

WOODMASTER FORCE 20

Retain this manual

WOODMASTER® PELLET FURNACE



POWERED BY THE RENOVATOR PELLET BURNER

www.woodmaster.com / 800-932-3629 / Manual PN: 7994-800

Northwest Manufacturing, Inc. / 600 Polk Ave SW / Red Lake Falls, MN 56750

Obadiah's • 406-300-1776



TABLE OF CONTENTS

Table of Contents.....	2
Terms	3
Safety	4-5
Technical Features	6-7
Fuels	8
Installation	9-19
Operation.....	21-24
Maintenance	25-33
Troubleshooting	34-35
Wiring Diagram	36-38
Warranty	39-42
Specifications	43
Temperature Conversion	44
Notes	45

Thank you for purchasing the Force 20 furnace from WoodMaster. This product was designed to deliver easy, trouble free operation for years to come. Check out other WoodMaster heating products at www.woodmaster.com, or our line of quality pellet grills at www.woodmasterpelletgrills.com.



TERMS



Force 20 - Forced air pellet furnace

Renovator AKA Burner or Pellet Gun - Combustion chamber that burns pellets

Air Compressor - Optional on board air cleaning agent. an optional adapter (pn: 0020-213) can be used to attach the air cleaner to a shop air compressor

PLC - Programmable Logic Control - Controls the burner

Start Dose - Amount of fuel need to initiate ignition (approx. 5.25 oz, 150 grams, and 8.5 oz in volume)

Photo Sensor - Reads the photo resistance value to control the flame from ignition to combustion

Auger Spiral - Feed auger screw

Pellets - Wood sawdust compressed into small cylinders to be used as fuel

Fault - An error or malfunction during the ignition or combustion process

Flue AKA Chimney - any duct or passage for air, gas or exhaust

O2 The oxygen that is in the flue gas

Flue Gas Analyzer - O2 sensor that is used to properly calibrate the air to fuel ratio of the burner. (Testo 327-0632 320370)

End Stop - Replaceable plate at the end of the burn pot that prevents the pellets from falling off the burn pot

Flame Guard - A guard that prevents the flame from going up the intake chute

Igniter - A heating element that ignites the pellets

Tipping Chute - The fuel inlet pipe on the Renovator

Combustion Fan - The fan that controls the air flow for combustion

Blower aka Circulation Fan - A multi speed fan that circulates hot air through your heating system



SAFETY

- *Read and follow these directions carefully. Retain this manual for as long as you own your furnace.*
- *All installation and operations must follow STATE and LOCAL CODES for wiring, and firing of this unit. These CODES may differ from this manual. Installation must be performed by a qualified installer.*
- *Follow the manual carefully. Follow the recommended cleaning and maintenance.*
- *Never open the ash doors during operation!*
- *Never operate any part of the furnace or system with covers, shields or panels removed.*
- *Anyone who is not familiar with and/or has not been trained to operate the furnace may not operate the system. Only responsible adults should operate your furnace. If the furnace is not fired properly damage could result and the warranty may be voided.*
- *Never allow children to play near or tamper with the furnace, fuels/fuel tank or any other part of the system.*
- *Always keep the area around and in front of the furnace clean and free from combustible materials.*
- *Keep animals away from the furnace.*
- *The operation may not be continued or restarted in the event of visible damages (for example, thermal distortion, traces of smoke or fire, mechanical damages, etc.). Any damages must be repaired. In the event of any doubts, please contact your authorized WoodMaster Dealer.*
- *The furnace system must not be exposed to external mechanical stress (for example, as storage, climbing support, brace, or similar). This also applies for single parts (doors, covers, etc.).*
- *During operation only touch the PLC Temperatures at other points (for example, chimney, ash door, ducting...) can be very high.*
- *The Force 20 must be operated exclusively according to the guidelines for planning, assembly, regulations, statutes and product related instructions. The manufacturer is not liable for damages and their results, if they occurred due to improper assembly, operation, application and also inadequate maintenance and cleaning.*
- *Do not connect this unit to a chimney flue serving another appliance. Follow all state/local codes.*
- *Ensure that the burner is inserted to the maximum depth of the furnace. Check this each time the burner is removed for cleaning or servicing.*
- *After installation the exhaust must be tested with an O2 sensor from dealer for a flue gas analysis.*

SAFETY



Sweeping

The chimney should be inspected and cleaned as needed, typically twice a year. This is to be done by qualified persons. Regular cleaning of heating surface of the furnace will help the furnace operate at the highest possible efficiency. Shut off furnace, disconnect power and allow the furnace to cool before attempting to clean the furnace.

Warning!

Always disconnect the power to the furnace before any cleaning or maintenance.

Service agreements increases operation length and life of the unit. For more information contact your local WoodMaster dealer.

Replacement parts should only be genuine Northwest Manufacturing, Inc. components. Your WoodMaster dealer can supply the genuine service parts and install them. They can then reevaluate the system and provide a flue gas analysis. Failure to perform a flue gas analysis may void your warranty.

Safety Standards

Guardian info: Solid Fuel Burner System. Listed by Guardian Fire Testing Laboratories Inc. Tested and listed to THE Applicable Sections of UL-391, ETLM 78-1, ASTM-E 1509 & CAN/CSA-B366.1 EPA EXEMPT PER 40CFR60.53A, METHOD 28A

SOLID FUEL BURNER SYSTEM			
Listed By: GUARDIAN FIRE TESTING LABORATORIES, INC.			
Make/Model:	Force / 20 Kw	Serial No.:	
Production Date Code:			
Manufacturer:	Northwest Mfg., Inc. WoodMaster		
Test Date:	09/27/2011	Electrical Rating:	6A, 120V, 60HZ
	Burner:	WOOD PELLETS, 10% MAXIMUM MOISTURE CONTENT. LESS THAN 1% ASH CONTENT	
Tested and Listed to THE Applicable Sections of UL-391, ETLM 78-1, ASTM-E-1509 & CAN/CSA-B366.1 / EPA EXEMPT PER 40CFR60.53A, METHOD 28A			

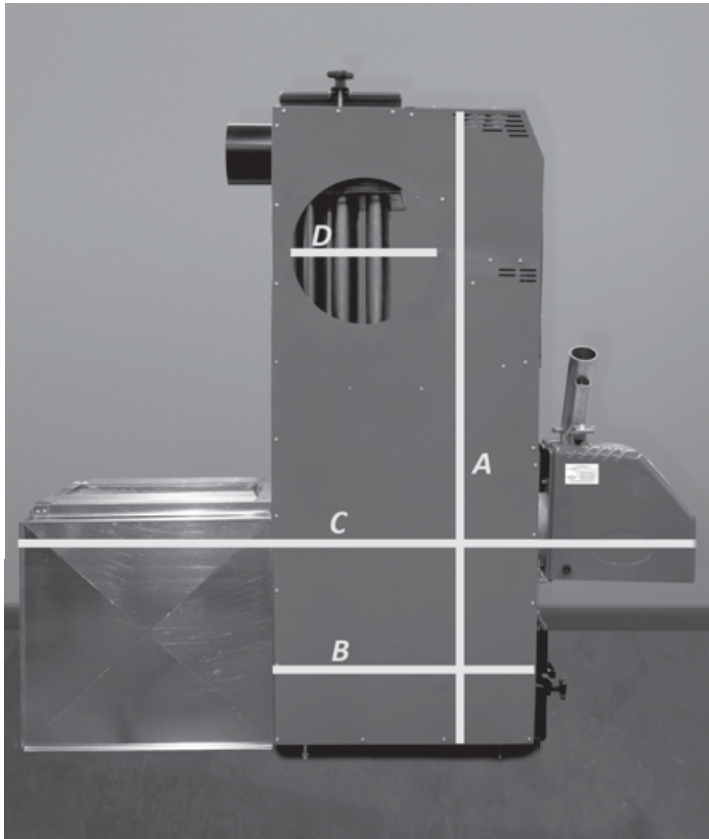


TECHNICAL FEATURES

Dimensions

Below are the dimension of the furnace and hopper. The hopper can be situated in numerous locations to suit your specific installation needs. The system needs certain clearances from combustible materials:

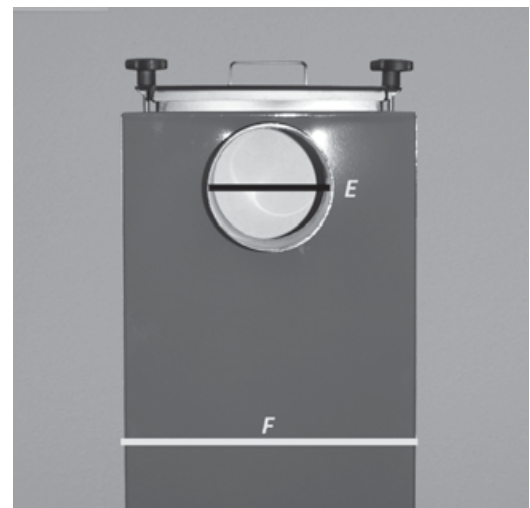
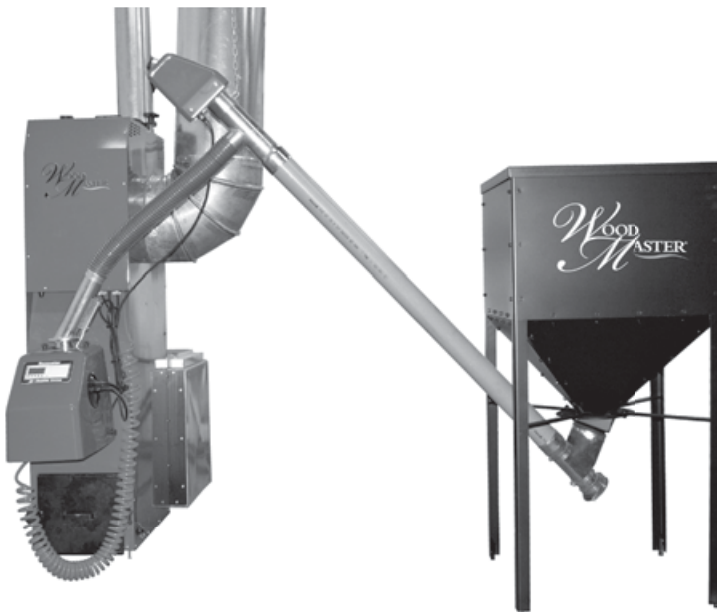
Back Wall: 24" Side Walls: 18" Ceiling: 36" Front: 36" Flue, All Sides: 18"



A = 55" B = 22.5" C = 59" D = 12.5"



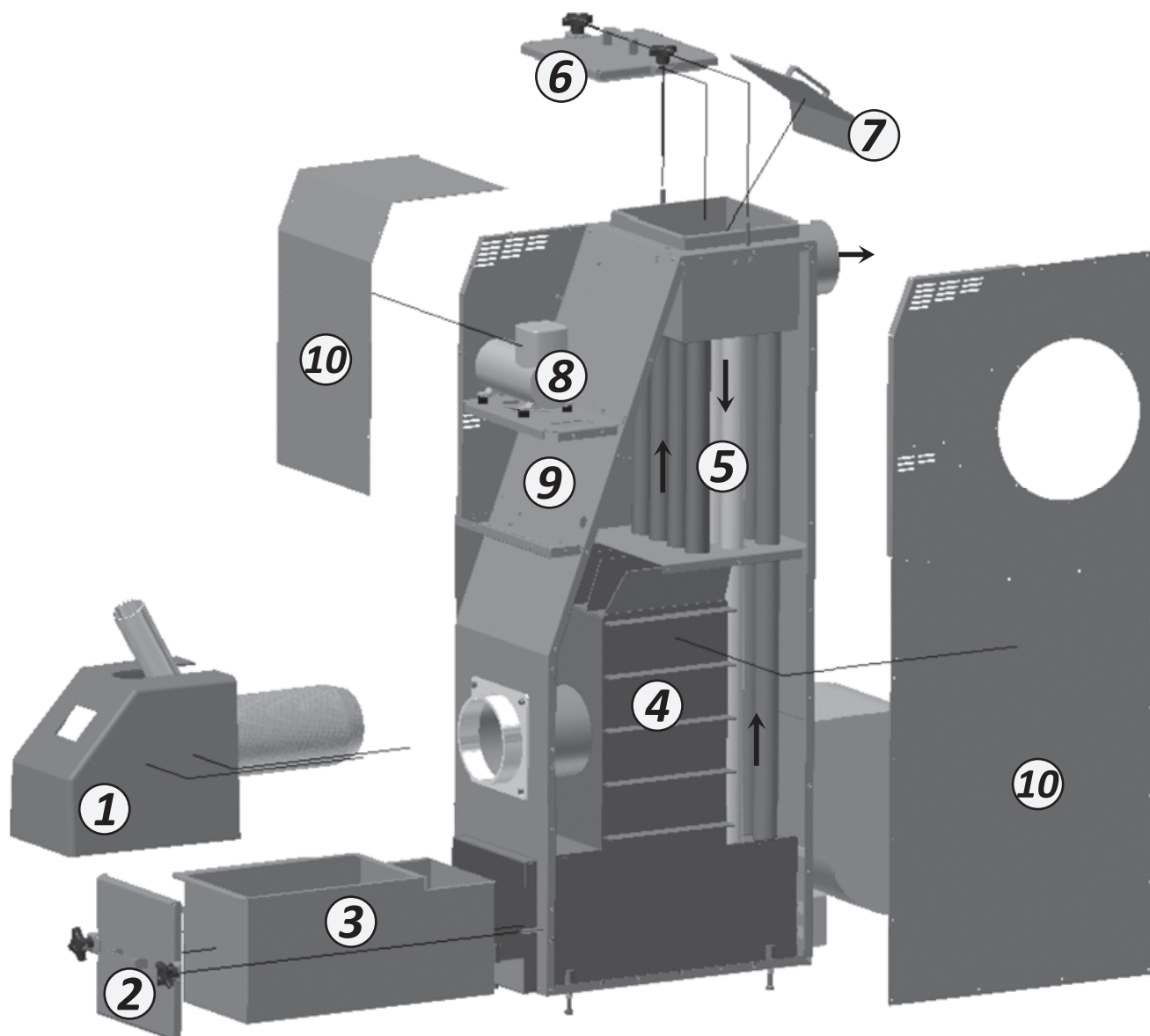
The hopper is 24" wide by 24" deep and 52" tall.



E = 5" F = 13.2"

TECHNICAL FEATURES

WOOD
MASTER



1. High Efficiency Renovator 20kW burner
2. Easy access ash door in front
3. Large ash box - holds approx. 1-2 weeks of ash
4. High efficiency louvered fire box transfers the maximum amount of heat to the air chamber
5. Triple Pass flue tube insures the heat stays in your home and not out the stack (5")
6. Easy access flue tube clean out door
7. Flue tube diverting plate
8. On board air supply to auto clean the Renovator (Optional accessory)
9. One central electrical location for ease of wiring
10. High quality and attractive outer shell



FUELS

All wood pellets must conform to certain quality standards to ensure trouble free operation of the burner. Use of unapproved fuels may result in faulty operation and a voided warranty. Never use the following: trash, plastics, gasoline, rubber, or naphtha. Please contact your WoodMaster Dealer or Northwest Manufacturing, Inc. for any questions on fuel use.

Pellet Specifications

Only premium wood pellets certified by the Pellet Fuels Institute may be used and must follow these guidelines:

- Bulk density per cubic foot must be a minimum of 40 pounds
- The diameter is between 1/4 inch to 5/16 inch
- Maximum length is 1.5 inches
- Fines (dust) of not more than 0.5% by weight
- Sodium content shall be less than 300 parts per million
- Ash content of 1% or less
- Moisture content of 10% or less

Note: Pellets should be stored in a dry area and should not be allowed to get wet.
Handle pellets with care.

Note: Each time you change brand/quality of pellets you may also have to change the start dose and feed rate of the burner.

INSTALLATION



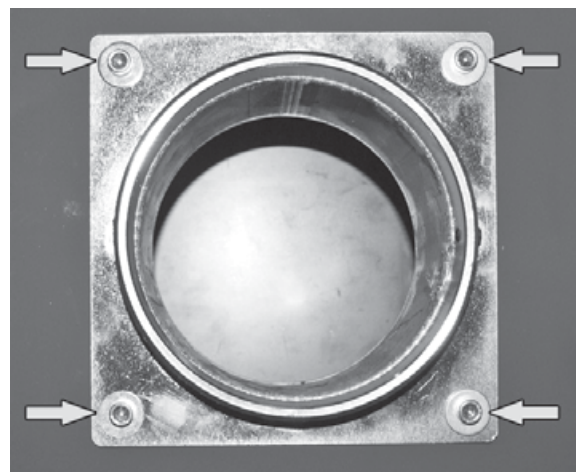
Furnace Installation

The Force 20 furnace must be installed in a location that has enough space for easy cleaning and maintenance of the furnace. There must also be ample room for the pellet hopper and auger assembly. The furnace must be on a level surface that can support the weight of the unit, as well as the weight of a full pellet hopper. The furnace room must also have a vent to allow ample fresh air for the combustion process. A vent size of at least 20 sq. in. is recommended. The main electrical wiring should be done by qualified persons.

NOTE: The wire brush used for cleaning is shipped inside one of the furnace tubes. Remove the flue tube clean out door on the top of the furnace and remove the brush prior to installation.

Renovator Pellet Burner Installation

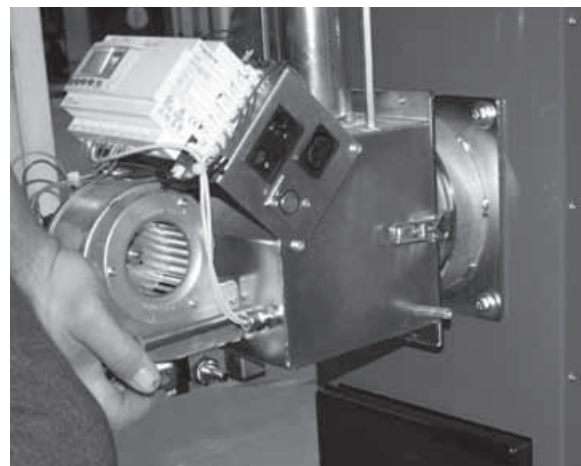
Install the mounting bracket to the furnace with the supplied hardware. The holes on the frame are slotted to allow adjustments for proper alignment. Leave the bolts loose to allow for adjusting when installing the burner. There is a set screw on the ring of the bracket to lock the burner in position. Position the bracket so the set screw is easily accessible.



Attach the tipping chute to the burner in the desired angle with the supplied screws. Remove the four thumb screws that hold the cover on the burner and remove the cover.



Slide the burner assembly into the furnace 3/4 of the way to center the mounting bracket. Tighten the four allen head bolts. Now slide the burner all the way into the furnace. Ensure the burner is level and secure it in place with the set screw on the bracket.





INSTALLATION

Place the cover over the burner and secure it in place using the four thumb screws provided.

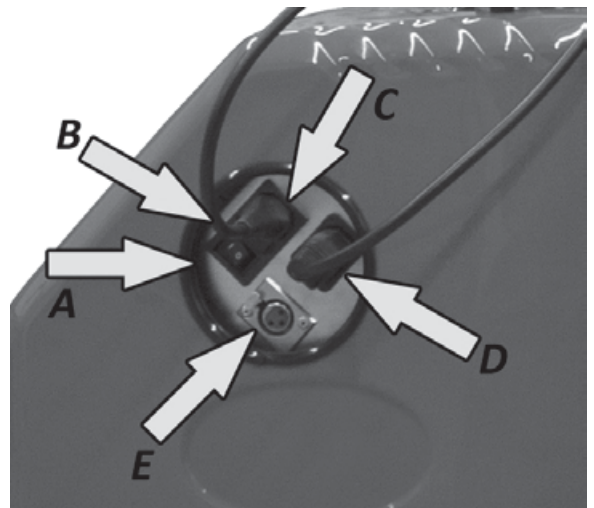


Connect the wires to the burner. The Renovator Pellet Burners have very simple connections that allow for easier removal for cleaning and maintenance.

- A. Power Switch
- B. Fuse
- C. Power Lead In
- D. To Feed Auger
- E. To Temperature Sensor

The protective cover on the burner cannot be removed without disconnecting these cables.

Replacement Fuse PN: 100-0038



INSTALLATION

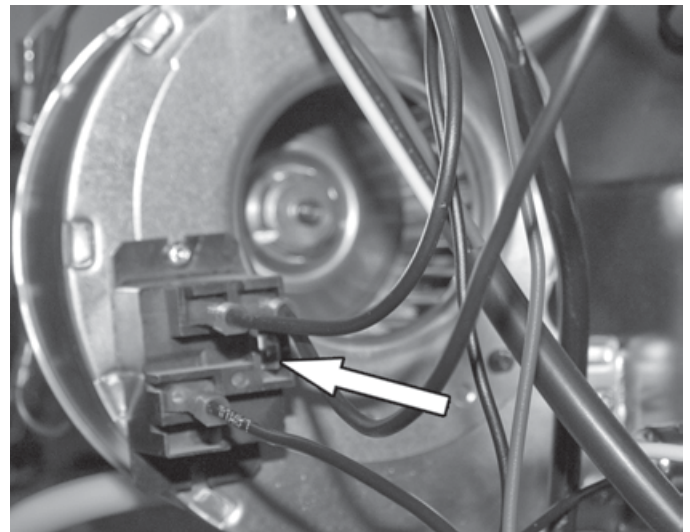


800 Watt Igniter Wiring

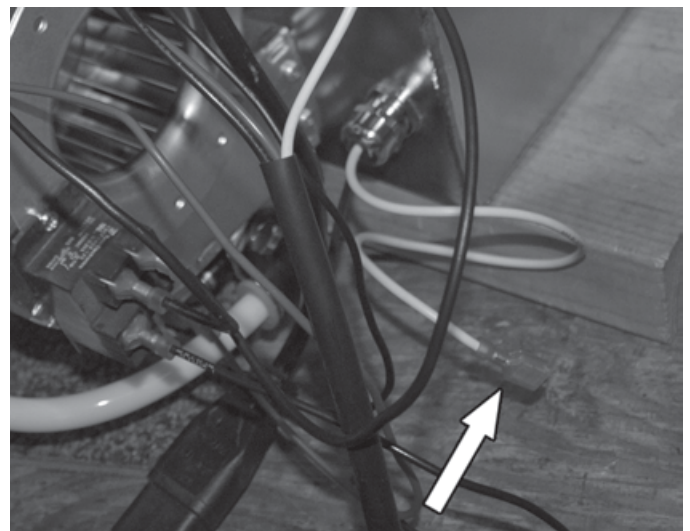
Some burners are now supplied with an 800 watt igniter for faster ignition. 800 watt igniters need a dedicated 120v power source, that is routed through a relay on the side of the combustion fan. If your burner does not have a relay on the side of the fan, it is equipped with a 400 watt igniter and no further wiring is needed. **NOTE: Disconnect all power during installation.**

Note: The burner does not need to be removed from the furnace to perform this installation, the burner is shown off the furnace for reference only.

The black wire from the igniter is already connected to the relay, along with two wires from the PLC. There should be one open location on the relay; this should be connected to the black wire from a 120v power source.



The white wire from the burner should be connected to a black wire from a 120v power source. See the wiring diagram for complete wiring of the burner.



Feed Auger Installation

The angle of the auger should be between 43 and 45 degrees. The feed auger has to be fastened well. The auger can be hung from the ceiling or overhead support with a chain. The feed auger should be placed so that it does not sit right above the tipping chute on the burner. This helps reduce potential damage in the event of a burn back. Fill the feed auger with pellets before you connect the tube to the burner. Connect cable of the auger with the power cable for the burner and run it manually until pellets have been fed out from the auger for about 15 minutes. We recommend that you run the auger a couple of times manually for 70 second intervals and then weight each dose to see if the auger gives an even feeding. The margin of error should only be within 3-4 %. In 70 seconds the auger loads approx. 150 grams or 5.25 ounces, which is the recommended start dose. Insert the auger tube into the tipping chute when complete.

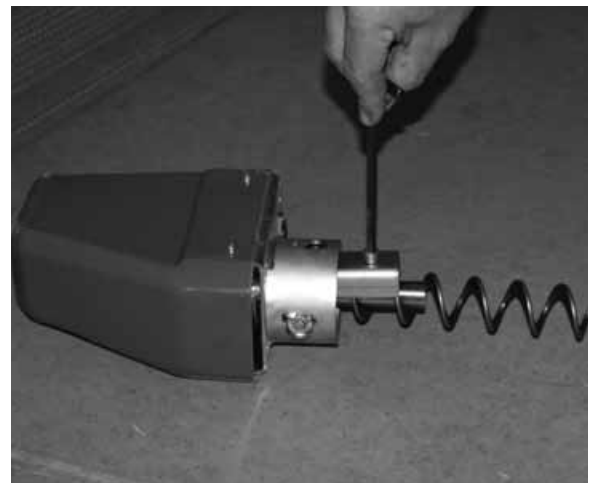
Feed Auger Assembly

The following instructions describe how to assemble the feed auger out of the supplied parts. The auger pipe is 51" in length and the spiral is 65.75". No modifications to the length of the components can be made.

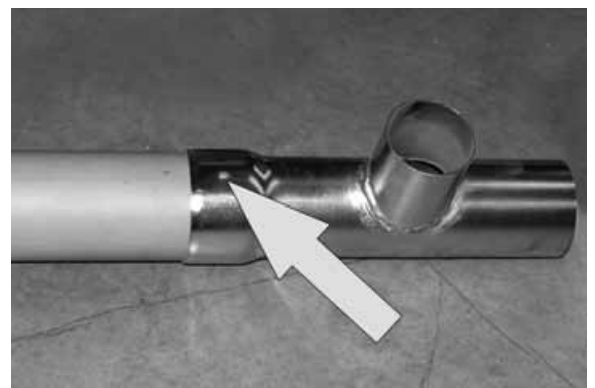
Manufacturing and mounting example:

1. Attach the auger spiral to the motors output shaft. Push the spiral as far as it can go onto the shaft, then pull it back approx. 3/8" to prevent binding. Clamp the spiral in place by tightening the two bolts that hold the clamp in place.

Note: The auger head may have a slightly different appearance than the one shown in the pictures. Assembly of the auger will not change.



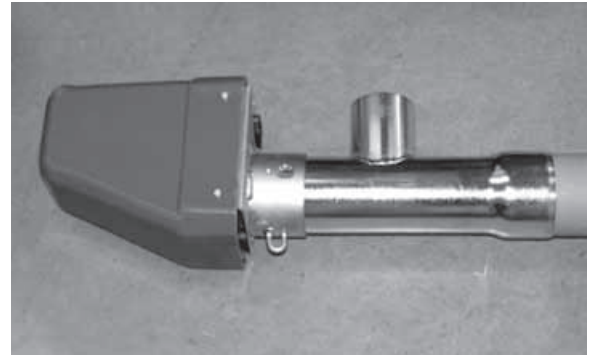
2. Slide the T-pipe onto the auger tube and fasten them together using the screw indicated by the arrow.



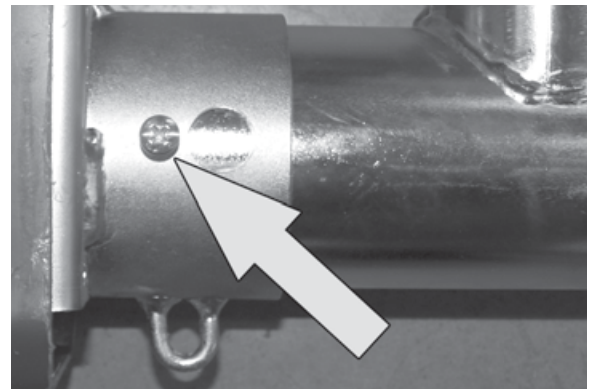
INSTALLATION



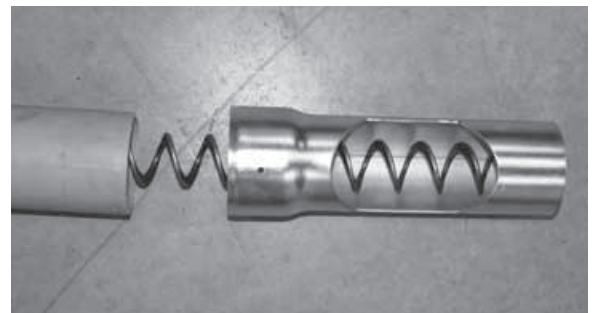
3. Route the auger spiral through the T-pipe and slide the auger motor over the other end of the T-pipe.



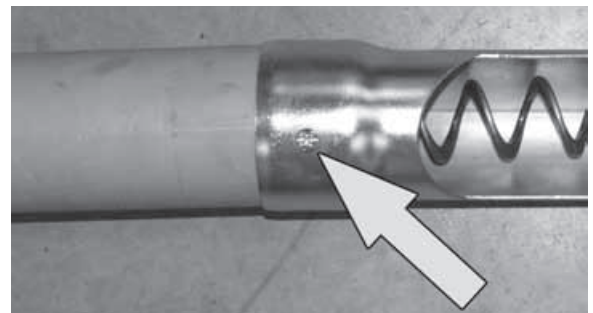
4. Fasten the motor to the T-pipe. Make sure that the T-pipe and the wire connection on the motor point in the same direction.



5. Slide the inlet pipe over the auger tube. The hole in the inlet pipe should be 180 degrees towards the outlet on the T-pipe.



7. Slide the inlet pipe over the auger tube. The hole in the inlet pipe should be 180 degrees towards the outlet on the T-pipe. Fasten the screw shown to lock the inlet pipe in place.



7. Slide the blue tube to the outlet of the T-pipe, and the cap on the end of the inlet pipe. The auger is now ready to be installed.



Pellet Hopper Assembly

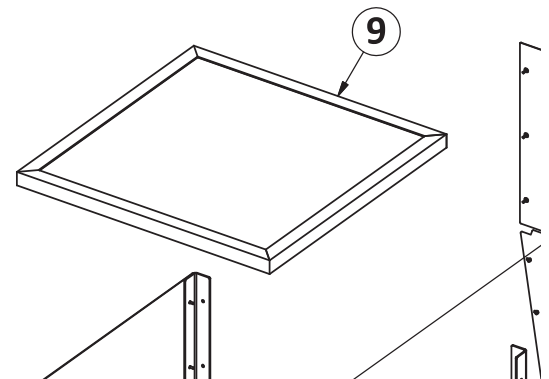
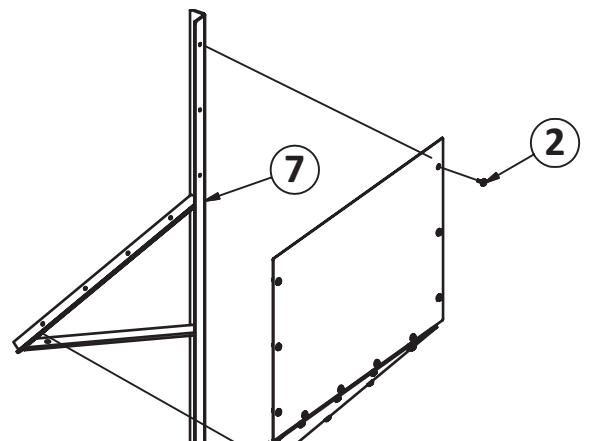
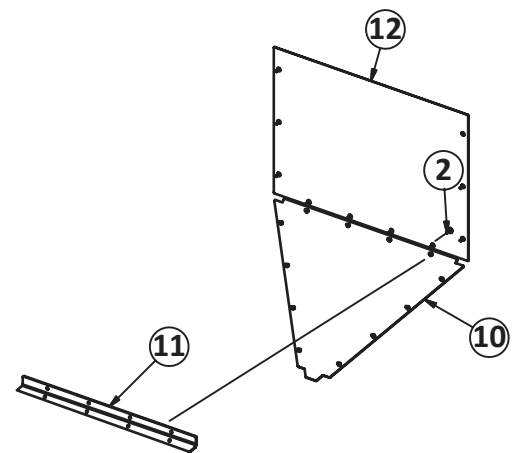
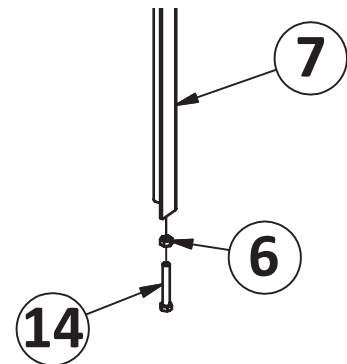
The optional pellet hopper holds approximately 280 pounds of pellets. Northwest Manufacturing, Inc. recommends using our pellet hopper to ensure proper fuel flow. Each part is numbered on the chart on the next page for reference.

Install the adjustable feet into each of the four legs of the hopper.

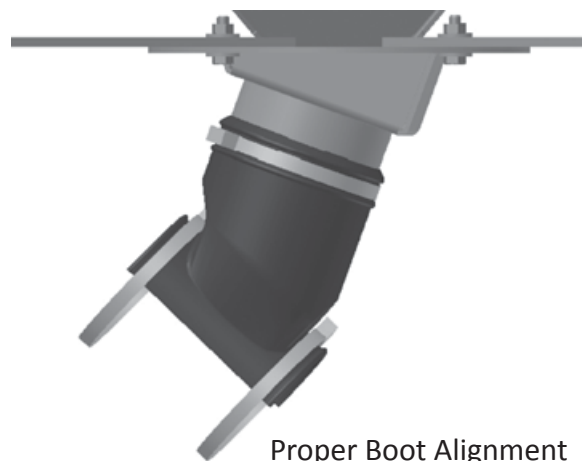
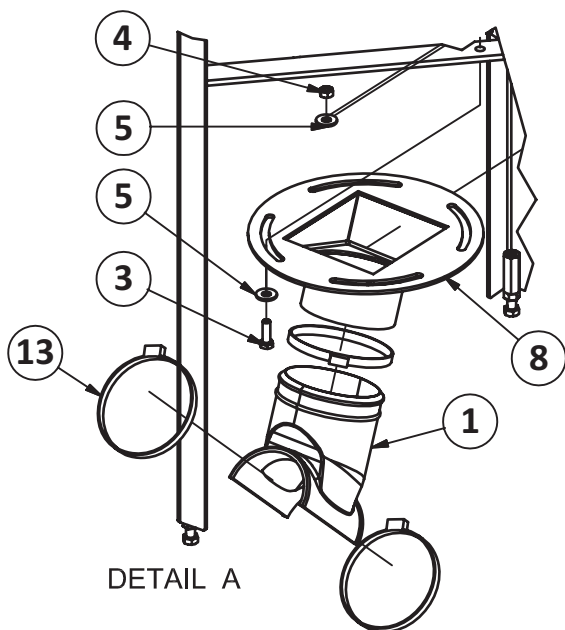
Assemble the four side walls out of side skins 12 and 10. Use the hopper side seam 11 to join the skins together using the provided screws.

Join the assembled side walls to the legs using the supplied screws. The legs will be on the inside of the hopper, with the skins screwed to the outside.

Place the lid of the hopper on the hopper when assembly is complete. DO NOT remove during operation.

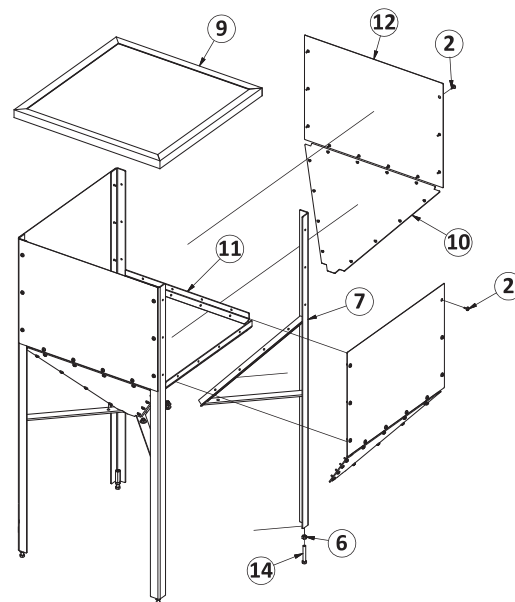


INSTALLATION



Proper Boot Alignment

Once the hopper is assembled put it in place next to the furnace. The bottom is adjustable to allow for easy installation of the auger tube. Assemble the bottom by securing the hopper boot to the adjustable bottom with a hose clamp. Using the provided bolts and washers secure the bottom to the braces on the legs, do not tighten the bolts until the auger is in place to allow for adjustments.



Exploded Assembly View

ITEM	PART NUMBER	QTY	DESCRIPTION
1	0409-212	1	AFS9 HOPPER BOOT
2	0219-948	88	SCREW: 1/4-20 x 1/2" PPH THREAD ROLLING, Z
3	0219-265	4	SCREW: 5/16-18 x 1, HHCS, Gr5, Z
4	0219-001	4	NUT: 5/16-18, HEX, Z
5	0219-041	8	WASHER: 5/16" USS FLAT, Z
6	0219-002	4	NUT: 3/8-16, HEX, Z
7	980-0081	4	PTD: 4' HOPPER LEG WMT
8	980-0082	1	PTD: HOPPER ADJUSTABLE BOTTOM WMT
9	980-0083	1	PTD: HOPPER LID WMT
10	910-0285	4	PTD: HOPPER FUNNEL SIDE SKIN
11	910-0286	4	PTD: HOPPER SIDE SEAM
12	910-0287	4	PTD: HOPPER SIDE SKIN
13	0209-250	3	HOSE CLAMP, Ideal # 6872
14	210-0010	4	BOLT: 3/8-16X2.5; HH, FULL THREAD

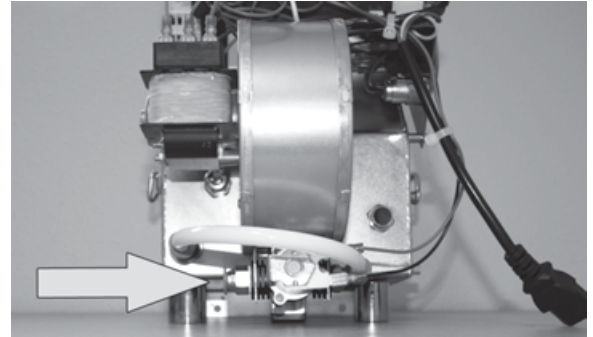


INSTALLATION

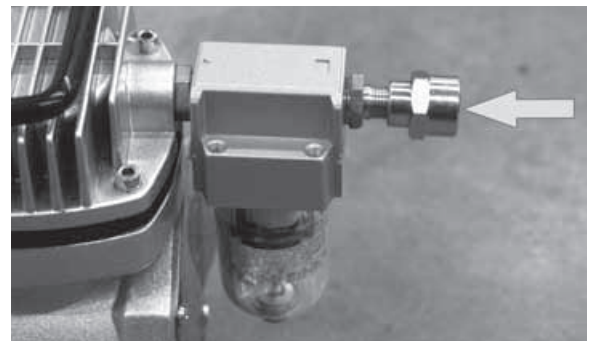
Optional On Board Air Cleaner Installation

The Renovator Pellet Burner has the capability to clean the fire pot with compressed air supplied by an on board air compressor. This allows for easier ignition as well as lower maintenance. Below is a brief explanation of the installation process. **NOTE: Disconnect all power during installation.**

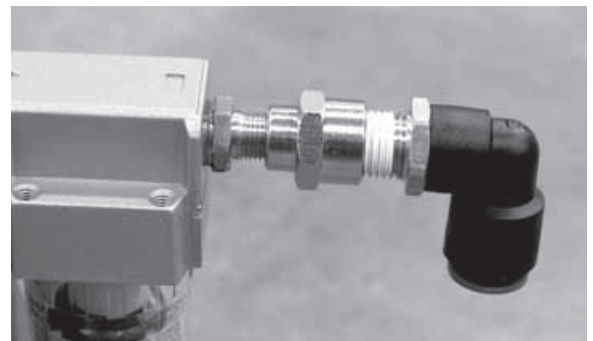
1. Disconnect the wiring and remove the plastic cover of the burner. **NOTE: The burner does not need to be removed from the furnace to perform this installation, the burner is shown off the furnace for reference only.** The location of the air line connector is below the combustion fan on the left side. Connect the supplied air hose to the air line connector on the burner.



2. Unpack the air compressor. Connect the adaptor fitting to the outlet of the air compressor. **NOTE: Thread sealant must be used in this connection.**



3. Connect the quick connect elbow to the adaptor fitting that you just installed on the air compressor. **NOTE: The threads on the quick connect elbow will already have thread sealant applied.**



4. Carefully remove the front panel of the furnace to expose the mounting location for the air compressor.



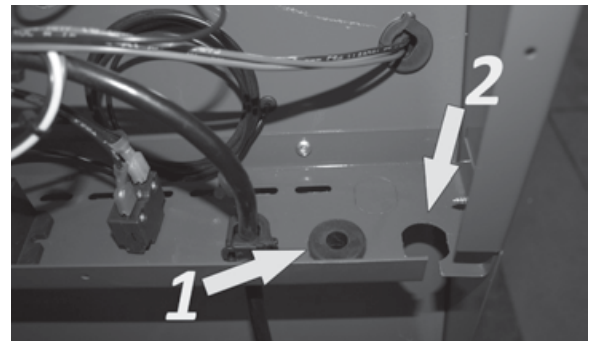
INSTALLATION



5. Install the shelf that the air compressor sits on. The self is secured to the two side panels with two screws on each side. The holes for the screws are already in the side panel.

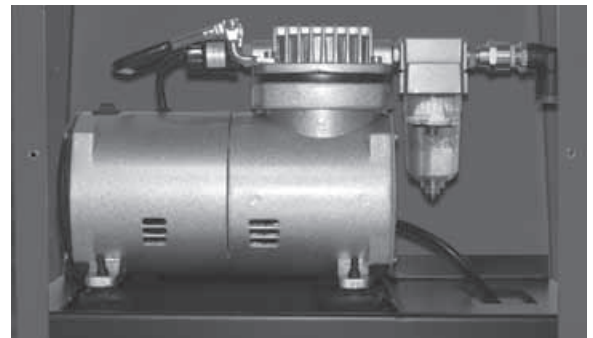


6. Run the air line through knockout number 1 in the panel. Run the power cord through the notched knockout number 2 in the same area. **NOTE: Do not modify the length of the air hose.**

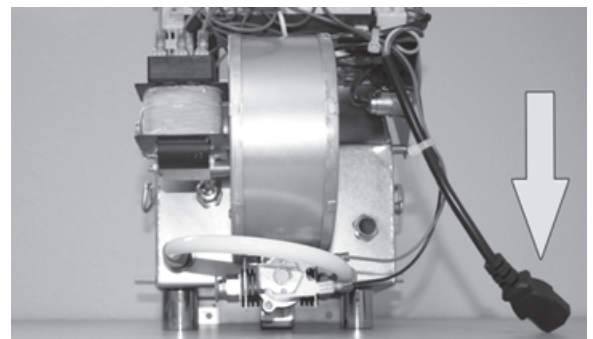


7. Connect the air hose to the air compressor via the quick connect. Make sure the air compressors power switch is left in the “on” position. Once all connections have been made, reinstall the front furnace panel.

NOTE: Do not operate the furnace/air compressor with the furnace panel removed.



8. Plug the supplied air compressor power cord adaptor into the burner. Plug the air compressor power cord into the adaptor. Replace the burner cover.



If you do not obtain the optional on board air cleaner, you still need to supply compressed air to the burner for cleaning. Northwest Manufacturing, Inc. offers an adapter (Part Number: 0020-213) that will allow you to connect the air hose to a full size air compressor. Whenever the furnace is operational there needs to be a constant supply of compressed air over 90 psi available to the burner.

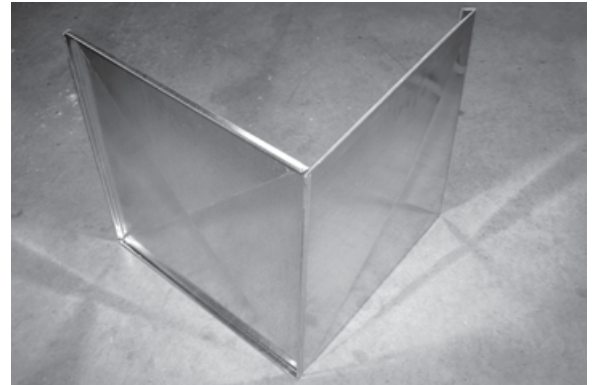


INSTALLATION

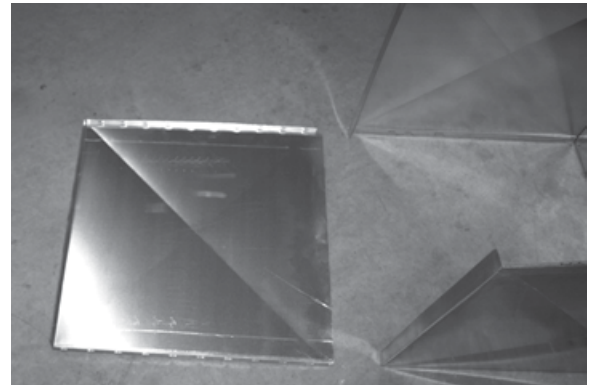
Filter Box Assembly

The filter box is assembled by snapping the panels together. The filter box is attached to the Force 20 with an adapter plate. Secure the plate to the furnace before installing the fan and filter box. **CAUTION: Edges of the filter box panels are sharp!**

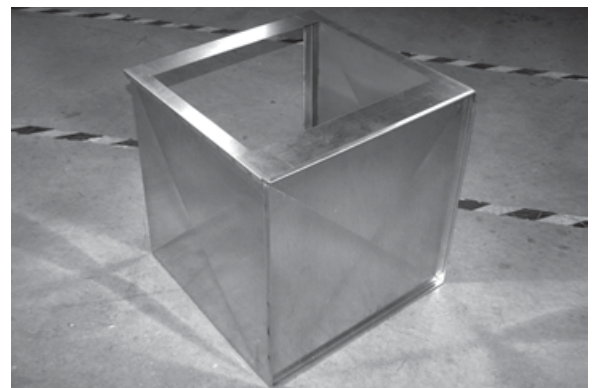
Fasten the end panel with the two side panels. Make sure the tabs on the end panels are pointed towards each other.



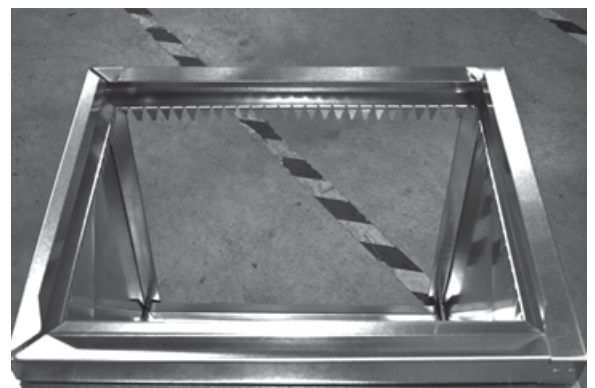
Secure the bottom panel to the side and end panels.



Secure the panel with the cutout for the opening to the filter box assembly.



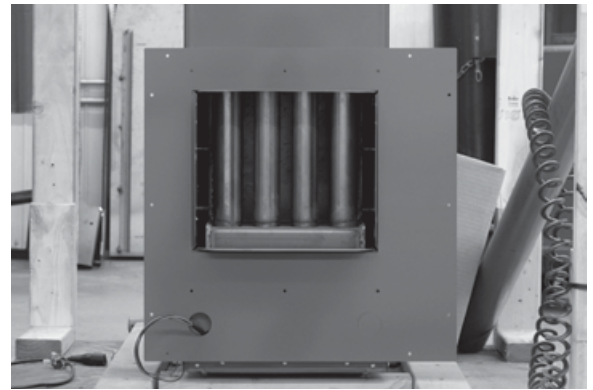
Before locking the filter holder in place decide how the filter box will be attached to the Force 20. The filter box can be rotated so the filter is on the top side, left side or right side. **NOTE: Make sure that the filter box is installed in a way that allows for the filter to be easily changed.** Fold the tabs in the filter holder once the position has been determined.



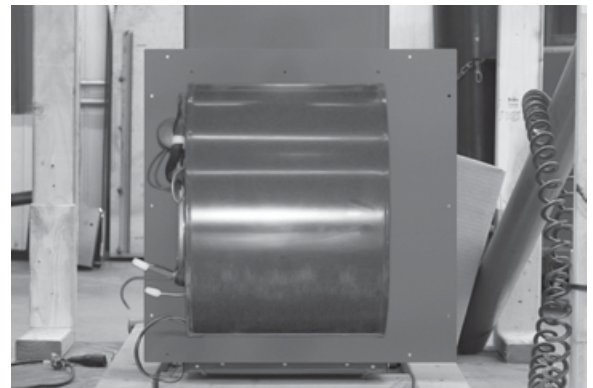
INSTALLATION



Route the wires from the furnace through the hole on the filter box mounting plate and secure the plate to the furnace with the supplied screws. The holes in the mounting plate are pre drilled.



Place the blower on the furnace and use the provided screws to secure it. The blower can only be installed in the shown orientation. Do Not rotate the fan. **NOTE: All wiring should be done by qualified persons.**



Once the blower is secured and wired, place the filter box over the blower and secure it to the mounting plate with the supplied screws. The ducting system should be installed by qualified persons.





INSTALLATION

Chimney

The flue pipe to be installed is a rising chimney.

Elbows can be used, but T's are recommended to allow for the cleaning of the flue pipe.

For every one foot of horizontal pipe three feet of vertical pipe is required.

A draft controller should be used to allow proper flow. The draft controller must be installed as close to the furnace as possible.

A draft inducer may be used to ensure proper draft.

The chimney draw must be between $-.15$ and $-.10$ mbars ($-.06$ and $-.04$ inches of water).

The chimney must follow all state and local codes.

The Chimney should be installed by a qualified professional.

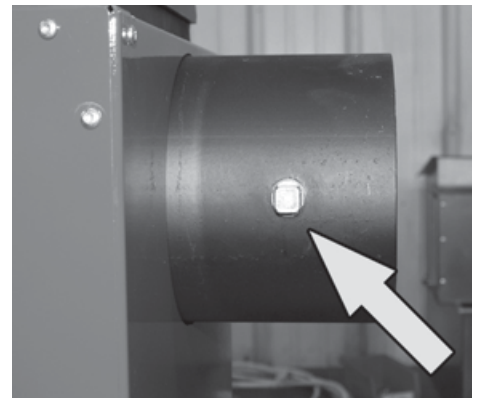
Your Force 20 can be vented into an existing chimney as long as the chimney fits the necessary criteria, and does not service any other appliance.

Flue Gas Analysis

Once the furnace is installed, it must be adjusted to proper burn settings. There is a plug on the flue pipe that can be removed to allow the sensor of the flue gas instrument to be inserted into the chimney. These setting will vary slightly depending on variables in each installation. A flue gas instrument must be used to properly adjust the burner. **NOTE: Make sure the flue gas instrument used supports biomass fuels, otherwise damage to the instrument may occur.** The target value for oxygen that you are trying to reach is:

O2: 6.-10.5% with the ideal target being between 6% and 8%.

the O2 value is the average over a one hour continuous burn. The value will fluctuate slightly during the duration of the burn. It is recommended to wait 3-5 minutes between adjustments to give the burner time to react to the adjustments. Shorter on/off time intervals will result in a more even and efficient burn. There is a minimum of three seconds for the on time. When adjusting to the oxygen level, if the O2 level is below the target values, then less fuel needs to be added, if it is above the target values, then more fuel is needed. Adjustment is done on the menu described in Section 7: Operating, number 4. The furnace should be readjusted each time a new brand of pellets is used.



Testing Location

OPERATION



The burner is not adjusted from the factory. The burner has to be adjusted with a flue gas instrument the first time the burner is fired and after a change in fuel brand/quality. **NOTE: The Force 20 is shipped with a protective coating on the heat exchanger to prevent corrosion. This will burn off during the first time firing of the furnace and may briefly produce a blue smoke.**

1. Fill the feed auger with pellets before you connect the tube to the burner. Connect cable of the auger with the power cable for the burner and run it manually until pellets have been fed out from the auger for about 15 minutes. Insert the auger tube into the tipping chute when complete.
2. Setting of start dose (the amount of pellets at ignition). A good start dose is approx. 150 grams (5.25 ounces) We recommend manually measuring the start dos. The start dose is approx. equal to the volume of an 8.5 oz cup.
3. To adjust amount of fuel for operation, a flue gas instrument must be used. The proper adjustment is needed to obtain the cleanest and most efficient burn. This should be made by your authorized WoodMaster Dealer.

Programming and information about the PLC

To make changes to the settings of the PLC, use button 1 to scroll between menus. Once you have found the menu with the setting you wish to change, press the white button on the right with button 4.

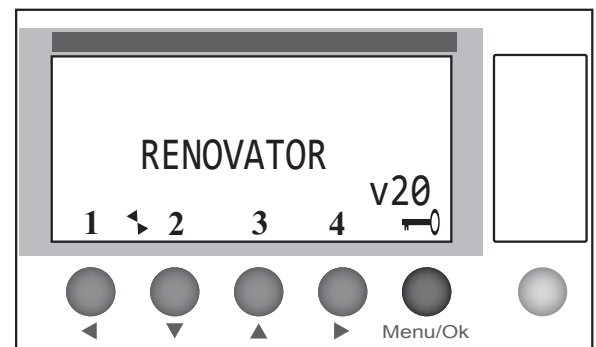
Once the white button and button 4 have been pressed one of the values that can be changed is now blinking.

To change the desired value, adjust with buttons 2 (down) and 3 (up).

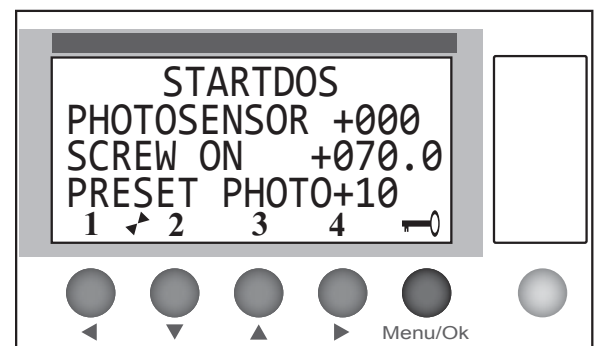
Buttons 1 and 4 let you scroll between the different settings on each menu.

Press the menu/ok to save any changes made. The value should stop blinking.

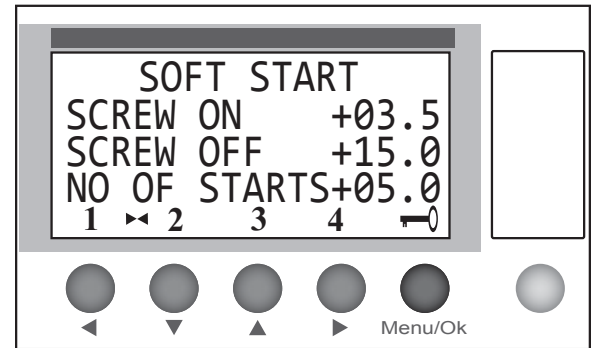
1. This is the default home screen. No changes can be made in this menu. Pressing the White button and the Menu/Ok button will briefly change the display to show the date/time screen. This will change back on its own.



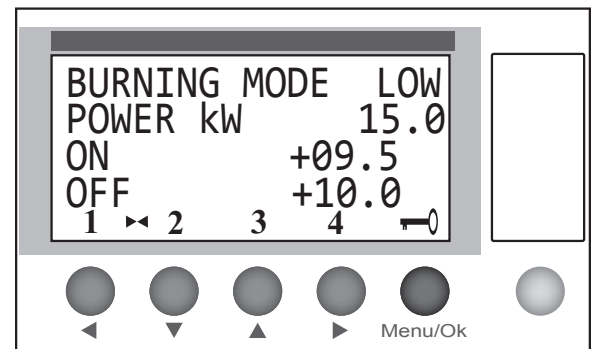
2. In this menu you can set the start dose. Here you choose how many seconds the auger takes to feed the optimal start dose (approx. 150 grams or 5.25 oz) of fuel pellets. Factory default is 70 seconds. This menu also handles the desired value of the photo sensor that controls the flame at combustion. When the sensor feels the flame has reached input value the burner switches to the soft start in the combustion. The photo sensor value can also be read in real time.



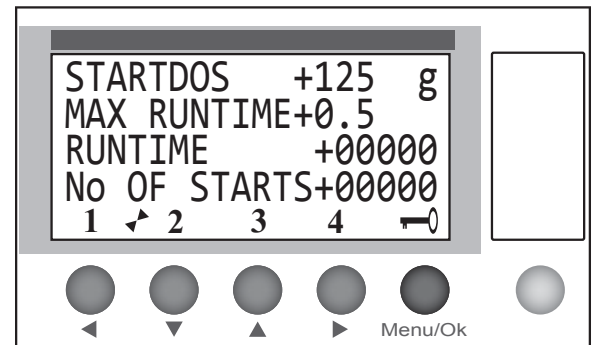
3. In phase two, the soft start level, the auger feeds the burner 5 times with three second operation intervals on the auger before it goes over completely to full burn mode. The three values in this menu can be changed.



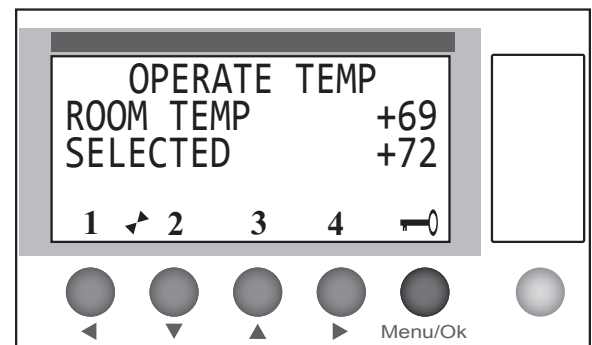
4. The next menu shows the burn mode the burner. The power displayed is the approximate input power. This is where the settings for the burner are changed when adjusting the furnace with a flue gas analyzer. This is made by adjusting the time for the feeding of the auger and time between the feeds. You can also select the mode in this menu. The choices are LOW and HIGH, where the user determines the feed rate, and AUTO mode, where the PLC determines the feed rate. See step 5 for adjusting AUTO mode. Press buttons 2 and 3 together to change this value. You do not have to press button 4 and the white button prior to changing this setting.



5. The Startdos value in this menu (this is a different setting than the startdos previously described) is adjustable between 100 and 400 grams and is the adjustment used when the burner is in Auto burning mode. The MAX RUNTIME value is how long the burner will run before shutting down to self clean. The default value shown is 1/2 an hour. If heat is still called for, the burner will restart after the cleaning is completed. You can also read the operation time of the burner and how many times it has started.



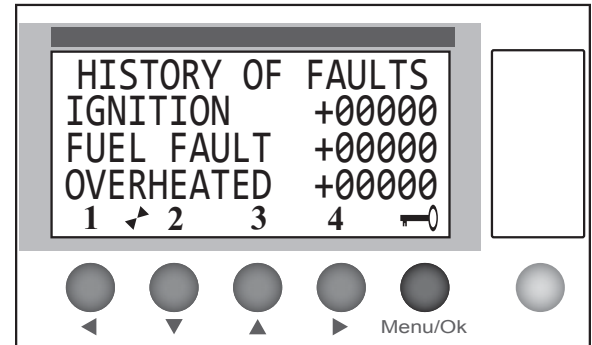
6. This menu displays the current room temperature and allows you to set the desired temperature. The selected temperature can be changed. The room temp is the temperature that the supplied temp sensor is detecting. The burner comes with a temperature sensor that starts and stops the burner. A wall mounted thermostat can be wired directly to the PLC on the burner. If a wall mounted thermostat is used, disconnect the temperature sensor. If a wall mounted thermostat is used, the selected value can no longer be changed in this menu, and is instead controlled by the thermostat.



OPERATION

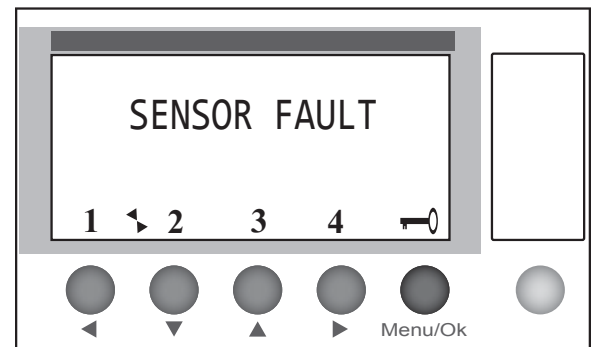


7. The PLC also keeps track of some faults that could be useful to in the event of a problem occurring. This history shows how many ignition errors, fuel errors and if the burner has overheated via the temperature sensor that is placed on the tipping chute. There are no values that can be changed in this menu.

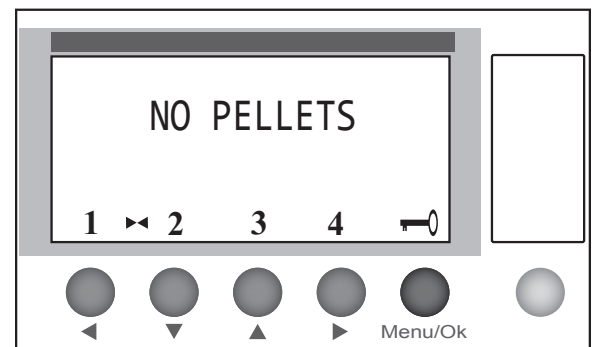


Alarm (The display shows a message and the burner has turned off.)

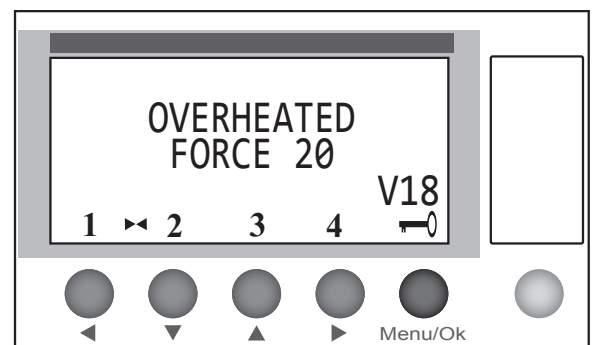
8. This alarm example indicates an error has occurred to the sensor that controls the furnace temperature. ***Do not attempt to start the burner.*** Turn off the burner and check the connections for the sensor. restart the burner. If the problem persists, contact your dealer or Northwest Manufacturing, Inc.



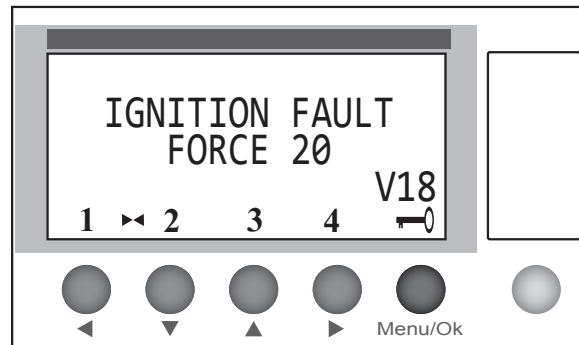
9. When this alarm appears the pellet hopper is empty. Please refill the pellet hopper with pellets. This will only appear if you have set up a level sensor in the pellet hopper. If you do not have a level sensor in the pellet hopper, then a FUEL FAULT will occur. See the troubleshooting section for further assistance.



10. When this alarm appears on the burner turn the power off to the burner once the combustion fan has stopped. Allow the furnace to cool and clean the furnace. Check the blower air box filter and replace if the filter is dirty. Turn the burner back on and reset it. To reset the burner hold down button 4 until the PLC is reset. If the problem persists, there could be a lack of proper draft. Contact your dealer or Northwest Manufacturing, Inc. or see the troubleshooting section for further assistance.

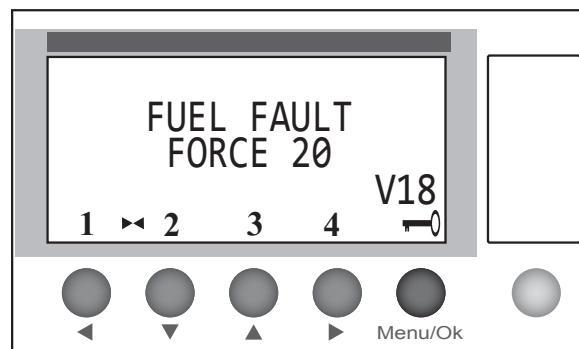


11. Error on the ignition element. This may be caused by an incorrect start dose, a dirty burner or a failed igniter. Turn off the burner and restart. Check to make sure you have the correct start dose settings, or check the connection for the feed auger. If the burner starts, no further action is needed. If not see the troubleshooting section for further assistance. If the problem persists or if the igniter is bad, contact your dealer or Northwest Manufacturing, Inc.



12. The error "FUEL FAULT" can be displayed for multiple issues:

1. Make sure there are pellets in the pellet hopper.
2. Make sure that the auger drive motor is working by connecting the power cord of the burner and the power cord of the auger.
3. If the pellet hopper is empty it is best to fill and run the auger until pellets come again manually. Let the auger run for approx. 10 -15 min to get an even dosage.
4. Make sure the pellets in the pellet hopper are not cavitating. If this is occurring, clean the pellet hopper.



If the problem persists, contact your dealer or Northwest Manufacturing, Inc. See the trouble shooting section for further assistance.

13. Shutting the Burner Off

When shutting off the burner, either for maintenance or for the season, the burner must be allowed to enter and complete its shutdown process. Failure to allow the burner to shut down properly can result in damage to the burner, especially if done repeatedly. It will also greatly reduce the burners efficiency. If the burner is idle and the combustion fan is off, the burner can be switched off.

If the burner is running, the STOP set point on the operation temp screen should be adjusted so that it is lower than the current boiler temperature. This will initiate the burners shut down process. Once the burner has air cleaned and the combustion fan has turned off, the burner can be switched off. This process will take approximately five minutes.

MAINTENANCE



The Force 20 and Renovator should be cleaned regularly. It is recommended that for each hoppers worth of pellets burned, the furnace should be cleaned.

Sweeping the Heat Exchanger Tubes

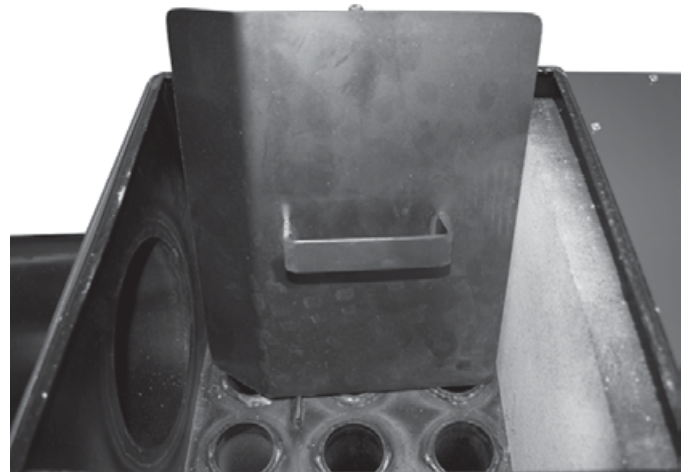
Regular cleaning of the heat exchanger tubes is made from the top by removing the flue tube clean out door on the top of the furnace. Ensure the furnace has had ample time to cool before cleaning the heat exchanger tubes and emptying the ash box. Dispose of ash in a metal container away from combustible materials. When cleaning the heat exchanger tubes ensure that you do not damage the ceramic insulation in the process.

NOTE: Make sure the cables and hoses are not damaged during the cleaning process.

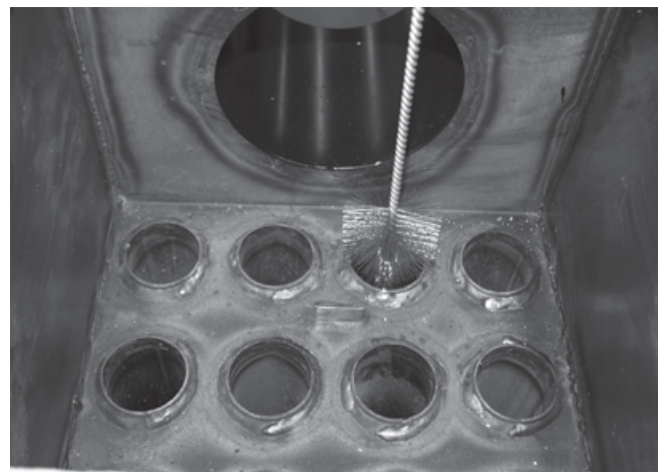
Unscrew the two black knobs and remove the tube access cover from the top of the furnace.



Remove the diverting plate.



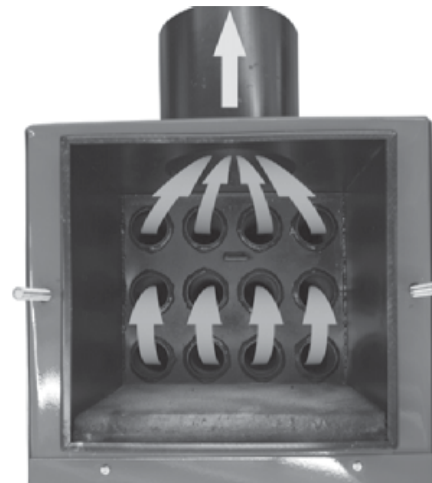
Clean each tube with the wire brush.



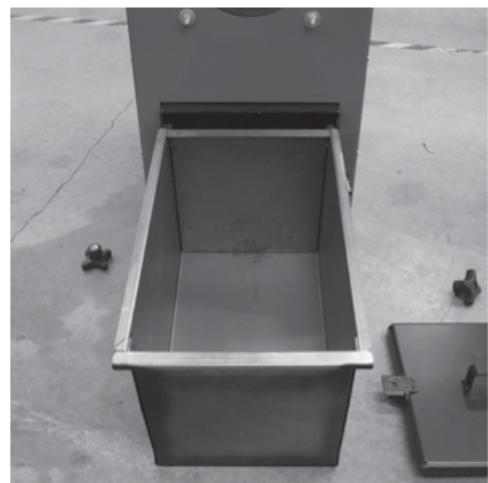
Replace the diverting plate, making sure it is installed correctly, and covering the two sets of tubes at the front of the furnace.



direction that the flue gas travels when the diverting plate is installed



Unscrew the door for the ash box and empty the ash box.



The Force 20 has an extra large ash box in the bottom to help with cleaning and maintenance. The ash box should be checked and emptied regularly. The ash box can hold approximately 1 cubic feet of ash, or 1-2 weeks worth of ash, or 1000 pounds of pellets that have been burned.

MAINTENANCE



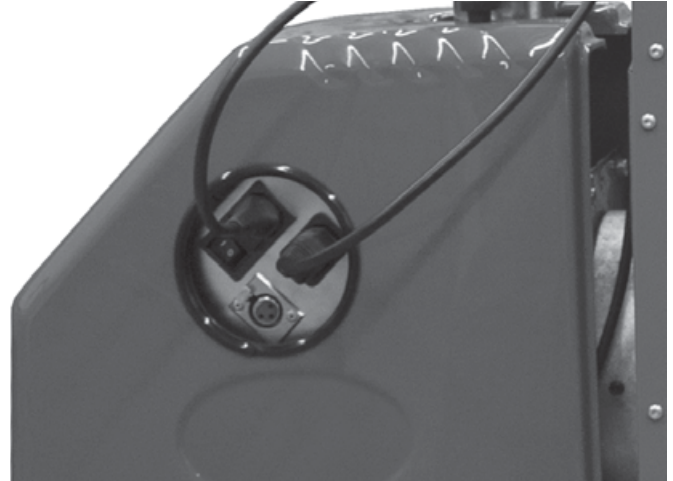
WARNING: Before performing any of the following tasks, ensure that the power is disconnected from the furnace and the burner, and that all components of the system have had ample time to cool.

Cleaning the Burner

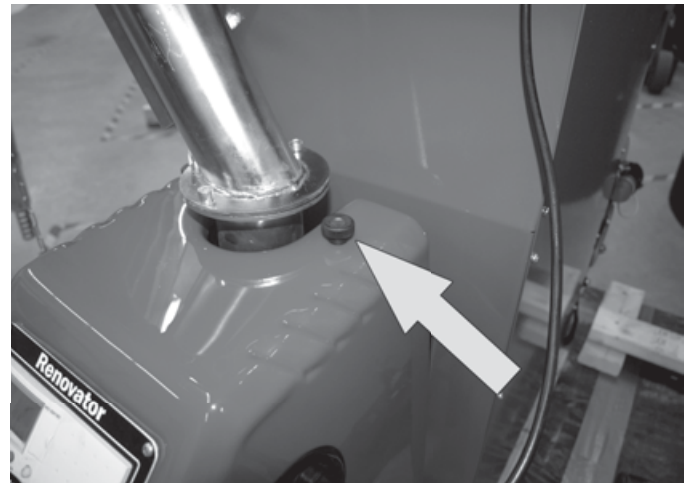
Manual cleaning is a simple process. Removal of the firepot takes only a few minutes. Below is a step by step process for burner removal. The burner and chimney should be cleaned twice a year.

Removal and Cleaning of the Burner

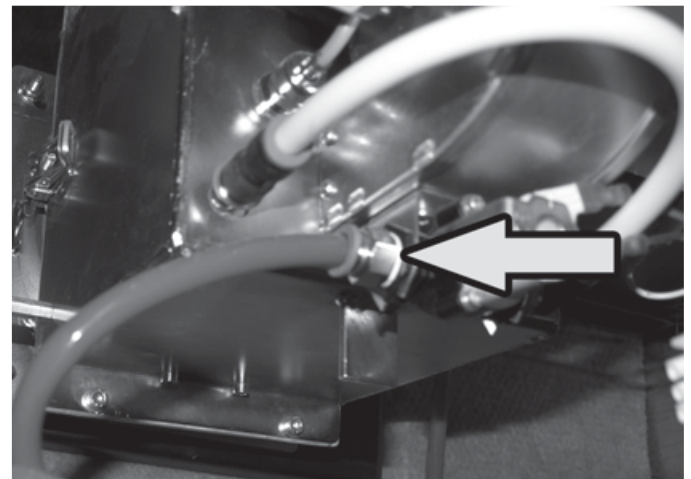
Disconnect the cables on the side of the burner.



Remove the auger tube from the burner chute. Remove the four thumb screws that hold the cover on the burner. Remove the cover.

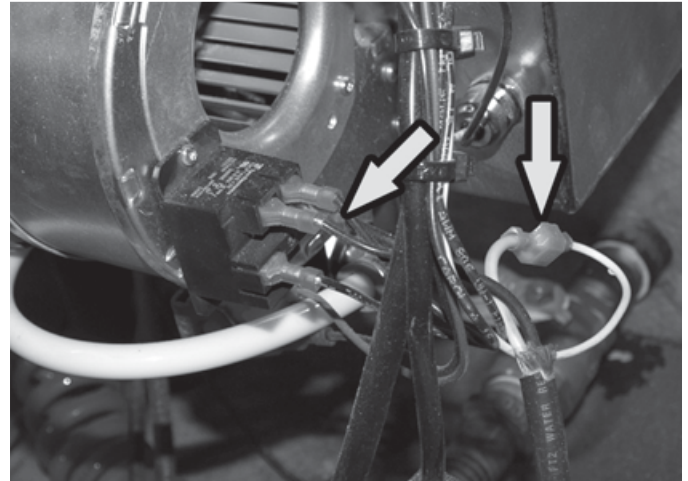


Disconnect the red air line from the air compressor by pushing in the blue collar on the fitting, while pulling out on the hose.



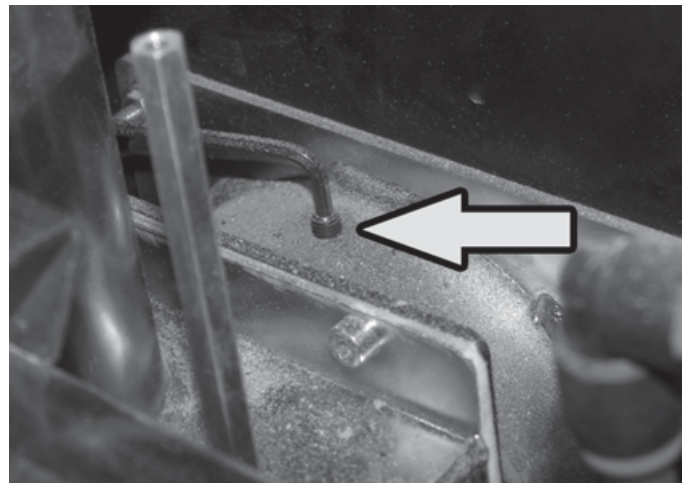
Disconnect the white wire for the igniter, and remove the black igniter wire from the relay on the side of the fan.

The burner can be removed in two different ways. The first example removes the entire burner from the furnace and should be done yearly for a full inspection and cleaning. The second way leave the burner tube installed and allow for easier access to the burn pot for routine cleaning.

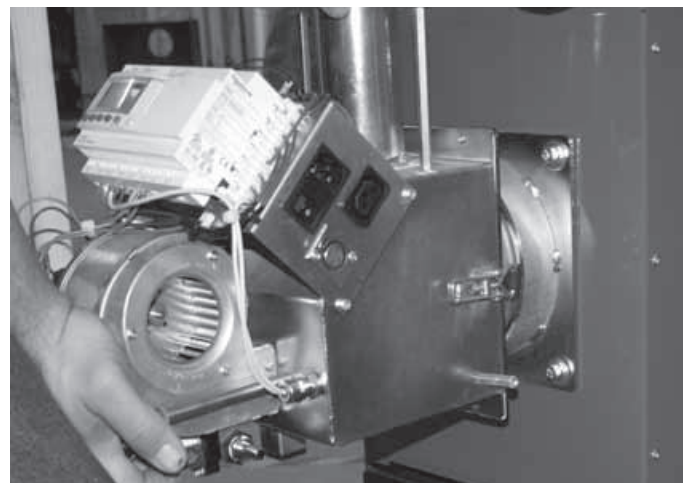


To completely remove the burner:

Remove the set screw from the mounting flange.



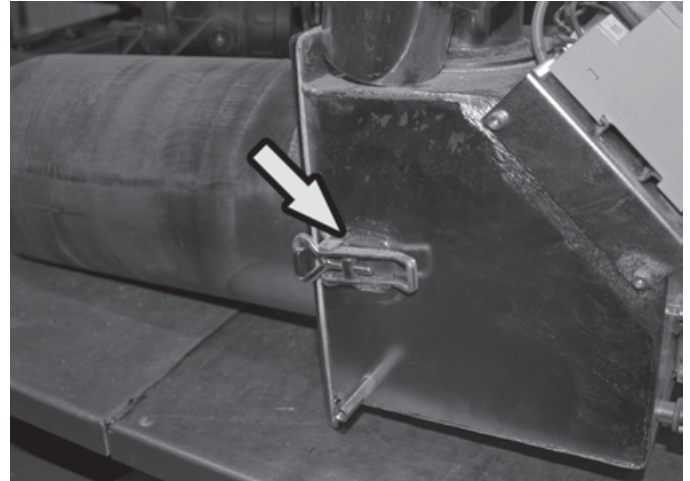
Carefully slide the entire burner assembly out of the furnace.



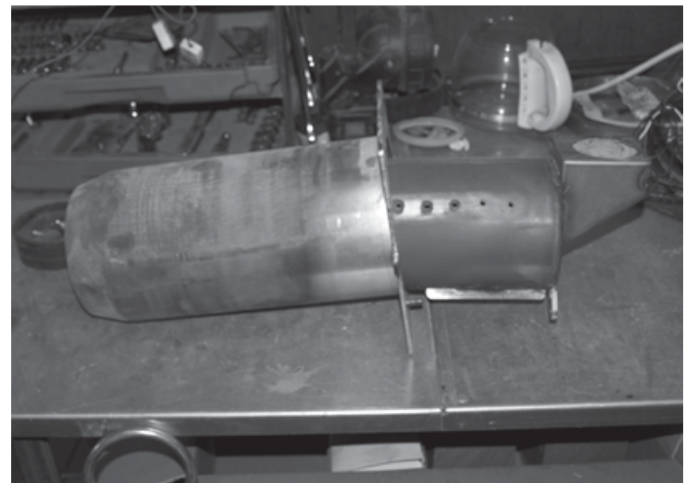
MAINTENANCE



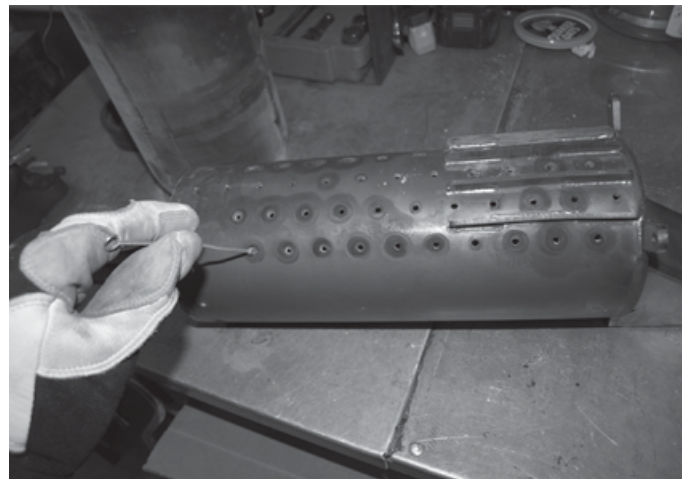
Release the quick latches that hold the sections together. Be careful as to not damage the gasket between the sections.



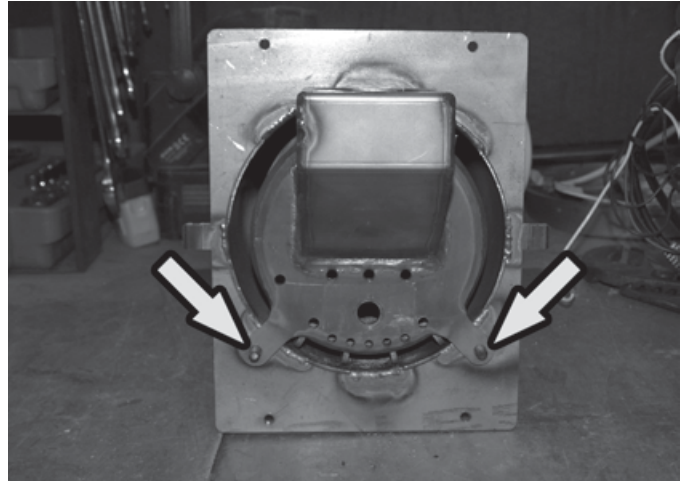
Slide the inner part of the burn pot out of the outer sleeve.



Clean any buildup out of the burn pot, and clean all debris out of the air holes.

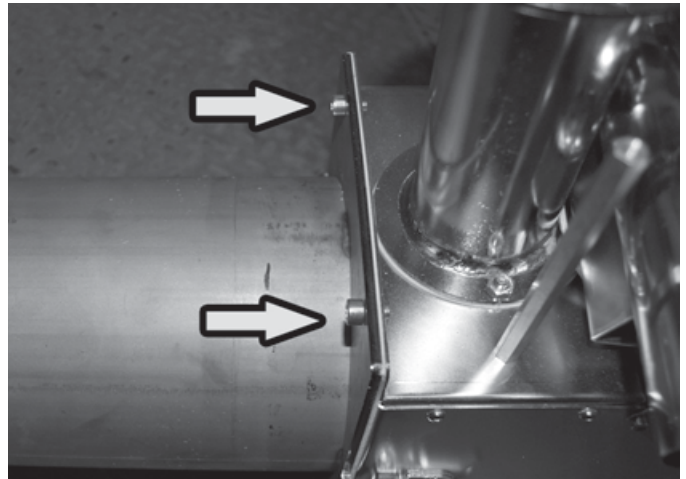


Once clean, insert the inner part of the burn pot into the outer sleeve. Ensure the alignment pins line up.



When reassembling the burner, line up the four alignment screws that align the sections together with the gasket in place. Then latch the quick latches.

Repeat the reset of the removal process in reverse to reassemble the burner.

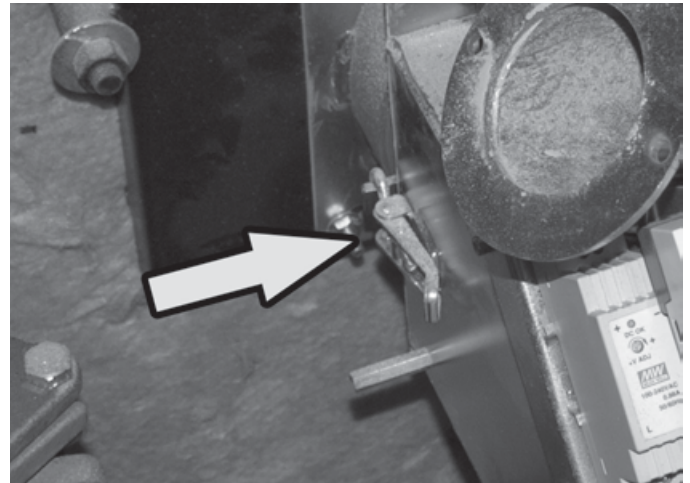


MAINTENANCE

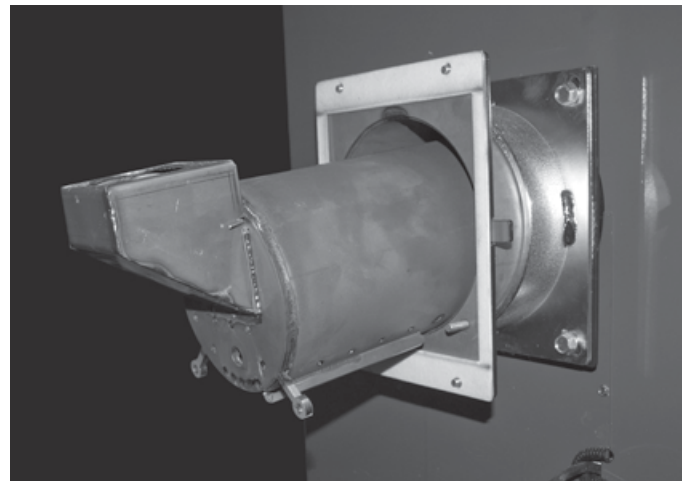


To partially remove the burner:

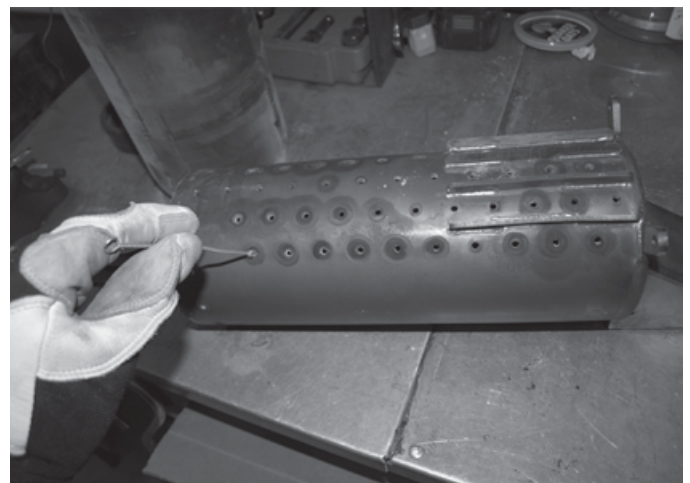
Release the quick latches that hold the sections together. Be careful as to not damage the gasket between the sections.



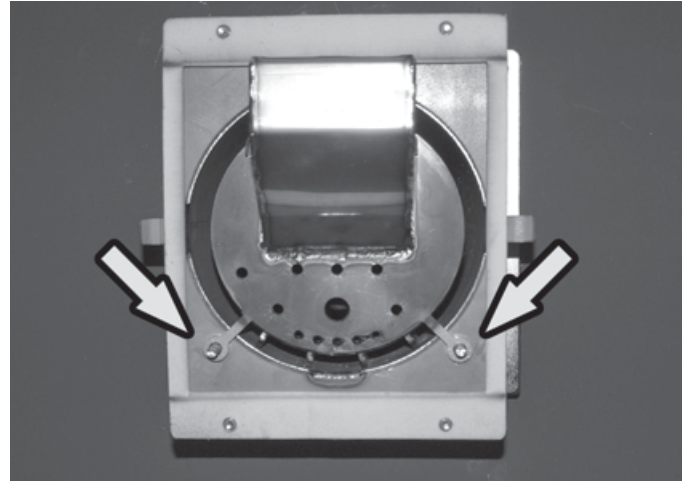
Slide the inner part of the burn pot out of the outer sleeve.



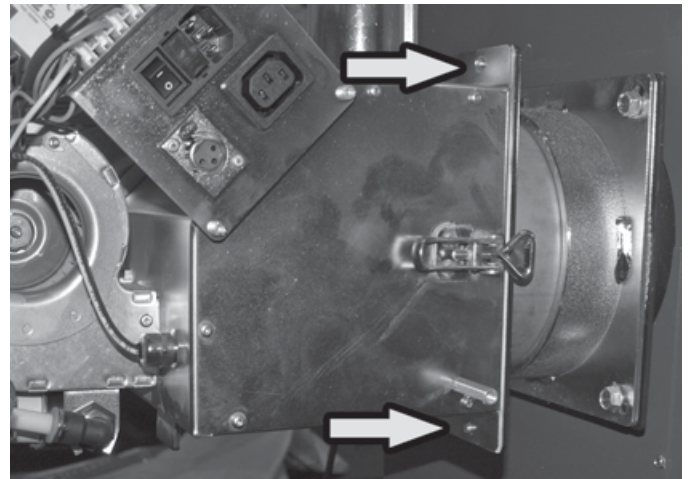
Clean any buildup out of the burn pot, and clean all debris out of the air holes.



Once clean, insert the inner part of the burn pot into the outer sleeve. Ensure the alignment pins line up.



When reassembling the burner, line up the four alignment screws that align the sections together with the gasket in place. Then latch the quick latches. Repeat the reset of the removal process in reverse to reassemble the burner.



MAINTENANCE



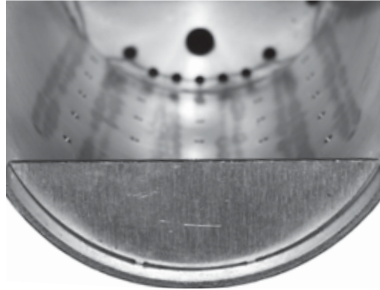
WARNING: Before performing any of the following tasks, ensure that the power is disconnected from the furnace and the burner, and that all components of the system have had ample time to cool.

Replacing the Endstop

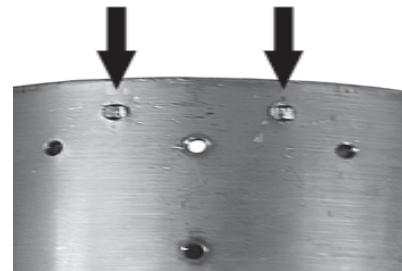
To replace the endstop, (if the endstop is installed from the factory) remove the burner from the furnace by following the removal process described on the prior pages.



1. Locate and remove the endstop from the burn pot.



2. Use a pliers or similar tool to press the endstop into the burn pot.



3. Use a screwdriver to lock the endstop into place.

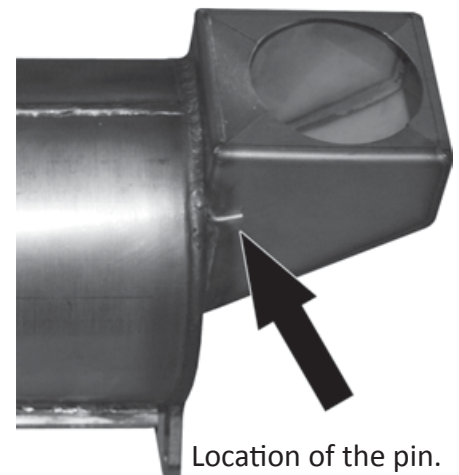
Replacing the Igniter

The igniter is located inside the air box of the burner. Remove the burner as shown on the prior page. It is recommended to clean the firepot while the burner is removed. Disconnect the two power wires for the igniter. The connection for the wires are located outside of the air box. Then loosen the screw that holds the igniter in the mount. Carefully remove the old igniter and place the new one in the mount. Secure the screw and plug the igniter in. Properly secure all wires. Remount the burner.



Replacing the Flame Guard

The flame guard is located inside the burn pot of the burner. Remove the burner as shown on the prior page. The flame guard is in the chute of the burn pot. To remove the flame guard, first locate the metal pin that holds the guard in place. Bend one end of the pin straight. Carefully pull the pin out the other end. Carefully put the new guard in place and slide the pin in, ensuring that the pin properly goes through the guard. Once in place, bend the straight end of the pin to lock it in place. Ensure the flame guard moves freely before reinstalling the burn pot in the furnace.



Error	Cause	Solution
The burner has stopped. "Fuel fault" is on the display.	1. The pellet hopper is empty. 2. An air pocket has developed in the inlet of the feed auger. The fuel is cavatating in the pellet hopper. 3. The auger has been blocked by waste. 4. The tipping chute is plugged.	1. Fill the pellet hopper with pellets. Restart the furnace. 2. Agitate the fuel in the pellet hopper. NOTE: Ensure power to the auger is disconnected before agitating fuel. 3. Clean the feed auger. 4. Decrease the start dose.
The burner stops even though it ignites.	1. Too heavy of feeding during the soft start or combustion phase. 2. Flame guard is dirty or broken.	1. Adjust the fuel feed rate. 2. Clean or replace the flame guard.
The burner does not ignite. "Ignition fault" is on the display.	1. Incorrect start dose. 2. Broken ignition element. 3. Stop in tipping chute.	1. Change the start dose. 2. Replace the ignition element. 3. Clean the tipping chute.
The burner stops without visible reason.	1. Incorrectly adjusted burner. 2. Too much back pressure in the chimney. 3. Error in the fuel feeding.	1. Adjust the burner. 2. Install a draft limiter. 3. Test with O2 Sensor 4. Clean the feed auger.
"Overheated" on display.	1. Too low of draft in the furnace. 2. Dirty filter in the filter box 3. Safety temp limiter has tripped 4. There is no power to the burner	1. Turn off the burner and clean the furnace, burner and air filter. 2. Check to ensure proper airflow in the System. Clean the filter. 3. Check to ensure the chimney is not restricted. 4. Check the power to the furnace and the burner. Check the breaker.

TROUBLESHOOTING



Safety temperature limiter (STL)

The Force 20 furnace is equipped with a Safety Temperature Limiter to shut power off to the burner in the event that the heat exchanger overheats.

To restart the furnace if the STL has been tripped you must:

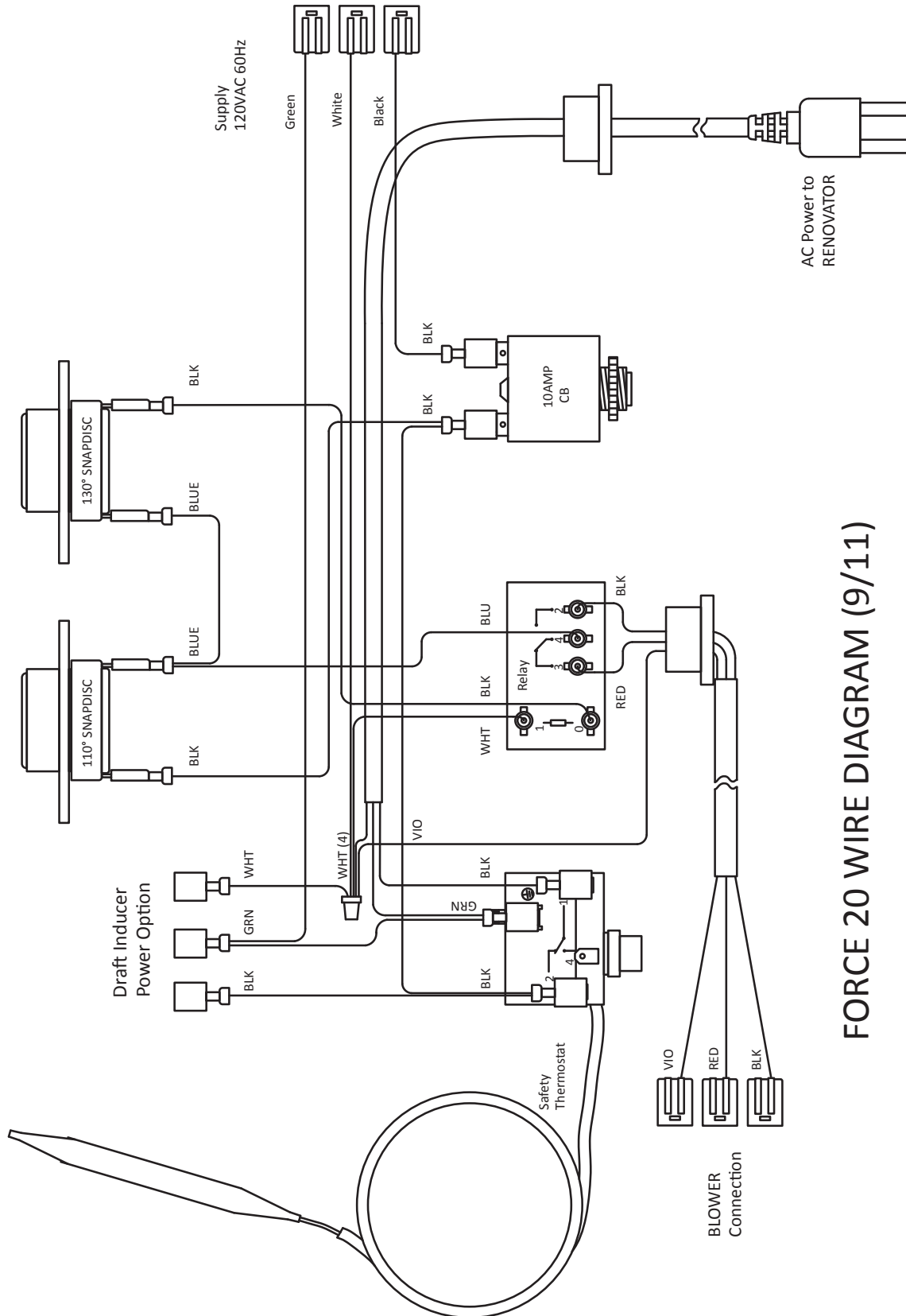
1. Wait until the furnace temperature cools.
2. Clean both the furnace and the burner.
3. Check for proper air flow in the chimney, in the furnace heat exchanger and in the filter box.
4. If the problem persists, contact your dealer or Northwest Manufacturing, Inc.



10 Amp Circuit Breaker

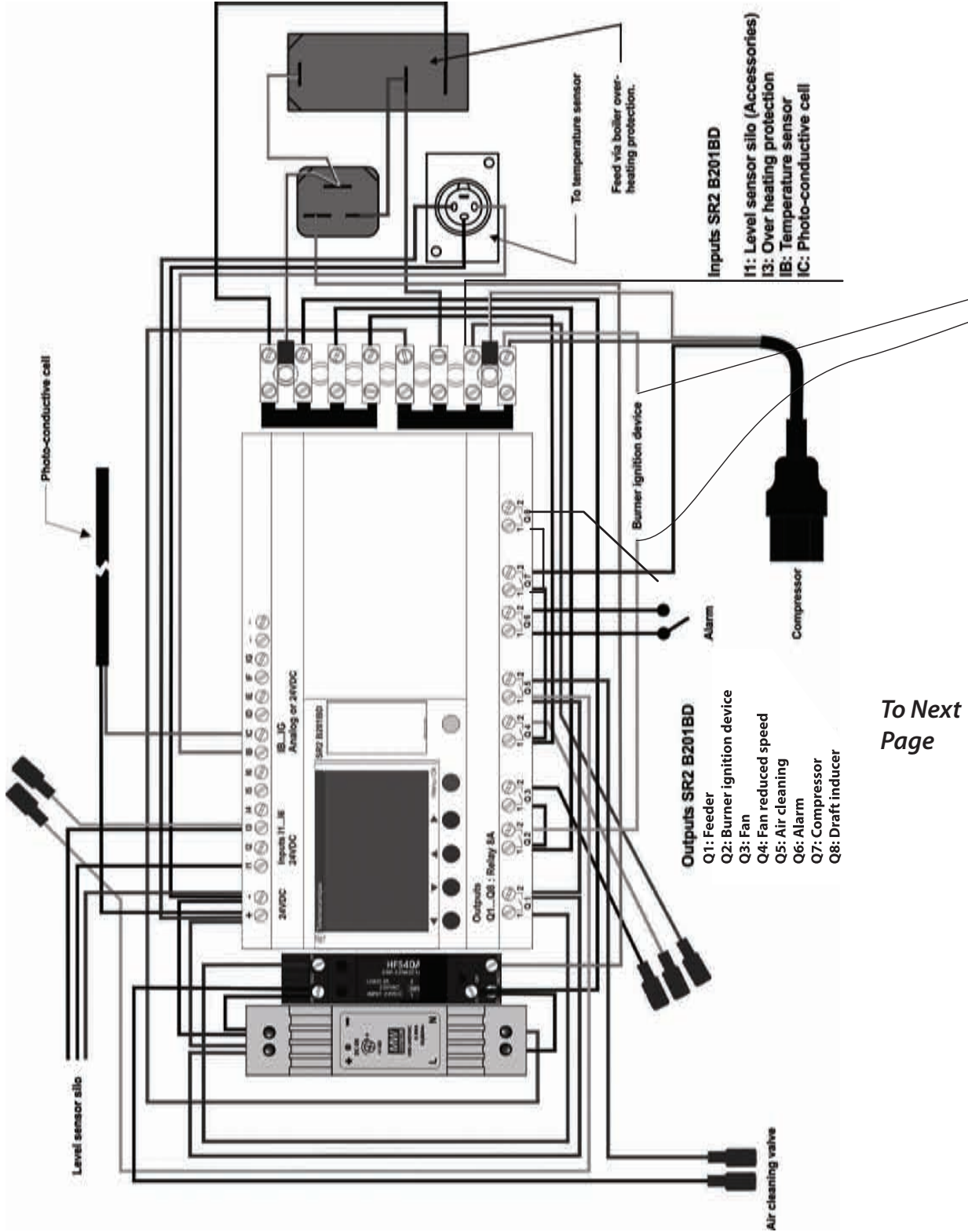
The Force 20 furnace is equipped with a 10 amp circuit breaker. The reset switch is located on the furnace, above the burner. If the problem persists, contact your dealer or Northwest Manufacturing, Inc.





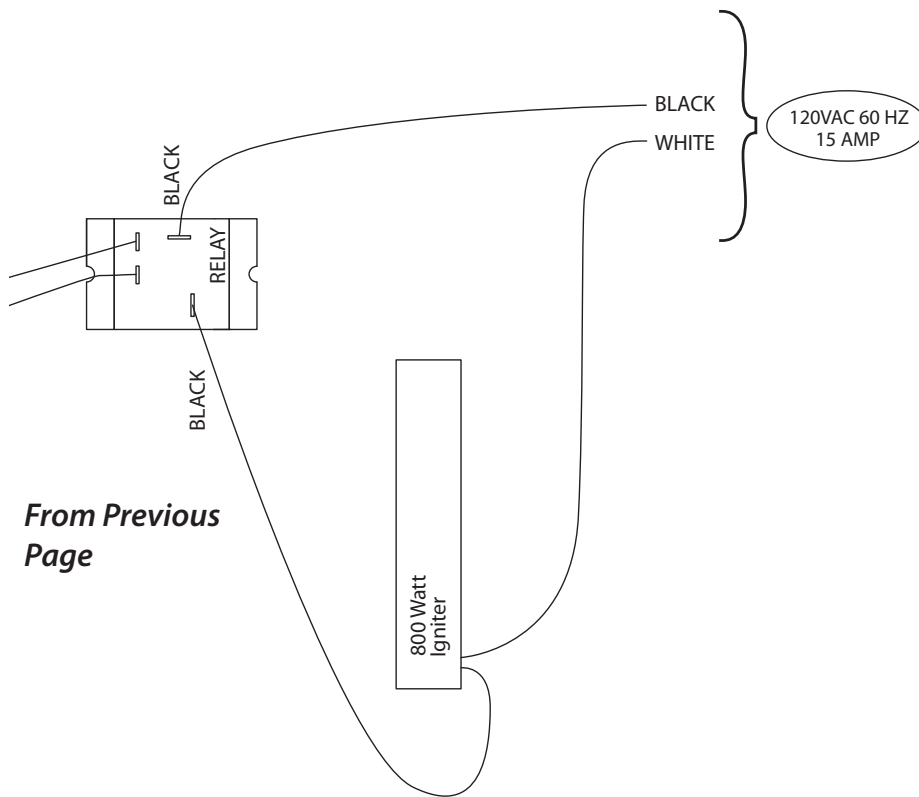
FORCE 20 WIRE DIAGRAM (9/11)

WIRING



Renovator 20 Wiring Diagram

For systems with a 400 watt igniter the igniter will be powered by the PLC. The 800 watt igniters include jumper wires from the PLC to a relay, then to the 800 watt igniter with an exterior power source.



WARRANTY



FIVE (5) YEAR LIMITED WARRANTY - FIREBOX & HEAT EXCHANGER

This Warranty is provided by Northwest Manufacturing, Inc. only for the benefit of the initial purchaser (Original Owner) of the Northwest Manufacturing, Inc. Force 20 Pellet Furnace (the "Furnace") on the original site of installation (the "Site of Original Installation"). This Warranty provides specific legal rights. You may have other rights depending on where you live.

The rights in this warranty depend on the proper assembly, installation and commissioning of the Furnace by a dealer or installer who is certified by Northwest Manufacturing, Inc. (the "Certified Contractor"); and proper operation and maintenance. Proper maintenance in accordance with the Maintenance Intervals (as defined herein) must be preformed. Installation by an uncertified or unqualified contractor or installer and/or improper maintenance, operation, misuse or abuse of the Burner shall void this Warranty in whole or in part.

LIMITED FIVE (5) YEAR WARRANTY FOR THE HEAT EXCHANGER

Northwest Manufacturing, Inc. warrants that the Heat Exchanger of the Furnace shall be free of defects in material and workmanship for FIVE (5) YEARS from the Date of Original Installation. If there is a defect in your properly delivered and installed WoodMaster Force 20 in the first year, WoodMaster will replace the heat exchanger at no cost to the original owner. Northwest Manufacturing, Inc. will only pay costs of warranty work for years two (2) through five (5) – 100% of warranty work, once a defect is determined, repair or replacement of the Heat Exchanger, in a whole or part, will be at the sole discretion of Northwest Manufacturing, Inc..

LIMITED ONE (1) YEAR WARRANTY ON THE BURNER AND ELECTRICAL COMPONENTS

Northwest Manufacturing, Inc. warrants to the Original Owner, That the Renovator Pellet Burner (the "Burner") is free from manufacturing defects for the period of one (1) year from the date of installation. Northwest Manufacturing, Inc. will not warranty the Flame Guard and endstop on the burner, these items are consumable items and in the case of normal wear is the responsibility of the owner to replace as necessary. Northwest Manufacturing, Inc. warrants any electrical components are free from defects for the period of one (1) year from the date of installation. Northwest Manufacturing, Inc. will determine whether to repair or replace the defective parts.

LIMITED ONE (1) YEAR WARRANTY ON ADDITIONAL COMPONENTS

Northwest Manufacturing, Inc. warrants to the original owner only, any additional components, including, but not limited to the outer shell, paint, insulation, doors and latches during normal usage for a period of one (1) years from the date of installation.

START OF WARRANTY PERIODS

The Warranty Period shall begin on the date the Furnace and Burner installation has been completed (the "Original Date of Installation"). In the event of dispute as to the Date of Original Installation, the shipping date of your Furnace and Burner, as recorded by Northwest Manufacturing, Inc., shall be deemed to be the Date of Original Installation.

WARRANTY LIMITATIONS

I. Damages for unsatisfactory performance caused by improper installation or any damages caused by or as a result of improper use of the Furnace and Burner, incorrect start-up, incorrect or careless handling, improper control adjustment, incorrect burner adjustment, disregard of the operating instructions and proper maintenance or disregard of any other instructions supplied with the Furnace and Burner, improper operation of the Furnace and Burner or improper alteration and repairs/service by a third party not affiliated with Northwest Manufacturing, Inc. will not be covered under this warranty. All repairs must be performed by a Certified Contractor.

II. The warranty will not cover damage to parts caused by improper installation, improper care or maintenance. The Furnace, Burner and any installed accessories must be serviced, inspected and cleaned at regular intervals. Northwest Manufacturing, Inc. will NOT warranty damage to the Furnace and Burner due to ash corrosion.

III. The workmanship, repairs or replacement of parts of the Certified Contractor will not be covered under this warranty.

IV. Components of the heating system not furnished by Northwest Manufacturing, Inc. as part of the Furnace and Burner and components of the Burner are not covered under this Warranty. Damages caused by components of the heating system not supplied by Northwest Manufacturing, Inc. will not be covered under this Warranty.

V. Fuels used in the Burner must meet the specifications set out by Northwest Manufacturing, Inc.. Suitable fuels are listed in the owners manual. Damage caused by the use of any unapproved fuel, or any fuel that does not meet the guidelines set forth by Northwest Manufacturing, Inc. will not be covered by this warranty.



WARRANTY

VI. Any costs for labor for the examination, removal or reinstallation of allegedly defective parts, transportation of the parts to and from Northwest Manufacturing, Inc. facilities will not be covered and will be the responsibility of the Original Owner. This includes any other labor and costs for any material necessary for the said examination, removal or re-installation.

VII. The warranty will not cover damage to the Furnace and Burner or any of their original parts, replacement parts or other accessories or standard equipment caused by excessive temperatures or pressures, vandalism, fuel or gas explosion, electrical, chemical or electrochemical reaction, electrical failures, insurrection, riots, war, acts of God, combustion air contaminated externally, air impurities, sulfur or sulfuric action or reaction, dust particles, corrosive vapors, oxygen corrosion, and situating the Furnace and Burner in an unsuitable location or continuing use of the Furnace and Burner after onset of a malfunction or discovery of a defect.

VII. Consumable parts, and parts in direct contact with the flame, will not be covered under this warranty.

WARRANTY TERMS

The Warranty shall also be subject to the following terms and conditions:

I. The Furnace and Burner must have been installed by a Certified Contractor.

II. The Furnace and Burner must have been properly maintained, cleaned and serviced during the Warranty Periods in accordance to the manual.

III. This Warranty is non transferable and only covers the Original Owner, at the original site of installation.

IV. Northwest Manufacturing, Inc. shall have the time needed and unobstructed access to the Furnace and Burner for the purpose of conducting tests of the Furnace and Burner and for the making of repairs or installation of replacement parts.

V. Repairs, replacement or the repair of replacement parts shall be subject to the terms and conditions of this Warranty as if they had been installed at the time of original installation.

VI. This Warranty is limited to the provisions previously described and does not extend to any Furnace and Burner, related parts or products that are (a) not sold in Canada or the United States; (b) not installed in Canada or the United States; or (c) not purchased from an Authorized Distributor.

VII. Northwest Manufacturing, Inc. shall not be responsible for any consequential damages, direct or indirect caused by the products described in this Warranty.

APPLICABLE LAW

All disputes or claims on the Warranty shall be determined in accordance with the laws of Red Lake County, Minnesota.

WARRANTY CLAIM/SERVICE

Notify the Certified Contractor who installed your Furnace and Burner. The Contractor will then notify Northwest Manufacturing, Inc. who will make all warranty decisions. No warranty work can be carried out without approval from Northwest Manufacturing, Inc.. If the Certified Contractor fails to make a warranty claim, contact Northwest Manufacturing, Inc. directly. Allegedly defective parts MUST be returned to Northwest Manufacturing, Inc. for the purpose of inspection to determine cause of failure.

Northwest Manufacturing, Inc. / 600 Polk Ave. SW / Red Lake Falls, MN 56750-5002
(800) 932-3629 • Fax: (218) 253-4409 / www.woodmaster.com



Cut here and mail registration card

Northwest Manufacturing Inc.
600 Polk Ave. SW
Red Lake Falls, MN 56750

PLACE
POSTAGE
HERE

Northwest Manufacturing Inc.
600 Polk Ave. SW
Red Lake Falls, MN 56750

Force 20 Warranty Registration Card

Please fill out the warranty registration card below and mail it back to us.

Failure to register may delay warranty claims.



Serial Number

Heat Exchanger: _____

Pellet Burner: _____

Owners Name _____

Address _____

City _____ State _____ Zip _____

Daytime Phone _____ Home Phone _____

Email _____ Date of Purchase _____

Dealers Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

How did you learn about our product?

Raido ☐ Newspaper ☐ Internet ☐ TV ☐ Print ☐ Other _____

Would you like information on other WoodMaster Products? Yes ☐ No ☐

I have read the owners manual and understand the proper usage of my Force 20 Pellet Furnace.

Signature _____ Printed Name _____

Thank you for purchasing a WoodMaster Force 20.



SPECIFICATIONS



Technical Data

Flue Pipe	5" Diameter
Power Connection	120v
Maximum Current Draw*	7.73 Amps @ 120 v, 60 Hz
Blower (Max Draw)	6.9 Amps @ 120 v, 60 Hz
Igniter (Max Draw)	3.3 Amps @ 120 v, 60 Hz
Burner (Max Draw)	0.83 Amps @ 120 v, 60 Hz
Maximum Power (Input)	68,000 BTU
Ash Box Volume	1 cubic Foot (approx)
Weight	220 Pounds (approx.)
Height	55.1"
Width	13.2"
Depth	53.1"
Blower (circulation fan) Capacity	1100 cfm -1638 cfm
Blower (circulation fan)	Multi Speed

*Note: The maximum current draw is calculated by the adding the max draw of the burner plus the blower. The blower and igniter should not operate simultaneously, but it may happen under the proper circumstances.



TEMPERATURE CONVERSION

Degree C	Degree F
0	32
1	33.8
2	35.6
3	37.4
4	39.2
5	41
6	42.8
7	44.6
8	46.4
9	48.2
10	50
11	51.8
12	53.6
13	55.4
14	57.2
15	59
16	60.8
17	62.6
18	64.4
19	66.2
20	68
21	69.8
22	71.6
23	73.4
24	75.2
25	77
26	78.8
27	80.6
28	82.4
29	84.2
30	86
31	87.8
32	89.6
33	91.4
34	93.2
35	95

Degree C	Degree F
36	96.8
37	98.6
38	100.4
39	102.2
40	104
41	105.8
42	107.6
43	109.4
44	111.2
45	113
46	114.8
47	116.6
48	118.4
49	120.2
50	122
51	132.8
52	125.6
53	127.4
54	129.2
55	131
56	132.8
57	134.6
58	136.4
59	138.2
60	140
61	141.8
62	143.6
63	145.4
64	147.2
65	149
66	150.8
67	152.6
68	154.4
69	156.2
70	158
71	159.8

Degree C	Degree F
72	161.6
73	163.4
74	165.2
75	167
76	168.8
77	170.6
78	172.4
79	174.2
80	176
81	177.8
82	179.6
83	181.4
84	183.2
85	185
86	186.8
87	188.6
88	190.4
89	192.2
90	194
91	195.8
92	197.6
93	199.4
94	201.2
95	203
96	204.8
97	206.6
98	208.4
99	210.2
100	212
101	213.8
102	215.6
103	217.4
104	219.2
105	221
106	222.8
107	224.6

NOTES

[illegible]



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Northwest Manufacturing, Inc / 600 Polk Ave SW / Red Lake Falls, MN 56750

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