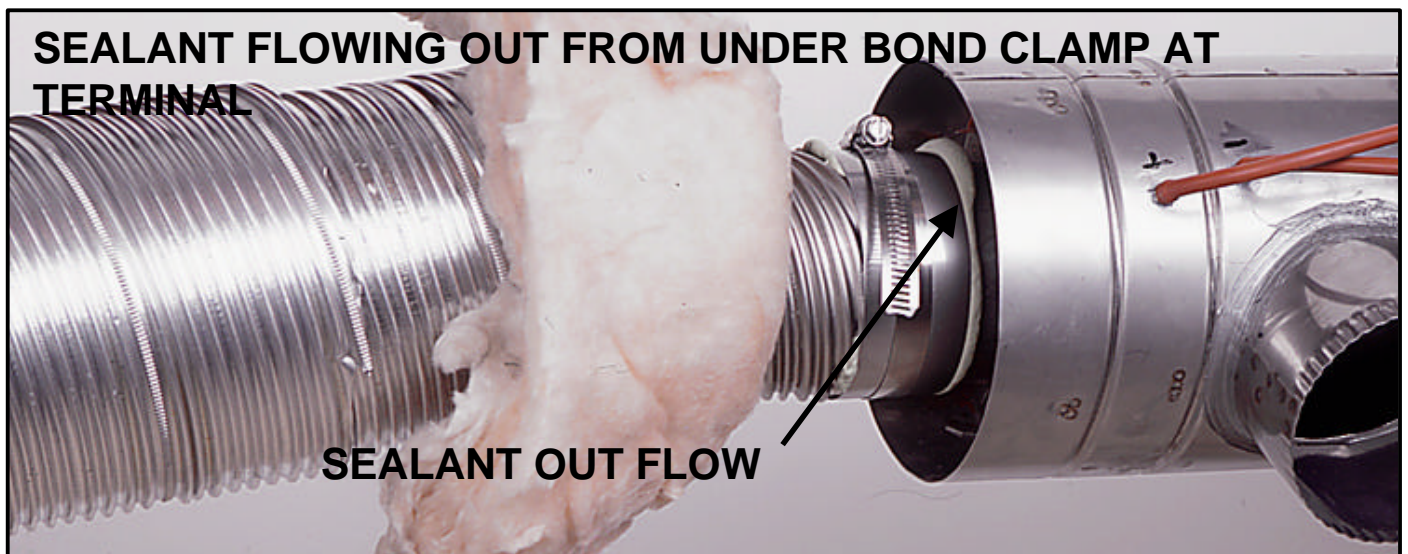


FIGURE # 1.10



FIGURE # 1.11



2. Using sharp tin snips, cut the aluminium outer sleeve back by 5" for the IFV Series vent
3. Pull the insulation back to expose the corrugated stainless steel core.
4. Cut the corrugated stainless steel core back by 3" for the IFV Series vent. You should now have about 3" of insulation hanging out past the stainless steel core.
5. Push the stainless steel core onto the pipe on the back of the terminal as far as it will go and mechanically attach the vent to the terminal using three of the #8 X 1/2" self-drilling screws provided with the VTK Series kit. The screws should be equally spaced around the circumference of the stainless steel core, starting with the first screw at top dead center. Start the drill point of the screws in the valleys of the corrugations at 3/8"-5/8" back from the end of the stainless steel core.
6. With the stainless steel core now firmly attached to the terminal, tear off the other green gum-sealing strip from the backing strip. Wrap the seal strip around the joint, always keeping the centerline of the seal strip over the line where the corrugated stainless steel core makes the transition to the smooth outer surface of the terminal pipe. After wrapping the seal strip around once, allow 1/2" overlap and tear off the residual length.
7. Break the residual length of seal strip in to 3 equal parts and stuff them onto the screw heads of the stainless steel self-drilling screws so that the screw heads are completely covered.
8. Position the other stainless steel band clamp over the gum seal joint so that the edge of the clamp closest to the terminal lines up with the edge of the gum seal that is closest to the terminal. Tighten the band clamp with considerable torque to cause the gum seal be squeezed into all crevices and to ooze out of the end of the clamp closest to the terminal (see figure #1.11).
9. The seal is permanent and should never need to be disconnected as the end of the terminal can be opened for cleaning and inspection by removing the screened end-cone assembly. Tuck the vent insulation into the recess in the terminal body.
10. Screw the spin sleeve tightly into the recess for a finished appearance. Wrap the other end of the spin sleeve with aluminium tape to cover any metal burrs that may be present (see figure #1.12).
11. Bend the venting into the desired radius coming off the terminal.

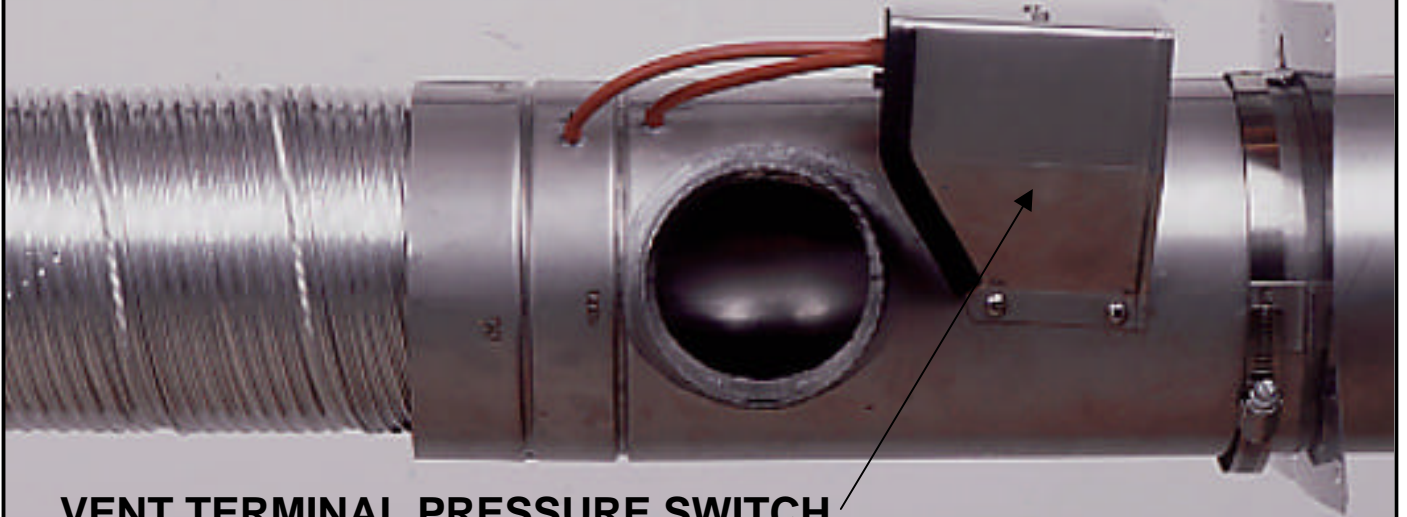
#### **Installing terminal in the wall - DV-2000™:**

1. Cut a 6" hole in the side-wall in accordance with the location considerations outlined in the previous section.
2. Fasten the wall plate to the inside-wall using 4 field-provided fasteners appropriate for the material behind the wall plate. Depending on the angle of access, the pressure control bracket may need to be removed to access the top right wall plate screw hole. For concrete and block, Tapcon™ screws or equivalent are recommended. Install the wall plate so that the top of the hole in the wall plate is positioned 1/8" lower than the top of the 6" hole in the wall. This will accommodate the proper downward slope of the terminal, in the direction from the inside to the outside.
3. Remove the 2 screws fastening the end cone in place and remove the cone.
4. Remove the 2 screws fastening the stabiliser shroud in place and remove the stabiliser shroud.
5. Insert the main body of the terminal through the wall plate so that the end of the terminal extends about 2" past the outside wall.
6. Install the stabiliser shroud and replace the two mounting screws. (see figure #1.13).
7. For concrete and block wall installations in particular, If it appears that the flange on the back of the stabiliser shroud is not large enough to cover the irregularities in the hole, a field fabricated wall plate can be constructed out of 304, 316, or 316L stainless steel.
8. Silicone seal the circumference of the joint where the stabiliser shroud connects to the main body of the terminal.
9. Apply caulking to the back plate of the stabiliser shroud and push the terminal back firmly against the wall.
10. While pushing down gently on the top of the stabiliser shroud, install the 3 stainless steel 2" screws provided with the kit to secure the back of the shroud to the wall. Do not overtighten the screws or it will distort the stabiliser shroud. The screws will not be necessary in a concrete or block wall as the mortar can provide positive positioning.
11. Tighten the clamp on the wall plate to secure the terminal in position.
12. Apply more caulking all around the seam where the stabiliser shroud meets the wall. It is important to



FIGURE # 1.12

**TWIST SPIN SLEEVE TIGHTLY INTO RECESS**



**VENT TERMINAL PRESSURE SWITCH.  
REFER TO WIRING DIAGRAM FOR ELECTRICAL  
CONNECTION.**

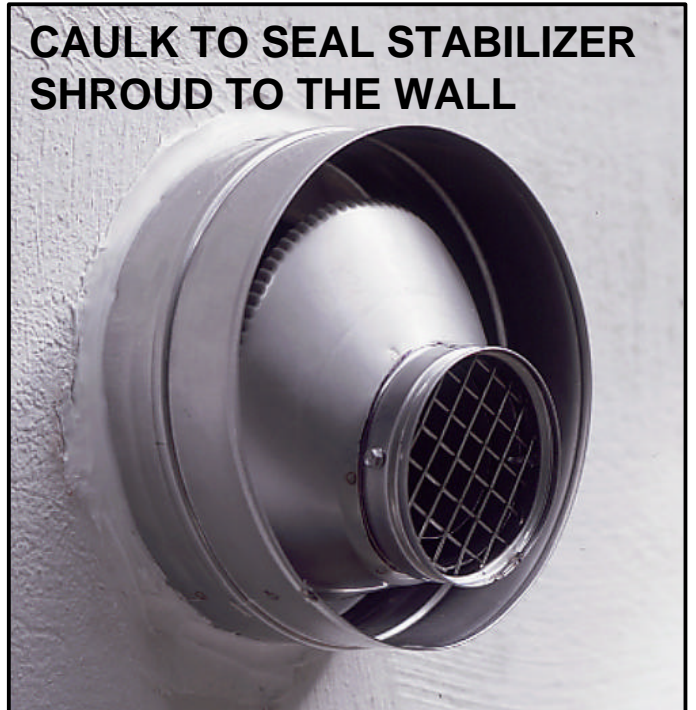
FIGURE # 1.13

**INSTALL  
STABILIZER  
SHROUD**



FIGURE # 1.14

**CAULK TO SEAL STABILIZER  
SHROUD TO THE WALL**




have a good seal to prevent water from entering the dwelling (see figure #1.14). A considerable amount of caulking may be necessary for irregular wall surfaces such as lapped siding.

13. Install the end cone and replace the two mounting screws.
14. Support the vent and intake air piping so that a 1/4" to 1/2" downward slope (toward the outside) results for proper drainage out the terminal body.

#### **Connection of combustion air piping to the terminal - DV-2000™:**

Refer to Part 1, section 5.3, Outdoor Combustion Air – Side-wall Venting, DV-2000™ for a complete description.

### **5) AIR FOR COMBUSTION**

 **WARNING**

**Poison carbon monoxide gas hazard.**

**Comply with NFPA standard for the installation of Oil Burning Equipment and applicable provision of local building codes to provide combustion and ventilation air.**

**Failure to provide adequate combustion and ventilation air can result in personal injury and/or death.**

#### **5.1) General:**

Oil furnaces must have an adequate supply of combustion air. It is common practice to assume that older homes have sufficient infiltration to accommodate the combustion air requirement for the furnace. However, home improvements such as new windows, doors, and weather stripping have dramatically reduced the volume of air leakage into the home.

Home air exhausters are common. Bath and kitchen fans, power vented clothes dryers, and water heaters all tend to create a negative pressure in the home. Should this occur, the chimney becomes less and less effective and can easily downdraft.

Heat recovery ventilation (HRV) systems are gaining in popularity. The HRVs are not designed to supply

combustion air. If not properly balanced, a serious negative pressure condition could develop in the dwelling.

#### **5.2) Contaminated Combustion Air :**

Installation in certain areas or types of structures will increase the exposure to chemicals or Halogens which may harm the furnace. These instances will require that only outside air for combustion.

The following areas or types of structures may contain or have exposure to the substances listed below. The installation must be evaluated carefully as it may be necessary to provide outside air for combustion.

- a. Commercial building.
- b. Building with indoor pools.
- c. Furnaces installed near chemical storage areas.

Exposure to these substances:

- a. Permanent wave solutions for hair.
- b. Chlorinated waxes and cleaners.
- c. Chlorine based swimming pool chemicals.
- d. Water softening chemicals.
- e. De-icing salts or chemicals.
- f. Carbon tetrachloride.
- g. Halogen type refrigerants.
- h. Cleaning solvent (such as perchloroethylene).
- i. Printing inks, paint removers, varnishes, etc..
- j. Hydrochloric acid.
- k. Solvent cements and glues.
- l. Antistatic fabric softeners for clothes dryers.
- m. Masonry acid washing materials.

#### **5.3) Ducted outdoor combustion air:**

Three burners are set up to duct outside combustion air directly to the burner; the Beckett AFII and Riello 40-BF for side-wall venting using the new DV-2000™ venting system, and the Beckett AFG for use with conventional chimney venting. The Riello 40-F is not suitable for direct-connected outdoor air.

**CAUTION**

The use of ducted outside combustion air is mandatory for the DV-2000™ venting system. This system operates on a balanced flue principle and will not function properly if the combustion air piping is not attached and sealed at all connections between the vent terminal and burner inlet.

### Outdoor combustion air kit – chimney venting:

The following kit has been certified for use on the appliance. The component kits contain an important safety feature, namely a vacuum relief valve, or VRV. During normal operation the burner aspirates outdoor air. If the intake terminal ever becomes partially blocked or fully blocked from ice or snow etc., the VRV will open to allow a proportion of air from the dwelling to enter the burner thus maintaining proper combustion. Once the blockage is removed, the VRV will close and the burner will draw all air from the outdoors again:

**CAS-2B** Components (except air duct) for the Beckett AFG burner. The kit includes the intake terminal, vacuum relief valve (VRV) and special air boot connection with integral air adjustment means for the AFG burner. The CAS-2B can be used with 4" galvanised air duct or with 4" flexible aluminium air duct. It is recommended that the metallic air ducting material should be insulated from the air intake up to 5 feet from the burner to avoid condensation on the outside of the intake pipe.

**CAD-1** Air duct kit consists of 25 feet of insulated UL/ULC Listed Class 1 air duct, and two 4" steel band clamps. The duct incorporates a corrugated flexible aluminium core, surrounded by fibreglass insulation covered with a vinyl vapour barrier.

#### CAUTION

The CAS-2B does not turn the furnace installation into a direct vent system. Therefore the building structure must provide for adequate combustion air to be delivered **at the vacuum relief valve**. The burner will need to draw combustion air from the VRV's surroundings if the intake ever becomes blocked. Therefore non-direct vent installation codes must be followed.

Comprehensive installation instructions are provided with the kit.

### Outdoor combustion air – side-wall venting, DV-2000™:

The new DV-2000™ venting system is a sealed system and completely isolates the furnace from the interior of the building. The burner is totally unaffected by any pressure fluctuations within the building which makes it ideal for tight home constructions.

The DV-2000™ venting system requires additional parts, which are not included with the kit. These additional parts must be constructed of 3" Schedule 40 PVC, PVC-SWV, SDR-26, SDR-21, Septic Sewer Pipe,

or ABS plastic pipe, fittings and sealant. Also, installation procedures, piping and fittings must conform to the following ANSI /ASTM standards:

PVC	ASTM D-1785
SDR26, SDR21	ASTM D-2241
Septic Sewer Pipe	ASTM D-2729
PVC-DWV	ASTM D-2665
PVC Primer and Solvent Cement	ASTM D-2564
ABS Pipe and Fittings	ASTM D-2235
Procedure for Cementing Joints	ASTM D-2855

### Additional parts required (not included in VTK kit):

- 3" elbow fitting as required
- 3" plastic pipe
- 3" 90°elbow, female-female(for terminal)
- 3" female to 2" female reducer (Riello 40-BF burner only)
- 2" 90°elbow, street type, female-male (Riello 40-BF burner only)
- 3" female-female PVC or ABS coupling (not sewer pipe) (Beckett AFII burner only)
- transition bushings to go from PVC or ABS to ASTM D2729 Septic Sewer Pipe (if applicable).

If PVC fittings are mixed with ABS fittings, use a solvent cement that is approved for bonding the two plastics.

### Intake pipe length - DV-2000™:

The DV-2000™ venting system has been certified for 120 equivalent feet of 3" intake pipe. Count a 90°elbow as 10 equivalent feet and a 45°elbow as 5 equivalent feet in the calculation.

For Example:

1	5' Length	= 5 equivalent feet
2	10' Lengths	= 20 equivalent feet
3	90°elbows	= 30 equivalent feet
2	45°elbows	= 10 equivalent feet
1	90°elbow (terminal)	= 10 equivalent feet
1	90°elbow (Riello Burner)	= 10 equivalent feet
	Total	= 85 equivalent feet, which is less than 120 feet, which is acceptable.

### Intake pipe installation - DV-2000™:

Obtain the necessary additional parts, to complete the installation, and start by piping at the burner. If the optional vestibule has been installed, remove the appropriate knockouts in the side panels of the vestibule. The lower 5" knockout in the right hand panel is used for the Beckett AFII burner. The higher 5" knockouts on the right and left-hand panels are for right or left connection to the Riello 40-BF burner.



### Beckett AFII burner:

Remove the burner intake cover by removing the 3 screws securing it in place. Discard the cover and screws. Apply silicone liberally around the end of a 3" coupling and fully insert the silicone end onto the burner opening. Fasten securely with 3 self-tapping sheet metal screws.

### Riello 40-BF burner:

Fully insert the female end of the 2" 90° street elbow into the combustion air fitting on top of the burner. Fasten securely with 3 self-tapping sheet metal screws. Cement the 2" end of the 3" female to 2" female reducer onto the male end of the 2" 90° street elbow. If these parts are not easily obtained, use a 3" 90° street elbow with the male end fitted over the combustion air fitting. The fitting will have to be silicone sealed as the fit is a bit loose. Fasten securely with 3 self-tapping sheet metal screws.

### Terminal connection:

Insert the 3" 90° female-female elbow onto the stainless steel air intake fitting located on the right side of the vent terminal (viewing from the rear). Fasten securely with 3 self-tapping sheet metal screws.

### Intermediate piping:

Pipe as required between the terminal and the burner. Ensure that the 3" piping is routed and supported in accordance with local and national codes. Obey minimum furnace clearances to combustibles when routing any sections of 3" piping in the vicinity of the furnace. If Septic Sewer Pipe is to be used, install transition bushings at the 3" female ends of the fittings at the burner and at the terminal. Transition bushings are readily available and are required because 3" PVC and ABS pipes have a typical outside diameter of 3.5", whereas Septic Sewer Pipe has a typical outside diameter of 3.25".

## 6) OIL TANKS AND LINES

Check your local codes for the installation of the tank and accessories.

A manual shut-off valve and an oil filter shall follow sequence from tank to burner. Be sure that the oil line is clean before connecting to the burner.

The oil line should be protected to eliminate any possible damage. Installations having the fuel oil tank below the burner level must employ a two pipe fuel supply system with an appropriate fuel pump (more than 8' lift use 2 stage pump and more than 16' an auxiliary pump).

Follow the pump instructions to determine the size of tubing you need in relation of the lift, or the horizontal distance.

## 7) BURNER INSTALLATION

### Mounting the burner:

- The warm air furnace burner mounting plate has a four bolts configuration.
- Position the mounting gasket between the mounting flange and the appliance burner mounting plate. Line up the holes in the mounting flange with the studs on the appliance mounting plate and securely bolt in place.

### After the burner is mounted:

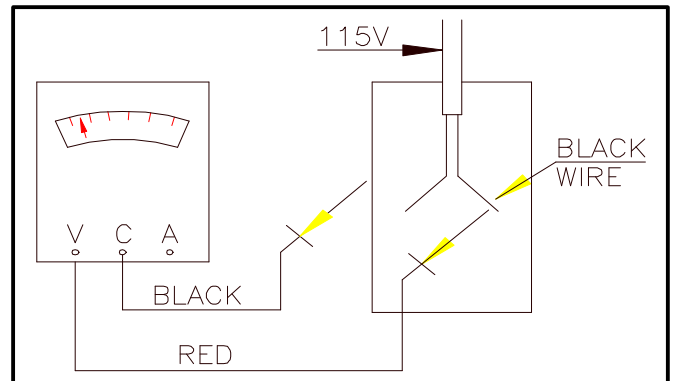
- Remove drawer assembly or air tube combination
- Install nozzle (see specifications)
- Confirm electrode settings
- Make the electrical connections
- Complete oil line connections

### CAUTION

Do not turn on the burner until you have checked the polarity

### Checking the polarity:

FIGURE # 2



The oil burners used on the furnaces have solid state control systems which makes them sensitive to the proper connections of the hot and neutral power lines. The controls will be damaged if the two lines are reversed.

- Set your voltmeter to line voltage.
- Place one prong on your grounded electric entry box and one prong on the black wire.

- c. Read the voltage.
- d. If the voltage is zero, check the white wire. If line voltage shows. Reverse the 115-volt leads entering the furnace junction box.

**Nozzles:**

The burners are provided with the highest capacity USGPH nozzle installed. If another size nozzle, or replacement nozzle is required, use the nozzle spray angle, type and manufacturer recommended in the table #4. Note that all nozzle-marked sizes are based on a pump pressure of 100 psi.

Always select nozzle sizes by working back from the actual desired flow rate at operating pressure, and not by the nozzle marking.

**Air and turbulator settings:**

Before starting the burner for the first time, adjust the air and turbulator settings to those listed in the Table #4, Once the burner becomes operational, final adjustment will be necessary.

**Fuel supply system:**

Fuel Specifications

**NOTE:** Use No.1 or No.2 Heating Oil (ASTM D396) or in Canada, use No.1 or No.2 Furnace Oil.

Before starting the burner be sure the fuel tank is adequately filled with clean oil.

**! WARNING**

**Fire and explosion hazard.**

**Use only approved heating type oil in this furnace. DO NOT USE waste oil, used motor oil, gasoline or kerosene.**

**Use of these will result in death, personal injury and/or property damage.**

**NOTE:** You may notice a slight odor the first time your furnace is operated. This will soon disappear. It is only the oil used on the parts during manufacturing.

**IMPORTANT**

When using nozzle sizes of less than .75 USGPH, the Installation Code for oil burning equipment requires the installation of a 10 micron (or less) filter in the fuel oil line. ICP requires that this practice be followed in order to keep the lifetime heat exchanger warranty intact.

**8) INSTALLING ACCESSORIES**

**! WARNING**

**Electrical shock hazard.**

**Turn OFF electric power at fuse box or service panel before making any electrical connections and ensure a proper ground connection is made before connecting line voltage.**

**Failure to do so could result in property damage, bodily injury or death.**

**8.1) Electronic air cleaner:**

Wire leads are provided to direct 115 volts @ 0.5 Amp maximum to an electronic air cleaner (EAC). Power will be available to the EAC at all times, so it must incorporate a flow proving switch if it is to be wired into the furnace control box. Most modern EACs have the required integral airflow-proving switch. Wire the electronic air cleaner as indicated in figure #6.

**8.2) Humidifier:**

Terminals are provided to direct 115 volts @ 1.0 Amp maximum to the transformer powering the humidifier. The humidifier will be energised anytime the blower is operating on the "Heating Speed". Wire the 115-volt power as indicated in figure #6.

**8.3) Air conditioning:**

An air conditioning coil may be installed on the supply airside only. Also, notwithstanding the evaporator coil manufacturer's instructions, a minimum of 6 inches clearance must be allowed between the bottom of the coil drain pan, and the top of the heat exchanger. Wire

the thermostat and condensing unit contactor as indicated in figure # 6.

#### 8.4) Ductwork and Filter:

##### Installation:

Design and install air distribution system to comply with Air Conditioning Contractors of America manuals or other approved methods that conform to local codes and good trade practices.

When furnace supply ducts carry air outside furnace area, seal return air duct to furnace casing and terminate duct outside furnace space.

Install air conditioning cooling coil (evaporator) on downstream side (in the supply air plenum) or furnace.

If separate evaporator and blower unit is used, install good sealing dampers for air flow control. Cold air from the evaporator coil going through the furnace could cause condensation and shorten furnace life.

##### **CAUTION**

Dampers (purchased locally) **MUST** be automatic.



##### **WARNING**

**Poison carbon monoxide gas hazard.**

**Do NOT draw return air from inside a closet or utility room. Return air duct MUST be sealed to furnace casing.**

**Failure to properly seal duct can result in death, personal injury and/or property damage.**



##### **WARNING**

**Poison carbon monoxide gas hazard.**

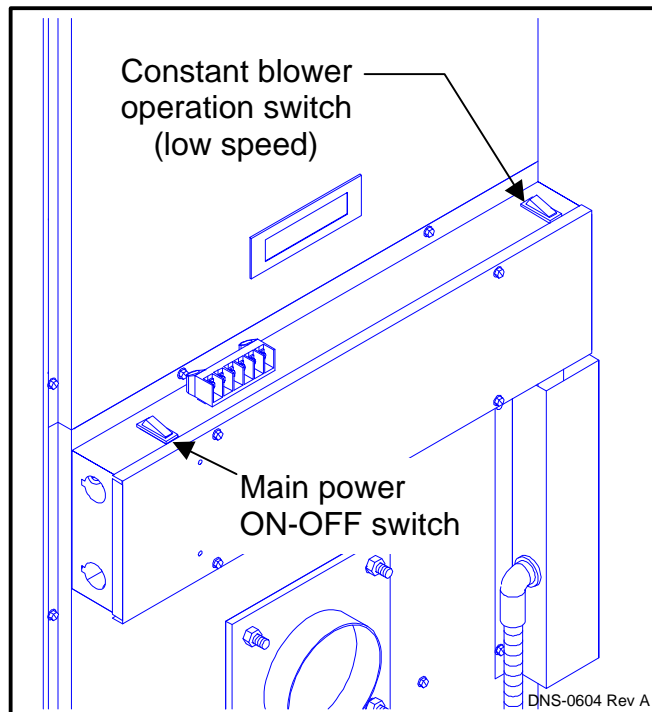
**Install evaporator coil on the supply side of the furnace ducting.**

**Evaporator coil installed in return side ducting can cause condensation to form inside heat exchanger resulting in heat exchanger failure. This could result in death, personal injury and/or property damage.**

## PART 2 OPERATION

### 1) MANUAL OPERATION SWITCHES

FIGURE # 3



#### 2.1) Sequence of operation - Beckett AFII, Side-wall venting:

1. For the Beckett AFII burner, the T-T terminal have to be jumpered on the primary control of the burner.
2. Normally open contact (W-R) on SPDT relay closed when thermostat calls for heat.
3. Burner motor starts and spark is established. The burner motor fan pre-purges the combustion chamber and vent for 15 or 20 seconds, establishing the combustion air pattern.
4. After prepurge period, solenoid valve opens allowing oil to flow through nozzle.
5. The ignition transformer spark ignites oil spray.
6. Cad cell senses flame and burner continues to fire.
7. After fan-limit control heats up to the factory set point, the circulating air blower starts.

8. The circulating air blower, burner motor and ignition transformer remains on until the thermostat is satisfied. Also, the solenoid valve remains open.
9. Thermostat is satisfied.
10. SPDT relay contacts open, solenoid valve closes, burner fan motor post-purges the combustion chamber and vent for a pre-set time (30 sec. to 4 min.). The ignition transformer also continues to spark for this time period.
11. During the post-purge cycle, the fan-limit control cools down to the factory set point of 90 degrees Fahrenheit, and the circulating air blower turns off.

#### 2.2) Sequence of operation - Riello 40-BF, Side-wall Venting:

1. Normally open contact (W-R) on SPDT relay closed when thermostat calls for heat.
2. Burner motor starts. The burner motor fan pre-purges the combustion chamber and vents for 10 seconds, establishing the combustion air pattern. During this time the solenoid valve holding coil pressure will be approximately 100 psig.
3. After prepurge period, solenoid valve opens, allowing oil to flow through nozzle. At the same time, the burner motor's ignition coil produces spark.
4. The ignition transformer spark ignites oil spray.
5. Cad cell senses flame and burner continues to fire. Ignition transformer ceases sparking.
6. After fan-limit control heats up to the factory set point, the circulating air blower starts.
7. The circulating air blower and burner motor remain on until the thermostat is satisfied. Also, the solenoid valve remains open.
8. Thermostat is satisfied.
9. Relay contacts open, solenoid valve closes, and then the burner fan motor post-purges the combustion chamber and vent for a pre-set time (5" breech model only) (0 min. to 6 min.).
10. During the post-purge cycle, the fan-limit control Bi-metal cools down to the factory set point of 90

degrees Fahrenheit, and the circulating air blower turns off.

**NOTE:** With burner relay contact open, the Riello 40-BF will post-purge when 115 volt power is applied to the burner.

### **2.3) Sequence of operation - Beckett AFG and Riello 40-F, chimney:**

1. For the AFG burner, the T-T terminal have to be jumped on the primary control of the burner.
2. Normally open contact (W-R) on SPDT relay closed when thermostat calls for heat.
3. AFG Burner: The motor starts and spark is established. The pump pressure builds and the poppet valve opens admitting fuel to the nozzle. Pressure builds and poppet valve opens, allowing oil to flow through nozzle.

40F: Burner motor starts. The burner motor fan pre-purges the combustion chamber and vent for 10 seconds, establishing the combustion air pattern. During this time the solenoid valve holding coil pressure will be approximately 100 psig. Solenoid valve opens, allowing oil to flow through nozzle. At the same time, the burner motor's ignition coil produces spark.

4. Spark ignites oil droplets.
5. Cad cell senses flame and burner continues to fire. Ignition transformer ceases sparking (Riello R40-F).
6. After fan-limit control heats up to the factory set point, the circulating air blower starts.
7. The circulating air blower and burner motor remain on until the thermostat is satisfied (AFG). The ignition transformer continues to spark (AFG). The solenoid valve remains open (R40-F).
8. Thermostat is satisfied.
9. SPDT relay contacts open, solenoid valve closes (R40-F), burner fan motor shuts down. The ignition transformer ceases sparking (AFG).
10. The fan-limit control BI-metal cools down to the factory set point of 90 degrees Fahrenheit, and the circulating air blower turns off.

### **2.4) Sequence of operation – internal furnace controls (All models) :**

#### **No call for heating or cooling:**

Power is available to the Electronic Air Cleaner (EAC) at all times. Power at L1 enters the common terminal of the single pole double throw (SPDT) relay, and then passes through the normally closed (NC) switch of the relay and continues to the normally closed (NC) switch of the fan control. This provides power to the constant blower operation speed tap on the blower motor if the constant (low speed) blower operation switch is selected to be close. The low speed motor tap would normally be chosen for constant blower operation.

#### **Call for heat:**

Power comes from L1 to the limit control and then leaves the limit control via the red wire to provide power to the burner. RH - W close in the thermostat completing a 24 volt circuit the SPDT relay coil. This relay energises and switches 115 volts power to operate the oil burner.

When the plenum temperature reaches the fan "On" setting, the normally open (NO) fan control contacts close and the normally closed (NC) contacts open. Power then flows to the heating speed tap selected on the blower motor, and to the HUM power lead to supply 115 volts to the humidifier transformer.

#### **Call for cooling:**

Rc - G close in the thermostat completing a 24-volt circuit to the SPDT relay coil. The NC contacts open interrupting power to the fan control. The NO contacts close and power flows to the cooling speed tap selected.

Rc - Y also close in the thermostat completing a 24-volt circuit to the outdoor condensing unit contactor coil. The contactor closes and switches power to the compressor and condenser fan in the condensing unit.

### **2.5) Sequence of operation - DV-2000™ Venting system:**

#### **Normal operation:**

1. Before a call for heat the contacts of the pressure switch are closed.
2. When the room thermostat calls for heat the normally open contact W-R close and the burner blower starts and creates suction in the intake piping circuit and a pressure in the vent piping circuit.

3. The differential pressure setpoint of the pressure switch is not exceeded and the thermostat circuit remains closed until the call for heat has ended.

### Abnormal operation:

#### Start-up:

1. When the room thermostat calls for heat the normally open contact W-R close and the burner blower starts and creates suction in the intake piping circuit and a pressure in the vent piping circuit.
2. If there is a blockage in the intake or vent openings to cause a pressure differential beyond the set point of the pressure switch, then the thermostat circuit is opened and the burner will go into a 2 minute post-purge and then shut down.
3. After the post-purge, once the burner blower shuts down, the pressure switch contacts will re-close. If the call for heat remains, the burner will re-start. If the blockage still exists, the thermostat is again opened, and the burner post-purges again. The post-purge function thus becomes an inherent anti-short cycling device.
4. The unit will essentially go into a continuous re-cycling post-purge mode with no heat being supplied to the dwelling, which will prompt a call for service to the equipment.
5. During the re-cycling post-purges, if the blockage of the terminal is removed, the burner will immediately fire up at the end of the current post purge cycle.

#### During operation:

If the terminal vent or intake openings become blocked to the point where the set point of the pressure switch is exceeded, during a firing cycle, the burner flame will shut down and the burner will go into the indefinite recycling post-purge mode as described above, until the blockage is removed.

## 3) CHECKS AND ADJUSTMENTS

### 3.1) General:

During initial start-up and subsequent yearly maintenance calls, the furnace must be thoroughly tested.

Open the oil bleed port screw and start the burner. Allow the oil to flush into a portable container for at least 10 seconds. Slowly close the bleed screw - the oil should flow absolutely free of white streaks or bubbles

to indicate that no air is being drawn into the suction side of the oil piping and pump. Tighten the bleed screw and the burner will fire. Adjust the oil pressure as indicated in table # 4.

### IMPORTANT

The burner must be put in operation for at least 10 minutes before any test readings are taken. For new installations, set up the burner to the settings (see table # 4), before firing. These are rough adjustments but they will ensure that the burner will start and run smoke-free in advance of the fine adjustments being made.

### 3.2) Restart if Burner Should Stop:

1. Set thermostat lower than the room temperature.
2. Press the reset button on the burner primary control (relay).
3. Set thermostat higher than the room temperature for 10 seconds and set lower than room temperature. This will start pre purge cycle. Repeat twice.
4. Set thermostat higher than the room temperature.
5. If the burner motor does not start or ignition fails, turn off the disconnect switch and CALL YOUR SERVICEMAN

### CAUTION

Do not attempt to start the burner when excess oil has accumulated, when the furnace is full of vapour, or when the combustion chamber is very hot.

Always keep the supply valve shut off if the burner is shut down for an extended period of time.

### 3.3) Combustion chamber curing:

Some moisture and binders remain in the ceramic combustion chambers after fabrication. It is important to clear the chamber of these residues before testing. If you smoke test before curing, the instrument may become damaged. To cure the chamber, run the unit for 3 consecutive cycles, with 3 minutes of elapsed time in between each cycle. Each burn cycle should be 3



minutes duration. The exhaust will have a pungent odor and produce a white cloud of steam.

### 3.4) Perform the smoke / CO2 test:

1. For chimney installations, pierce a test hole in the smoke pipe near the furnace breech. For side-wall vented installations, remove the threaded cap from the extended test pipe that is welded into 4-bolt breech plate. Insert the smoke test instrument probe into the open hole.
2. Starting with a zero smoke reading, gradually reduce the burner air setting until just a trace (#1 on Bacharach Scale) of smoke results.
3. Take a CO2 sample at the same test location where the smoke sample was taken. Note the CO2 reading associated with the #1 smoke condition.
4. For chimney vented installations, adjust the burner air setting to obtain a CO2 reading 1% lower than the reading associated with the #1 smoke.
5. For side-wall vented installations, adjust the burner air setting to obtain a CO2 reading 1.5% lower than the reading associated with the #1 smoke.
6. This method of adjusting the CO2 will allow adequate excess air to ensure that the burner will burn clean for the entire heating season, and will ensure proper calibration of the DV-2000™ blocked intake/ vent safety shutdown system used in side-wall venting applications.

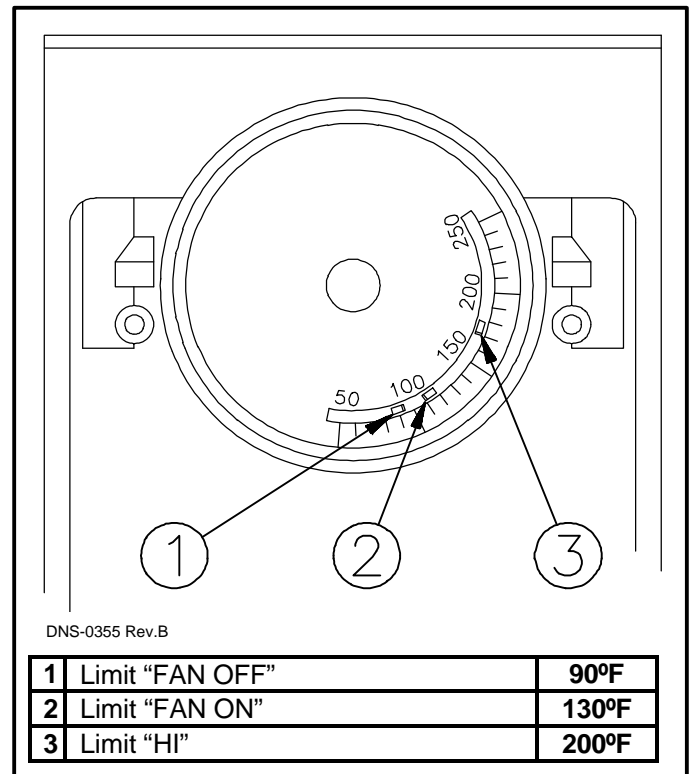
### 3.5) Perform the supply air temperature rise test:

1. Operate the burner for at least 10 minutes.
2. Measure the temperature of the air in the return air plenum.
3. Measure the temperature of the air in the largest trunk coming off the supply air plenum, just “out of the line of sight” of the radiation coming off the heat exchanger; 12” away from the plenum on the main take-off usually satisfies this objective.
4. The temperature rise is calculated by subtracting the return air temperature from the supply air temperature.
5. If the temperature rise exceeds the temperature specified in table # 4, change to the next higher blower speed tap until the temperature rise falls to at this temperature or below. If the excessive temperature rise cannot be reduced by increasing

fan speed, investigate for ductwork restriction(s), dirty or improper air filter, or overfiring caused by excessive pump pressure, or improper nozzle sizing.

### 3.6) Fan limit adjustment:

FIGURE # 4



### 3.7) Vent temperature test:

1. Place a thermometer in the test hole located in the breech pipe.
2. The vent temperature should be between 400 and 575°F. If not, check for improper air temperature rise, pump pressure, nozzle size, or for a badly sooted heat exchanger.

### 3.8) DV-2000™ Blocked intake / blocked vent test:

For side-wall venting the furnace the DV-2000™ venting system incorporates a safety shutdown system that will shut the burner down before a #1 smoke occurs due to the presence of a blocked intake or blocked vent outlet. Test the system as follows:

1. Ensure that the furnace has been running for at least 10 minutes.

2. Gradually block the intake. The burner flame should shut down before a #1 smoke reading occurs.
3. Gradually block the vent outlet. The burner flame should shut down before a #1 smoke reading occurs.
4. If the burner does not shut down before a #1 smoke occurs, ensure that the burner is set up according to Part 2, section 3.4. Perform the CO<sub>2</sub>/ Smoke Test, and allow the 1.5% CO<sub>2</sub> operating headroom required by the instructions.
5. If the burner still does not shut down before a #1 smoke occurs, check for blockage of the pressure hose, or at the hose connection points.

### **IMPORTANT**

The DV-2000™ safety shutdown system will act to shut down the burner flame during a blocked intake or blocked vent condition if and only if the burner has been set up and calibrated in accordance with Part 2, section 3.4. Perform the CO<sub>2</sub>/ Smoke Test. For instance, if the burner is adjusted and final-set to a #1 smoke condition during normal operation, the burner flame can't possibly shut down before a #1 smoke occurs during a blockage condition.

## **PART 3 MAINTENANCE**

### **1) GENERAL**

#### **Preventive Maintenance:**

**“Preventive maintenance” is the best way to avoid unnecessary expense and inconvenience. Have your heating system and burner inspected at regular intervals by a qualified service man.**

After inspection, a complete combustion test must be performed after each annual service of the unit to maintain optimum performance and reliability.

### **! WARNING**

**Electrical shock hazard.**

**Turn OFF power to furnace before any disassembly or servicing.**

**Failure to do so can result in property damage, bodily injury and/or death.**

**Do not tamper with the unit or controls. Call your service technician.**

**Before calling for service, check the following.**

- a. Check oil tank gauge and check if the oil tank valve in oil is open.
- b. Check fuse or circuit breaker.
- c. Check if shut-off switch is “ON”.
- d. Reset thermostat above room temperature.
- e. If ignition does not occur, turn off the disconnect switch and call your qualified service technician.

**When ordering replacement parts, specify the complete furnace model number.**

#### **1.1) Heat exchanger:**

The entire heat exchanger should be inspected annually for soot accumulation. If the burner is operating normally there should very little soot accumulation. If the heat exchanger requires scale removal, use a wire brush first to loosen the scale and then vacuum the soot and scale that has fallen into the secondary heat exchanger (radiator) section. You will find that a 36” long flexible hose attachment will be helpful to reach into the back of the radiator; a piece of 1/2” flexible gas connector, or a piece of 1/2” liquid-tight vinyl jacket metallic electrical conduit works well as a makeshift device.

#### **Cleaning the heat exchanger:**

Remove the 4-bolt flange from the front of the furnace to reveal the clean-out port and check for soot deposits. If there is very little soot in the radiator section visible

from the clean-out port, you will not need to clean it. However, if you notice scaling in the radiator, you should remove the scale.

The wrap-around radiator can now be cleaned entirely from the front inspection port. Also the new furnace has external clean-out ports so the soot does not fall into the fan compartment during the cleaning operation.

### **IMPORTANT**

Do not vacuum the ceramic chambers—they are easily damaged.

Soot will have collected in the first sections of the heat exchangers only if the burner was started after the combustion chamber was flooded with fuel oil, or if the burner has been operating in a severely fouled condition.

## **1.2) Refractory fire pot:**

Remove the burner and check the fire pot.

### **IMPORTANT**

Use extreme care if cleaning of the pot is required. After firing, the pot becomes very fragile. Do not use any commercially available soot remover. This furnace has a fiber type refractory combustion chamber. Normal servicing of this unit does not require cleaning of the combustion chamber.

If the pot is damaged, it must be replaced. A damaged pot could lead to premature heat exchanger failure. Cracking of the fire pot is normal, however, replace the pot if the cracks have propagated more than 2/3 the way through the wall thickness. The average wall thickness of the firepot is 3/4”.

### **Flooding of the fire pot:**

Flooding can occur when the oil primary control has been reset a number of times in a no-heat situation. Each time oil is fired into the pot and does not ignite, it is absorbed in the pot. Even if the burner is removed and the pot is felt for wetness, it is difficult to assess the degree of oil absorption by the pot.

There is only one way to properly service a flooded fire pot, and that is to change it.

### **CAUTION**

If you observe the red warning light on the burner, push once **ONLY** to try and restart. If the burner will not start, phone your authorised service agent. Do not press the button again.

### **Self-aligning firepot:**

- a. The appliance primary heat exchanger is comprised of an upper and lower half. The lower half is essentially a “can” that houses a self-aligning firepot. the firepot will fit into the bottom half in one orientation only.
- b. A slot in the front of the firepot acts as a track that captures a burner tube sleeve that extends into the bottom heat exchanger half. This provides automatic rotational alignment, vertical alignment.
- c. Five tabs around the bottom and four tabs around the top provide automatic centering of the firepot.

### **Removing the firepot:**

The firepot is seldom replaced, but when it must be replaced one must simply :

1. Remove the burner.
2. Remove the burner limit control.
3. Remove the breech plate.
4. Remove the front panel.
5. Remove the brass nuts on the stainless steel heat exchanger studs.
6. Pry the bottom heat exchanger halves apart using the designated prying tabs.
7. Remove the bottom heat exchanger half from the furnace cavity through the front of the furnace.
8. Pull the firepot up and out of the bottom heat exchanger half.
9. Pull the old sealing gasket down off the flange of the upper heat exchanger half.
10. Scrape off any residual gasket material off the heat exchanger mating flanges.

### **Replacing the firepot:**

1. Align the slot in the front face of the firepot with the burner tube sleeve and gently lower the firepot into the bottom heat exchanger half.

2. Holding the firepot near the perimeter, gently push the firepot all the way into the bottom heat exchanger half until it seats.
3. Completely wet the gasket with water using a spray pump bottle, position the tabs over the studs, and push the gasket upward against the sealing flange of the upper heat exchanger half.
4. Install the brass nuts on the studs by engaging only 2 or 3 threads.
5. Position the bottom heat exchanger half underneath the upper heat exchanger half and rotate the bottom half so that the slots in the bolting tabs engage the stainless steel studs. There is no further need to hold onto the bottom half as it will now be suspended on the stud nuts.
6. Push upward on the can and thread the nuts finger-tight as far as possible.
7. Intermittently tighten the brass nuts with a wrench in a sequence that will pull the heat exchanger halves together evenly. Tighten all nuts to 90 inch-lbs Torque once and then alternately re-tighten all nuts again to 100 inch-lbs **THE RE-TIGHTENING SEQUENCE IS ABSOLUTELY NECESSARY TO ENSURE A TIGHT JOINT.**
8. Re-assemble the front panel, breech plate, limit control and burner in opposite sequence to their removal.
9. Follow the instructions for starting the burner for the first time to cure the firepot and perform combustion checks.

### 1.3) Drawer assembly:

Remove the drawer assembly. Clean all foreign matter from the retention head and electrodes. If a Beckett AFG burner has been installed, the burner will have to be removed to check the retention head and to check for proper "Z" dimension with the Beckett "T" gauge supplied with every burner. Check for any sign of oil boiling out of the nozzle and caulking - the solenoid valve could be leaking (if applicable).

### 1.4) Nozzle:

Replace the nozzle with the one specified in table # 4.

### 1.5) Oil filter:

#### Tank filter:

The tank filter should be replaced as required.

#### Secondary filter:

The 10 micron (or less) filter cartridges should be replaced annually.

### 1.6) Air filters:

Air filters are the disposable types. The disposable filters should be replaced on at least an annual basis. Dusty conditions, presence of animal hair etc. may demand much more frequent filter changes. Dirty filters will impact furnace efficiency and increase oil consumption.

### 1.7) Motor lubrication:

Do not lubricate the oil burner motor or the direct drive blower motor as they are permanently lubricated.

### 1.8) CAS-2B combustion air kit (chimney venting):

If used, check the CAS-2B combustion air kit for proper operation. Check to see that the inlet screen is not plugged. Block the air inlet completely and ensure that a zero smoke reading results. If a zero smoke reading is not obtained, set up the burner as indicated in Part 2, section 3.

Gradually block off the intake. The CO<sub>2</sub> should increase by a maximum of 0.5 percentage points at the fully blocked condition. If not, check that the VRV gate is pivoting freely and that the pivot rod is in a horizontal position. Also, check that the counterweight has been properly adjusted in accordance with the CAS-2B installation instructions.

# PART 4 INFORMATION

Model : \_\_\_\_\_ Serial number: \_\_\_\_\_

Date of installation of the furnace : \_\_\_\_\_

Service telephones - day : \_\_\_\_\_ Night : \_\_\_\_\_

Dealer's name and address : \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

## RESULT OF START-UP TEST

Nozzle: \_\_\_\_\_ Pressure : \_\_\_\_\_ lbsi

Burner adjustments :     Primary air     \_\_\_\_\_

                                  Fine air     \_\_\_\_\_

                                  Draw Assembly     \_\_\_\_\_

CO<sup>2</sup> : \_\_\_\_\_ %                   Smoke scale : \_\_\_\_\_ (Bacharach)

Gross stack temperature:     \_\_\_\_\_ ° F

Ambiant temperature:         \_\_\_\_\_ ° F

Chimney draft:                 \_\_\_\_\_ " C.E.

Overfire draft :                \_\_\_\_\_ " C.E.

Test made by : \_\_\_\_\_

**TABLE # 4**  
**Technical specifications**

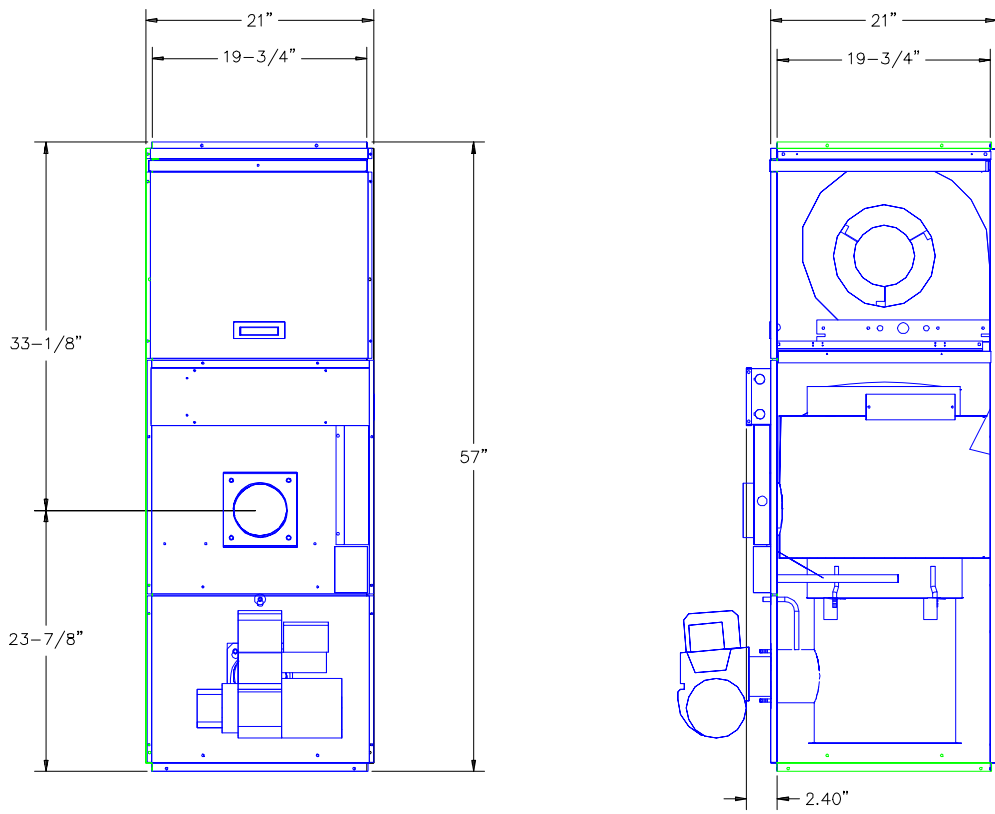
Model : OCF	OCF105A12A			
<b>RATING AND PERFORMANCE</b>				
Firing rate	.50	.63	.75	.72
Pump pressure (PSIG)	100	156	156	145
Input (BTU/h)	70 000	88 200	105 000	100 800
Heating capacity, chimney installation (BTU/h)	58 000	72 500	85 200	
Heating capacity, side-wall installation (BTU/h)	58 200	72 600	85 700	83 000
Minimum - maximum temperature rise	55 - 70 Degr. F			
Stack draft, (Chimney), (Side-wall)	(-0,035 to -0,06) (+0,04 to +0,16)			
Overfire pressure (chimney), (Side-wall)	(0,00 to +0,035) (+0,10 to +0,25)			
<b>BECKETT BURNER, CHIMNEY INSTALLATION</b>		<b>AFG-F0 (insertion tube 5 3/16")</b>		
Low firing rate baffle	Yes	Yes	No	
Static disc, model	2 3/4 #3383	2 3/4 #3383	2 3/4 #3383	
Nozzle (Delavan)	0.50 - 70A	0.50 - 70A	0.60 - 70B	
Combustion air adjustment (shutter / band)	4.5 / 0	8 / 0	7.5 / 0	
<b>RIELLO BURNER, CHIMNEY INSTALLATION</b>		<b>40-F3 (insertion tube 5 3/16")</b>		
Nozzle (Delavan)		0.50 - 60A	0.60 - 60A	
Combustion air adjustment (turbulator / damper)		0 / 3	0 / 4	
<b>BECKETT BURNER, SIDE-WALL INSTALLATION</b>		<b>AFII-85 (insertion tube 4 15/16")</b>		
Nozzle (Delavan)	0.50 - 60W	0.50 - 60W	0.60 - 60W	
Combustion air adjustment (screw / dial)	3 / 1.5	3 / 3	3 / 4.5	
<b>RIELLO BURNER, SIDE-WALL INSTALLATION</b>		<b>40-BF3 (insertion tube 5 3/16")</b>		
Nozzle (Delavan)		0.50 - 60W		0.60 - 60W
Combustion air adjustment (turbulator / damper)		0 / 6		0 / 7.5
<b>ELECTRICAL SYSTEM</b>				
Volts - Hertz - Phase	115-60-1			
Operating voltage range	104 - 132			
Rated current (Amps)	12,2			
Minimum ampacity for wiring sizing	13.7			
Max. fuse size (Amps)	15			
Control transformer	40 Va			
Ext. control power available, cooling and accessories	30 Va			
<b>BLOWER DATA</b>				
Blower speed at 0.5" W.C. static pressure	MED-LO	MED-HI	HIGH	HIGH
Blower speed at 0.25" W.C. static pressure	MED-LO	MED-HI	HIGH	HIGH
Maximum cooling, speed	LOW	MED-LO	MED-HI	HIGH
Maximum cooling, tons @ 5" W.C.	1.5	2	2.5	3
Motor (HP) / number of speeds	1/3 HP / 4 speeds			
Blower wheel size (in.)	10 X 10			

**TABLE # 5**  
**Air delivery - CFM with air filter**

	OCF105A12A	
	EXTERNAL STATIC PRESSURE WITH AIR FILTER	
SPEED	0,25	0,5
LOW	690	640
MED-LO	800	770
MED-HI	1060	970
HIGH	1350	1210



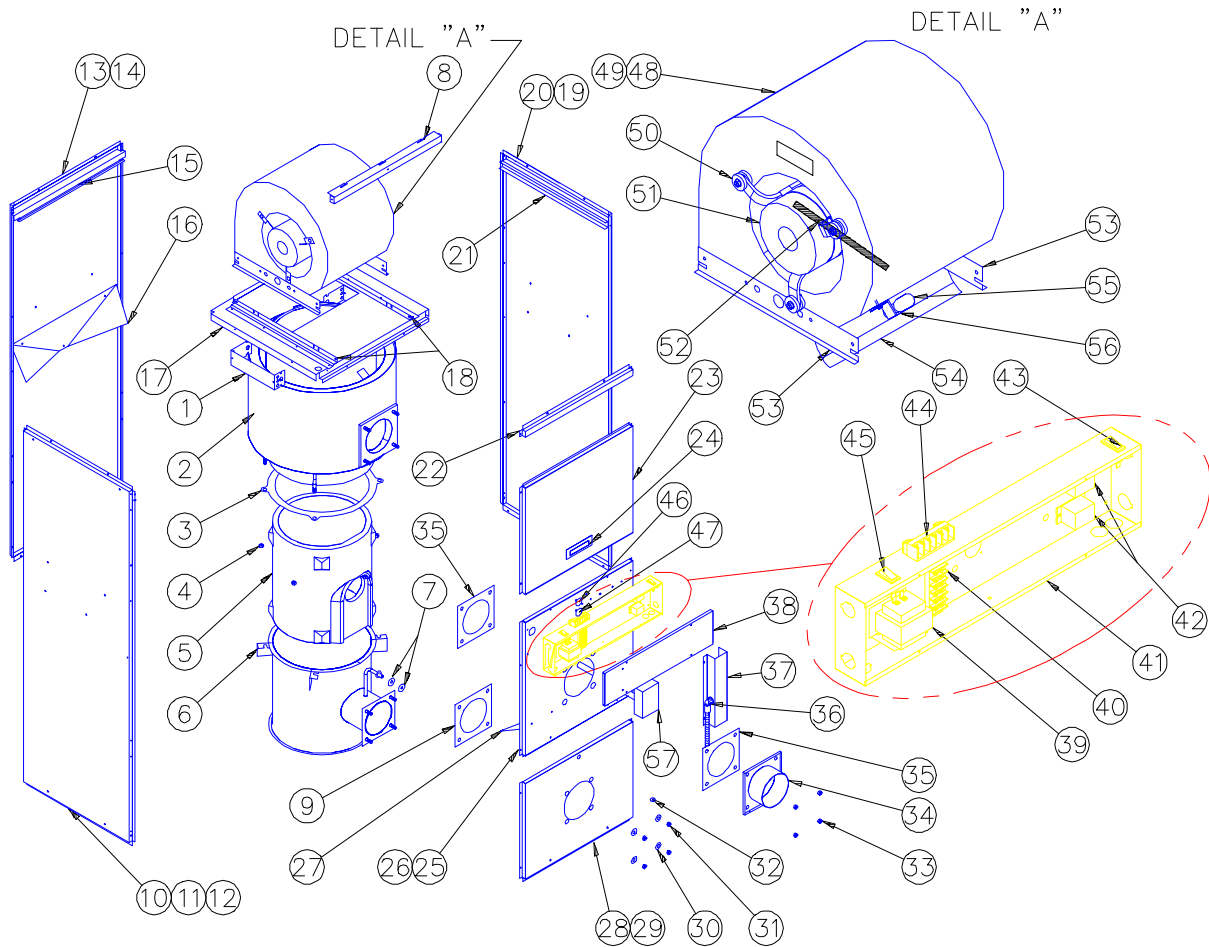
**FIGURE # 5**  
**Model : OCF105A12A**



DNS-0589 Rev. A



**PARTS LIST**  
**Model : OCF105A12A**



DNS-0577 Rev. B

ITEM	DESCRIPTION	MANUFAC.
1	Complet heat exchanger	B30541-01
2	Top heat exchanger	B30542-01
3	Gasket, heat exchanger	B30517
4	Hexagonal flange nut 3/8-16NC brass	F070001
5	Combustion chamber	B30518
6	Bottom heat exchanger	B30464
7	Gasket, overfire pressure tube	B30415-03
8	Front filter drawer	B30582
9	Gasket, burner	B30534
10	Left side panel ass'y	B30550-02
11	Left side panel insulation	B30571
12	Left filter support	B30566
13	Rear panel ass'y	B30549
14	Rear panel insulation	B30572
15	Rear filter support	B30555
16	Rear Baffle	B30564
17	Division panel	B30567
18	Blower slide support	B30513
19	Right side panel ass'y	B30550-01
20	Right side panel insulation	B30571
21	Right filter support	B30566
22	Upper front reinforcer	B30556
23	Blower door ass'y	B30709-02
24	Door handle	Z99F050
25	Center front panel ass'y	B30703
26	Center front panel insulation	B30570
27	Front right baffle	B30569-01
28A	Front left baffle	B30569-02
28B	Bottom front panel ass'y	B30546
29	Bottom front panel insulation	B30573

ITEM	DESCRIPTION	MANUFAC.
30	Washer 3/8" AA zinc	F06F005
31	Hexagonal nut 3/8-16NC brass	F07F024
32	Female cap 1/8" NPT brass	G16F002
33	Hexagonal flange nut 3/8-16NC brass	F070001
34	5" breech plate	B30459
35A	3" breech plate	B30515
35B	Gasket, breech plate	B30415-02
36	Burner electrical kit	B30575
37	Corner conduit	B30557
38	Hexagonal flange nut 3/8-16NC brass	B40098
39	Transformer 120/24 VAC / 40 VA	L01F003-2
40	Terminal strip, 6 positions	A00336
41	Electrical box	B30708
42	Relay SPDT 24VAC	L01H009
43	Rocker switch SPST (constant blow er opera	L07F003
44	Terminal strip, 6 positions	L05F011
45	Rocker switch SPST (main power)	L07F016
46	Thermoswitch 110-10F	R02N011
47	Thermoswitch 160-40F	R02N012
48	Blower weel 10 X 10	Z01L002
49	Blower 10 X 10 (housing and wheel)	Z01I004
50A	Blower ass'y	B01405-01
50B	Motor mount ass'y	B01888
51	1/3 HP direct drive motor (complete w ith leg	B01890-01
52	Blower electrical kit	B30096
53	Blower side rails	B30433
54	Sealing strip	B01291-01
55	5 MF capacitor	L01I001
56	Capacitor holder	B01024
57	Fan limit control	R02I002