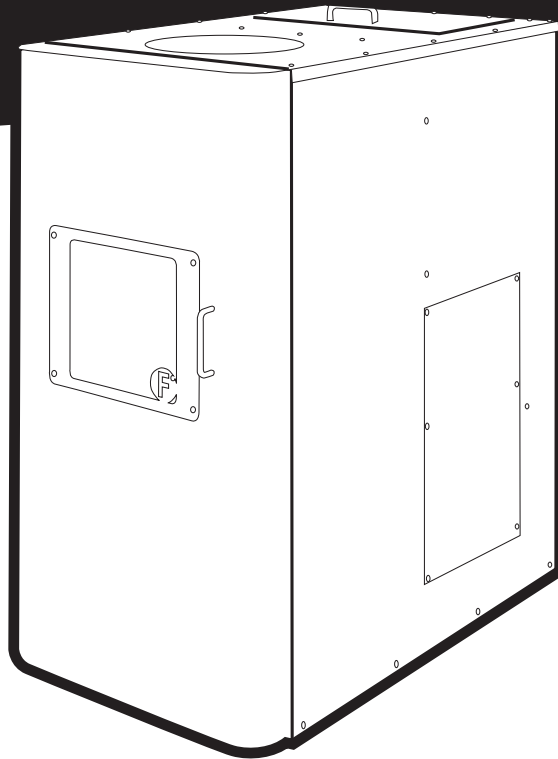




# INSTALLATION & OPERATION MANUAL



Fahrenheit  
TECHNOLOGIES INC

## Endurance<sup>®</sup> 50F Biomass Furnace/Stove

Rev K, Patents Pending

### SAFETY PRECAUTIONS



**SAFETY NOTICE:** A qualified installer must perform installation in order to prevent the possibility of a house fire. Some jurisdictions may require the installer to be licensed or accredited. These installation instructions must be strictly observed. Failure to follow instructions may result in property damage, bodily injury or even death. Please read this entire manual before installation and operation of this unit. Contact the local building officials to obtain a permit and information on any local installation restrictions and inspection requirements.



Tested to UL391 Standards

**SAVE THIS MANUAL FOR FUTURE USE**

# SAFETY INFORMATION

## SAFETY NOTICE

**Please read the entire manual before installing and using your new furnace. Failure to follow instructions may result in property damage, bodily injury, or even death.**

- The 50F is intended for residential interior applications as a stand-alone furnace, add-on furnace or as an in-room stove. Many insurance companies prohibit the use of a solid-fuel furnace as a primary furnace; consult your specific policy/application.
- Keep a fire extinguisher or water hose close by the furnace for safety.
- Familiarize yourself with all local building and safety codes before installation.
- The installation instructions and code requirements must be followed exactly.
- Prior to installation, have your chimney inspected by a qualified inspector to make sure it is clean, in good condition and operating properly.
- Do not allow anyone to operate this furnace that is not familiar with the proper and safe use of the furnace.
- Create a barrier between the furnace and any area where children may be playing. Never leave children unattended in the furnace or stove area.
- Wear protective clothing, such as leather hearth gloves and safety glasses while tending the fire.

## Safety Testing

This furnace has been tested by Intertek Test Laboratories in accordance with the following standards – 1482/ASTME 1509/ULC S627 covering Room Heater and Mobile Home installations. CSA B366.1-M91, UL 391-99 covering Central/Supplementary Furnace installation to included Canadian installations. Please refer to label on furnace for safety related information.

### Caution:

The 50F furnace's exhaust system works with negative combustion chamber pressure and slightly positive chimney pressure. Therefore, it is imperative that the air intake and exhaust system be airtight and installed correctly. Do not install a flue damper in the exhaust vent of this unit. Do not connect this unit to a chimney flue serving another appliance.

### CAUTION:

Failure to follow the instructions in the installation manual may result in a house fire. Please follow installation and maintenance instructions.

### WARNING:

Burning improper fuel (i.e. charcoal) can result in Carbon Monoxide poisoning, which may lead to sickness or death.

## Building Permit

Contact local building officials to obtain a permit and information on local installation restrictions and inspection requirements.

## Disclaimer of Warranty

**Fahrenheit Technologies Inc. has no control over the installation of the furnace. Fahrenheit Technologies Inc. grants no warranty for the installation of the furnace and assumes no responsibility for any special, incidental or consequential damages.**

### Manufactured By:



**Fahrenheit**  
TECHNOLOGIES INC

526 East 64th Street  
Holland, MI 49423

**FAILURE TO FOLLOW INSTALLATION REQUIREMENTS  
WILL VOID ALL WARRANTIES.**

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# INTRODUCTION

*For use in the U.S. and Canada, mobile home approved.*

*Check with local authorities and obtain needed permits.*

***Installation is to be performed by a  
qualified professional.***

## Unpacking the Furnace

Remove two bolts underneath that hold the unit to the skid for shipping. These bolts can be used for mobile home installation. The front door handle will need to be installed with the screws provided. (See figure 2).

## Before Starting The Furnace For The First Time

1. Outside air is required. Use only approved parts. Check that the outside air inlet is connected to draw fresh air from outside the building.
2. All joints of PL vent and single wall stainless steel pipe should be fastened by at least 3 screws and correctly installed. (Follow vent manufacturers' recommended instructions). Seal all joints with high temperature silicone to create an airtight seal.

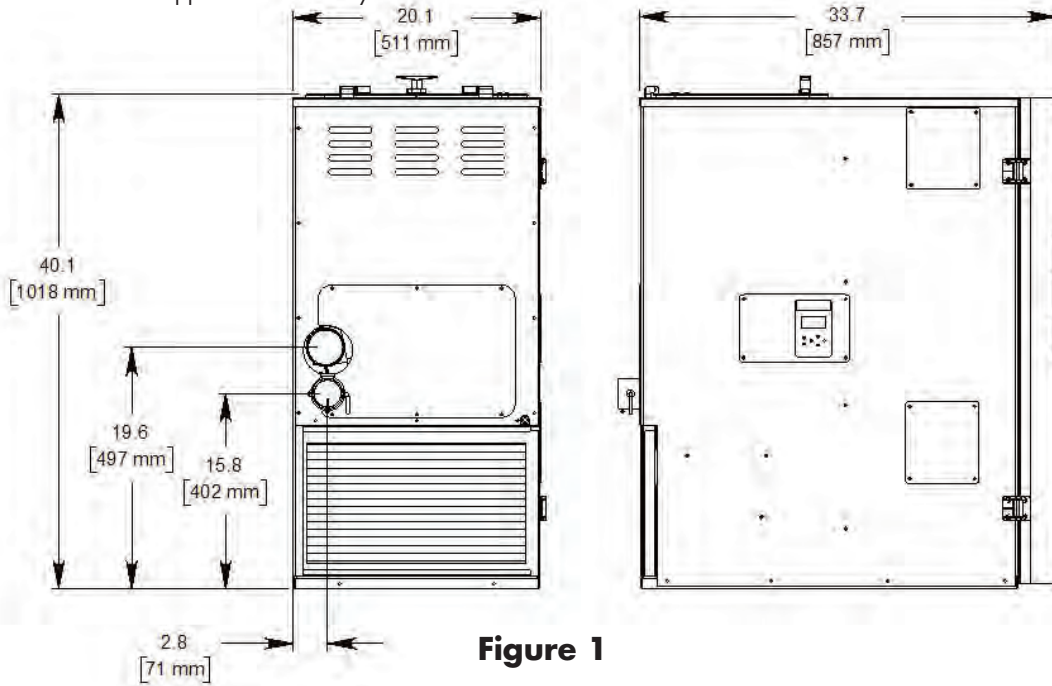
### **WARNING**

The high temperature paint on this furnace may take several hours of burning at a high fuel setting to fully cure. During this time, an odor that is not harmful may be evident. When odors are present, the area around the Furnace should be well ventilated.

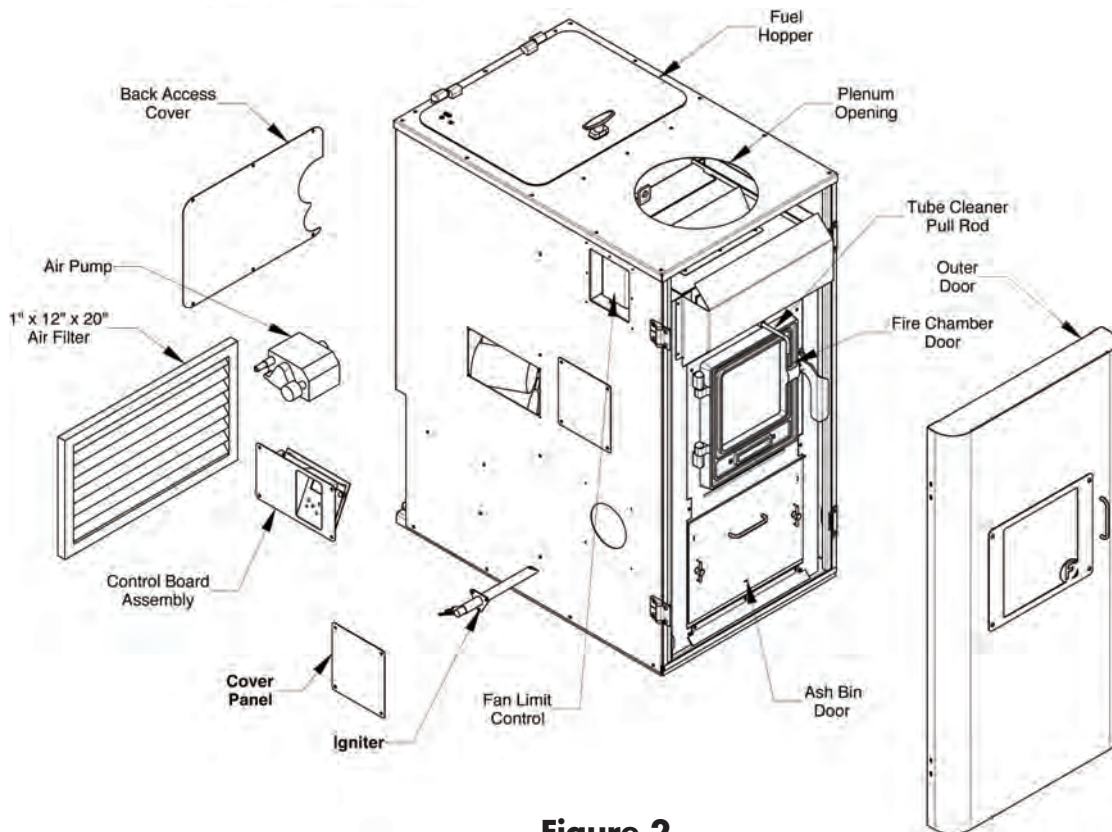
### **CAUTION**

The high temperature paint can be easily scratched prior to the first time the furnace is lit.

The Endurance 50F furnace is designed with a software-controlled, patent pending pot cleaning system that is hands free, which means less daily maintenance. The automatic operation is based on the amount of fuel fed into the burn pot; the controller also monitors this. Once the set amount has been reached, the unit will cycle in the cast re-light plate. The fuel now falls on this plate and is ignited by the lower flame. After it is ignited the pot pusher will push forward and return twice to disperse the ash. When the pot pusher has returned the second time, the cast re-light plate will retract, dropping the new fire into the cleaned out pot area. This all happens automatically so the user does not have to monitor as often.



**Figure 1**



**Figure 2**

# LOCATION

## Installation Location

### Consider the Following

The front door opens smoothly to allow access to the ash pan and the fire chamber door for routine maintenance. The Control Board is mounted on the left side. There are also 2 access panels on the left side. The upper cover gives you access to the Fan Limit Control. The lower cover gives you access to the igniter. The right side access panel allows for removal of combustion blower and proof of flame switch. Removing the air filter and brackets will allow access to the convection blower. Removal of the rear maintenance panel will allow access to the actuators and auger motor.

*Surge protector is recommended!*

**Supply Air.** The 50F furnace may be connected to a gas, oil, or electric/heat pump system with existing duct work.

**Return Air.** The furnace does not need to be connected directly to the existing cold air return system, but it is recommended.

**Venting.** The location should be as close as possible to an outside wall for venting purposes. The furnace has a 3" collar; therefore the use of a 3" to 4" increaser will be required. The furnace must be vented with a 4" diameter vent system. The shortest vent system with minimal elbows is the best.

**Electrical.** This unit requires 115v. and comes with a 6 ft. AC Cord.

- Refer to marking on the furnace for additional information.

## Installation Requirements

### Clearances and Access for Service and Maintenance

#### Floor Protection

The furnace should be installed on a non-combustible surface extending 16" in front of the unit and 6" on either side. Chimney connectors must have floor protection underneath extending 2" either side.

**Right Side** – 2" minimum clearance from combustibles and/or 24" to allow for furnace maintenance.

**Left Side** – 24" minimum clearance from combustibles and to allow for furnace maintenance.

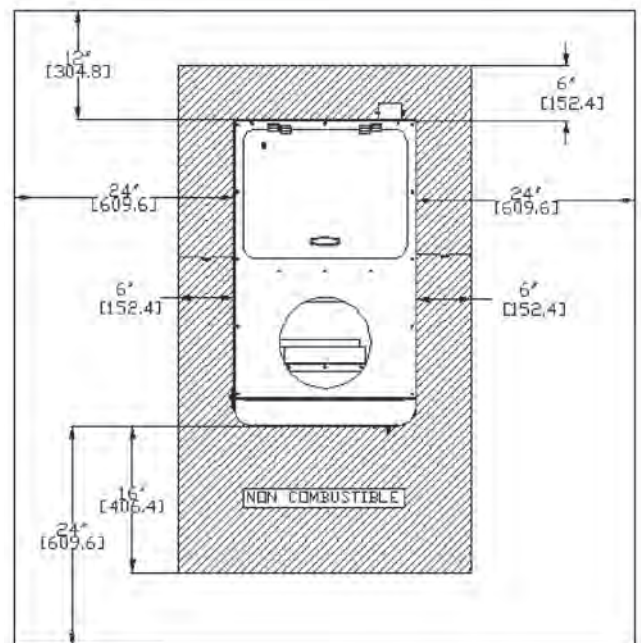
**Front** – 24" minimum clearance from combustibles and to allow furnace maintenance.

**Back Side** – 6" minimum clearance from combustibles and/or 12" to allow for furnace maintenance.

#### Access for Service and Maintenance

The clearances shown above are for maintenance and are only recommendations; user may use own discretion.

Clearances to combustible must be maintained.



**Figure 3**

# VENTING

## CAUTION:

- Installation is to be performed by a qualified installer or dealer.
- Adhere to all clearances specified by the manufacturer of the venting system used.
- Adhere to all clearances specified in the installation instructions of this furnace.
- Do not install this unit in a sleeping room.

*NOTE: Condensation from a bio furnace is detrimental to the venting system. Only buy venting systems that are warranted with burning corn and other bio fuels.*

- When planning the installation of your furnace, keep in mind that condensation is detrimental to exhaust systems. Bio fuels have a high moisture content and can be more susceptible to condensation forming in certain types of installations. Install the furnace with minimum piping exposed to the cold temperatures outside the PL envelope of the house.
- Check with the manufacturer of your venting system to see that they honor the warranty of their PL vent with the use of corn and other bio fuels.
- **The longer the vent pipe and the more elbows that are used, the greater the flow resistance. Each elbow or tee is equal to 5 feet of straight pipe. Because of this we recommend using as few elbows as possible and a maximum of 20 feet of piping. It is recommended that the vent system be installed with a minimum of three feet (3') of vertical rise above the exhaust port on the back of the furnace. It is recommended to get the vertical rise while still in a heated area to reduce exterior piping. Failure to provide the natural draft that results from a vertical rise may result in smoke being released into the house when electricity to the unit is interrupted while burning or smoldering fuel remains in the burn pot.**
- Approved corn/pellet furnace venting materials are:
  - 1) PL vent, a double wall vent with a stainless steel liner
  - 2) Single wall rigid or flexible stainless steel pipe. In this manual, approved venting will be referred to as a "PL vent" or "single wall vent."
- All single wall vent adapters must be stainless steel. Flex pipe should be stainless steel, 4-ply construction with a total thickness of approximately .07 inches.
- Single wall stainless steel may be used inside an existing chimney. (No clearances to combustibles are needed on single wall stainless steel adapters, rigid, or flex pipe installed within a chimney).
- **A clean out "tee" (PL vent or "Quick-Connect Exhaust") must be installed directly to the furnace and at the bottom of each vertical run of the exhaust system. These tees are to assist in periodically cleaning the pipe. Single or double clean-out tees may be used.**
- For a venting system ending in a horizontal run, the exhaust pipe must be terminated by a listed end cap or a PL vent elbow (45 or 90 degrees). Note: End caps or elbows must vent exhaust gases away from the building.
- For termination above the building roofline, a rain cap is required.
- The exhaust flange is 3" diameter to accommodate a pipe adapter. The use of a 3" to 4" increaser section or increaser tee will be required. Increaser tees are available that have a 3" pipe to branch and 4" pipe to body.
- The furnace must be vented with a 4" dia. vent system.
- All joints for connector pipes are required to be fastened by three screws.
- **If vented horizontally, joints should be made gas tight in a manner that should be specified.**

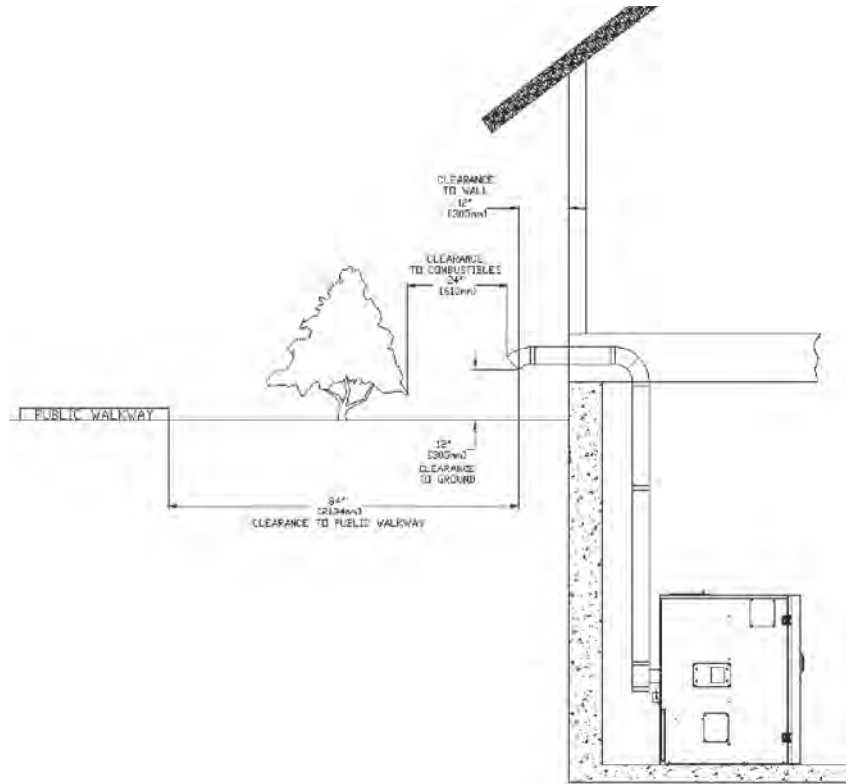
*NOTE: Adhere to PL vent clearance to combustibles as required. Strictly observe manufacturers guidelines.*

*NOTE: Type "B" gas vent must not be used in the installation of this furnace. The exhaust must be installed so the entire system can be cleaned without disassembly.*

# Termination Requirements & Clearances

In determining optimum vent termination, carefully evaluate external conditions especially when venting directly through a wall. Since you must deal with odors, gases and fly ash, consider aesthetics, prevailing winds, distances from air inlets and combustibles, location of adjacent structures and any code requirements.

1. Exhaust must terminate above combustion air inlet elevation.
  2. Do not terminate vent in any enclosed or semi-enclosed area, (i.e. carports, garage, attic crawl space, etc.) or any location that can build up a concentration of fumes.
  3. Vent surfaces can get hot enough to cause burns if touched by children. Non-combustible shielding or guards may be required (Figure 4).
- 4' (1.2 m) BELOW a door, window, cavity, or air vent
  - 4' (1.2 m) HORIZONTALLY FROM a door, window, cavity, or air vent
  - 1' (305 mm) ABOVE a door, window, cavity, or air vent

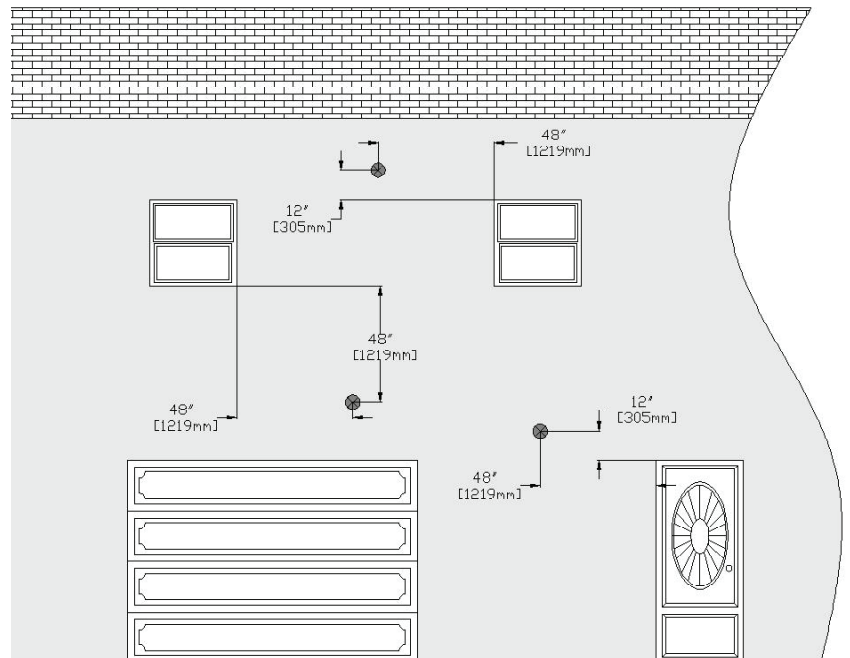


**Figure 4**

## Install Vent at Clearances Specified by the Vent Manufacturer.

The exhaust termination location must be at least

- 1' (305 mm) ABOVE the ground level
- 7' (2.1 m) FROM a public walkway
- 1' (305 mm) FROM the wall penetration point
- 2' (610 mm) FROM any adjacent combustibles such as: adjacent buildings, fences, protruding parts of the structure, roof eaves or overhangs, plants, shrubs, etc.



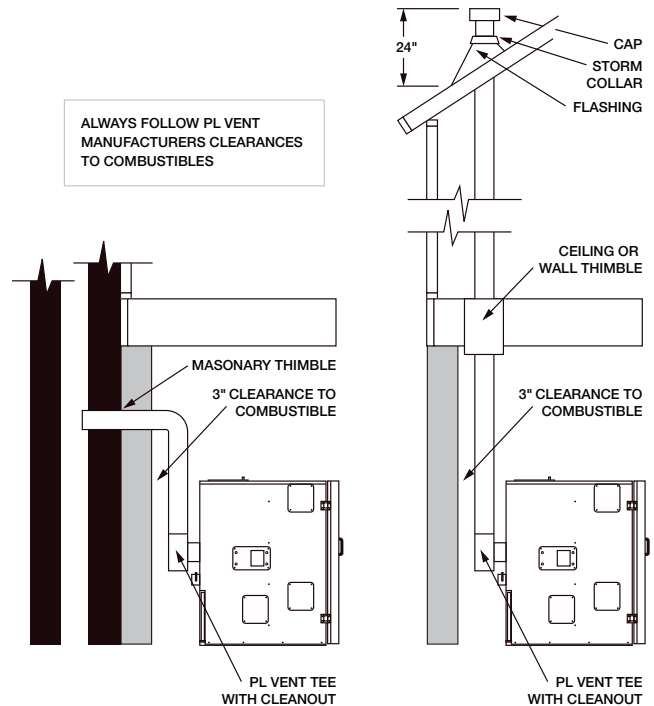
**Figure 5**



# Venting into an Existing Chimney

The 50F furnace may be connected to an existing Class A chimney or a masonry chimney which meets the minimum requirements of NFPA 211.

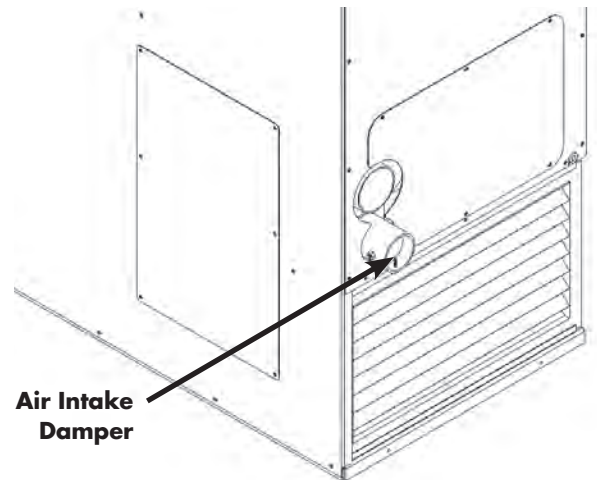
1. If the furnace's exhaust is connected to a masonry chimney, the masonry chimney must be free of cracks that could leak exhaust gases or fly ash. A relining of the chimney with either PL vent or single wall stainless steel pipe may be necessary to bring the chimney into compliance.
2. When chimneys are relined, a chimney chase cap that reduces the outlet of the chimney to the size of the liner is required. Extend the exhaust vent above the chimney chase cap and finish it off with a rain cap. A single wall liner may need to be wrapped with insulation to maintain adequate exhaust temperatures when outside temperatures drop below freezing, causing the flue temperatures to become too low.
3. Venting into the side of an existing masonry chimney must be done through a masonry thimble. When wall penetration is necessary to access a masonry chimney, use a listed PL vent wall thimble. Chimney connectors should be made with minimum 24 Gauge black or blue steel.
4. When venting into a Class A steel chimney, use an appropriate PL Vent adapter.



**Figure 6**

## Combustion Air

- Outside air is required.
- Outside air may be drawn from a semi-enclosed attic or crawl space or any semi-enclosed space. Take care not to draw cold air past water pipes that may freeze.
- Use 3" or greater flexible or rigid metal piping.
- Terminate the outside air pipe below the exhaust vent outlet.
- An open mesh screen should be placed over the outside air pipe opening to prevent birds or rodents from nesting in the opening. Use an elbow or shield to prevent prevailing winds from blowing directly into the outside air intake pipe. NOTE: Mesh screen should be no smaller than one-fourth inch (1/4") by one-fourth inch (1/4").



**Figure 7**

**⚠ WARNING**

Outside combustion air is required for all installations!

*NOTE: The outside air pipe must terminate above the maximum snow line. Long runs should be avoided.*

**⚠ WARNING**

Use the air intake damper for adjusting combustion inlet air only! Other methods of restricting or blocking combustion inlet air are strictly prohibited!

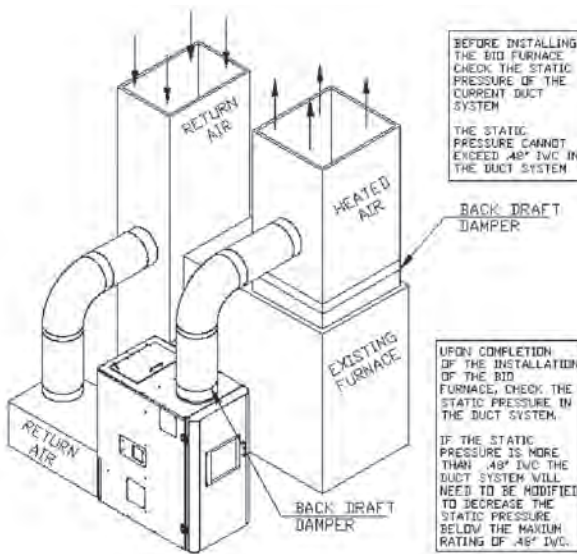
# INSTALLATION

## Connecting to Existing Duct Work & Furnaces

The 50F is approved to connect to the existing ductwork of a gas, oil or electric/heat pump furnace with a minimum rating of 40,000 to 100,000 BTU. The ductwork of the furnaces may not be hooked in series with each other. This means the warm supply air of the 50F furnace may not be hooked into the cold air return of the existing furnace. See example in figure 8. The cold air return of the 50F furnace is connected to the return air duct of the existing furnace.

**Minimum Duct Size**

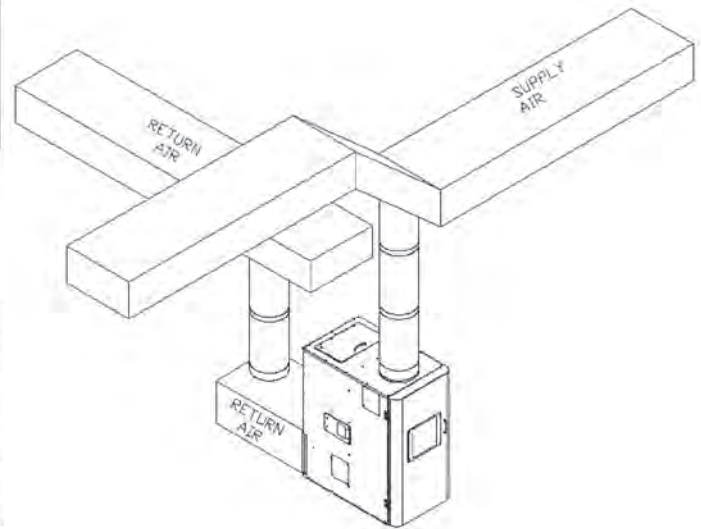
Round: 10"  
 Rectangular: 6" x 15"  
 Intake Air Duct should be 10% larger  
 Maximum Static Pressure: .45" for supplementary and .48" for central hookups.



**Add-On Furnace**

BEFORE INSTALLING THE 50F FURNACE CHECK THE STATIC PRESSURE OF THE CURRENT DUCT SYSTEM. THE STATIC PRESSURE CANNOT EXCEED .45" IWC IN THE DUCT SYSTEM.

UPON COMPLETION OF THE INSTALLATION OF THE 50F FURNACE, CHECK THE STATIC PRESSURE IN THE DUCT SYSTEM. IF THE STATIC PRESSURE IS MORE THAN .48" IWC THE DUCT SYSTEM WILL NEED TO BE MODIFIED TO DECREASE THE STATIC PRESSURE BELOW THE MAXIMUM RATING OF .48" IWC.



**Stand-Alone Furnace**

**Figure 8**

The warm air supply of the 50F furnace connects to the supply plenum of the existing furnace. Back draft dampers must be used in the 50F warm air duct and in the warm air plenum of the existing furnace to prevent the airflow from reversing. The use of back draft dampers are not required for stand-alone installations. It is recommended to enter the supply plenum of the existing furnace above the air conditioning A coil. If the materials used for the warm-air supply duct must have a minimum temperature rating of 250° F. The plenum of the 50F furnace must be constructed of metal. This unit is not to be connected to a chimney flue serving another appliance. Once installed, check the static pressures in the ductwork to make sure they do not exceed the limits of the existing central furnace or of the 50F furnace (.45"). Running both furnaces at the same time should not cause any nuisance tripping of the high limits in either unit. If being used as central heating, connect to existing duct work with maximum static pressure of (.48").

Follow all instructions when connecting to existing ductwork. Connecting the warm air supply to the cold air return may cause harm to the existing furnace and may void the warranty of both the existing furnace and the 50F furnace.

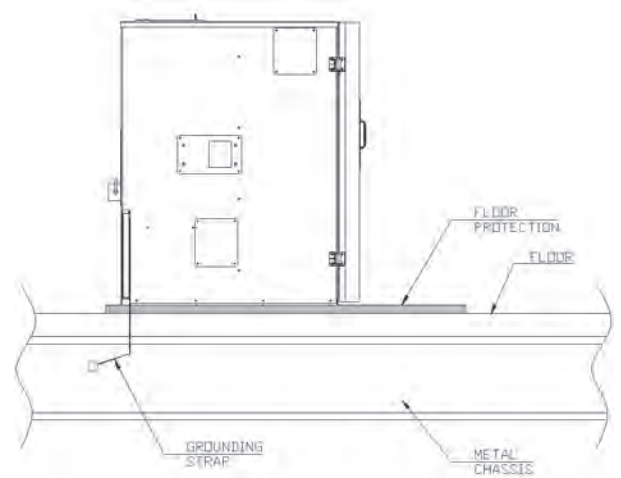
**⚠ CAUTION**  
 Do not connect the 50F Furnace to a down flow furnace system.

**⚠ CAUTION**  
 Do not connect an air conditioner to the furnace.

**FAILURE TO FOLLOW INSTALLATION REQUIREMENTS WILL VOID ALL WARRANTIES.**

# Mobile Home Installation

1. Permanently bolt the furnace to the floor.
2. Electrically ground the furnace and pedestal to the metal chassis of the home. Use a number eight (8) gauge or larger copper wire.
3. Maintain an effective vapor barrier at location where PL vent exits the structure.
4. Check any other local building codes or other codes that may apply.
5. Do not use components other than those specified for use with this unit.
6. Floor protection requirement must be followed precisely.
7. PL vent must be used for exhaust venting. Single wall vent is not allowed. Follow PL vents manufacturer's installation directions and observe all listed clearances to combustibles.



**Figure 9**

**⚠ WARNING**

Do not install in a sleeping room.

Combustion air must come from the outside of the mobile home! Failure to do so may create negative pressure within the mobile home and could disrupt proper venting and operation of the furnace.

The structural integrity of the floors, walls, ceiling and roof must be maintained.

Installation should be in accordance with manufactured home and safety standard (HUD), CFR 3280, part 24.

# Installation as a Stove

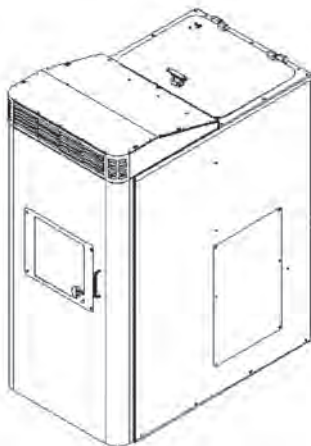
**⚠ WARNING**

Do not install in a sleeping room.

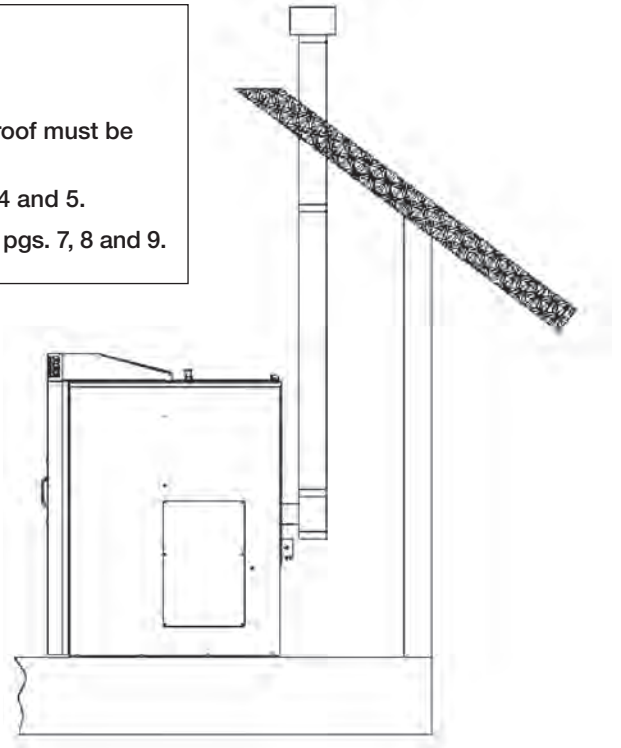
The structural integrity of the floors, walls, ceiling and roof must be maintained.

Installation must follow clearances shown in figures 3, 4 and 5.

Installation must follow venting procedures outlined on pgs. 7, 8 and 9.



**Optional Diffuser CS1-7100**  
converts the 50F bio-mass furnace into a stand-alone stove.



# Connecting To The Thermostat

## Wiring Connections

Please read the section covering thermostat control for operation. To connect a thermostat, secure the wires from the thermostat to the internal wire terminal located on the backside of the 50F Furnace control board. A certified technician should do this. The internal terminal has been pre-wired to the control board.

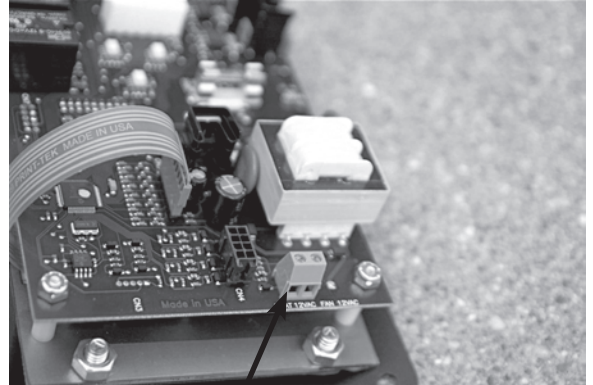
*NOTE: Installers must determine a neutral location to mount the thermostat for accurate room temperature measurements.*

### CAUTION

This unit will only operate with the hopper lid closed. Failure may result in emission of products of combustion from the hopper under certain conditions. The hopper lid needs an adequate seal to the unit.

Do not attempt to run the unit during a power failure.

*NOTE: For installations requiring an external thermostat, the 50F furnace must be connected to an approved external thermostat.*



**Figure 10**

**FAILURE TO FOLLOW INSTALLATION REQUIREMENTS  
WILL VOID ALL WARRANTIES.**

# APPROVED FUEL TYPES

*NOTE: This furnace is approved only for corn, wood and grain pellets, wheat and cherry pits.*

## Corn, Wheat and Grain

Shelled corn, wheat and grain pellets must have **16% or less moisture content. The keys to satisfactory performance are proper operation of the furnace, diligent maintenance, and burning only dry, clean, quality fuel. These fuels must be screened to remove dust prior to using.**

***NOTE: Excessive grain dust must be screened by sifting with mesh screening. Large pieces of cob may plug the auger.***

Clinkers and ash are by-products of burning biomass fuels and are not caused by your furnace. Furnace performance is reduced if poor quality fuel is used. Using a thermostat will cause variations in the maintenance. Check the burn pot frequently in the beginning to establish a maintenance schedule based on fuel use and burn rates. Contact your dealer for more information on where to get high quality biomass fuels to burn in your furnace. Store fuel in an air tight container or use other methods to ensure they do not become rain soaked or absorb moisture from damp or wet floors. This will also prevent rodents from becoming a problem. Do not store fuel within furnace installation clearance areas or within the space required for ash removal. The 50F furnace is not warranted against damage caused by poor quality fuel, incorrect operation, poor maintenance or incorrect installation.

## Wood Pellets and Cherry Pits

Contact your dealer for more information on APFI approved wood pellet fuels. No standard exists for cherry pits.

## Fuel Selection Screen

### Fuel Type:

1. High Ash
2. L Wheat
3. Wheat
4. HM Corn
5. Corn
6. LM Corn
7. Cherry Pit
8. LG Pellet
9. S Pellet
10. P Pellet

### Fuel Description:

High Ash = Any High Ash Fuel  
L Wheat = Lower Wheat  
Wheat = Normal Wheat  
HM Corn = High Moisture Corn (16 - 14%)  
Corn = Normal Corn (15 - 13%)  
LM Corn = Low Moisture Corn (14 - 12%)  
Cherry Pit = Cherry Pits  
LG Pellet = Low Grade Pellets  
S Pellet = Standard Pellets  
P Pellet = Premium Pellets

# OPERATING INSTRUCTIONS

*Proper installation is essential for safety, effective operation, warranty coverage, insurance requirements and to meet local building codes. Installation requirements are described in the first section of this manual. Verify the installation, including venting, is correct before starting the furnace for the first time.*

## Follow These Operating Instructions Exactly as Stated to Ensure Safe and Reliable Operation.

If you have difficulty adjusting the 50F furnace, contact your dealer or technical support.

1. Carefully read this "Installation and Operation" manual in its entirety before starting your furnace for the first time.
2. Obtain final inspection and approval of installation from local building officials.
3. Have your dealer demonstrate all the operational and maintenance steps necessary for proper use of the furnace. Sign and return the warranty card to the address listed on the back page.
4. Some odors may be given off during the first few hours of burning during initial break-in. These odors are normal and not harmful. However, ventilating the room until the odors disappear is recommended.
5. The furnace will become hot while in operation. Keep children, clothing and furniture away from all hot surfaces. **WARNING:** Direct contact with the furnace fire chamber during operation may cause severe burns to a person's skin.
6. To avoid the possibilities of smoke and/or spark entering the room, always keep fire chamber door and ash pan drawer secured whenever the furnace is operating.
7. A certain amount of carbon monoxide may be produced within the furnace as a by-product of combustion. All exhaust vent connections must be sealed with high temperature silicone to assure an air tight seal. Any leaks into a confined area caused by faulty installation or improper operation of the furnace could produce dizziness, nausea, and in extreme cases, death.
8. Smoke detectors installed in the same general area as the furnace, may be activated if the furnace fire chamber door is left open and smoke is allowed to enter the area.

### **CAUTION**

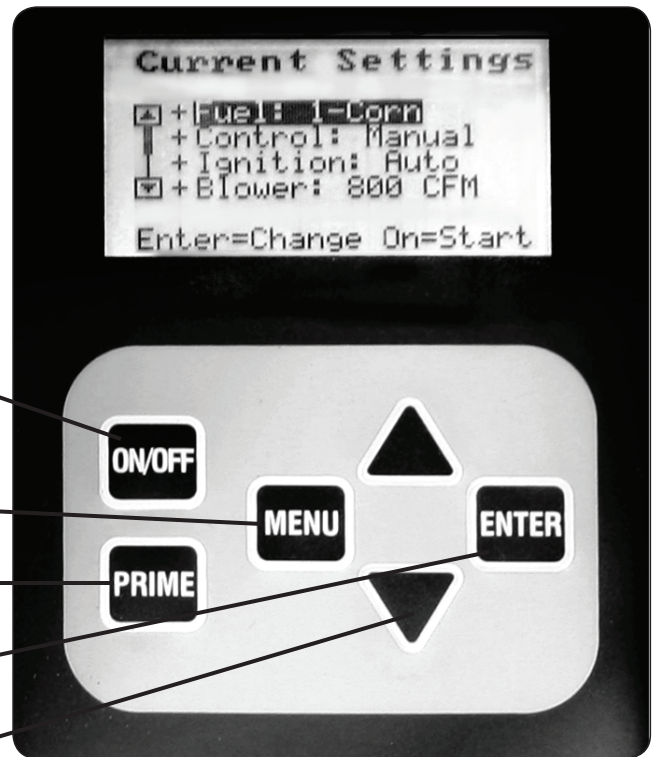
- Hot surfaces
- Keep children away
- Do not touch during operation
- Never add fire starter to a hot furnace

# CONTROL BOARD FEATURES

The LCD Control Board controls all functions of the furnace by monitoring system sensors. These sensors serve two purposes:

- A. General Operation of the Furnace.
  - B. Safety Features that shut the unit off in the event the sensors detect a problem.
- The Control Board also has diagnostic capabilities to help in troubleshooting. The buttons on the board function as follows: (Refer to Figure 11)

- A. **On/Off** – Press for 1 second initiates start-up. Press for 1 second while running initiates shutdown. SHUTDOWN DISABLED WHILE SELF CLEANING IS IN PROGRESS.
- B. **Menu** – Returns the screen to the Menu.
- C. **Prime** – Allows the user to manually feed fuel into the burn pot on start up when needed. This is particularly helpful in priming the Auger Tube when it is empty.
- D. **Enter** – Selects the highlighted Menu item (for example, LM Corn).
- E. **Arrows** – For scrolling up or down the Menu items.



**Figure 11**

*NOTE: Auger will not operate with hopper lid open.*

## Modes and Operating Description

The following diagram (page 16) displays the Menu and Sub-menu options available on the Endurance 50F. You may need to make adjustments to best suit your heating requirements.

1. **Fuel Type** – See page 13.
2. **Temp Control** – Cycles between Manual Heat Control, Thermostat Heat Control and Fuelmizer.
3. **Ignition Mode** – Cycles between Manual and Automatic Ignition. Manual ignition is not normally required unless the ignitor has malfunctioned. See page 18.
4. **Main Blower Speed** – 600 CFM Switch Off, 800 CFM Switch Off, 600 CFM or 800 CFM. With switch off enabled, the blower is shut off when the outer door is opened.
5. **Auger Trim** – Allows fine tuning of feed rate for the heat level 1 setting. This increases or decreases the amount of fuel fed on heat level 1. Auger Trim level 3 is factory default.
6. **Draft Trim** – Allows for fine tuning of the combustion fan for the heat level 1 & 2 settings. This increases or decreases the airflow on heat level 1 & 2. Draft trim level 3 is factory default.
7. **Maintenance Mode** – Activates functions for Pot removal.

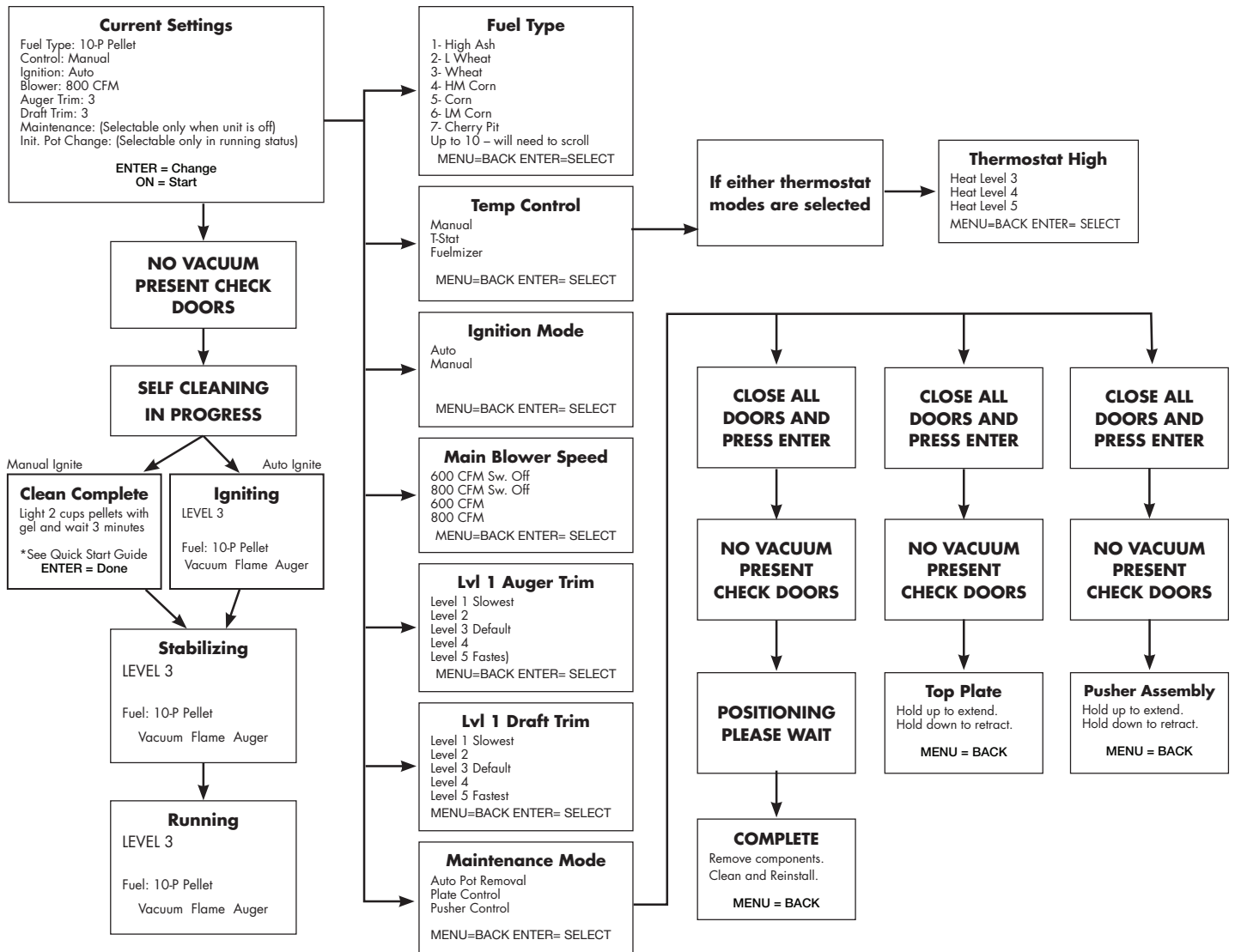
### **WARNING**

- The auger can start at any time while the furnace is running.
- Fuel is fed from the hopper to the burn pot by a high torque motor that is capable of doing serious harm to fingers.
- Do not manually over fill burn area during operation, which can cause overfiring.

### **DANGER** Risk of Fire or Explosion

- Do not operate with the fire chamber door or ash pan drawer open.
- Do not store fuel or other combustible material within marked Installation Clearances.
- Inspect and clean flues and chimneys regularly.
- Do not burn garbage, gasoline, drain oil or other flammable liquids in the unit.

# CONTROL BOARD OPERATION



*NOTE: When using Fuelmizer Mode, after 60 minutes with no call for heat the unit will shutdown and restart when heat is again required.*

*NOTE: With door switch off enabled the main blower will turn off while the front door is open. This is to help to keep the dust from the Fire door and Ash pan blowing during cleaning.*

*NOTE: If front door is left open with door switch off enabled with fire in the furnace, the blower will turn back on in 2 minutes if the fan limit control is warm enough for the blower to run. Do not leave the furnace unattended with the door open.*

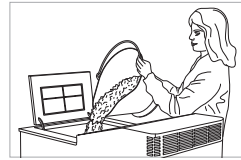


# AUTO IGNITION

1. **Make sure the Endurance has been properly installed and plugged into a standard 115V outlet.**

2. **Fill the Fuel Hopper**

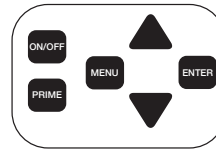
- a. Make sure the Endurance hopper has adequate fuel, filled to near the top, and the lid is closed. The lid must be closed for the feed auger to operate.
- b. Confirm the ash pan is secured and the fire chamber door is closed.



3. **Prime the Unit**

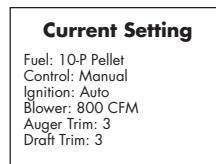
Press and hold the Prime button until the auger is fully 'primed' and your fuel (corn, pellets, etc.) begins to feed into the burn pot. This may take 2-3 minutes.

*(This step is not necessary if the auger is filled with fuel from previous operation).*



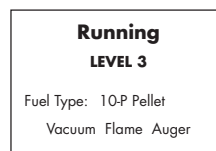
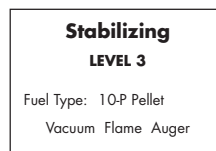
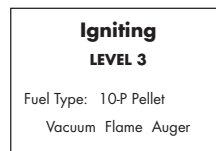
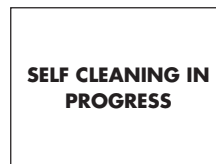
4. **Verify the Settings**

The LCD Control Panel will display the MENU of default settings. To change a setting, use the UP and DOWN arrows to select the menu item, then ENTER to select the options, etc.



5. **Press the ON/OFF Button to Start –**

Once the settings are correct for your fuel type etc., push the ON/OFF Button for approx. 1 second. The unit will automatically run through several different processes. The LCD screen will display what process is running:



# MANUAL IGNITION

1. **Make sure the Endurance has been properly installed and plugged into a standard 115V outlet.**

2. **Fill the Fuel Hopper**

a. Make sure the Endurance hopper has adequate fuel, filled to near the top, and the lid is closed. The lid must be closed for the feed auger to operate.

b. Confirm the ash pan is secured and the fire chamber door is closed.

3. **Prime the Unit**

Press and hold the Prime button until the auger is fully 'primed' and your fuel (corn, pellets, etc.) begins to feed into the burn pot. This may take 2-3 minutes. *(This step is not necessary if the auger is filled with fuel from previous operation).*

4. **Verify the Settings**

The LCD Control Panel will display the default settings. To change a setting, use the UP and DOWN arrows to select the menu item, then ENTER to select the options, etc.

5. **Press the ON/OFF Button to Start**

Once the settings are correct for your fuel type etc., push the ON/OFF Button for approx. 1 second. The LCD screen will display what process is running.

## The Start Up Program Works as Follows:

A. Approximately 15 minutes after start up is initiated the control board checks to make sure the Vacuum switch and the P.O.F. switch are made.

B. When the board senses the Vacuum switch and the P.O.F. switch have been made, the unit will switch to normal operation in heat level 5 and start up has been successful.

Fuel will then begin to feed into the pot. Note: Unit will run at Level 5 for 15 minutes to build a hot base even though controller may read your desired level. The unit will go to set level once base build up is complete.

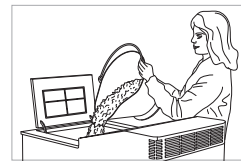
C. If the board fails to sense vacuum or the P.O.F., it will go into a safety shutdown and flash the appropriate Diagnostic code. If this happens, repeat steps 1 through 5 from the section below.

## Furnace Shutdown:

1. Press the On/Off button for 1 second while running initiates shutdown; the fire will go out in a few minutes. Shutdown is disabled while self cleaning in progress.

2. Combustion fan will run for at least 5 hours before shutting down completely to insure no smoke enters the home.

3. Supply blower will continue to run until the unit temperature falls below setting on the fan limit switch.



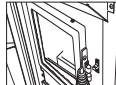
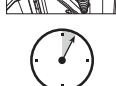



**Current Setting**

Fuel: 10-P Pellet  
Control: Manual  
Ignition: Manual  
Blower: 800 CFM  
Auger Trim: 3  
Draft Trim: 3

**SELF CLEANING IN PROGRESS**

**Clean Complete**

- Mix approximately 2 cups of WOOD PELLETS with a starter enhancer gel. 
- Open the fire chamber door and pour this mixture into the burn pot. 
- Using a long nosed lighter or match, light the fuel mixture. 
- After lighting starter mixture, LEAVE THE FIRE CHAMBER DOOR OPEN SLIGHTLY FOR 4-5 MINUTES. 

ENTER = DONE 

**Stabilizing LEVEL 3**

Fuel Type: 10-P Pellet  
Vacuum Flame Auger

**Running LEVEL 3**

Fuel Type: 10-P Pellet  
Vacuum Flame Auger

## WARNING

Never unplug the furnace to shut it off.

Doing so may cause a significant amount of smoke to enter the room.

# ERROR DESCRIPTIONS

**Shut Down**  
Loss of Power  
10 Minutes Left  
Press ENTER for options

**LOSS OF POWER** - Loss of Power occurred. Once power is returned the unit will turn on the combustion blower for 5 hours to exhaust any possible smoke.

**SOLUTION:** Check power connections and circuit breakers. Clear fault and restart unit.

**Shut Down**  
Loss of Flame  
10 Minutes Left  
Press ENTER for options

**LOSS OF FLAME** - The exhaust temperature has dropped below minimum temperature. This is normally due to fire going out.

**SOLUTION:** Check burn pot and insure it is in proper position and verify there is fuel in the hopper. If unit displays same error when attempting a restart it may be necessary to replace the switch.

**Shut Down**  
Auger Time Out Error  
10 Minutes Left  
Press ENTER for options

**AUGER TIME OUT** - The control board sensed the auger had not been running for 2 consecutive minutes. This can be caused by leaving the hopper lid open longer than 2 minutes or the High Limit switch tripping

thus shutting off motor. **SOLUTION:** Verify wires to motor are not broke or disconnected. Verify the lid was closed and lid switch is operating. Check fan limit switch by removing cover and ensure dial is not above 200 degrees.

## **WARNING**

These safety switches are designed to protect life and property. Bypassing these features voids all warranties and the safety listing of the furnace.

**Shut Down**  
Loss of Vacuum  
10 Minutes Left  
Press ENTER for options

**LOSS OF VACUUM** - The unit has sensed a loss of vacuum. **SOLUTION:** Check to ensure the fire door and ash pan are securely closed. Check that the gaskets are in good shape. Verify the incoming combustion air

and the exhaust is free of any debris that could interrupt air flow. Insure air damper is open and Sail switch is swinging open by looking into the damper opening (outside air will need to be disconnected). Restart unit to see if the combustion blower starts, if not replace blower. If unit displays the error again the Sail switch may need to be replaced.

**Shut Down**  
Actuator Limit Error  
10 Minutes Left  
Press ENTER for options

## **ACTUATOR LIMIT ERROR** -

Actuators did not reach their extended or retracted limit in the proper time limit or there is a loose wire connection.

**SOLUTION:** Verify there is not obstructions in the fire pot keeping the components from moving properly. Go to the maintenance menu and operate each actuator individually to ensure freedom of movement. If it fails to move in either direction the controller or actuator may need to be replaced. Check for loose or disconnected wires to the actuators.

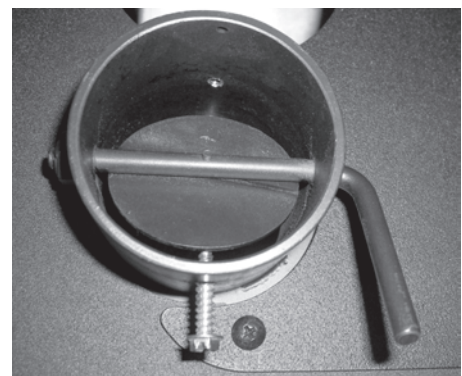
*Fahrenheit Technologies Inc. Bio Furnace has been Safety Tested by an accredited, independent laboratory.*

# COMBUSTION AIR DAMPER/BOX

*NOTE: This may take several hours to setup depending on each home. However, once complete this should not need to be done again. Please be patient as this is the key to having a proper running furnace. Do not use damper to adjust Level 1. The Trim function is used for level one adjustments.*

Your furnace is equipped with an air inlet damper/box. The purpose of this damper/box is to adjust combustion airflow to match the characteristic of each specific home and chimney configuration and prevent smoke from flowing back out the tube during power failures. The damper is preset at the factory with an adjustment screw (See Figure 12). The damper will most likely only need a small adjustment during the break in period. To determine if the damper needs to be adjusted, read below to see the two areas that need to be observed. During the adjustments be sure to only make small adjustments and allow 15-20 minutes before re-evaluating.

Pilot mode or Level 1 will be the most critical during setup. A bright violent flame can cause fuel to burn out therefore maintaining a red coal base is primary concern. These adjustments are to be made with the trim function not damper.



**Figure 12**

# ADJUSTMENTS

## Burn Pot

It may be necessary to open the door briefly to see down in the burn area. When burning corn, the bottom of the burn pot should have a bed of red coals with layer of corn. The corn should turn black rapidly after it falls into the pot. If the corn is building up it will begin to stick together and will eventually overflow the pot. To remedy this, increase the air intake by opening the damper assembly slightly. If the coal bed is only red in the middle and the edges appear not to be burning, it is possible there is too much air flow. Reduce the inlet air using the damper assembly. Constantly running the furnace on a low setting with too little combustion air may cause creosote and condensation to form.

## Flame

Proper air adjustment should result in a violent flame that is bright in color. This will be the most effective flame and the cleanest burning flame. Level 1 may be the exception due to the small amount of fuel being fed in. If the flame appears to be lazy and dark yellow in color the airflow is probably too low. If this occurs, build up can occur in the exhaust and the unit, resulting in poor performance. Break-in requires the burning of 15 bushels of fuel or a continuous burn for two weeks. The adjustment screw is used for fine adjustments and to have a factory setting that should work in most applications.

If you experience problems adjusting the 50F furnace during the break-in period, contact your dealer. Some chimney systems have abnormal characteristics, which can take time to adjust. For instance a chimney with excessive draft or one with a long horizontal run.

*Remember: Choosing a lower pilot setting may require the damper to be fine-tuned to match the lower feed rate. Monitor how the furnace is operating after a change is made and adjust the damper if needed.*

## Thermostat Control

The 50F furnace may be controlled with a thermostat to help maintain a more consistent temperature. A biomass furnace will be a little slower in reacting to a thermostat than the typical gas, electric or oil fired furnace. Keep in mind that the furnace is constantly producing some heat that helps heat the home while the furnace is in pilot mode. The furnace will operate at the selected thermostat high heat level when heat is called for and heat level 1 when no heat is required.

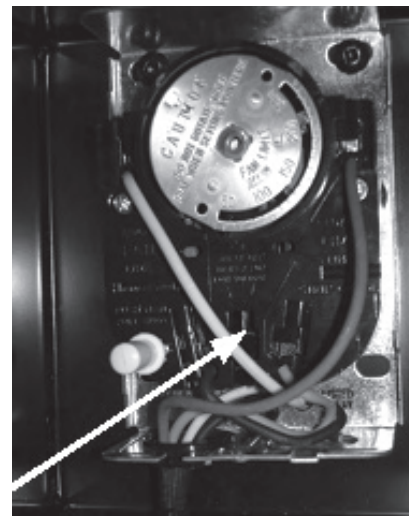
## Fan Limit Control

The 50F furnace uses a fan limit control built into the furnace centered below the 10" plenum opening. The high limit function of this control is set at a maximum setting of 200° F.

### CAUTION

Do not tamper with the high limit setting.

There are two fan control settings. They control when the convection blower turns on, and when the blower turns off. This will help control the temperature of the air coming out of the registers. The fan limit has a breakaway tab that has been removed. When replacing the fan limit control, be sure to remove the tab as shown in figure 13.



**Figure 13**

# CLEANING REQUIREMENTS

Determine the needed cleaning frequency during the initial days of operation. The furnace is designed to require only a minimum amount of daily cleaning. Required maintenance depends largely upon the type and quality of fuel burned and the rate of burn. The amount of daily maintenance will increase if fuel quality decreases and/or the burn rate of fuel increases.

## Ash Removal

Ashes must be removed from the furnace to ensure proper operation. The time required for the ash pan to fill depends on the quality of the fuel and on the quantity of fuel burned. A furnace running on a thermostat cycling at a moderate rate will generally operate 4-5 days before the ash pan requires emptying. However if the furnace is running continuously on the highest setting, the ash pan will need emptying approximately every 2-3 days. The ash pan should never be allowed to become too full to receive a clinker. If the ash pan is too full, the clinker may not drop into the pan. It is the responsibility of the owner/user of the furnace to determine the frequency of dumping the ash, based on the rate of burn and the quality of fuel (ash content).

## Air Box Trap Door

The air box trap door should be cleaned out each time the ash pan is emptied. See Maintenance Guide for details.

## Clinker Removal (Corn Fuel)

The 50F Furnace features Cycleclean, an automatic clinker removal system that maintains a constant fire while dumping the clinker into the ash pan. The frequency of clinker removal is based on the amount of fuel burned in the burning pot. When the clinker is ready for removal, the furnace will ramp up to level 5 and initiate the clinker removal. This cycle takes 5-6 minutes. The furnace remains at level 3 to build a new base before returning to initial setting.

### CAUTION

The door and front part of the furnace will be hot. Do not touch any part of the furnace that is hot!

*Note: Opening door during automatic clinker removal will pause the motion momentarily until door is closed and vacuum is detected.*

*Note: Failure to keep your furnace clean, as described in this manual, could result in poor operation, inefficient fuel usage and a possible safety hazard! It is the responsibility of the owner/user to determine the needed maintenance frequency.*

## Heat Exchange Tubes

When removing the ash pan, it is recommended that you pull the tube scraper back and forth a couple of times to keep the tubes clean. If the Tube Scraper feels sticky and difficult to move, check for the presence of creosote on the tubes. If creosote is present, a damper adjustment may be needed or the furnace has become plugged and needs a thorough cleaning. Call dealer for assistance.

## Clean the Glass

The rate of burn will determine how often the window needs cleaning. Prolonged burning at a slow burn rate will result in the need for more frequent window cleaning. It is recommended to clean the window when the unit is cold, however it is possible to clean the door during operation. To do so, open the door quickly and wipe with a dry cloth or paper towel. You must do this within the 90 second window allowed by the vacuum switch. If needed, close the door and wait 1 minute before reopening the door to reset the 90-second timer. If the door is left open for more than 90 seconds the Furnace will go into safety shutdown. You will need to start over with the Lighting Procedure. Use of a glass cleaner is only permitted when the furnace is cold.

## The Chimney and Chimney Connector

Should be inspected at least once every two months during the heating season to determine if a creosote build-up has occurred. If a significant layer of creosote has accumulated (3 mm or more), it should be removed to reduce the risk of a chimney fire. Use of an appropriately sized chimney brush or the services of a professional chimney sweep are recommended. Also clean the exhaust system if needed.

### CAUTION

Do not slam the door. Do not operate the furnace with broken or cracked glass. Replace only with heat resistant ceramic glass supplied by the manufacturer.

# PERIODIC MAINTENANCE

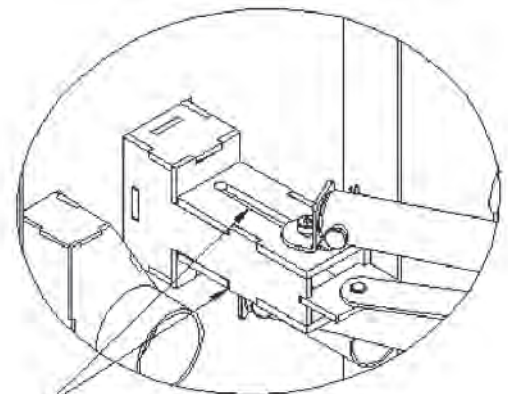
Check with dealer to see if maintenance contracts are available.

## CAUTION

Periodic maintenance should only be done while the Furnace is shut off and cold. The intervals are suggestions only, more or less frequency may be required depending on fuel and the amount of use.

1. **Burn Pot** – Remove the pot components see (Pot Removal pages 24-26). Clean burn pot holes whenever needed. Remove and place burn pot in water to soak. Use a wire brush to aid in cleaning. Vacuum out the frame of the pot before reinstalling burn pot and plate.
2. **Clean-Out Port** – The Furnace has an Exhaust Clean Out Port located in the CENTER of the firebox and behind the ash pan.  
  
Frequency of cleaning depends on the amount of fuel being burnt and the quality of the fuel. Failure to clean the ash traps will cause the Furnace to become plugged with fly ash.
3. **Heat Exchange Baffle** – To remove the baffle, lift the front of the baffle up to clear the keyway and slide to the rear. Then lower the front and remove. When putting the baffle back in the furnace, make sure the screws are in the keyhole slots and the back of the baffle is lifted up over the inner back to keep the baffle locked in place. Once removed, clean the ashes that accumulate on a regular basis. Once a month or sooner, depending on the quality of fuel being used, clean the baffle on a regular basis. Failure to clean the baffle can cause the furnace to perform poorly.

4. **Exhaust System** – Periodic cleaning of the exhaust system is required. Under certain conditions chimneys may plug up rapidly. Dirty/high moisture content fuel and poor installations require more frequent chimney cleanings. See the "Preventing Chimney Fires" section of this manual. The products of combustion will also contain small particles of fly ash. The fly ash will collect in the exhaust vent and restrict the flow of the flue gases. Judge the frequency of cleaning by checking the amount of ash that accumulates in the elbows or tees of the exhaust system. Ask the dealer for suggested frequency of cleaning, equipment needed and procedures for cleaning. Check the exhaust system and ash traps at least once every two months during the heating season.
5. **Gaskets** – Periodically inspect the condition of the rope gasket around the door, window and ash pan door. Replace as needed.
6. **Air Filter** – Check the return air filters at least once a month and replace when needed. The size of the filter is 1" x 12" x 20".
7. **Actuators** – As required and at the beginning and end of each season apply a lithium - based grease to the slide mechanism located at the end of the actuators near the heat exchanger. This will allow for smooth quiet operation. Removing the control panel can access this area. (See figure 14).



Grease slotted area on upper and lower plates.

**Figure 14**

# ANNUAL MAINTENANCE

To maintain safe operation and longevity of furnace this maintenance needs to be followed.

**Spring Shutdown** – After the last burn in the spring, cool the furnace. Remove all fuel from the hopper and the auger. Remove and clean all burn pot components, ash pan and ash ports behind the ash pan.

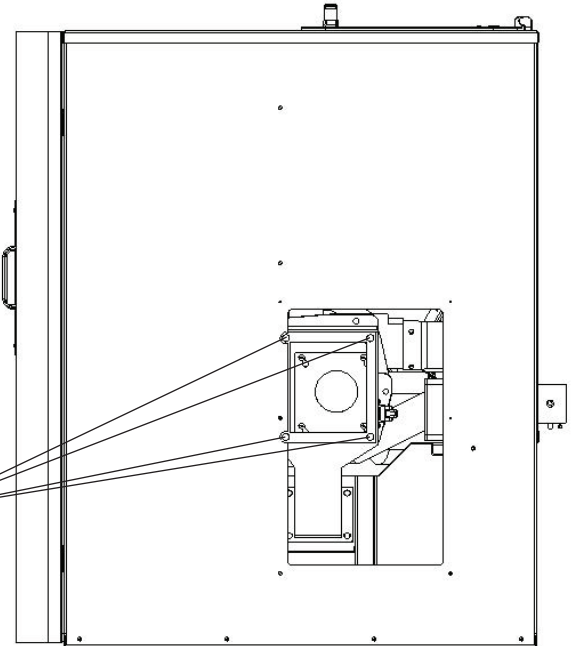
1. The exhaust system should be thoroughly cleaned. Call your dealer for this service.
2. The mechanical area in the rear should be vacuumed.
3. Apply grease to actuator slides.
4. The exhaust fan should be cleaned (may require a new gasket). Call dealer for this service. Annual oiling of the motors is not needed. (See Figure 15).

## Fall Startup –

1. Prior to lighting the first fire, check the outside area around the exhaust and air intake systems for obstructions. Try all controls to see that they are working prior to lighting a fire. Also check periodic maintenance items.

*NOTE: Be sure to unplug the furnace before accessing the rear of the furnace.*

*Remove side panel to allow access to the four bolts holding the exhaust cover plate. To clean the fan blades remove the exhaust cover plate, then slide the restrictor plate up and to the left to remove.*



**Figure 15**

# BURN POT REMOVAL & INSTALLATION

The following is used for cleaning or replacement of burn pot. Steps 1-5 cover the burn pot removal and steps 6-11 cover removal of pot frame (not required for cleaning or maintenance). Ensure the unit is allowed time to cool.

**⚠ CAUTION** Pinch Point

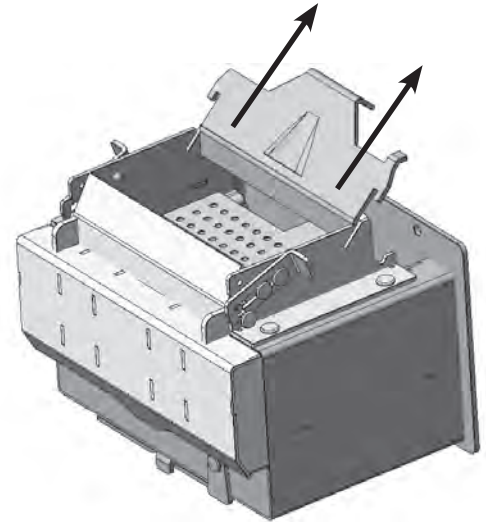
Please take care to keep hands and other objects out of the pot area during movement.

## Positioning Parts for Removal

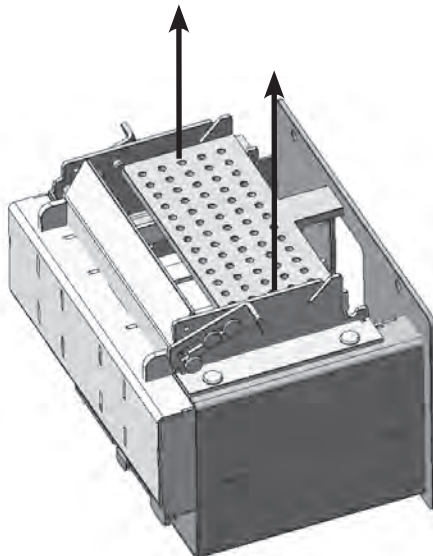
1. Enter maintenance mode from the Main menu (Current Setting).
2. Select Auto Pot Removal.
3. Close all doors and press Enter.
4. Wait for pot parts to be positioned for removal.
5. When complete, door can be opened and parts can be removed.

## Remove Pot Parts

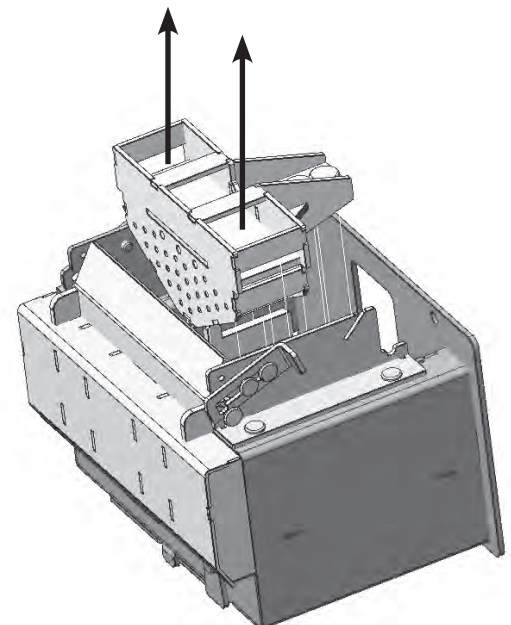
6. Begin by lifting upward on the Removable Ramp (Figure 16).
7. Lift Cast Re-light Plate up and out (Figure 17).



**Figure 16**



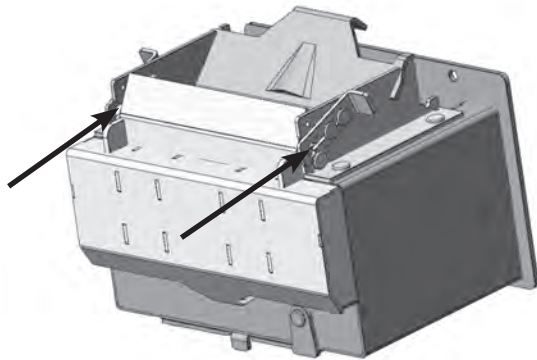
**Figure 17**



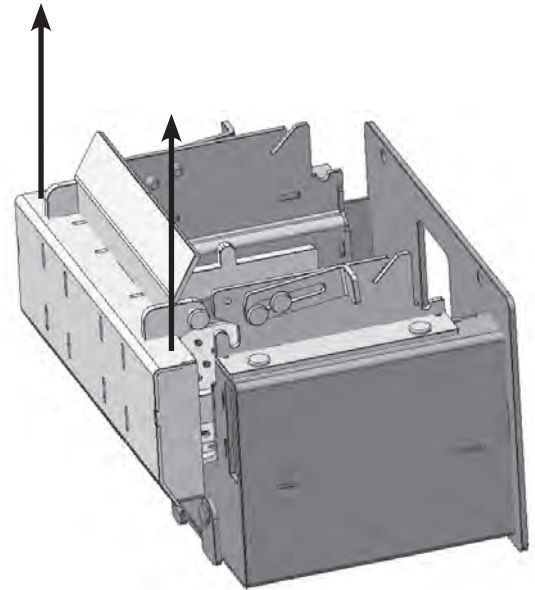
**Figure 18**



# BURN POT REMOVAL & INSTALLATION



**Figure 19**



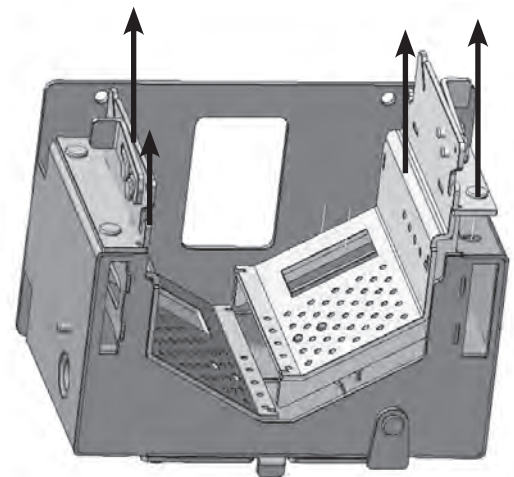
**Figure 20**

8. Lift Pusher Assembly up and out (Figure 18).
9. Slide the Flapper Door Hold down Tabs back (Figure 19).
10. Remove the Flapper Door Assembly by lifting upward (Figure 20).
11. Remove the Burn Shell by lifting up and out (Figure 21).

## Installation of Pot Parts

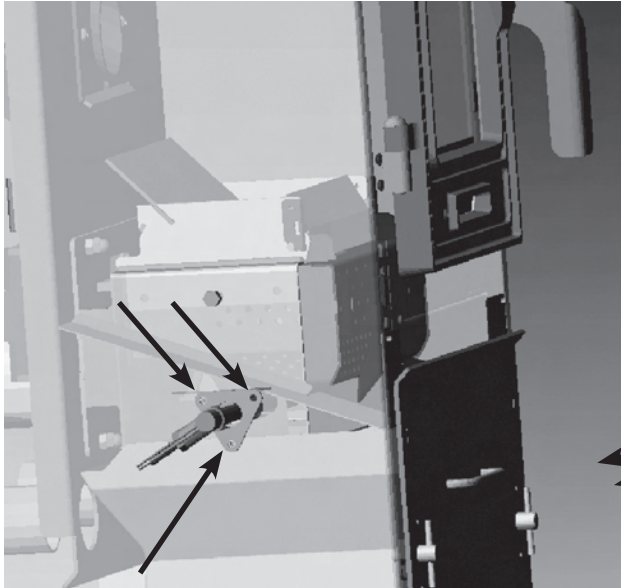
Reverse of steps 6 thru 11 above.

*NOTE: Actuators will be pulled back into normal position as part of the normal start-up sequence.*

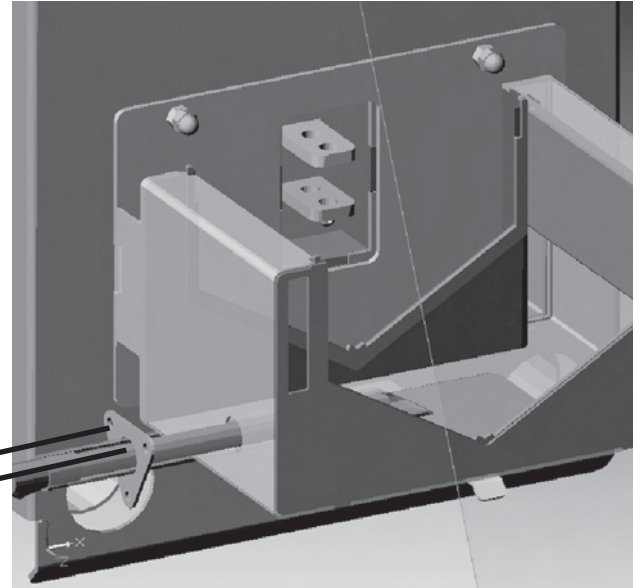


**Figure 21**

# POT FRAME REMOVAL



**Figure 22**



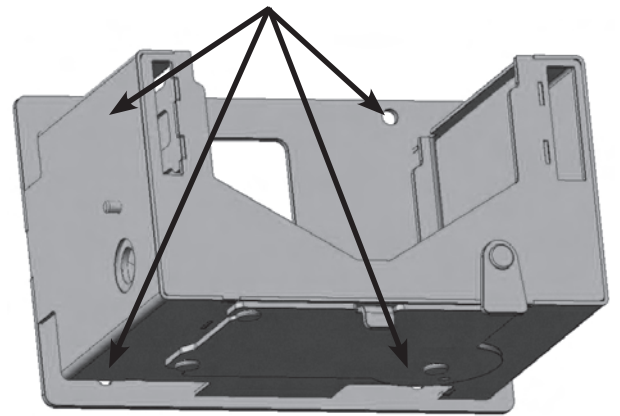
**Figure 23**

1. Remove pot parts as shown in previous 2 pages (Steps 6 thru 11).

**⚠ CAUTION**

Pot is heavy, so care should be taken when removing last nut.

2. Remove Igniter Access Panel, shown in Figure 2 on page 5. Then remove three screws from flange as shown in Figure 22. When removing the screws take care not to drop the screws between the panels of the unit. Remove wire connectors and carefully remove Igniter and Tube Assembly as shown in Figure 23.
3. Remove two lower acorn nuts and hex nuts carefully. Then remove upper acorn nuts and hex nuts carefully.
4. Lower pot down and out through the ash pan opening.



**Figure 24**

## Installation of Pot Frame

Reverse of steps 1 thru 4 above.

*NOTE: Acorn nuts must be used to protect threads from build up.*

*Use a 7/16" wrench to remove acorn nuts and hex nuts that hold the pot in heat exchanger. Insure mating surfaces are clean prior to re-installation.*

*NOTE: Recommended torque for Burn Pot hex and acorn nuts is 6 lb.-ft. Over torquing can result in broken studs.*

# IGNITER REPLACEMENT

## Igniter Removal

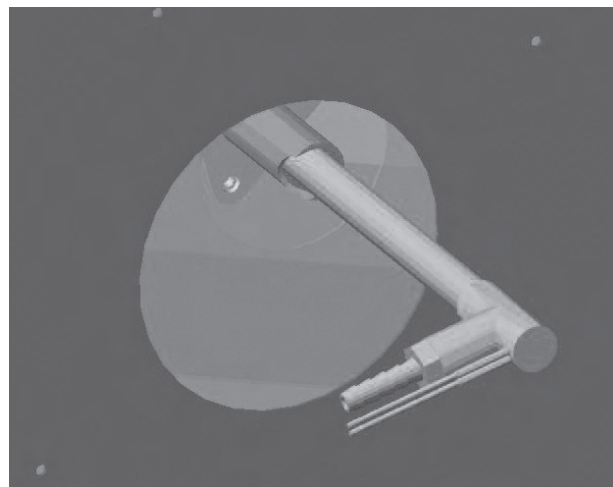
1. Remove igniter Access Panel, shown in Figure 2 on page 5.
2. Remove wire connectors and rubber tubing from the ignitor.
3. Pull the ignitor out (breaking the silicone that is holding the ignitor in place).

## Igniter Installation

1. Slide igniter into the ignite tube (seal with high temperature silicone sealant).
2. Install wire connectors and rubber tubing to the igniter.
3. Install igniter Access Panel, shown in Figure 2 on page 5.

## Safe Operation

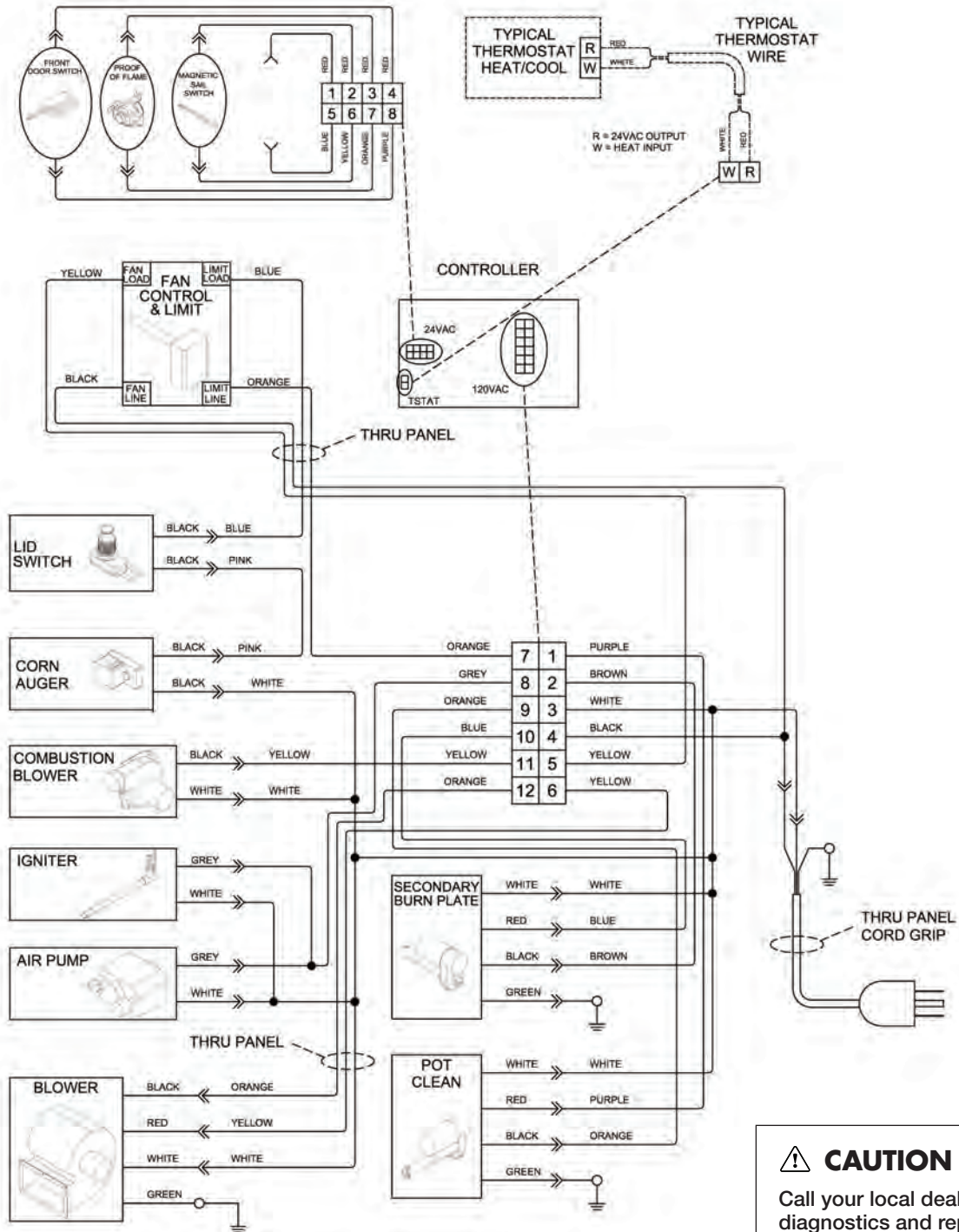
1. **Disposal of Ashes** – Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are to be disposed by burial in soil or otherwise locally dispersed, they should be retained in the container until all cinders have thoroughly cooled.
2. **Never use** gasoline or gasoline types such as lantern fluid, kerosene, charcoal lighter fluid or similar liquids to start or improve a fire in this furnace. Keep all such liquids well away from the furnace while it is in use.
3. **Creosote, Soot and Fly Ash** – The formation and the need for removal. The products of combustion will contain small particles of fly ash. The fly ash will collect in the venting system and restrict the flow of flue gases. Incomplete combustion, such as occurs during start-up and shut-down, or incorrect operation of the furnace will lead to some soot or creosote formation which will collect in the venting system. The exhaust system should be inspected regularly during the heating season to determine if creosote buildup has occurred. Check more frequently at first to determine a schedule for cleaning the venting system based on individual use of this bio-burning furnace. If creosote has accumulated, it should be removed to reduce the risk of a chimney fire.
4. **Do Not Over-Fire This Unit** – Follow all instructions regarding the proper use of this furnace.



**Figure 25**

# WIRING SCHEMATIC

The electrical rating for this furnace is: 115 Volt, 60Hz, 4 AMP. The minimum circuit is 15 AMP.



**⚠ CAUTION**  
Call your local dealer for diagnostics and replacement of electrical components.

# CANADIAN REQUIREMENTS

## Additional Canadian Installation Requirements

1. The fans of this 50F furnace may cause a negative pressure area in the room where this furnace is installed. If the furnace is not connected to a return air duct system in the house, provision should be made to provide make-up air to the unit. It is recommended to provide an opening equal to 120 square inches for return air to the furnace room.
2. If fans are used in the storage area, they should not create negative pressure in the room the furnace is installed.
3. The handle for the front outer door should be attached prior to operating.
4. Installers should measure draft with a manometer to check for positive flow upward.

## Additional Canadian Operation Requirements

1. Store corn in sealed containers in a dry environment to prevent the fuel from absorbing moisture and becoming damaged.
2. Creosote formation and cleaning:
  - a. Establish a routine for the storage of fuel, care of the furnace and firing techniques.
  - b. Check daily for creosote build-up until experience shows how often cleaning is necessary.
  - c. Be aware that the hotter the fire, the less creosote is deposited, and that weekly cleaning may be necessary in mild weather, even though monthly cleaning may be enough in the coldest months. Run the furnace on the hottest setting once a day for 30-45 minutes to prevent excessive build-up in the furnace.
3. Keep the doors closed and all seals in good condition while operating the furnace.
4. Inspect the flue pipes, joints and seals regularly to ensure that smoke and flue gases are not drawn into and circulated by the air-circulation system.
5. Cleaning of the heat exchanger, flue pipe, chimney and draft inducer is especially important at the end of the heating season to minimize corrosion during the summer months caused by accumulated ash.
6. Do not use chemicals or fluids to start the fire.
7. Do not burn garbage, gasoline, naphtha, engine oil, or other inappropriate materials.
8. The 50F furnace will not operate during a power failure. Prolonged power outages will require the use of a generator to operate the furnace.

# Additional Canadian Requirements For Supplementary (Add-On) Furnaces

1. Do not use duct elbows having an inside radius of less than 6"(150mm) on the furnaces.
2. Do not connect ductwork so that a reverse flow is possible.
3. Operate the (gas, oil or electric) furnace periodically to ensure that it will operate satisfactorily when needed.
4. Certified for installations with ductwork configurations similar to that shown in figure 6.
5. Do not relocate or bypass any of the safety controls in the original (gas, oil or electric) furnace installation.
6. Do not connect with any gas furnace that has not been certified initially as complying with CAN/CGA-2.3.
7. The operation of the gas furnace must be verified for acceptable operation before and after installation of this add-on furnace by a gas fitter that is recognized by the regulatory authority.
8. Do not connect to any gas furnace that is not equipped with an air-circulating blower or to a chimney or vent serving a gas furnace or appliance.
9. This furnace should only be installed on a furnace duct system and chimney that are in good operating condition. See figure 6 for duct configuration.
10. This furnace is equipped with a direct drive blower motor. This motor should not be changed with one of lesser speed. A motor with a faster speed may be used. The size of the blower should not be changed. This equipment should be installed, acceptable to regulatory authority, by experienced licensed personnel.
11. Installation should comply with requirements of CAN/CSA-B365, and CAN/CGA-B149.1 and CAN/CGA-B149.2(for gas-fired).

# TROUBLESHOOTING & FAQ

The 50F Furnace is very trouble free in operation when properly maintained and quality fuel is used. When the furnace fails to operate properly, use the following to troubleshoot.

## 1. No fuel is being dispersed.

*Solution:* Insure the auger tube is primed. If it is, check for jams or that the lid is closed (the micro switch on the hopper will not let the auger run if open). If not, press manual feed to prime the auger.

## 2. My furnace keeps overloading the burn pot.

*Solution:* If burning corn check the moisture content of your corn. It should be 16% or less. Also make sure you are using clean corn. Otherwise this is mainly caused by improper combustion (See Damper Adjustment section of the Operations Manual). Besides the damper adjustment, there are several areas that can have an effect on the combustion process. Check all gaskets, doors and door latching systems for air leaks. Any leaks in these areas will negatively affect the burn process and cause the pot to overload.

**3. My furnace isn't burning and the control is displaying LOSS of FLAME.** This message indicates the Proof of Fire switch no longer senses a flame in the firebox area of the furnace. What caused the furnace to go out?

- Fuel stopped feeding.
- Fire went out due to fuel overloading the fire pot.
- The Proof of Fire switch is defective.
- The Proof of Fire switch is defective.
- Unit ran out of fuel.

*Solution:* Check hopper for fuel. Press the Prime button to ensure fuel is being dispersed. Check fire pot to ensure proper installation and re-light the furnace.

**4. My furnace isn't burning and the controller is displaying LOSS of VACUUM.** This message indicates that the Sail switch no longer senses a vacuum in the furnace.

- The door of the unit was left open longer than 90 seconds.
- The ash pan door was left open longer than 90 seconds.
- Switch is defective.

d. Intake air or exhaust path obstructed.

e. Seals need replacing.

*Solution:* Check inner door gasket and ash pan gasket to insure good seal. Check combustion air path for obstruction. Check to see if combustion blower is still operating by attempting to restart.

**5. My furnace isn't burning and the controller is displaying LOSS of POWER.** This means the power was interrupted at some point and the unit shutdown.

*Solution:* Restart furnace if power has been restored.

**6. I turned the furnace on with the On/Off switch and nothing happens.**

*Solution:* First check to see if the Furnace is plugged in and the receptacle has power to it. Check the fuse on the back of the control board. Replace with a 10 A fuse.

**7. I turned the furnace on with the On/Off switch and the board lights up and the fans come on, but the pot doesn't go into self-clean.**

*Solution:* Unit may be waiting for the sail switch therefore check for proper seals and that the fire door and ash pan are securely closed. Actuators will not move unless vacuum is detected.

## 8. Why is my glass dirty?

Normal operation of your Fahrenheit Technologies Inc. Furnace will produce a light build-up on the glass that wipes off with a dry paper towel. However extended burning on the low setting only will produce a light tan color. These types of build-ups on the glass are normal. A heavy black build-up on the glass could indicate a problem.

*Solution:* Adjust the combustion air setting to the proper setting. If this doesn't seem to help, make sure the clean out cover plates are installed in the furnace. It also could be an indication that the furnace is getting plugged and needs a good cleaning. Refer to the section in the manual that covers the daily, periodic and yearly maintenance of the furnace.

### CAUTION

During troubleshooting some components are hot. Allow unit adequate time to cool. Use gloves as needed.

## FAQ continued...

### **9. How do I adjust my pilot feed rate settings**

**(#1 setting)?** Not all fuel burns at the same rate. The moisture content of corn greatly influences how it burns. Following is a description of the function of the feed trim button.

*Solution:* The auger trim mode on the control board allows the feed rate on #1 (Pilot setting) to be increased or decreased. Default is level #3. 1 is the lowest feed-rate and 5 is the fastest. Different types of fuel and the way the furnace is installed will affect the low burn and needs attention during the break-in period of the furnace.

### **10. How do I adjust the draft for the Pilot settings (#1 setting)?**

*Solution:* Following is a description of the function of the Fan Trim button. The draft trim mode on the control board allows the draft fan speed to be increased or decreased. Default is level #3. 1 is the slowest and 5 is the fastest. This may be used in a venting situation that is restrictive, a long horizontal run or a venting system with excessive elbows for instance. Before calling your dealer for assistance, please read your Installations and Operations Manual and perform all the maintenance issues covered in the Daily and Periodic Maintenance section of the manual. If the furnace still does not operate correctly, call your dealer for assistance.

**11. My Furnace isn't burning and the controller is displaying AUGER TIME-OUT.** The unit sensed the auger had not running for more than 2 consecutive minutes. This can be caused by leaving the hopper lid open or the unit sensing and over temperature and the fan high limit switch tripping.

*Solution:* Verify the Lid is closed and the switch is operating properly. Remove fan limit switch cover and ensure the dial is not above 200 degrees.

**12. My Furnace isn't running and the controller is displaying ACTUATOR LIMIT ERROR.** The unit sensed that the actuator did not reach the extended or retracted position in the allotted time or a wire is broken or disconnected from a actuator.

*Solution:* Once the unit has cooled down verify the pot is installed properly and the remove any obstructions. Go to the maintenance mode and operate both actuators forward and back to ensure they move freely. Check for any loose, broken or disconnected wires to the actuators.

*Before calling your dealer for assistance, please read your Installations and Operations Manual and perform all the maintenance issues covered in the Daily and Periodic Maintenance section of the manual. If the furnace still does not operate correctly, call your dealer for assistance.*



# LIMITED WARRANTY

## Fahrenheit Technologies, Inc.

Fahrenheit Technologies, Inc. extends a limited warranty for its products as described on this page.

### What does this warranty cover?

Fahrenheit Technologies, Inc. warrants its products to be free from defects in material and workmanship in normal use and service and it further warrants the products to be free from mechanical and electrical failures in normal use and service, all as described in this manual.

### What does this warranty not cover?

This warranty does not cover paint, glass, burn pot and all gaskets, damage or breakage due to or caused by mishandling, freight damage, or misuse of any unauthorized modification of the product. This limited warranty does not cover any product that is not installed by an authorized installer. This limited warranty will not cover any product in which unauthorized fuel is used.

### What is the period of coverage?

This limited warranty extends only to the original purchaser of the product and starts at the date of the sales invoice and extends for five years with respect to all components except for electrical and mechanical failures, and as to those components, extends for a period of two years from the date of the sales invoice.

### What will we do to correct problems?

Before taking any action, a local representative of Fahrenheit Technologies, Inc. must inspect the unit to determine if the unit is defective. If the inspection reveals that the failure is due to defective material or workmanship and the part is covered by this warranty, then Fahrenheit Technologies, Inc. will, at its option, repair or replace the defective part. The sole duty of Fahrenheit Technologies, Inc. and its liability under this limited warranty is limited to the repair or replacement of the covered defective part. The purchaser assumes all costs related to shipping the replacement parts or return of the unit to the factory for replacement. If the defect was caused by Fahrenheit Technologies, Inc., then Fahrenheit Technologies, Inc. will cover the cost of shipping the repaired unit or replacement parts to the original purchaser.

### What will we not do?

Fahrenheit Technologies, Inc. will not pay for any removal or reinstallation costs of its product. Furthermore, Fahrenheit Technologies, Inc. nor any reseller to the purchaser accepts any responsibility for incidental or consequential damage to the property or persons resulting from the use of this product. Any warranty implied by law including, but not limited to, implied warranties and merchantability or fitness shall be limited to one year from the date of the original purchase. Whether the claim is made against Fahrenheit Technologies, Inc. based upon breach of this warranty or any other type of warranty, expressed or implied by law, Fahrenheit Technologies, Inc. shall in no event, be liable for any special, indirect, consequential or other damages of any nature in excess of the original purchase price of this product. All warranties by Fahrenheit Technologies, Inc. are set forth in this document and no claim shall be made against Fahrenheit Technologies, Inc. based upon any oral warranty or representation.

### How does State Law apply?

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations of implied warranties and, therefore, the limitations of implied warranties may not apply to you.

### How do you get service?

A warranty registration card is provided. The card is to be filled out, signed and returned to the factory by the owner. Failure to do so will void the warranty. All claims under this warranty must be through the dealer where the furnace was purchased.

*Installer's notes: After installation and break in, use the area below to record settings and other pertinent information for your records.*

**Auger Trim:** \_\_\_\_\_

**Draft Trim:** \_\_\_\_\_

**Serial Number:** \_\_\_\_\_

**Date of Purchase:** \_\_\_\_\_

**Dealer Information:** \_\_\_\_\_

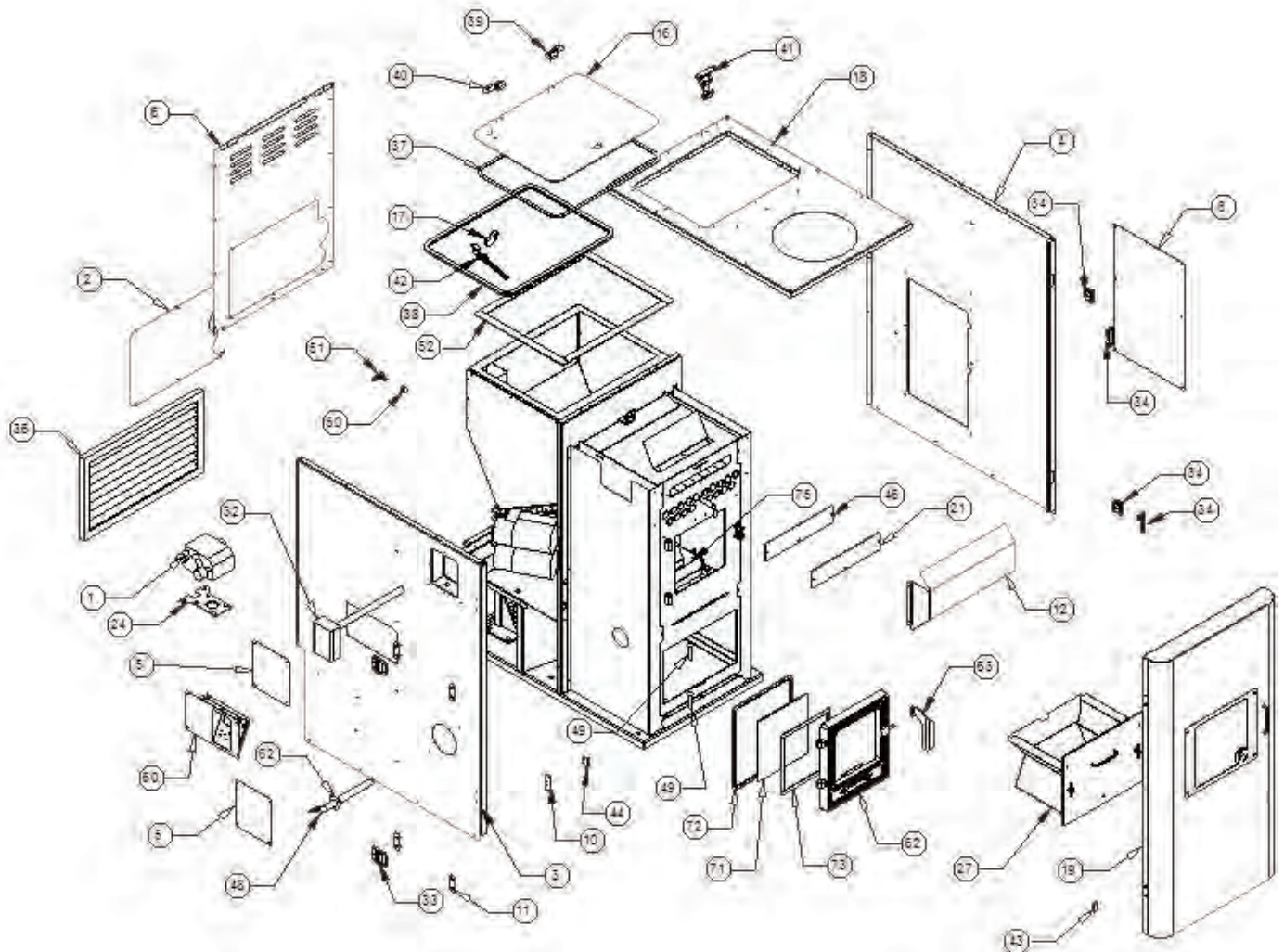


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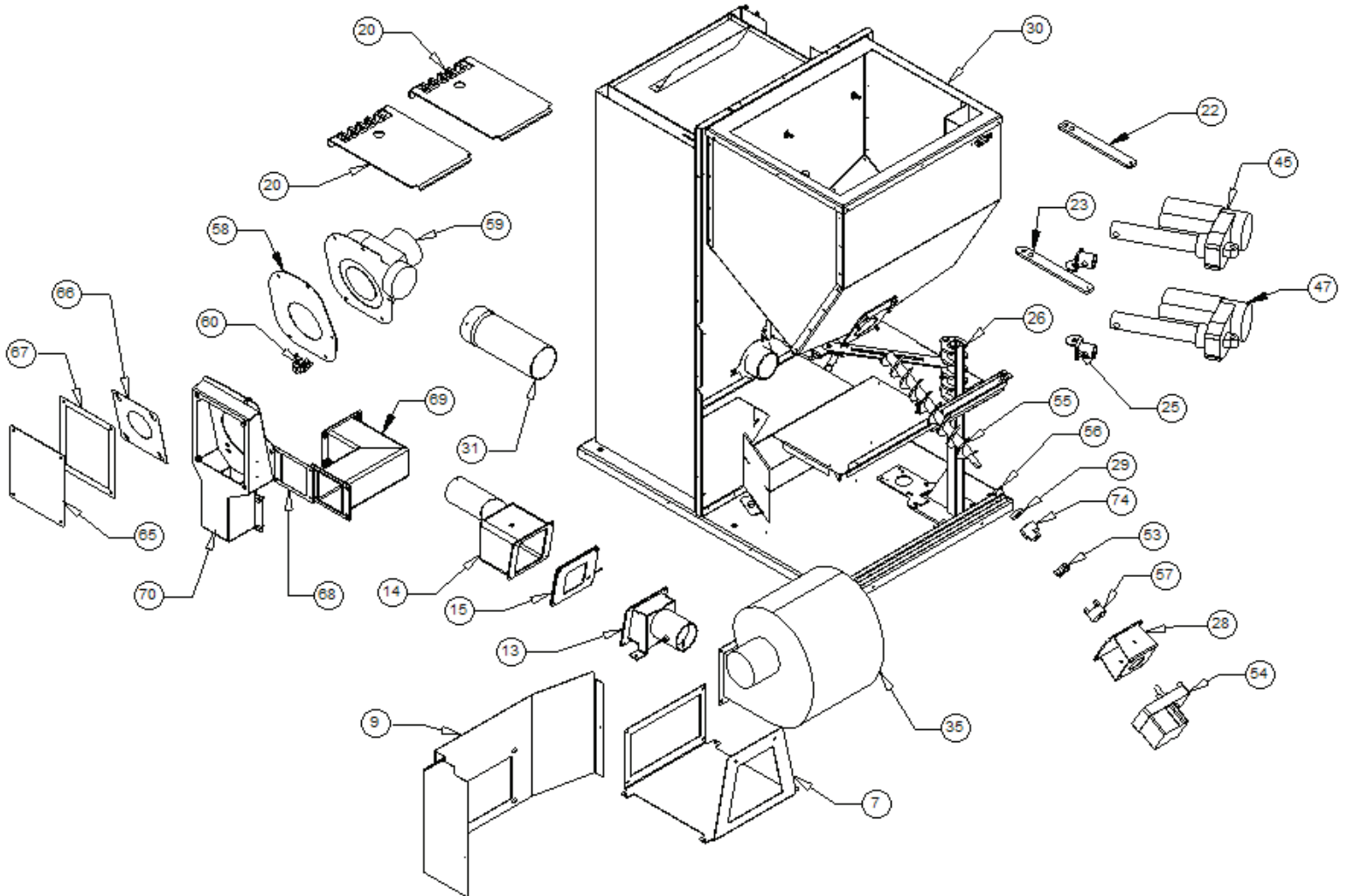
# PART LIST

Item	Part Number	Description	Item	Part Number	Description
1	150057-60255SE	Air Pump	18	CS1-1550	Top Panel Assembly
2	CS1-1003	Rear Maint. Panel	19	CS1-2000	Exterior Door Assembly
3	CS1-1004	Left Panel	20	CS1-3001	HE Baffle
4	CS1-1006	Right Panel	21	CS1-3002	HE Tube Plate
5	CS1-1007	Panel Cover	22	CS1-3003	Top Link
6	CS1-1008	Rear Panel	23	CS1-3004	Bottom Link
7	CS1-1010	Blower Bracket	24	CS1-3018	Pump Mount
8	CS1-1017	Exhaust Motor Cover	25	CS1-3050	Slide Arm Connector Assembly
9	CS1-1024	Blocker Plate	26	CS1-3100	Actuator Tower Assembly
10	CS1-1025	Door Switch Bracket	27	CS1-3300	Ash Bin Assembly
11	CS1-1080	Back Up Hinge Assembly	28	CS1-4200	Auger Motor Bracket Assembly
12	CS1-1108	HE Air Deflector	29	CS1-4401	Auger Spacer
13	CS1-1350	Air Intake Tube Assembly	30	CS1-4500	Hopper Frame Assembly
14	CS1-1380	Intake End Assembly	31	CS1-5008	Exhaust Extension
15	CS1-1390	Sail Switch Assembly	32	CS1-9101	Fan Limit Control
16	CS1-1501	Hopper Top	33	CS1-9102	Outer Door Hinge
17	CS1-1505	Lid Switch Arm	34	CS1-9103	Outer Door Latch (Male & Female)



Item	Part Number	Description
35	CS1-9104	Convection Blower
36	CS1-9105	1' x 12" x 20" Air Filter
37	CS1-9152	Top Panel Seal
38	CS1-9154	Hopper Seal
39	CS1-9155	Right Lid Hinge
40	CS1-9156	Left Lid Hinge
41	CS1-9157	Lid Handle Latch
42	CS1-9158	Friction Support
43	CS1-9204	Door Switch Magnet
44	CS1-9205	Door Switch Wired
45	CS1-9301	Knife Actuator
46	CS1-9304	HE Tube Plate Gasket
47	CS1-9309	Pot Actuator
48	CS1-9351	Ignitor
49	CS1-9352	Head Brass Pin
50	CS1-9405	Lid Switch Cover
51	CS1-9406	Lid Push Switch
52	CS1-9408	Hopper Compression Gasket
53	CS1-9421	Spider Coupler
54	CS1-9444	Auger Motor
55	CS1-9445	Auger

Item	Part Number	Description
56	CS1-9446	Bronze Bushing
57	CS1-9449	3/8" Coupler
58	CS1-9502	Exhaust Blower Gasket
59	CS1-9503	Exhaust Motor
60	CS1-9505	Snap Disc
61	CS2-1400	Controller Assembly
62	CS2-3200	Inner Fire Door
63	CS2-3260	Door Handle Assembly
64	CS2-3580	Igniter Assembly
65	CS2-5001	Exhaust Cover Plate
66	CS2-5002	Exhaust Combustion Plate
67	CS2-5003	Exhaust Box Gasket
68	CS2-5004	Exhaust Cover Plate Gasket
69	CS2-5100	Exhaust Tube Assembly
70	CS2-5200	Exhaust Flange Assembly
71	CS2-9321	Very High Temp Glass
72	CS2-9324	Rope Inner Door Gasket
73	CS2-9327	Fiber Glass Door Gasket
74	CS2-9448	Modified 1/2' Coupler
75	CS3-3900	Pot System Assembly





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**SAVE THIS MANUAL FOR FUTURE USE**



Tested to UL391 Standards