



**THE MOST
TRUSTED
OUTDOOR
BOILERS**

AUTOMATED BIOMASS SERIES

OWNER'S MANUAL

SAVE THESE INSTRUCTIONS

INSTALLATION, OPERATION & MAINTENANCE | VERSION 2026.1



2716 CRESCENT DR | PO BOX 1237
INTERNATIONAL FALLS, MN 56649
866-361-7355 | WWW.CROWNROYALSTOVES.COM



UL 2523-2022 AND
CSA B366.1-11 (R2020)

PROTECT YOUR INVESTMENT

COMPLETE YOUR WARRANTY BY REGISTERING YOUR CROWN ROYAL STOVE TODAY

Greentech Manufacturing Inc. offers to the original owner from date of purchase a limited twenty (20) year warranty from date of purchase, with a lifetime commitment guarantee. **To validate this warranty, without exception, you must:**

1. Complete the online warranty form within thirty (30) days of purchase, accessible by the QR code or by visiting www.crownroyalstoves.com/warranty-registration
2. Perform yearly water samples, the first to be received within thirty (30) days of warranty registration (information below)
3. Maintain water quality and strictly comply with the requirements of the owners manual

If, for any reason, you are unable to fill out your stove registration online please contact your dealer or call the factory at 866-361-7355 and we will provide you with a warranty registration form. Please consult <https://www.crownroyalstoves.com/warranty> for the most current warranty information.

ONLINE WARRANTY REGISTRATION FORM



YEARLY WATER TESTS REQUIRED FOR WARRANTY

SIGN UP FOR REMINDERS

Owners must use Crown Royal Stove's approved chemical treatment, available exclusively through your dealer or the factory, and mail water samples to our third party testing facility within 30 days of registration. **Warranty is void if Crown Royal Stoves' approved chemical treatment is not used, if the boiler water is not tested upon installation and at least annually, and sample report recommendations are not followed.** You will get notification of test results by email (if listed) or mail within 3 - 6 weeks. If you are not notified within 30 days please contact your dealer or the factory. If test results come back unsatisfactory, you are required to follow the instructions and retest within 30 days. If you add water to your system for any reason add ½ ounce of inhibitor per gallon of water added and send a new sample of water to the testing laboratory. If in doubt, test. For further information visit www.crownroyalstoves.com/water-treatment

WATER TEST REMINDERS



_____ **RECORD AND KEEP THIS INFORMATION FOR FUTURE REFERENCE** _____

Model: _____ Serial Number: _____ Installation Date: _____

Dealership Name: _____ Dealership Phone Number: _____

Dealership Address: _____

Dealership City: _____ Dealership State: _____ Dealership Zip: _____

Other Dealership Information: _____

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INTRODUCTION

Welcome and Thank You

Greentech Manufacturing and your dealer would like to express our sincere gratitude for your recent purchase of a Crown Royal Stove. We are honored by the trust you have placed in us and remain committed to providing you with exceptional service and support. Crown Royal Stoves are proudly manufactured in America using domestically sourced, Titanium-Enhanced 409 stainless steel. All welding and assembly are performed in-house at our state-of-the-art facility located in International Falls, MN - proudly known as the *“Icebox of the Nation.”*

Each boiler undergoes multiple pressure tests throughout construction and is assembled with the highest quality materials and meticulous workmanship. Before leaving our facility, every unit is carefully inspected by our quality control experts to ensure superior reliability, safety, and comfort for your family. We are so confident in the quality of our products that every Crown Royal Stove comes with a 20-year limited warranty and our Lifetime Commitment Guarantee.

To ensure the maximum efficiency and life expectancy from your boiler, please read and familiarize yourself with this manual prior to installing, operating, or servicing your boiler. **Always keep this manual for future reference.**

The BIO200 Biomass Boiler was designed as a modern, automated alternative to traditional wood heating. Unlike conventional systems that require manual loading and wood splitting, the BIO200 features an onboard fuel hopper and automatic feed system that delivers consistent fuel to the burn pot as needed.

Equipped with self-ignition, advanced PLC interface, and high-efficiency gasification, this boiler provides clean-burning, reliable heat with minimal effort. Its design emphasizes easy fueling, low maintenance, fuel efficiency, and cost savings. The BIO200 is ideal for heating a single home but is also capable of expanding into multiple buildings or commercial applications.

Key Benefits

- **Extended Burn Times:** A large onboard hopper and automated feed system minimize handling and extend burn durations—lasting from several days to weeks between refueling, depending on load, fuel type, and outdoor temperature. The hopper also includes an interior light and dual “EZ-Fill” loading doors for easy, convenient refueling.
- **High-Efficiency Combustion:** The Omni-O.2 burn pot introduces combustion air 360° around the fuel for complete primary combustion, while also facilitating secondary gasification—achieving cleaner burns and higher thermal efficiency.

- **Enhanced Monitoring:** The firebox door is equipped with a sight glass, allowing live visual inspection of combustion characteristics during operation.
- **Versatile Heating Applications:** Provides dependable heat for homes, garages, workshops, barns, businesses, greenhouses, swimming pools, spas, domestic hot water, radiant in-floor heating, and snow-melt systems.
- **Convenience and Sustainability:** Combines the efficiency and eco-friendliness of biomass heating with the ease and automation of a modern system—delivering dependable warmth without the labor of traditional wood-burning methods.

Specifications

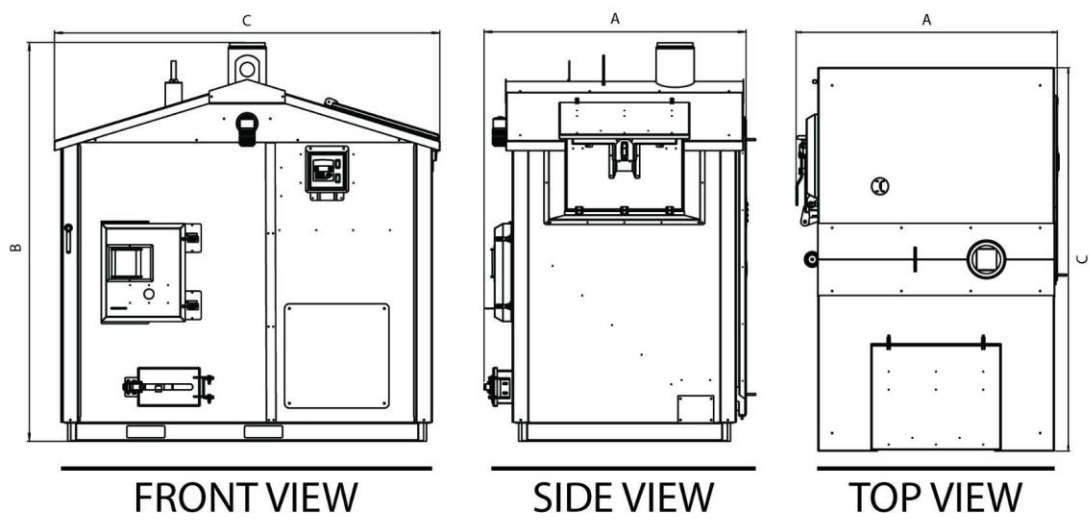
	BIO200
Heat Output Range	20,000 - 212,000 BTUs/hr
Approximate Heating Capacity **	5,000 Sq.Ft.
Weight (Empty)	2,250 lbs
Chimney Size	6"
Burn Pot Size (D" x W" x H")	12.75" x 7.5" x 8"
Firebox Door (L" x H")	16" x 16"
Approximate Water Capacity	135 gal.
Approximate Fuel Capacity	1,400 lbs (with augers full)
Efficiency LHV (lower heating value)*	96%
Efficiency HHV (higher heating value)*	89.2%
Supply/Return Size	1-1/4" (2 Sets)
Electrical Rating	20 Amp
Average Emissions Rate	0.079 lbs/mmbtu
Maximum Emissions Rate	0.087 lbs/mmbtu
Annual Efficiency Rating	89.2%

*The performance of your BIO200 depends on the quality of fuel, fuel feed rate, combustion efficiency, and how effectively heat is transferred into your home's heating system. These factors are measured using a single hopper load, without refueling, under standardized testing conditions (AFEU method). Real-world results may vary based on fuel quality, quantity loaded, and moisture content. **For best results, always use high-quality, low-moisture (<10%) pellets** approved by the manufacturer, and follow recommended maintenance and loading procedures.

**Listed as capacity in square feet. Be sure to properly size the boiler based on the heating demands of the attached system(s).

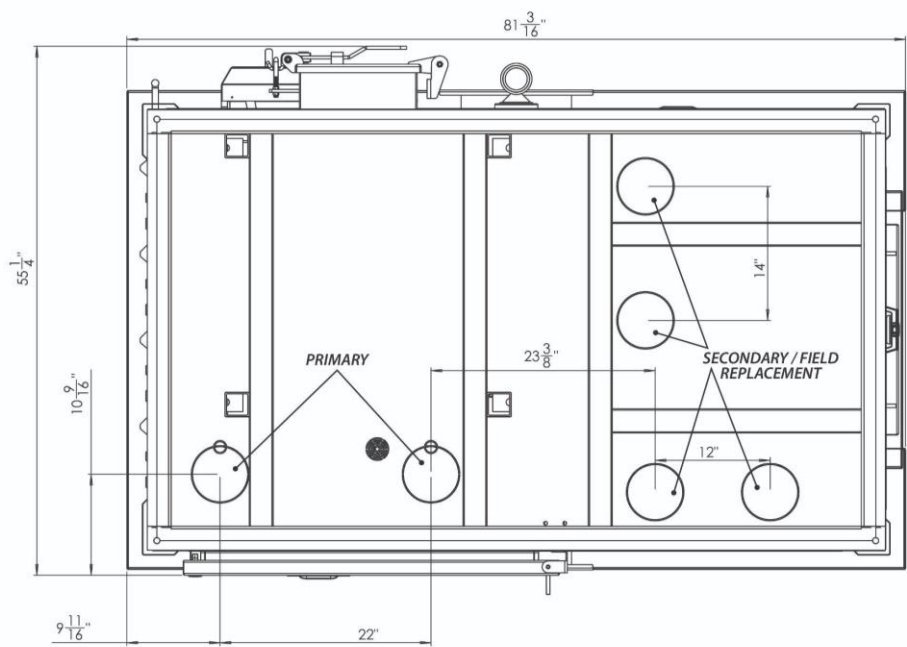
***Total height includes the pre-installed chimney connection. Additional chimney length(s) not included.

Dimensions



	BIO200
Width (C)	81"
Length (A)	55"
Height (B) ***	84"

Floor Plan



SAFETY PRECAUTIONS

Be sure to familiarize each user with the following precautions before operation. All warnings should be taken seriously to protect your safety. Retain this manual and review at the start and end of each heating season and as necessary.

!! DANGER !!	Indicates an immediately dangerous situation which, if ignored, can result in serious injury, death, and/or equipment damage.
WARNING	Indicates a hazardous situation which can result in injury or death to the operator and/or equipment damage.
!! CAUTION !!	Indicates a hazard which can cause harm to the operator and/or equipment.

!! DANGER !!

- DO NOT OPEN ANY DOORS WHILE THE BOILER IS IN OPERATION! The BIO200 operates under negative (draft) pressure; if any of the doors are opened, required air flow will be interrupted and can cause dangerous conditions. Serious injury or damage may result!
- DO NOT OVERFIRE THIS BOILER. Attempts to achieve heat output rates that exceed boiler design specifications can result in permanent damage to the boiler.
- DO NOT start a fire with chemicals, volatile fluids, rubber, plastics or garbage. Some processed wood can contain resins and should NOT be used.
- Only qualified and competent persons with a sound understanding of this heating system should operate this boiler.
- Improper operation could result in property damage, personal injury and/or damage to the heating system, as well as invalidate warranty coverage.
- DO NOT burn garbage, gasoline, drain/waste oil, naphtha, engine oil, railroad ties, particle board, leaves, or any other flammable liquids.
- DO NOT operate the boiler unless all access doors are securely closed.
- DO NOT store fuel or other combustible materials (straw, hay or wood, etc) within the minimum installation clearances. Keep all sides of the boiler clean and clear of obstructions.
- Follow the regular maintenance schedules outlined in this manual.
- All coverplates, enclosures, and guards must always be in place and in good working order during normal operation.
- DANGER: Death can result if you do not disconnect electrical power before accessing the electrical control panel, opening any electrical covers, or replacing any electrical components.
- The automated feed system(s) have moving parts that start and stop automatically when the unit is on. Always use caution around these components (augers, motors, fans, blowers, etc), and never remove any protective guardings during operation.

WARNING

- This boiler needs periodic inspection and maintenance for proper operation. It is against federal regulations to operate this boiler in a manner inconsistent with operating instructions found in this manual.
- All models operate at atmospheric pressure. The water level gauge must fit loosely on the vent opening. Do not obstruct, block or plug the vent tube in any way. **DO NOT ALLOW THE BOILER TO BECOME PRESSURIZED.**
- This boiler cannot be hooked to a chimney that is already serving another appliance. When installing a chimney that is higher than twelve feet, guidelines must be used.
- Hot Surfaces: Keep children and incompetent persons away. Do not touch during operation.
- Be sure the boiler is filled with water before firing. Never fire without the water level being at ½ mark, or higher, on the gauge.
- Load fuel carefully to avoid injury to head, arms, hands, fingers, and any other body parts in close proximity to the hopper and fuel loading doors.
- Follow regular maintenance schedules, including cleaning of all airflow pathways and related mechanical components, including but not limited to firebox, ash chamber, heat exchangers, chimney/flue systems, actuator assemblies, fan blades, motors, blowers, and damper plates.
- Allow the boiler to cool before performing any maintenance or cleaning.
- When cleaning, all ash and coals must be placed in a fire-retardant, closed container, on a noncombustible floor, far away from all combustible materials, until final disposal. Ashes should remain in the fire-retardant closed container until all cinders have cooled.
- The button “F2: Stop Boiler” is the proper method to shut down the boiler for any reason, as this will initiate a cooldown cycle and attempt to purge/burn off any remaining fuel in the burn chamber. Simply turning off the boiler may leave combustible materials inside that could ignite at random.

!! CAUTION !!

- Local and state building codes, and residential insurance providers, may prohibit the use of solid fuel burning appliances as a primary heat source. An alternative heating system should always be installed.
- Do not install this unit on any combustible surface.
- Check the water level before loading the boiler with fresh fuel.
- Use only premium-quality wood pellets with moisture content below 10%.
- Central Heating (CH) Circulator(s) must run continuously for proper operation of the boiler.
- Ensure no debris or foreign objects enter the fuel hopper (ex. pellet bags) to obstruct the fuel delivery system.
- The firebox sightglass window should be closed when not in use.
- Never attempt to manually ignite the fuel in the burn chamber.

PRECAUTIONARY LABELING



WARNING

BEFORE OPENING HEAT EXCHANGER DOOR FAN MUST BE COMPLETELY STOPPED. HEAT EXCHANGER DOOR IS EQUIPPED WITH A FAN HOUSING AND WHEEL ASSEMBLY. NEVER PLACE HANDS OR OBJECTS IN THE FAN HOUSING OR PERSONAL INJURY MAY RESULT. HEAT EXCHANGER CLEAN-OUT AREA WILL BE VERY HOT. ALWAYS USE HEAT PROTECTED GLOVES WHEN REMOVING TURBULATORS AND CLEANING HEAT EXCHANGER TUBES OR PERSONAL INJURY MAY RESULT.

AVERTISSEMENT

AVANT D'OUVRIER LA PORTE DE L'ÉCHANGEUR DE CHALEUR, LE VENTILATEUR DOIT ÊTRE COMPLÈTEMENT ARRÊTÉ. LA PORTE DE L'ÉCHANGEUR DE CHALEUR EST ÉQUIPÉE D'UN CARTER DE VENTILATEUR ET D'UNE ROUE. NE PLACEZ JAMAIS LES MAINS NI AUCUN OBJET DANS LE CARTER DU VENTILATEUR, SOUS PEINE DE BLESSURES. LA ZONE DE NETTOYAGE DE L'ÉCHANGEUR DE CHALEUR SERA TRÈS CHAUDE. UTILISEZ TOUJOURS DES GANTS DE PROTECTION THERMIQUE POUR RETIRER LES TURBULATEURS ET NETTOYER LES TUBES DE L'ÉCHANGEUR DE CHALEUR, SOUS PEINE DE BLESSURES.

!! CAUTION !!

**AUTOMATED
EQUIPMENT MAY
START UP WITHOUT
WARNING**

!! DANGER !!

**RISK OF FALLING
AND INJURY. NO
ACCESS OR ENTRY.**



**POSSIBLE PINCH POINT. COULD
RESULT IN LOSS OF LIMBS OR DEATH.**

**DO NOT ALTER
THIS EQUIPMENT
IN ANY WAY**

HOW IT WORKS

The **BIO200** is a versatile, fully automated, wood pellet-fired outdoor boiler engineered for simplicity, durability, and long-term reliability. Designed with the user in mind, it delivers extended burn times ranging from several days to weeks between refueling, depending on usage and demand. Built with high-quality components and robust construction, the BIO200 ensures dependable performance for years of operation.

Advanced PLC (Programmable Logic Controller) technology and self-igniting capabilities enable the BIO200 to achieve high-efficiency burn cycles with variable heat output levels up to 212,000 BTU/hr.

Fuel System and Hopper Design

The BIO200 features a large onboard 32 ft³ fuel hopper with a storage capacity of approximately 1,400 pounds of wood pellets. This generously sized hopper allows for extended run times and reduced maintenance intervals. The hopper includes an interior light for convenient loading and dual access doors to simplify refueling.

A unique “EZ-Fill” lower loading door enables users to easily fill the hopper to roughly 60% capacity. Once the “EZ-Fill” door is closed, additional fuel can be loaded through the top access lid to reach full capacity. This design enhances user safety and accessibility while minimizing spillage during loading.

Fuel Delivery and Ignition Process

Fuel is automatically metered and delivered from the hopper into the firebox via dual augers, precisely controlled by the PLC. Once in the burn pot, the fuel awaits ignition. When a call for heat is detected, the system’s electronic ignition activates, rapidly igniting the pellets. After the PLC confirms a successful ignition, it continuously feeds fuel as needed to maintain the desired operating setpoints.

Combustion and Gasification Process

Combustion air is regulated through an actuated damper plate and a variable-speed negative pressure draft fan. Fresh air enters the boiler through the rear damper and is evenly distributed by the “Omni-O.2” burn pot, introducing combustion air 360° around the fuel.

Primary air is drawn upward through orifices in the burn pot, supporting the main combustion. As the burn progresses, the fuel releases gases such as hydrogen, carbon monoxide, and carbon dioxide. Additional secondary air, introduced from above and around the flame, ignites these gases in a process known as gasification. This results in hotter, cleaner combustion, reaching temperatures up to 1,800°F, which maximizes thermal efficiency and minimizes emissions.

Heat Exchange and Exhaust Path

Heat generated in the firebox is transferred directly to the boiler's internal water jacket through two water-filled crossover tubes and the firebox walls. The variable-speed draft fan maintains negative pressure, drawing hot gases downward through a series of heat exchanger tubes beneath the burn pot, where additional heat is extracted.

Exhaust gases then pass through the lower cleanout area, moving across the base of the firebox to further transfer heat before rising through a secondary set of heat exchanger tubes. By the time the exhaust exits through the chimney, temperatures are reduced to as low as 220°F, ensuring optimal energy recovery and efficiency.

Operating Sequence and Firing Stages

During normal operation, once the stove confirms a successful ignition, it initially operates at a low setting for several minutes to establish a stable coal bed in the burn pot. This controlled startup phase ensures consistent combustion and smooth system performance before full operation begins.

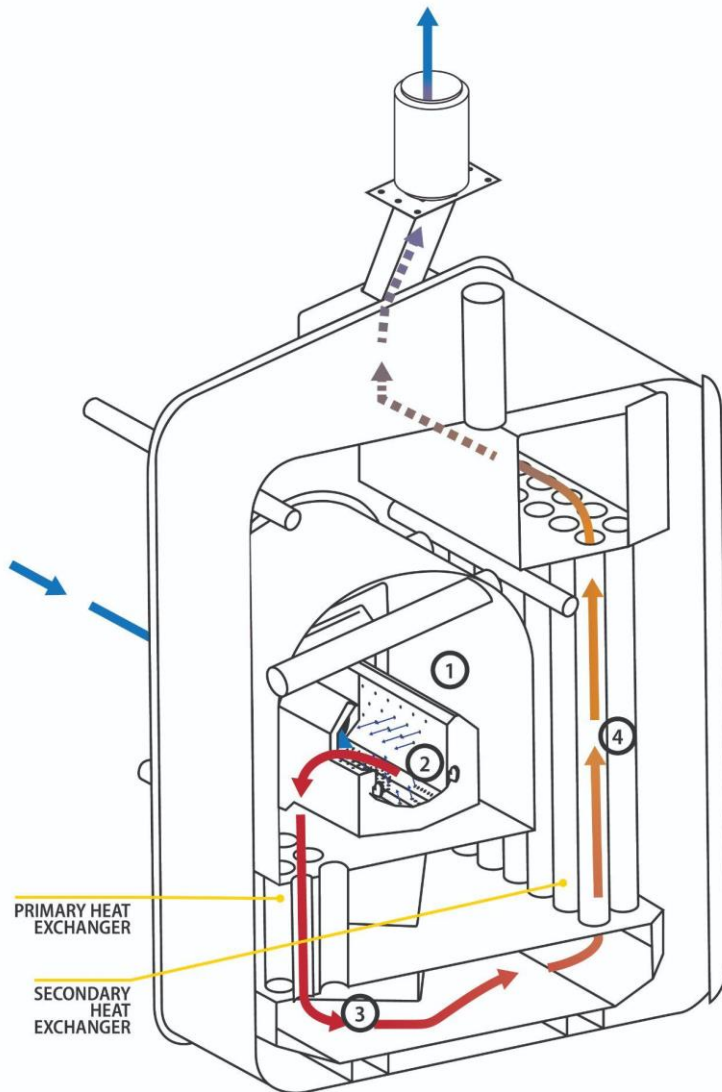
After the startup phase, the stove automatically transitions through three firing stages—High Fire, Medium Fire, and Low Fire—based on the system's water temperature and heating demand.

- **High Fire:** The stove begins in High Fire mode, operating at maximum output to quickly raise the water temperature. Once the PLC detects a designated temperature increase, the unit automatically reduces output and shifts to Medium Fire.
- **Medium Fire:** In this stage, the stove maintains steady combustion at a reduced fuel feed rate and airflow, allowing the water temperature to continue rising in a controlled manner. Medium Fire provides a balance between performance and efficiency during moderate heating demand.
- **Low Fire:** When the water temperature approaches the High Set Point, the stove transitions to Low Fire mode. Here, it continues burning at a low rate to sustain the target temperature while conserving fuel. The established coal bed remains active, enabling rapid response to any subsequent heating demand.

Throughout this process, the system continuously monitors water temperature and automatically modulates between firing stages as needed. If a temperature drop is detected—such as during heavy hot water usage or increased heating load—the stove will adjust upward, returning from Low Fire to Medium Fire, or from Medium Fire to High Fire, to restore the programmed temperature range.

For example, a sudden demand for hot water—such as during peak usage periods in a home's heating or domestic water system—may trigger the stove to temporarily increase its burn rate to maintain the desired water temperature and ensure uninterrupted system performance.

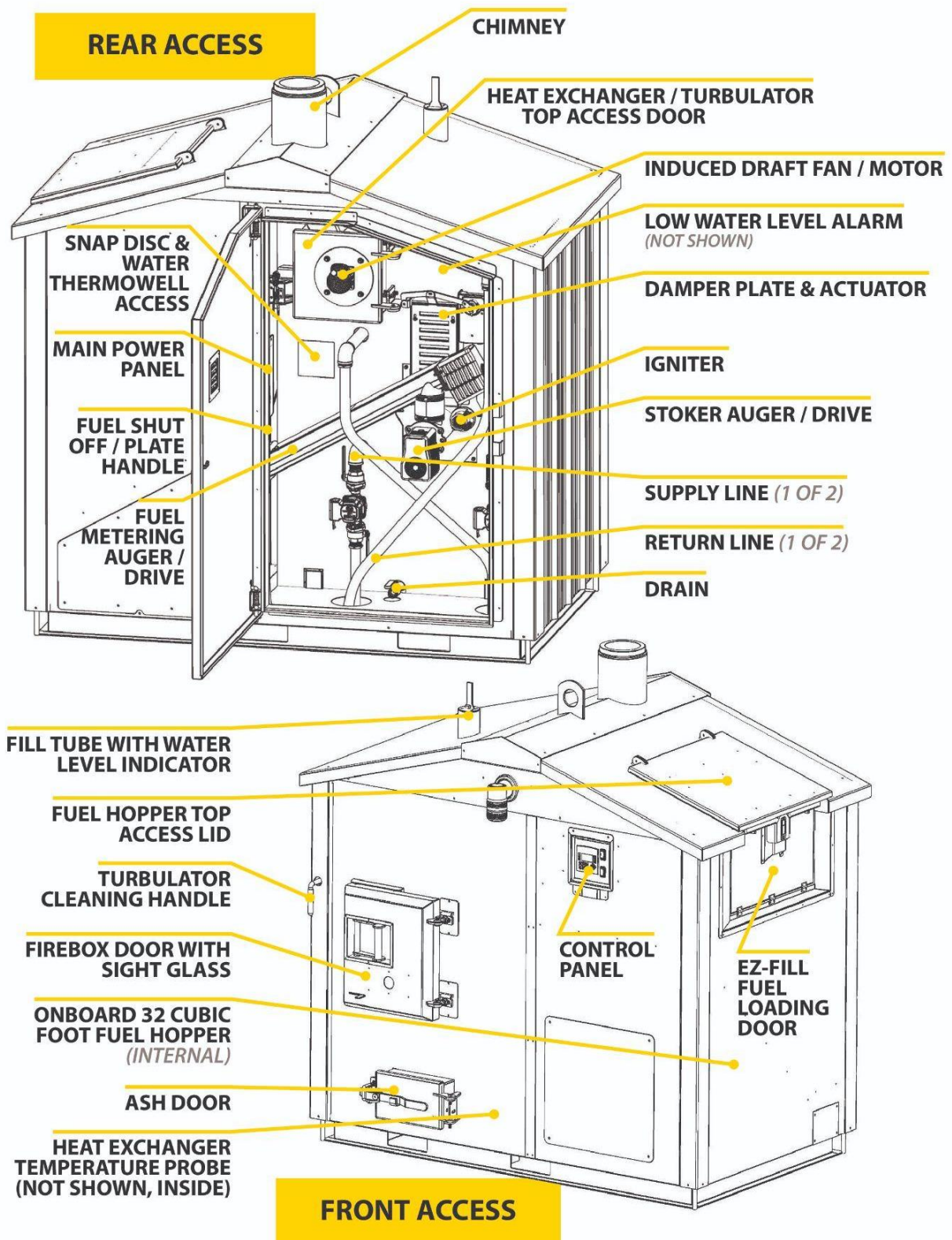
Combustion Airflow and Heat Exchanger Process



Ambient combustion air enters the rear of the stove through a PLC-controlled actuated damper. The negative draft fan draws the combustion air through the Omni-O.2 burn pot, supporting both primary and secondary combustion processes.

The resulting super-heated air passes through a series of primary heat exchanger tubes and across the bottom of the boiler, providing substantial heat transfer. The hot exhaust air then flows through a series of secondary exchanger tubes for additional thermal efficiency before the low-temperature exhaust gases exit through the Class-A chimney.

COMPONENTS DIAGRAM



INSTALLATION

Important: All users must comply with state, federal, and provincial requirements, including but not limited to local ordinances and applicable laws. Refer to the higher level of care and the authority having jurisdiction for piping, electrical wiring, and chimney installation. All work must be performed by qualified personnel only. The operation of the existing heating system must be verified for acceptable operation before and after installation of the Crown Royal Stove by a gas fitter who is recognized by the regulatory authority.

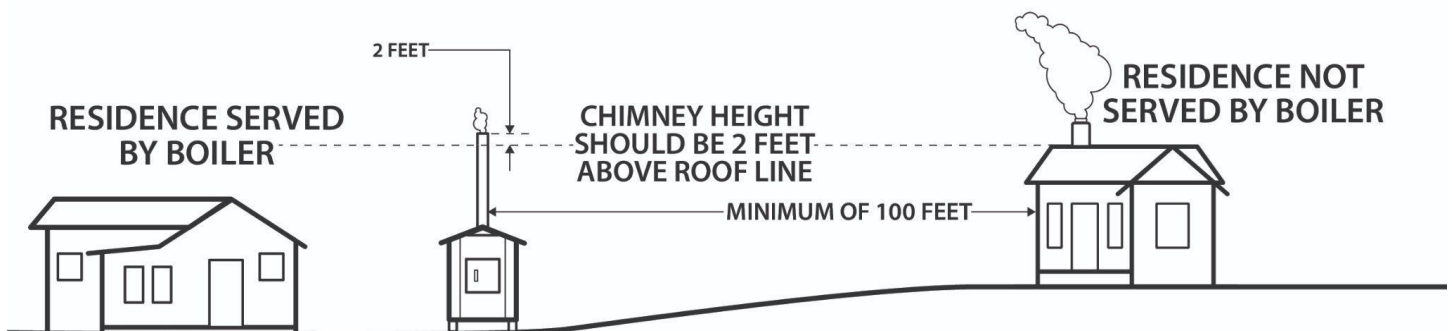
For units installed in Canada: Ensure the installation complies with the requirements of CAN/SCA-B365. Any changes to the installation should comply with CSA B139 (for oil-fire), C22.1 (for electric), or CAN/CGA-B149.1 or CAN/CGA-B149.2 (for gas-fired).

Prohibited Fuels

The EPA's list of prohibited fuels include: garbage, yard waste, rubber, tires, plastic, petroleum products, paints or paint thinners, asphalt products, asbestos, construction debris, paper products and cardboard, plywood, particleboard, railroad ties, pressure-treated wood, animal remains, or salt water saturated materials.

Location

When choosing the location of your boiler you should consider prevailing wind direction, distance from home for refueling and storage, and give consideration for any effect on your neighbors. Check your local code requirements and homeowner's insurance company to ensure they will approve the proposed location relative to the distance from building and combustibles. We recommend a minimum of 25 feet from any inhabited building and 100 feet from a residence not served by the boiler..



All users are also responsible for operation in a manner that does not create public or private nuisance conditions. The distance and stack height Greentech Manufacturing recommends and the requirements in any applicable laws or other requirements may not always be adequate to prevent nuisance conditions due to terrain or other factors.

Clearances

Minimum Clearances to Combustibles				
Side	Front	Back	Top	Chimney Connections
36 Inches	60 Inches	36 Inches	12 Inches	60 Inches

WARNING

DO NOT STORE FUEL OR OTHER COMBUSTIBLE MATERIALS WITHIN MARKED INSTALLATION CLEARANCES.

Combustion Air Requirements

When installing a fuel burning appliance in a building, review the IMC (International Mechanical Code) and NFPA 54 definitions of “confined” and “unconfined” spaces. Unconfined simply means that the area in which the appliance is located is sufficient to provide the combustion air requirements of the appliance. All Crown Royal Stove models must be installed in “unconfined” spaces.

To determine if a space can adequately support proper combustion:

1. Calculate the volume of the space: Length (ft) x Width (ft) x Height (ft) = Volume (CF)
2. Calculate the BTU requirements of every appliance located in the space (to the nearest 1,000 BTU per hour)
3. Divide the total combustion air requirements (step 2) by 50 CF
4. Compare the result of step 3 with step 1

If the requirement of step 3 is higher than the room volume in step 1, additional combustion air must be added. Consult your local dealer or other industry professional for approved methods to ensure proper operation.

!! CAUTION !!

When installing fans in the fuel-storage area, ensure they are positioned and operated so they do *not* create negative pressure in the room where the solid-fuel-burning appliance is located, *per B366.1*. Negative pressure can disrupt appliance performance and may lead to unsafe operating conditions.

!! CAUTION !!

WORKING SMOKE AND CARBON MONOXIDE DETECTORS MUST BE INSTALLED AND MAINTAINED FOR ANY INDOOR INSTALLATION. DO NOT INSTALL THIS BOILER IN ANY INHABITED BUILDING, INCLUDING, BUT NOT LIMITED TO, AN ATTACHED GARAGE TO A HOME.

Foundation

Inspect the ground conditions that you intend to install your boiler on. If the area is unstable or has a history of staying wet, you will need to improve the sub-soil with gravel as well as raising the elevation. The preferred installation is on a concrete pad of 4" – 6" inches, reinforced with rebar and wire mesh. At a minimum, the slab should be 2" wider than the perimeter of the boiler base, but extra working area is beneficial. We recommend adding a 32" apron to the fuel-loading side of the boiler as a work area. If needed, this provides a safe, level surface for a ladder while re-fueling. Place the rear of the boiler base 2" from the back edge of concrete to give 12" for your underground lines to come up.

Minimum & Recommended Pad Dimensions (width x length)
BIO200
Minimum: 86" x 60"
Recommended: 118" x 60"

WARNING

DO NOT EVER INSTALL THIS BOILER ON A COMBUSTIBLE SURFACE, INCLUDING BUT NOT LIMITED TO TIMBERS OR PRESSURE TREATED LUMBER.

Chimney

The chimney size and termination height all depends on the unit you have purchased and where the unit will be located. Contact your local dealer or Greentech Manufacturing, Inc. for chimney design and purchase information.

Your boiler was designed and tested using Selkirk Chimney Systems. It is required to use Class A Selkirk brand chimney type HT (High-Temperature) Ultra Temp Series. This assembly meets the requirements of UL103 and ULC-S629, as well as complies with Chapter 11 of NFPA 211 (Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances). Install each section of piping by placing male and female sections together then twisting them to lock sections together. Be sure to install a locking band on every section. Selkirk recommends bracing every eight feet, with a maximum chimney height of no more than forty (40) ft.

Chimney termination caps are required for warranty coverage. Installation of spark arresters must be used in high fire risk areas. Clover leaf caps are an excellent choice as an alternative for spark arrestors, and can eliminate down draft issues.

WARNING

ADHERE TO LOCAL BUILDING CODES AND NFPA 31, 54 AND 211. FOLLOW ALL CHIMNEY MANUFACTURES INSTALLATION REQUIREMENTS. THIS UNIT CAN NOT BE HOOKED TO A CHIMNEY ALREADY SERVING ANOTHER APPLIANCE.

Refer to the manufacturer's recommendations and requirements for proper clearances. Each model is equipped with a Selkirk brand anchor plate and a 12-inch chimney length, preinstalled as standard. Additional chimney components and extensions are recommended and are available from your local dealer or by contacting Greentech Manufacturing directly at 866-361-7355.

WARNING

NEVER ATTEMPT TO FABRICATE YOUR OWN CHIMNEY COMPONENTS. NEVER MIX SELKIRK CHIMNEY WITH OTHER MANUFACTURED BRANDS. INSPECTIONS OF CHIMNEYS NEED TO BE PERFORMED AT LEAST ANNUALLY TO ENSURE THEY ARE FREE OF ANY OBSTRUCTIONS DUE TO CREOSOTE BUILDUP. PERFORM REGULAR CLEANING OF CHIMNEY TO PREVENT CHIMNEY FIRES.

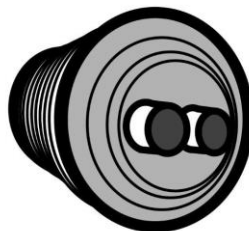
NOTE: It is recommended that at least one 4' section of chimney be installed on every boiler.

Transfer Lines

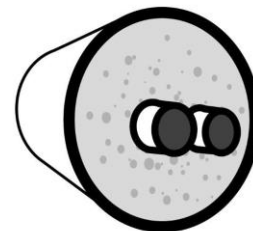
Piping System	Advantages	Disadvantages
Multi-wrap foil faced EPE Insulation A	Entry level system designed as a low cost option. Tight bend radius capabilities.	High cost of ground prep for proper installation. Single layer drain pipe susceptible to damage and failure. Typically carrier pipe type PEXb.
Multi-layer crosslinked micro-cellular PEX foam B	High quality product designed for tight installation. Bending radius comparable to entry level option. PEXa tubing. Double-wall pipe jacket.	Higher cost than entry level. Site prep and sand bed required. Pipe jacket more robust than entry level, but still susceptible to physical damage.
Rigid Foam Filled Tubing System C	Heavy outside jacket. Water resistant closed cell foam insulation. Comparable in price to mid-level option. Designed for intensive environments and climates.	Heaviest product, making installation more difficult. Very stiff. Long bend radius required.
NOTE:	Transfer line should be at least 1" nominal diameter, rated for 100 PSI at 180°F continuous flow. Splices and repairs underground create a fail point for possible future leaks, so should be avoided if at all possible. Insulated underground piping systems must remain watertight. Ground water intrusion can significantly increase a system's heat load, so failed underground systems require immediate replacement. Refer to the manufacturer's installation requirements for the piping system that is chosen for your installation.	



A

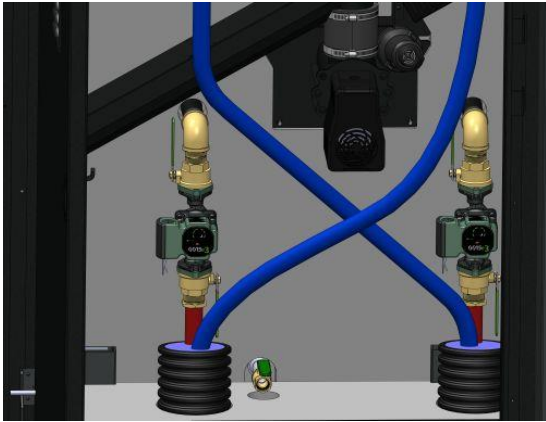


B



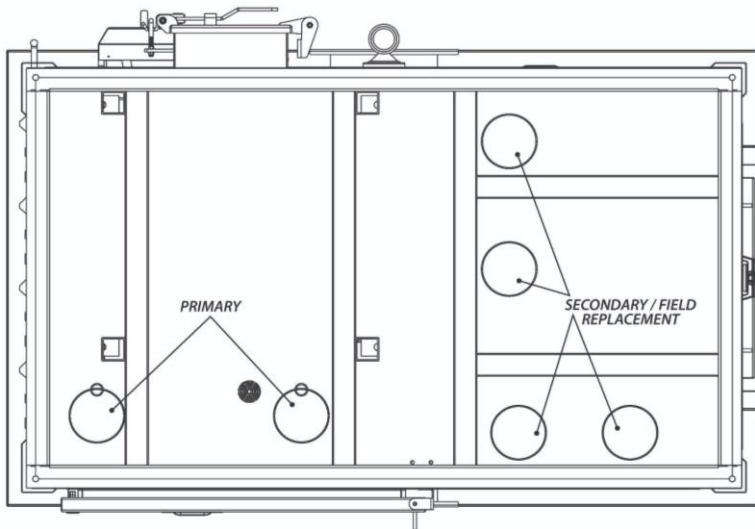
C

Piping Connections



Underground transfer lines should be installed through one or more of the knockouts located in the rear of the boiler. Be sure to install the assembly so that the outside casing and pipe insulation terminates inside the boiler.

Connections to the boiler are clearly marked: lower connections are for hot supply water leaving the boiler, and upper connections are for cool return water coming back to the boiler. If multiple locations are heated by the boiler, tees may be added on both the supply and return lines. (See page 21 for illustrations)

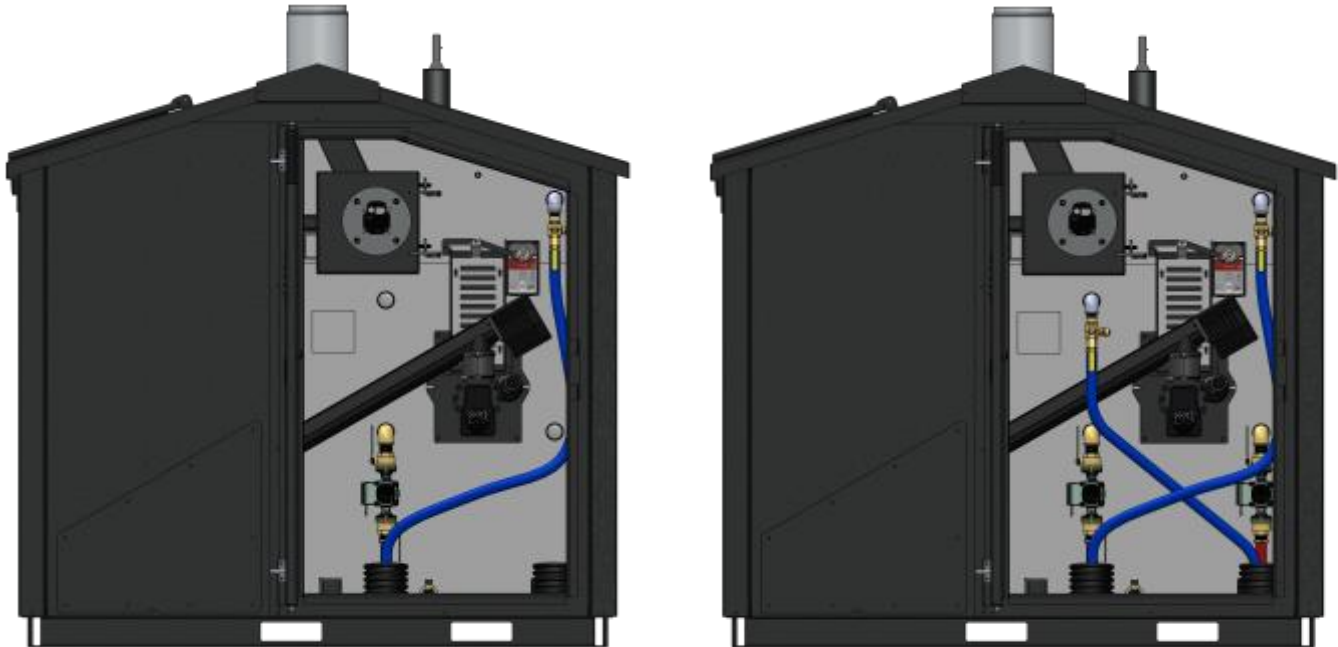


Note: There are multiple locations where supply and return water lines can be brought into the boiler from below. The primary knockouts are located inside the rear access door behind the boiler. Additional secondary locations (for retrofitting in existing locations) can be found beneath the fuel hopper, accessible via removable panels on the boiler exterior cladding (front or back).

Connections Illustration

WARNING

FIRST FITTING CONNECTIONS ON THE BOILER MUST BE STAINLESS STEEL OR BRASS. THE USE OF ANY OTHER MATERIALS WILL INVALIDATE THE WARRANTY.



Circulators should always be installed on the supply line, as close to the boiler as possible. Do not install flow checks (or IFC). A circulator is needed for each building or zone for independent heat control. Install an isolation flange on the suction side, and an isolation flange with drain on the discharge side. A ball valve with a drain should be installed on the return line at the boiler. The illustrations above show the proper configurations. Installing the system this way allows for easy air purge and future servicing, and the supply side loop creates a safety for the circulator and boiler in the case of a system leak.

NOTE: ALWAYS cross return lines. If zone A supply is on the lower left of the boiler, the upper right will be zone A return. Piping crossed returns will promote better water jacket mixing to increase efficiency and prevent stratification.

Electrical Connections

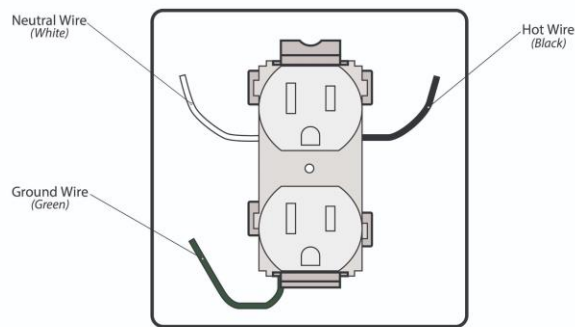
WARNING

All wiring must conform to local codes. Use an electrical wire rated and approved for underground installations. This wiring may be placed in the same trench, below the transfer lines. Use a minimum of 12 AWG, such as 12-2 UF or 12 AWG THHN in a conduit, to provide power to the combustion blower, aquastat, night light, etc. Heavier gauge wire may be necessary based on distance of run. Romex (NM-B) cable can NOT be used. Electrical wire assemblies must include a ground that is firmly bonding the boiler to the building's grounding system in accordance with applicable electrical codes to ensure electrical continuity and safety.

It was once believed that driving a ground rod at an outdoor boiler would help prevent galvanic corrosion or electrolysis. Do NOT install a ground rod for the boiler system. Safety grounding is accomplished through the electrical wire supplying the boiler. Adding a ground rod can actually increase galvanic corrosion or induce stray voltage. If additional corrosion protection is needed, a sacrificial anode can be buried next to the trench and connected to the boiler frame. Corrosion prevention items can be found in the from your local dealer or by contacting Greentech Manufacturing directly at 866-361-7355. Instructions for installation are included with the kit.

The boiler has been pre-wired for operation at the factory. The main power connection is located in the back of the boiler, behind the duplex receptacle.

- Use a knockout located on the side of the junction box with an appropriate box connector.
- Connect the ground (bare copper or green) wire to the green pigtail.
- Connect the neutral (L2 white wire) wire to the white pigtail or silver neutral terminal screw.
- Connect the power (L1 Black) wire to the black pigtail or gold power terminal screw.



Electrical Rating	60Hz/1PH
Nominal Volts	115vAC
FLA (Full Load Amp)	15a
RLA (Run Load Amp)	6a
Max Fuse/Breaker	20a

NOTE: USE COPPER CONDUCTORS ONLY

CH Circulator (s) should be plugged in to the receptacle for continuous operation.

CONNECTING TO AN EXISTING SYSTEM

All installations and operations involving the Crown Royal Stove outdoor boiler must be carried out in full compliance with federal, provincial, state, and local codes regulating wiring, plumbing, and chimney systems. Installations must be performed only by qualified professionals, such as licensed plumbers, HVAC technicians, or contractors familiar with hydronic heating systems.

It is strongly recommended that users consult with their dealer or a licensed plumber to design a system that best fits their specific application. The proper selection and placement of heat exchangers, pumps, valves, and controls is critical for system safety, efficiency, and longevity.

Recommendations

- Piping used inside any building must be rated for a minimum of 100 PSI at 180°F. A minimum diameter of 1 inch is required, with 1¼ inch or larger recommended for larger or higher-demand systems.
- Each building or zone must be equipped with its own circulation pump, typically located on the supply (hot water) side.
- A filtering device must be installed before each circulation pump to prevent debris from damaging the pump and to extend its service life.
- It is recommended to install ball valves, isolation flanges, and other service fittings to allow for easier maintenance or replacement of system components.
- A bleeder valve should be placed at the highest point in the system to allow air removal and ensure proper water circulation.



Visit crownroyalstoves.com for a wide range of installation recommendations for existing heating systems and other heating applications.

Forced Air Furnace Systems

For homes heated with a forced air furnace, a water-to-air heat exchanger is required. The heat exchanger coil must be installed inside the furnace plenum, preferably in a horizontal position with all four sides level. If there is an air conditioning evaporator coil already in the plenum, the water-to-air coil must be installed downstream (after) the A/C coil. The hot water supply line from the outdoor boiler should enter the bottom fitting of the exchanger and exit through the top fitting, returning the cooled water to the boiler.

If the plenum size does not match the coil, it must be modified to ensure proper airflow and coil fit. Once installed, the airflow of the furnace may need to be increased to support the new heat exchanger:

- Belt Drive Systems: Blower and motor pulleys may be changed as long as the motor's electrical load does not exceed its nameplate rating. A higher-power motor may be used if necessary.
- Direct Drive Systems: The motor must not be replaced, but its speed can be increased where applicable.

The heat exchanger operates by drawing air through its finned coil. Heat is transferred from the hot water running through the coil to the passing air, which is then distributed through your existing ductwork.

!! CAUTION !!

Never tamper with the furnace's original controls during heat exchanger installation. Thermostat wiring should be completed exactly according to the manufacturer's instructions. Existing blowers can be triggered using a line-voltage or low-voltage thermostat.

Hot Water Boiler Systems

For homes with a hot water boiler, a water-to-water heat exchanger is required to keep the pressurized indoor boiler system separated from the non-pressurized outdoor boiler system. If these waters mix, contamination and corrosion can occur.

The most common types of water-to-water exchangers used in these applications are:

- Flat Plate Heat Exchangers (more responsive to demand)
- Tube and Shell Heat Exchangers (more durable with hard water)

These devices safely transfer heat from one water system to the other while keeping the fluids separate. The indoor boiler can serve as a backup heat source and must remain operational. Installations must ensure that:

- The Crown Royal Stove does not interfere with the normal heat delivery of the existing boiler.
- Electrical and mechanical safety controls on the original boiler remain fully functional and unaltered.
- The system has adequate water capacity or provisions to prevent damage from loss of circulation during power failure.
- No rewiring or functional changes are made to the existing boiler.
- Wiring interconnection is permitted, but both systems must be powered from a single branch circuit—without exception.

Boiler Safety Note:

The existing boiler must be tested before and after installation by a qualified gas fitter to confirm safe operation. Safety controls cannot be relocated or bypassed. Installations must also comply with all applicable standards, including:

- CAN/CSA-B365 for general installation requirements
- CSA B139 for oil-fired systems
- C22.1 for electric systems
- CAN/CGA-B149.1 or B149.2 for gas-fired systems
- The outdoor boiler must not share a chimney or vent with any gas appliance.

Domestic Hot Water

To pre-heat domestic water, a flat plate heat exchanger is generally recommended due to its rapid thermal response. However, if hard water is present, a tube and shell exchanger is typically more durable and better suited for long-term use.

START UP AND OPERATION

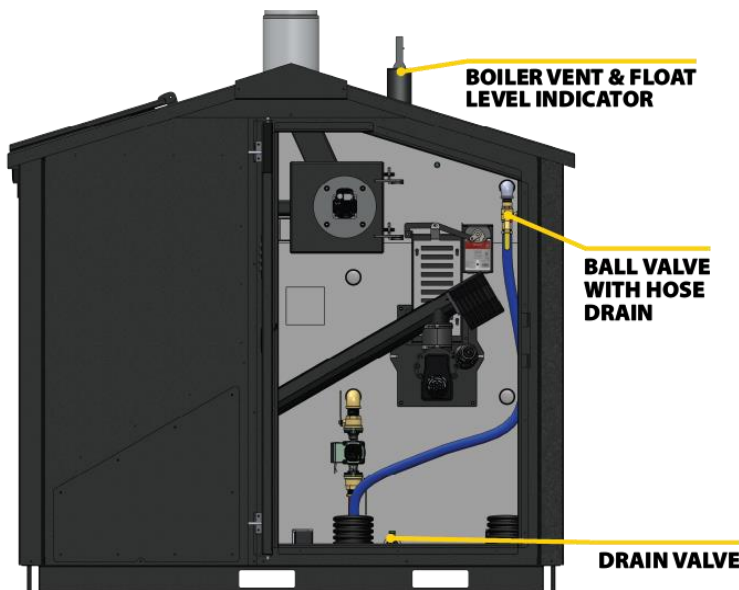
Filling The Water Jacket

(see also “Water Treatment” Section page 63)



It is widely recognized that the water used to protect a boiler from corrosion should be of at least the same quality as drinking water. If consuming the water is not advisable, it should not be used in a boiler.

If in doubt, TEST. Your dealer has access to water sample tests, and can send samples out to be tested if necessary.



Your boiler is equipped with a vent pipe, which holds the float level indicator, located next to the chimney and extending through the roof. To fill the furnace to the proper water level, simply place a garden hose into this pipe. For added convenience, a ball valve with a hose drain may be installed in the return furnace line. Boilers also come standard with a drain valve located on the bottom of the water jacket, which can be used for filling and adding water as needed. This setup allows you to connect a double-female hose, such as an automatic washing machine hose, between the furnace and your domestic water supply. During the initial filling, carefully inspect all system connections for leaks, and confirm that a bleeder valve has

been installed at the highest point of the system to release any trapped air. At this stage, add the initial dose of Control Chemical Inhibitor into the boiler vent with the float level indicator to ensure the steel is protected as soon as possible.

Note: This boiler is an open-to-atmosphere system, it is normal to add water annually, with 5 to 10 gallons being typical depending on conditions.

WARNING

DO NOT ADD WATER TO YOUR BOILER IF YOU CANNOT TREAT WITH CONTROL CHEMICAL INHIBITOR WITHIN IMMEDIATELY. DO NOT FIRE BOILER UNTIL IT HAS BEEN FILLED WITH WATER. DO NOT FILL THE BOILER WITH WATER FROM A SOFTENER.



When the float level indicator is at about the 1/2 mark, stop adding water to the system. As the water is heated, the indicator will rise.

As soon as water has been added as detailed above, plug the circulator in to the receptacle and be sure to raise the temperature to at least 180°F. When the boiler has reached a set temperature, recheck the water level and add fresh water if necessary. After 48 hours of starting the circulator, pull a water sample to be tested and to activate your warranty.

Water Treatment and Testing

All Crown Royal Stove owners are required to purchase authorized Control Chemical, for initial start-up and ongoing maintenance. Initial Control Chemical inhibitor dosages are based on your models water jacket capacity, estimated average piping, and standard heat exchanger capacity.

INITIAL INHIBITOR DOSAGE
BIO200
3/4 Gallon

Annual water testing is FREE. To collect a water sample:

- Circulate your water for 48 hours prior to taking a sample.
- Connect your double female (washing machine) hose to one of the purge valves in the back of the boiler. Alternative collections points would be boiler drain valve, a system drain valve or fill tube.
- With the circulator still running, slowly crack open the purge valve and allow the fluid to drain for approximately 30 sec.
- While still flowing, begin filling the sample bottle provided.
- Close purge valve when the sample has been collected.
- Complete the boiler information form, attaching one section to the sample bottle and the other half to the shipping container.

IMPORTANT: Be sure that your information is clear and legible.

WARNING

HOT WATER AND HOT SURFACES MAY CAUSE BURNS. USE EXTREME CARE WITH THE COLLECTION OF A WATER SAMPLE.

Test results are provided on all samples within 4-6 weeks. Be sure to check your email spam folder. If you don't receive a copy of your test report, contact your dealer or call 866-361-7355. To maintain your warranty, it is required to only treat with authorized Control Chemical inhibitor, send water samples at least once every 12 months, and maintain water chemistry. The testing facility will be verifying the following requirements:

pH	9.5-14
Conductivity	6 Max
Sodium Nitrite	900 ppm Minimum
Chlorides	Less than 50 ppm
Other	Proprietary markers, appearance, biological growth, etc.

TEMPERATURE SENSOR AND CONTROL OVERVIEW



An RTD temperature sensor, inserted into a thermowell located at the rear of the boiler, is wired directly into the control panel. This sensor serves as the primary control instrument, as all other boiler control functions operate to maintain the user-defined internal water temperature and differential—referred to as the Water High Set Point (High SP) and Water Low Set Point (Low SP).

The majority of PLC functions are governed by factory presets and default parameters. However, users may need to adjust the fan and auger speeds to suit their specific application, fuel type, and ambient temperature conditions.

A properly operating fire should appear bright white when viewed through the firebox door sight glass, with no visible emissions exiting the chimney.

If additional adjustments beyond those available in the following control screens are required, please contact your Dealer or Crown Royal Stoves directly for technical support.

OFF Mode

When main power is turned on, the PLC initializes in this mode. All control panel pages and parameters are accessible, but no boiler functions will start automatically.

This is the correct mode to prime the fuel augers and/or load the initial fuel into the burn pot.

Pressing “F2” during any operation will initiate the Stop Boiler command, activating automated purge functions and returning the boiler to this mode.

The boiler will also enter OFF Mode during any alarm condition, remaining in this state until the issue is resolved and the alarm is cleared by pressing “F2.”

Note: If, at any time during normal operation, the main power switch is turned off without first pressing “F2”, the PLC will interpret this action as a power interruption. As a result, the system will automatically initiate the ignition sequence once power is restored.

ON - Ignition Mode / Ignition Confirm

Pressing “F1: Start Boiler” initiates the Ignition Mode. The PLC automatically starts the draft fan, metering auger, and stoker auger to deliver fuel to the burn pot.

The automatic igniter then ignites the fuel, and the system monitors the heat exchanger temperature over a preset duration.

- If ignition parameters are met, the control panel displays “Ignition Confirm” and transitions to Run – Firing Mode.
 - If ignition fails, the boiler will attempt ignition two additional times (default) before entering an alarm state.
In this case, verify the fuel supply, burn pot cleanliness, fan speeds, and igniter condition before retrying.
-

ON - Run - Firing

In this mode, the boiler actively maintains internal water temperature within the range defined by the Water Low SP and Water High SP setpoints.

The PLC automatically modulates the fuel feed rate and fan speed based on the difference between the current water temperature and the desired High SP.

These parameters can be adjusted on the Auger Controls and Fan Controls screens to optimize combustion performance.

Example of operation:

- When water temperature reaches the Water Low SP, the augers and fan activate in High Fire mode for rapid heating.
- As temperature rises, the system transitions to Medium Fire mode, reducing auger and fan speeds.
- Near the Water High SP, it enters Low Fire mode to gently approach the target temperature without overshooting.

This automated modulation prevents over-firing, conserves fuel, and enhances efficiency. Once the High SP is reached, the PLC ends the burn cycle and transitions to Idle Mode.

If heating demand increases while still in “Run Firing”, the system will automatically re-enter Medium or High Fire modes to maintain the required temperature.

ON - Run - Idling Mode

This is the boiler’s most common operational state while powered ON.

When the current water temperature remains between the Water Low SP and Water High SP, the augers and fan remain off, and no fuel is delivered.

During this mode, the PLC continuously monitors water temperature to maintain it within the specified range.

OFF - Boiler Purge Mode

After pressing “F2: Stop Boiler”, the boiler automatically enters Purge Mode for a preset duration.

In this sequence:

- The metering auger stops fuel delivery.
- The stoker auger continues running to clear remaining fuel from the trough into the burn pot.
- The draft fan continues operating to maintain combustion until all fuel in the burn pot is consumed.

This purge process prevents potential burn-back.

Once complete, the stoker auger and draft fan shut down, and the boiler transitions to OFF Mode.

It is normal to see a slight increase in water temperature during this purge, due to residual fuel burning off.

Main Keys & Parameters

Control Navigation

- **Up/Down Arrows:** Navigate between (to and from) control panel pages.
- **Left/Right Arrows:** Navigate within a control panel page.
- **Return Arrow:** Acts as “Enter” key to accept parameter adjustments/changes.
- **F1-Start Boiler:** Initiates *ON – Ignition Mode* from any screen (if not in alarm state).
- **F2-Stop Boiler:** Initiates *OFF – Boiler Purge* from any screen.

Auto Prime Timer

Default: 5 min. 30 sec.

During initial startup, priming may be required to fill the fuel delivery augers with fuel for the burn pot. While in *OFF* mode:

- Press “3” on the Auto Priming screen to run the metering and stoker augers for the set duration.
- It is acceptable to leave the firebox door open to observe fuel delivery.
- Once fuel reaches the burn pot, stop the Auto Prime sequence by pressing “1”.

If no fuel arrives after the set time, use the Manual Prime function (#2) to deliver more fuel. Once the augers are primed, this process should not need repeating unless the hopper runs completely empty.

Note: Priming is only intended to fill the delivery system. Stop priming as soon as fuel begins entering the burn pot — the PLC controller automatically introduces the proper amount of fuel for ignition during normal startup.

Temperature Setpoints

- **Water Low SP:** *Default:* 170 °F (*Range:* 150 °F – 190 °F)
Defines the temperature at which the system enters *Run – Firing* mode. When water temperature drops below this value (or starts below it), the boiler fires to raise the temperature to the *Water High SP*.
- **Water High SP:** *Default:* 180 °F (*Range:* 170 °F – 195 °F)
Defines the target boiler water temperature. When reached, the boiler exits *Run – Firing* mode and enters *Run – Idling* mode.

Combustion Control Parameters

Proper adjustment of these parameters ensures optimal combustion. In general, increasing fuel delivery requires more oxygen (Fan Speed Low-Med-High). An ideal burn appears as a bright white flame visible through the sightglass located on the firebox door, with little to no visible exhaust coming from the chimney.

If optimal burn conditions cannot be achieved, contact your Dealer or Crown Royal Stoves for assistance.

Fan Speeds

- **Low Fire Fan Speed**

Default: 50% **Range:** 35-70%

Defines the draft fan speed in *Low Fire* mode as the boiler approaches the Water High SP. This value should be lower than the *Med* or *High* fan speed settings, allowing the PLC to gradually reduce flame intensity in the burn pot as the internal water temperature nears the target value.

- **Med Fire Fan Speed**

Default: 64% **Range:** 50-85%

Controls the draft fan speed in *Med Fire* mode as the boiler maintains water temperature between the Water High SP and Water Low SP. The PLC modulates fan speed to keep the temperature within these limits. Depending on heat demand, the boiler may transition between *High Fire* and *Low Fire* modes to maintain optimal operation.

- **High Fire Fan Speed**

Default: 88% **Range:** 50-99%

Sets the draft fan speed in *High Fire* mode as the boiler starts up or approaches the Water Low SP. This value should be higher than the *Low* or *Med* settings, allowing the PLC to increase combustion intensity for rapid heating and recovery. *High Fire* mode produces the most aggressive burn characteristics for quick temperature gains.

Metering Auger Speeds

The Metering Auger Speeds determine the rate of fuel delivery to the burn pot. These values work in coordination with the fan speeds to maintain optimal combustion and steady boiler operation. As the system temperature changes, the PLC automatically modulates the auger speeds to match combustion demand.

- **Low Fire Metering Auger Speeds**

Default: 14% **Range:** 10-20%

Defines the fuel delivery rate in *Low Fire* mode as the boiler approaches the Water High SP. This setting should be lower than the *Med* or *High* auger speeds, allowing the PLC to gradually reduce fuel feed and flame intensity as the internal water temperature nears the target level.

- **Med Fire Metering Auger Speeds:**

Default: 20% **Range:** 10-30%

Controls fuel delivery in *Med Fire* mode as the boiler operates between the Water High SP and Water Low SP. The PLC modulates this speed to maintain water temperature within these setpoints.

Depending on the system's heat load, the boiler may transition between *Low Fire* and *High Fire* modes to sustain efficient operation.

- **High Fire Metering Auger Speeds:**

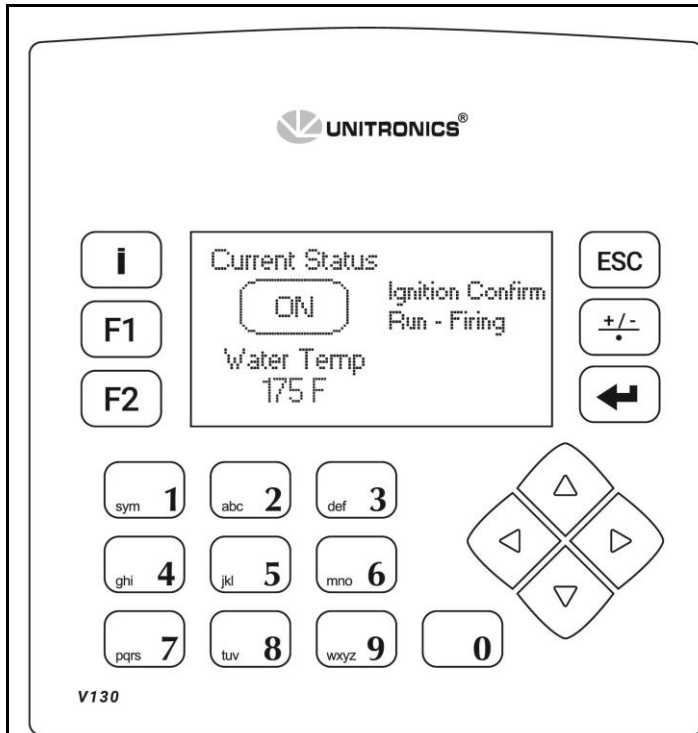
Default: 34% **Range:** 20-40%

Defines the fuel delivery rate in *High Fire* mode as the boiler starts up or approaches the Water Low SP. This setting should be higher than the *Low* or *Med* auger speeds, allowing the PLC to increase the burn rate and raise water temperature efficiently. *High Fire* mode provides the most aggressive combustion for rapid temperature recovery.

WARNING

ONLY QUALIFIED PERSONNEL SHOULD ADJUST THESE PARAMETERS.

Control Panel Screens

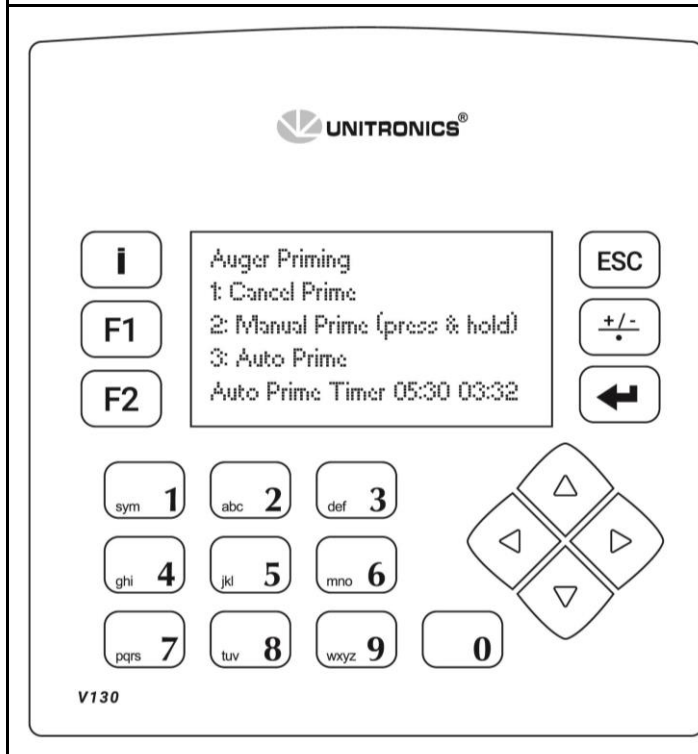


Main Status Screen

Displays:

- Current Status (ON, or OFF)
- Current Water Temperature (175 F)
- Ignition Confirm (if true, *shown*)
- Current Mode (Run – Firing, *shown*)

Other “ON” mode options: Ignition Mode, Run - Idling, Boiler Purge (*not displayed*)



Auger Priming Screen

Select:

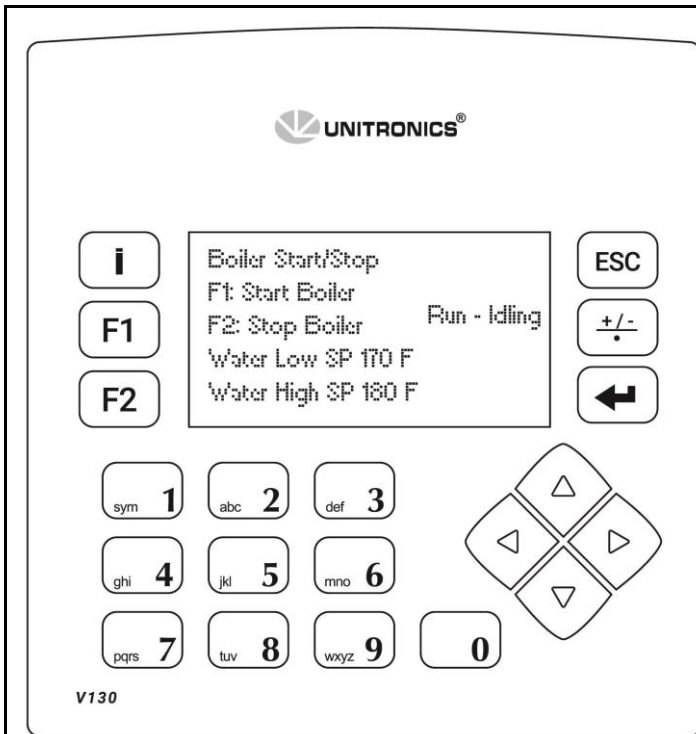
- Press “3” to initiate Auto Prime mode for set time
- Press and hold “2” to manually prime/run augers
- Press “1” to cancel/stop Auto Prime

Adjust:

- Auto Prime run timer (05:30)

Displays:

- Remaining time in Auto Prime cycle (03:32)



Boiler Start/Stop Screen

Select:

- Press "F1" to Start Boiler
- Press "F2" to Stop Boiler

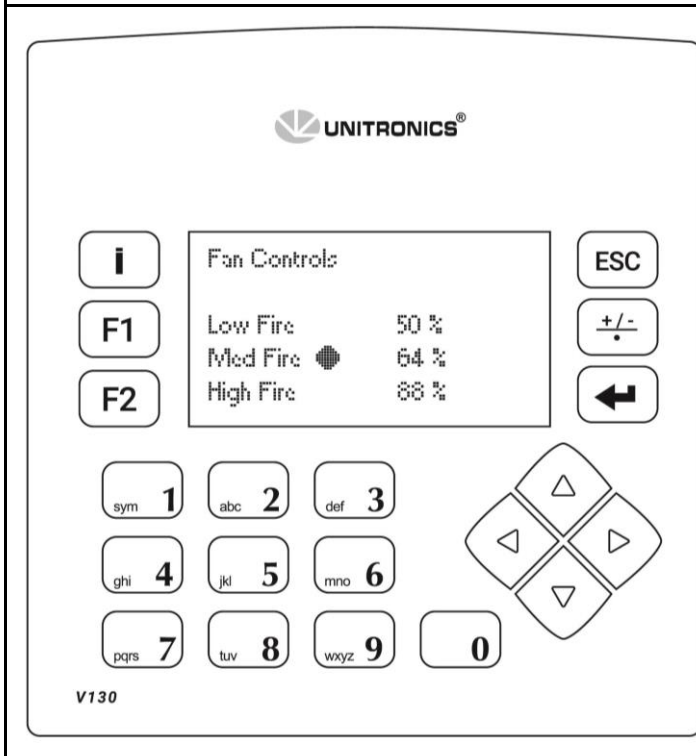
Adjust:

- Water Low SP [Set Point] (170 F)
- Water High SP [Set Point] (180 F)

Displays:

- Current Mode (Run – Idling, *shown*)

Other "ON" mode options: Ignition Mode, Ignition confirm Run-Firing, Boiler Purge (*not displayed*)

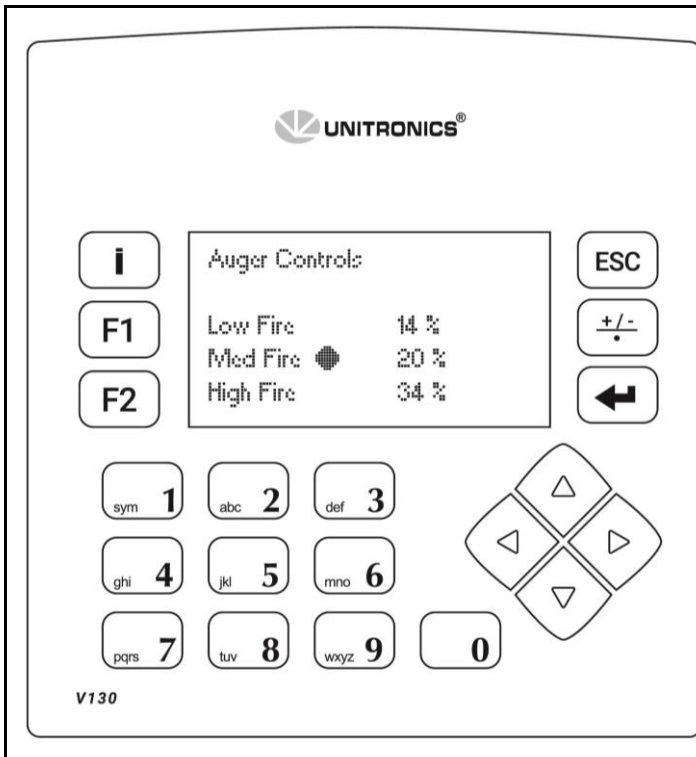


Fan Controls Screen

Adjust:

- Low Fire Fan Speed (50%)
- Med Fire Fan Speed (64%)
- High Fire Fan Speed (88%)

The bullet indicates current control mode, in this case, "Med Fire"



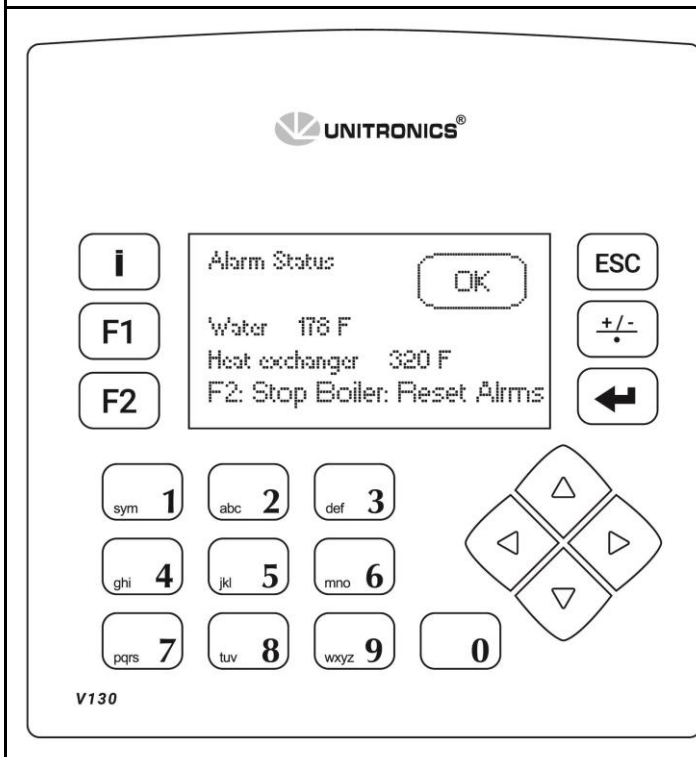
Auger Controls Screen

Adjust:

- Low Fire Metering Auger Speed (14%)
- Med Fire Metering Auger Speed (20%)
- High Fire Metering Auger Speed (34%)

The bullet indicates current control mode, in this case, "Med Fire"

Note: Auger percentages are based on a full, 30 second cycle. If set at 20% the auger will be on for 6 seconds off for 24 seconds.



Alarm Status Screen

Displays:

- Current Alarm Status (OK, *shown - or* ALARM)
- Current Water Temperature (178 F)
- Current Heat Exchanger Temperature (320 F)

Select:

- Press "F2" to Stop Boiler: Reset Alarms

Other Alarm Statuses: Ignition Fault, H2O Level Low, H2O Temp High, Exchanger Temp High, Exchanger Temp Low, General Fan Alarm

Safety Devices & Alarms

Snap Disc

This boiler is equipped with a snap disc as a protective measure against extreme or rapid over-temperature conditions. If the boiler water temperature reaches 200°F, an over-temperature fault condition will shut down boiler functions. Should the temperature continue to rise and reach 205°F, the snap disc will interrupt all power to the boiler and the automatic feed system. Power will remain off until the water temperature decreases below 160°F.

ALARMS

The following alarms may appear on the Alarm Status screen for various reasons that need to be addressed. If the boiler encounters any alarm state below, the boiler will automatically enter “Stop Boiler” mode to shut down and display the Alarm Status. In the event of any alarm, the boiler needs to be inspected for the cause, and will not restart until the alarm is remedied and manually cleared by pressing “F2: Stop Boiler: Reset Alarms”.

Low Water Level Alarm

The low water level alarm is a critical safety device that prevents the boiler from operating without adequate water. It continuously monitors the water level, and if it falls below a safe point, the switch shuts down the burner or fuel feed system to stop operation. This protects the boiler from overheating or running dry, which could cause severe damage or create unsafe conditions. The switch will reset automatically once water is restored but the alarm will need to be reset by pressing F2.

High Water Temperature Alarm

This alarm appears if the water temperature increases beyond the “Water High SP” and reaches 200°F. The alarm screen will appear and display “H2O Temp High” until manually cleared (the water temperature must be below 200°F to clear). This alarm suggests that the fire in the burn pot is burning too hot, or for too long (excess fuel or excess fan speeds).

Exchanger Temperature Alarm High

This alarm appears if the heat exchanger temperature probe reaches the set parameter “Heat Ex Max Temp” [Pr35]. This alarm suggests that the fire in the burn pot is burning too hot (excess fuel or excess fan speeds), or that the boiler airways are dirty and not transferring heat to the water efficiently.

Exchanger Temperature Alarm Low

This alarm appears if the heat exchanger temperature probe drops below the set parameter “Heat Ex Low Temp” [Pr36]. This alarm suggests loss of fire in the burn pot, likely due to lack of fuel in the burn pot.

General Fan Alarm

This alarm appears if there is an issue with the Induced Draft Fan Motor/Blower in the upper heat exchanger access door. The PLC has lost control of the fan signal due to a faulty motor, wiring, or some other issue.

Ignition Fault Alarm

This alarm appears if the PLC does not confirm ignition within the defined time and attempts parameters. During Ignition mode, the PLC monitors the heat exchanger temperature for an increase in temperature (to confirm the fuel is burning). A preset temperature deviation must be met within the preset time and ignition attempts to confirm ignition. If these conditions are not met, this alarm appears and suggests lack of sufficient fuel or an issue with the igniter.

OPERATING INSTRUCTIONS

Loading the Fuel Hopper

The BIO200 includes a large onboard 32 ft³ capacity fuel hopper to store approximately 1,400 pounds of wood pellets and extended burn times between refueling. To add fuel, initially open the top access lid of the hopper. Fuel can be added directly into this top access door to reach the full fuel capacity level, or for easier convenience the lower height “EZ-Fill” fuel loading door can be opened and used to fill the hopper to approximately 60% capacity. This dual hatch design makes refueling simple and flexible, allowing users to choose the method that best suits their needs.

The hopper is equipped with an interior light if desired, it can be turned on via the bottom switch on the right side of the control panel. Before loading, always inspect the hopper. Open the top access lid to check for any foreign objects, debris, or packaging material that could interfere with the auger system. Lock out power and remove anything that does not belong before adding fuel.



Once the hopper is clear, carefully load the selected fuel. Pour or transfer the fuel into the hopper. Ensure that pieces of fuel bags or packaging do not fall into the hopper, as these can cause damage or blockages. After loading, always close the doors in the correct order: shut the EZ-Fill side door first, followed by the top access lid. This ensures a proper seal, prevents moisture entry, and keeps the system operating safely and efficiently.

!! DANGER !!

- Risk of fire.
- Do not operate the unit with the fuel hopper top access lid, EZ-Fill fuel loading door, ash door, or rear heat exchanger cleanout door open.
- Do not store fuel or other combustible materials within the marked installation clearances.
- Only Wood pellets can only be loaded into the fuel hopper.
- Do not use the firebox door to manually load fuel directly into the burn pot. Doing so may cause damage or create unsafe conditions.
- NEVER ENTER the fuel hopper. The bottom of the hopper is equipped with an

automated auger that can start and stop at random.

WARNING

- Inspect and clean flues and chimney regularly.
- Perform regular cleaning of airflow pathways.
- Remove ashes regularly.
- Always ensure the hopper has an adequate supply of fuel while the boiler is burning to maintain consistent, reliable operation.

!! CAUTION !!

- Hot surfaces. Do not touch during operation.
- Keep children, incompetent, and unauthorized persons away from the unit while in operation.

Fuel Quality: Why Premium Wood Pellets Matter

Using premium-quality wood pellets is essential for the safe, efficient, and reliable operation of your pellet-burning appliance. High-grade fuel ensures maximum performance, reduces emissions, and minimizes maintenance. Choosing the right pellets will help protect your investment and provide the best heating experience.

Benefits of Premium Pellets

Premium wood pellets offer several advantages compared to lower-quality fuel:

- **Efficiency:** High-quality pellets burn hotter and more consistently, providing more heat output per bag.
- **Clean Combustion:** Low ash and moisture levels ensure cleaner burns, reducing smoke and harmful emissions.
- **Reduced Maintenance:** Less ash and fewer impurities mean less frequent cleaning and reduced wear on your appliance.
- **Extended Appliance Life:** Consistent, clean-burning fuel reduces stress on mechanical parts, helping your system last longer.

Fuel Standards and Requirements

To qualify as premium-grade, wood pellets should meet these specifications:

- **Moisture Content:** Less than 10%
- **Ash Content:** Less than 0.7%
- **Must comply with CAN/CSA-ISO 17225-2 Standards**

Use of wood pellets outside these specifications may result in reduced performance, increased emissions, and can void the warranty.

Important Notes

- Alternative fuels or low-grade pellets are not supported and will not be covered under warranty.
- Pellets with excess sawdust content may lead to feed rate interruptions. This can cause:
 - Irregular fuel delivery rates.
 - Increased burnback potential as the fuel delivery augers cannot convey fine particles.

Key Quality Indicators

When selecting wood pellets, look for the following indicators of quality:

- **Ash Content:** Less ash means less residue and easier cleaning.
- **Moisture Content:** Low moisture ensures steady, efficient combustion.
- **Durability:** Pellets should be dense and resist crumbling or breaking.
- **Fines and Clumps:** Bags should not contain excessive dust or clumped pellets, which indicate poor quality.
- **Consistency:** A trusted, consistent brand ensures your appliance can be set and operated without constant adjustment.

Prohibited Fuels

The EPA's list of prohibited fuels include: garbage, yard waste, rubber, tires, plastic, petroleum products, paints or paint thinners, asphalt products, asbestos, construction debris, paper products and cardboard (other than as fire starters), plywood, particleboard, railroad ties, pressure-treated wood, manure or animal remains, salt water saturated materials, or unseasoned wood.

WARNING

Burning any of the above materials can lead to severe damage, unsafe conditions, excessive creosote buildup, and increased risk of chimney fire or toxic exposure.

Fuel Storage

To ensure optimal performance of your BIO200 boiler, proper fuel storage is essential. Exposure to moisture can severely degrade fuel quality, causing inefficient combustion, increased emissions, and potential damage to the unit.

- Store fuel in a sealed container or building that fully protects them from rain, humidity, and ground moisture.
- Do not store bags directly on concrete or soil; use pallets or shelves to raise them off the ground.

WARNING

Do not store fuel or other combustible materials within marked installation clearances.

STARTUP AND OPERATING INSTRUCTIONS

Power Up

Ensure there is an adequate amount of fuel inside the fuel hopper. Turn on your boiler with the top switch on the left side of the control panel. A home page will appear and direct you to press down to continue. Navigate to the 'Boiler Start/Stop' page to set your target water temperature (Water High SP) and differential (Water Low SP) as operating parameters.

Priming

Prior to initial start-ups, the BIO200 automated fuel system and burn pot need to be primed with fuel. If the fuel delivery system is completely empty, the auto-prime function can be used to automatically run the metering and stoker augers to deliver fuel for the duration defined as the "Auto Prime Timer". Navigate the control panel to find the "Auger Priming" page. Pressing '3' will initiate an Auto Prime cycle that turns on these augers for approximately 5 minutes to fill the fuel troughs and deliver fuel into the firebox burn chamber. After the auto-prime time elapses, if more fuel is required, press and hold the Manual Prime '2' button to deliver additional fuel into the burn pot. During this process, the boiler is in OFF mode, with no ignition intended. The firebox door can remain open to monitor the delivery of a desired amount of initial fuel in the burn pot. Once enough fuel is present, the 'Cancel Prime' button can be pressed to stop fuel delivery, and any fuel that has been previously deposited should be cleaned out before ignition. If the auto prime timer times out and no fuel has reached the burn pot, it's recommended to use the "Manual Prime" button to deliver additional/adequate fuel.

Ignition

After adequate fuel has been delivered into the burn pot, close the firebox door and press "F1: Start Boiler" to begin the ignition sequence. The boiler will enter ON "Ignition Mode" and the augers and draft fan will start. Pre-set internal parameters will turn the igniter on and monitor the heat exchanger temperature to confirm fuel ignition (or not). Once confirmed, "Ignition Confirm" will appear on the main status screen and the boiler will advance to Run - Firing mode to reach the set Water High SP. If ignition is not confirmed within the pre-set duration, the controller will automatically re-attempt ignition up to two more times.

Combustion Control

The Firebox door is equipped with a sight glass to visually observe the burning characteristics in the burn pot. Ideal combustion should appear as a bright white flame, with little to no emissions visible coming out of the chimney. Various fuels may need different fan and auger speeds adjusted through each of the 'Run - Firing' modes; Low Fire, Med Fire and High Fire. Not enough fuel may cause the fire to go out or not reach the target water temperature setpoint. Too much fuel will reduce the boiler efficiency and potentially waste unburnt fuel and dirty the boiler as this excess fuel (not ash) gets pushed out of the burn pot. The draft fan and metering auger speeds can be adjusted on the 'Fan Controls' and 'Auger Controls' screens. The stoker auger runs at a constant speed, regardless of the fire mode as the metering auger adjusts the fuel delivery rate. Defaults for these parameters are as follows:

	Fan Speed	Auger Speed
Low Fire	50%	14%
Med Fire	64%	20%
High Fire	88%	34%

DO NOT OPEN ANY DOORS WHILE THE BOILER IS IN OPERATION! The BIO200 operates under negative (draft) pressure; if any of the doors are opened, required air flow will be interrupted and can cause dangerous conditions. Serious injury or damage may result!

Note: Additional fuel can be added to the fuel hopper during any boiler status. However, do not leave the fuel hopper doors open for an extended period of time as this can introduce moisture to the fuel, or excess air into the fuel delivery system.

Operating Precautions:

Upon initial start-up, the water jacket can reach a normal condition called “dew point”. This creates condensation buildup inside the firebox, which may last a couple of days. Condensation may come out of all the doors until the unit reaches operational temperature. As the water is heating, it expands and may also cause excess system water volume to come out of the top fill tube. All are normal occurrences.

WARNING

DO NOT OPERATE WITHOUT ALL ACCESS DOORS (FIREBOX, ASH DOOR & REAR HEAT EXCHANGER CLEANOUT DOOR) PROPERLY CLOSED AND LATCHED.

!! CAUTION !!

HOT SURFACES: KEEP CHILDREN AWAY. DO NOT TOUCH DURING OPERATION.

Prolonged Power Outage

Power is required to maintain safe and adequate combustion. The temperature control, combustion fan, damper actuator, and safety controls all operate when the proper electrical supply is connected. It is important not to open the load door, reaction chamber door, clean out door, or fan access door when there is no power to the boiler. Do not attempt to load new fuel, or start a new fire, during a power outage.

!! DANGER !!

OPENING ANY DOOR ON THE BOILER WHEN POWER IS DISCONNECTED CAN ALLOW FRESH AIR TO START AN UNCONTROLLED FIRE, POTENTIALLY CAUSING DAMAGE TO THE USER AND EQUIPMENT. REMOVAL OF UNBURNED FUEL FROM THE FIREBOX CAN BE VERY DANGEROUS. USE EXTREME CAUTION AND PAY SPECIAL ATTENTION TO HOT COALS AND SURFACES. REMOVE FUEL ONLY WHEN ABSOLUTELY NECESSARY.

The utilization of generators and battery backup systems is permitted for integration with your system, provided that the generator is appropriately sized to accommodate the system's requirements, maintains consistent voltage and hertz (as outlined in the Electrical Connections section on page 23), and is properly grounded. The generator should be sized to operate the boiler, the circulator(s), and the indoor heating system, ensuring proper heat distribution according to your designed heating system. For sizing of backup electrical systems, please contact your dealer or a local electrical contractor specializing in backup power systems.

IMPORTANT: When electrical power is restored to the boiler, the PLC will automatically resume operation in the same state it was in prior to the power interruption. If the water temperature has dropped below the Low Set Point (Low SP), the boiler will initiate the ignition sequence automatically—no user intervention is required.

CARE AND MAINTENANCE

General Maintenance

Crown Royal Stoves are designed to be easy to operate and simple to maintain.

Safety Precautions for Maintenance

- Always disconnect and lock out power before performing any maintenance, service, or repair on the boiler.
- Allow the fuel to burn down in the firebox and ensure the boiler is in OFF mode or powered down before performing any maintenance. Wait at least 3 minutes for the boiler to complete a shutdown or purge cycle to clear remaining fuel and combustible gases. Failure to do so may result in serious injury or death.
- Exercise extreme caution, as internal components may remain hot for an extended period after shutdown. Allow sufficient cooling time before performing any maintenance or inspection.
- Make sure all covers and guards are securely in place at all times, except during maintenance.
- Always have a clear plan to handle a chimney fire (see “Runaway Chimney Fire” in the next section).

Ash Accumulation

When burning wood pellets and other biomass fuels, ash accumulation is a normal byproduct of combustion. The amount of ash that builds up inside the boiler depends on several factors. Fuel quality plays a major role, as lower-grade pellets with higher bark, dust, or moisture content will produce more ash than premium-grade, clean, dry fuels. Ash levels also increase when burning biomass materials that contain impurities, such as additives, dirt, or non-wood content, since these leave behind more residue after combustion. Cleaning and removal of ash buildup is critical to maintain airflow, allow for complete gasification and ideal combustion, allowing for the greatest heat transfer.

Section 1 : Water Levels



Always check for adequate water using the water level indicator that is supplied with your boiler. This indicator is placed in the vent tube and can be easily checked daily to ensure the proper water level. The water level will fluctuate on the gauge as the water temperature changes in the boiler. Normal water level is anywhere between ADD and FULL when the internal water temperature is up to the High Water SP temp. There is no need to add water until the water level indicator is on ADD or just entering the hashed marks. Over-filling the boiler promotes evaporation, which increases water and authorized Control Chemical inhibitor usage. In addition, this boiler is equipped with a low-water alarm that is integrated into the PLC system. If the water level drops below the required amount, the alarm will activate and automatically shut down the boiler to prevent unsafe operation and potential damage. If significant amounts of water needs to be added or replaced, ensure the proper amount of Control chemical is included.

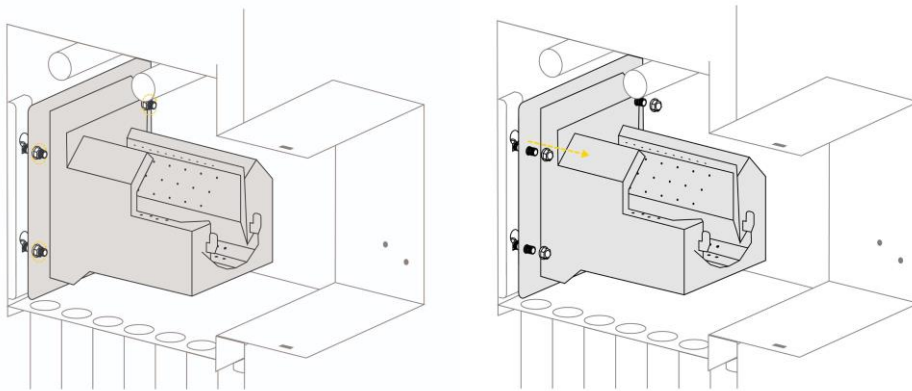
Section 2 : Firebox Area

Prior to removing any ash, ensure that it is cool and disposed of in a non-combustible container.

Ash buildup is most prominent in the firebox, as the fly ash produced during combustion is often too heavy and dense to pass through the primary heat exchangers into the ash container. The 360° directional change in combustion flow also causes gases to swirl, which results in ash particles settling in this area. The burn pot, located inside the firebox, should be included in routine firebox maintenance, as mineral deposits or fly ash can restrict airflow and reduce performance. Inspect and clean the firebox and burn pot on a weekly basis during the heating season, extending to every other week if buildup is minimal.

When cleaning, use the included ash rake/scoop (or an approved ash vacuum) to scrape and remove ash from the bottom and edges of the firebox, as well as from the burn pot where buildup collects. Scrape the inner firebox door and door frame to maintain a proper seal and extend the life of the door rope gasket. Regular attention to these areas ensures efficient combustion and reliable boiler performance.

Section 3: Burn Pot Removal, Inspection and Cleaning



During annual maintenance, and whenever deemed necessary, the burn pot should be cooled, removed, inspected, and cleaned. The burn pot is secured inside the firebox with four nuts. To remove it, simply remove the nuts and carefully pull the burn pot outward until it is free from the firebox. The burn pot is equipped with a silicone rope gasket that ensures proper sealing when the unit is reinstalled.

Once removed, clean away any buildup of mineral deposits and make sure the combustion air holes are clear. A round wire brush is recommended for cleaning, but take care not to damage, deform, or enlarge the holes, as this may reduce airflow and affect combustion efficiency. Inspect both the burn pot and the silicone rope gasket for signs of wear or damage, and replace components as needed before reinstalling.

Section 5 : Primary Heat Exchangers

To ensure proper air flow, the primary heat exchanger tubes located inside the bottom of the firebox need to be manually cleaned periodically using the tool/brush provided with the stove. Any ash build-up or accumulation can be pushed down into the ash container area where it can be removed.

Section 4 : Ash Container Area

Following the air path down through the primary heat exchangers leads into the ash container, which is easily accessed from the front of the stove through the ash door. This is the second most common area for ash accumulation, as the combustion flow changes direction again at this point. It is also the starting point of the secondary heat exchanger tubes, where ash loosened by the turbulators during operation will often collect. Special attention should be given to the area where the second-stage heat exchangers begin, as ash buildup tends to accumulate here and can restrict airflow if not removed regularly. Use the provided ash rake / scoop and an ash vacuum to properly clean this area.

During your first heating season, inspect the ash container weekly to establish how quickly buildup occurs under normal use. If little accumulation is found, the inspection interval may be safely extended to once every three to four weeks. Regular cleaning of this area, especially near the secondary heat exchanger entry, helps maintain proper airflow and supports efficient boiler performance.

Please note that a temperature probe is located in the ash container area and will require periodic cleaning. Exercise extreme caution when performing maintenance in this area to prevent damage to the probe from ash-cleaning tools.

Section 5 : Heat Exchanger/Turbulator Top Access

Ash accumulation can often be found behind the heat exchanger/turbulator top access door, particularly around the top of the heat exchanger tubes. This area should be inspected monthly, with the interval extended to every third month if buildup is consistently minimal.

Whenever the heat exchanger/turbulator top access door is open, also check and clean the fan blade of the induced draft motor and the fan guard mounted on the access door, as ash and debris can collect here and restrict airflow. This is also a good time to look upward through the chimney opening and check for buildup. If creosote has accumulated, it must be removed immediately to reduce the risk of chimney fire and maintain safe, efficient boiler operation.

Section 6 : Secondary Heat Exchanger Cleaners

The heat exchanger cleaners (turbulators), located in the secondary heat exchanger tubes, should be checked regularly to ensure they have full movement up and down via the cleaning rod at the front of the boiler. Restricted movement may indicate ash buildup, binding, or mechanical wear. During inspection, carefully examine the linkage and connections for any signs of wear, bending, or damage, and repair or replace components if necessary.

The cleaners are easily accessible from a handle at the front of the stove. Simply push and pull the Heat Exchanger Cleaner handle to remove any buildup of fly ash from the exchanger tubes. Regular use of the cleaner handle during the heating season helps keep the tubes clear and ensures consistent boiler performance. The cleaner your heat exchanger pipe are, the more efficient the boiler will operate.

Section 7 : Ash Removal & Disposal

The easiest way to remove ash from the boiler is by using a dedicated ash vacuum, as only light fly ash should typically be present. The included ash rake is specially designed to fit into the air passages and can also be used to assist with ash removal.

Ash must always be handled with care, as it may contain hot embers even after extended periods of time. All ash should be placed in a non-combustible metal container with a tight-fitting lid. This container must be set on a non-combustible surface and kept far away from combustible materials. The container should remain in this safe location until final disposal is completed.

WARNING

Never place ash in combustible containers or near flammable materials, as this creates a serious fire hazard.

Section 8 : Door Seals

Crown Royal Stoves use a large diameter high quality coated rope gasket. It is designed to perform for many seasons with proper care. When opening doors, be sure that they are fully opened. This will limit the seal exposure to unnecessary heat and flames. Loose fitting doors will not only lead to ambient air intrusion, and excessive moisture accumulation in the firebox, but the heat moving across the breach can lead to seal failure. If the outer coating becomes damaged, or the rope gasket no longer has any spring (it becomes hard), replacement is immediately necessary.

Replacing the Door Rope Gasket:

1. Remove the old gasket with a 1" putty knife.
2. Clean the channel with a wire brush.
3. Test fit the new seal, then remove.
4. Apply a bead of high-temp silicone (P/N: 50-050) approximately 1" wide and ½" thick.
5. Press the rope gasket firmly into the channel.
6. Seal corners and seams with silicone, smoothing flat with a putty knife.
7. Leave the door open for 24 hours to cure.
8. Position the seam on the vertical hinge side of the door.
9. Adjust the door as necessary to restore a proper seal.

Section 9 : Door Adjustments



Door adjustment can change based on the water temperature. Setting a door on a cold stove may need slight adjustment after it has reached a set temperature. Be sure to check and adjust doors as needed. A video showing how to properly adjust your doors can be found on our website.

Section 10: Exterior Cleaning

The exterior cladding of the boiler does not require special care. Outside components may be cleaned using a mild, non-abrasive cleaner and water suitable for painted surfaces. The black steel components are powder coated for durability. Avoid direct water contact with all electrical components and connections, as any water exposure can cause damage. Do not use high-powered pressure washers.

DANGER

BE SURE ALL ELECTRICAL POWER IS DISCONNECTED PRIOR TO CLEANING OR SERVICING ANY COMPONENTS. HOT COALS CAN LAST FOR SEVERAL DAYS OR MORE. DISPOSE OF HOT COALS IN A NON-COMBUSTIBLE CLOSED CONTAINER PLACED ON A NON-COMBUSTIBLE FLOOR AWAY FROM ANY COMBUSTIBLE MATERIALS. DISPOSING OF THEM IMPROPERLY OR TOO SOON CAN CAUSE A FIRE. BOILER COMPONENTS AND COALS MAY BE EXTREMELY HOT. USE CAUTION WHEN PERFORMING ANY MAINTENANCE.

WARNING

BURNING PELLETS WITH A MOISTURE CONTENT GREATER THAN 10% WILL LEAD TO INCREASED MAINTENANCE REQUIREMENTS, EXCESSIVE FIREBOX CONDENSATION, AND EXCESS CREOSOTE BUILDUP IN THE FIREBOX, HEAT EXCHANGERS, OR CHIMNEY. DOORS SHOULD NOT BE LEFT OPEN, EXCEPT FOR REGULAR MAINTENANCE. NEVER LEAVE THE BOILER UNATTENDED WITH DOORS ADJAR. NEVER ADD USED/WASTE OIL FOR FIRE STARTING, BURNING, OR MAINTENANCE AS A COATING. ONLY UNUSED LIGHTWEIGHT OIL CAN BE USED FOR END OF SEASON MAINTENANCE. NEVER USE A SHOP VAC FOR MAINTENANCE. ONLY A METALLIC LINED ASH VAC SHOULD BE USED. ASH VACS SHOULD BE EMPTIED AS SOON AS EACH TASK IS COMPLETED. DO NOT STORE ASH IN YOUR ASH VAC.

MAINTENANCE CHECKLIST

Before performing any maintenance, ensure that power is fully isolated and the boiler has completely cooled down. Failure to do so may result in serious injury or equipment damage.

FUELING CHECK LIST

- Check water level, add water if necessary
- Verify adequate fuel supply; add if needed
- Inspect and clean firebox and burn pot; remove ash as necessary
- Scrape inner firebox door and door frame
- Operate heat exchanger/turbulator cleaning rod (pull/push)

WEEKLY CHECK LIST

- Inspect system connections for leaks
- Operate heat exchanger/turbulator cleaning rod (pull/push)
- Inspect and clean firebox and burn pot (by-weekly depending on buildup)
- Clean ash buildup in combustion chamber (three to four weeks depending on buildup)
- Inspect door seals
- Check door alignment and adjust if needed

MONTHLY CHECK LIST

- Inspect and clean chimney
- Clean ash in heat exchanger/turbulator top access door area
 - Heat exchanger cleaners full movement up and down
 - Inspect Heat exchanger cleaner linkage
 - Clean fan guard and blade of induced draft motor
 - Verify proper fan operation
- Inspect damper assembly for correct operation
- Check air openings in burn pot for obstructions

END OF SEASON ANNUAL CHECKLIST

- Inspect system connections for leaks
- Check water level and add water if necessary
- Send water sample for testing (can be completed at start of season)
- Adjust water quality per test report recommendations
- Confirm water test report satisfactory
- Log next due date, one year later from satisfactory report
- Thoroughly clean ash and creosote from:
 - Firebox Area
 - Primary heat exchangers
 - Ash container
 - Rear heat exchanger/turbulator top access door
 - Inner firebox door and door frame
- Thoroughly clean:

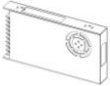
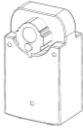
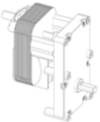
- Secondary heat exchanger tubes
- Fan wheel & guard
- Lubricate actuator assembly
- Remove burn pot, inspect, clean, and reinstall
- Cover chimney to prevent rainwater from entering the boiler when not in use
- Inspect door seals
- Unplug CH circulators

START OF SEASON ANNUAL CHECKLIST

- Read Owner's Manual
- Remove chimney cover and replace chimney cap prior to start-up
- Test all safety controls and verify proper system operations
- Inspect system connections for leaks
- Power up CH Circulators
- Check water level; add water if necessary
- Send water sample for testing (can be completed at end of season)
- Adjust water quality per test report recommendations
- Confirm water test report satisfactory
- Log next due date, one year later from satisfactory report
- Recheck and adjust door alignment after 24 hours of operation

Note: Circulators may need off season exercise. Taco recommends at least 30 seconds, once, every two weeks.

REPLACEMENT PARTS LIST

Image	Description	Part Number	Image	Description	Part Number
	Factory Programed Induced Draft Motor	50-115		RTD, Dual Wire, Temperature Probe, 6mm x 20mm, 320 mm Cable	50-124
	24VDC Power Supply	50-118		RTD, 3 Wire, Temperature Probe, 3/16" x 6", 6ft Cable	50-129
	Variable Actuator, 44 lb	50-119		Factory Programed PLC (Programmable Logic Controller)	50-125
	Ignitor Relay	50-120		Low Water Float Switch, 1/2 NPT Male	50-126
	Stoker/Metering Drive Motor	50-121		Auto Reset Snap Disk, 200 Deg F	50-107
	Igniter	50-122		Door Rope, Silicone Covered, 1" Required Lengths: Firebox Door, 5.5' Ash Container Door, 4' Rear Heat Exchanger Door, 4.5' Burn Pot Gasket 4.5'	50-053
	AC Switch	50-128		Silicone, Black, 10.2 Tube	50-050
	Brass Thermowell, 1/2"	50-038		Control Chemical Inhibitor, 1 Gallon	Control Chemical
				PH+ Builder	Control PH+

TROUBLESHOOTING

Maintain Efficient Combustion and Proper Air Flow

Poor combustion occurs when fuel, air, and ignition are not balanced, leading to reduced heat efficiency, visible (dark) smoke exhausting out of the chimney, or incomplete burning of pellets. Common symptoms include low heat output, excessive ash buildup, weak or irregular flames, ignition failures, unburned pellets, irregular fuel feed, smoke during operation, and longer heat cycles.

Why Proper Combustion Matters:

- **Efficiency:** Maximizes heat output, reduces fuel costs, and minimizes wasted energy.
- **Safety:** Prevents incomplete burning, which can produce harmful gases such as carbon monoxide and increase the risk of smoke or fire hazards.
- **Longevity:** Reduces wear on components, allowing the boiler to operate smoothly for years.
- **Lower Maintenance:** Produces less ash, requiring less frequent cleaning and easier upkeep.

Key Checks:

- Is the PLC calling for heat?
- Is the induced draft motor running?
- Are the fuel metering auger and stoker auger operating properly?
- Is the fuel hopper full?
- Is the igniter functioning correctly?
- Are the actuator and damper opening and closing as they should?
- Is there adequate airflow when the damper is open?
- Are all access doors closed and sealing properly?

Airflow Inspection and Cleaning:

Follow the boiler airflow pathways and check for blockages. Inspect and clean the following areas:

- Burn pot
- Primary heat exchangers
- Secondary heat exchangers
- Ash container area
- Rear heat exchanger/turbulator top access door area
- Chimney system

Backburn in the Boiler

A backburn occurs when fire travels backward from the burn pot into the augers and fuel hopper. This is a serious hazard that must be addressed immediately. If the boiler is operated under these conditions for extended periods, it can lead to damage of internal components and reduced performance.

Causes of a Backburn:

- Restricted airflow or poor draft (dirty burn pot, clogged system air flow, or creosote buildup).
- Improper fuel distribution rates (too much fuel).
- Failure of properly sealing access points in the system.
- Power outages that stop fans and auger motors, allowing smoke or embers to migrate backward.
- Access doors left open.

Risks of Backburn:

- Smoldering fuel in the hopper.
- Potential fire in the fuel delivery systems and/or hopper.
- Increased smoke and safety hazards.

Prevention Measures:

- Properly adjust auger and fan controls settings.
- Regularly clean the firebox, burn pot, secondary combustion chamber, primary and secondary heat exchangers, and chimney system.
- Inspect access door gaskets, burn pot gasket, and adjust doors to ensure airtight integrity.
- Confirm proper draft with correct chimney installation.
- Use only manufacturer-approved fuels.
- Avoid running the hopper completely empty.

Runaway Chimney Fire

A runaway chimney fire occurs when creosote deposits inside the chimney ignite and burn out of control, creating extreme heat and flames that can damage the stove, chimney, or even spread to the building.

- Follow all daily, weekly, monthly, and annual maintenance procedures to prevent chimney fires.
- If a chimney fire occurs:
 - Close all dampers.
 - Shut down power to the unit.
 - Ensure the firebox, ash container door, and heat exchanger doors are securely shut.
 - These steps cut off oxygen supply, extinguishing both the chamber and chimney fires.

Boiler Fails to Heat up:

- Check that the water level is adequate.
- Confirm that the temperature settings are correct.
- Ensure the boiler has power and is in an ON mode.
- Ensure there is no excessive ash build-up in the burn pot.
- Check that the fuel hopper contains an adequate supply.
- Inspect the fuel metering auger for obstructions and that it is delivering fuel to the stoker auger.
- Inspect the stoker auger for obstructions and that it is delivering fuel to the burn pot.
- Check that the burn pot has adequate fuel being delivered.
- Check that the induced draft fan motor is running without errors on controls.
- Check that the hot air igniter is functioning correctly.
- Verify that the actuator damper is open to allow sufficient air velocity.
- Inspect all airflow pathways to ensure they are clear and unobstructed.
- Check that the heat exchanger tubes aren't plugged and the heat exchanger cleaning handle is being pulled regularly.

Boiler Water Hot, No Heat in Buildings:

- Check that the circulation pumps are operating.
- Ensure all valves are open.
- Inspect the filter or Y-strainer for flow restrictions.
- Bleed the system remove trapped air.

Boiler Overheating:

- Retrieve as much heat as possible from the system by turning up the thermostats and opening windows until the boiler cools down.
- Verify that all access doors and the actuator damper are securely closed and that the door gaskets are properly sealed.
- Confirm the actuator damper plate is moving freely without sticking. It should be closed completely when the boiler temperature is over the water setpoint.
- Check that the heat exchanger cleaning rod moves freely.
- Ensure temperature settings and water levels are correct.
- Ensure that all pumps in the system are running.

Boiler Stops Running:

- Confirm that the unit has electrical power (e.g., check if the exterior light is functioning).
- Ensure that the control switches are in the on position.
- Check for power at the electrical box.
- Check the water temperature (furnace is equipped with a high-temperature cut-out at 200°F).
- If these steps do not resolve the issue, contact a qualified technician to inspect the control panel.

Boiler will not Start:

- Check if the high-limit switches have shut off due to water temperature exceeding the aquastat setting.
- Allow the water to cool down.
- Reset the snap disc before restarting.

- It is not possible to initiate the ignition sequence while the boiler is in a **Run–Idling** state and the water temperature has not dropped below the Low Set Point (Low SP).

Power Failure:

During a power outage, the boiler will shut down because the auger, fans, pumps, and PLC require electricity. Without circulation pumps running, hot water in the boiler can overheat and cause extreme safety risks.

- Allow the fire in the burn pot to die out naturally.
- Monitor water temperature.
- Do not open doors.
- When power is restored:
 - Inspect boiler for signs of overheating or damage.
 - Bleed system of trapped air from pumps and line.
- Consider installing a backup power supply to keep circulation pumps and control systems operating during outages.
- **NOTE:** When the power is restored, the boiler will resume in the operating state it was in prior to outage.

Smoke Leaking from Access Door:

- Ensure the door is properly sealed.
- Replace the door seal if it is worn or damaged.
- Adjust the door alignment as needed.

Causes of Excessive Creosote:

- Confirm that the boiler is properly sized to match the heat demand.
- Low combustion temperatures (burning on a low setting too often).
- Poor quality wood pellets.
- Restricted air flow from dirty burn pot, primary and secondary heat exchangers, or chimney.
- Induced draft motor issues.
- Air setting or damper motor issues.
- Infrequent cleaning or missed maintenance schedule.

Low Water:

Frequent water loss may indicate an underlying issue. If the boiler requires adding water more than once a week, or several gallons per week without an obvious explanation, further inspection is necessary.

- Evaporation: Verify that the temperature setpoint is not set higher than 180°F.
- Overheating: Inspect all gaskets for air leaks.
- Check for leaks around the boiler and throughout the plumbing system.

Burning Excess Fuel/ Improper Combustion:

- Could be caused from incorrect fuel feed rate.
- Poor airflow/draft issue.
- Dirty or blocked burn pot.
- Incorrect air settings.
- Poor quality fuel.
- Control, draft motor, auger motors, or ignitor problems.

Poor Water Circulation

- Could be caused from circulation pump issues.
- Air in the system.
- Closed or partially closed valves.
- Blockages in the pumping system.
- Low water level or pressure.
- Improper piping or system design.

Fuel Metering Auger / Stoker Auger not Working

- Check for power supply.
- Inspect the auger shafts for jams, buildup or foreign objects blocking rotation.
- Check that auger motors and drive assemblies are operating correctly, listen for unusual noises or grinding.
- Ensure that auger shafts are not seized
- Clean auger shafts if needed.
- Verify that the PLC and feed signals are functioning and calling for pellet delivery.
- Check connection between motor shaft and auger.

Incorrect Water or Heat Exchanger Temperature Reading

- Inspect and clean temperature probes, ensure properly installed and replace if faulty.
- Confirm that circulation pumps are running and valves are open; bleed system of air if necessary.
- Ensure all air flow pathways are clear of ash and creosote build up.
- Check for adequate fuel and ensure high quality fuel is being used.
- Use an external thermometer at the supply port to verify actual temperature and verify if the controller is in working order.

Corrosion in Boiler

Corrosion in a boiler occurs when moisture, oxygen, and acidic byproducts of combustion interact with metal surfaces inside the unit. Over time, this weakens components, reduces efficiency, and may lead to metal failure.

Common Causes:

- Operating the boiler at low temperatures for extended periods.
- Burning low-quality or high-moisture fuel.
- Low return water temperatures that allow condensation to form.
- Improperly sealed doors or failure to replace worn gaskets.
- Inadequate cleaning and poor maintenance schedules.
- Failure to annually test water and take the necessary actions.
- Insufficient or improper chemical levels.

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WATER CARE AND TREATMENT

As outlined on pages 27-29, water quality is crucial to the longevity of your boiler.

Control Treatment & Water Quality Requirements

Greentech Manufacturing, Inc. requires that only Control Treatment be used in all Crown Royal Stoves. Each stove must be shipped with the recommended initial dosage of the authorized treatment. Do not fire the boiler until it has been completely filled with water. Do not fill the boiler with water from a softener. Do not add water to the boiler unless it can be immediately treated with Control Chemical Inhibitor. Always shake the Control Chemical thoroughly before use.

To ensure proper operation and to maintain warranty coverage, water quality must be kept at satisfactory levels in accordance with the instructions provided on the official water sample reports. Water samples must be submitted for analysis to our designated testing facility at the time of installation and at least once every year thereafter, on or near the anniversary of the stove's installation.

Authorized Chemicals		
Control Chemical Inhibitor	1 Gallon	CONTROL
PH Plus Low pH Builder	1 Quart	PH+
Magic Germicide Sanitizer	1 Gallon	200020

Each gallon of Control Chemical includes two sample bottles and labels.

Mandatory Yearly Maintenance Dosage & Free Water Testing

To maintain warranty coverage, the following steps are required each year:

- Submit a water sample to our authorized testing facility.
- Follow instructions provided by authorized testing facility.

Water testing and sample kits are free of charge to all Crown Royal Stove customers for the life of the stove.

Failure to maintain treatment at the recommended levels and submit annual water samples will result in a voided warranty.

Yearly Maintenance Requirements:

Follow the provided instructions for water sample collection, and mail the sample to our authorized testing facility each year. Follow any instructions recommended by the testing facility.

Additional Dosage Requirements

- If the boiler system experiences a leak or requires water to be added, add treatment at the rate of ½ oz per gallon of water added.
- If the system is drained for any reason, follow the Initial Start-up Procedure for Water Treatment.

Purchasing Authorized Control Chemical

Control Chemical is specially formulated for Crown Royal Stoves. To uphold warranty coverage, no other chemical may be substituted. Customers are encouraged to contact their local dealership or call 866-361-7355 to purchase additional water treatment when needed.

An online form is available on our website to request free sample bottles and labels.

Important Notice

Submitting a water sample within the required timeframe that fails water quality standards will not affect your warranty coverage. However, failure to submit a sample, or failure to correct a water quality issue within 30 days of notification, will void the warranty.

Safety Warning

- Always read the full label before using any chemical.
- Safety Data Sheets (SDS) for Control Chemical are available on our website.
- Avoid contact with skin, eyes, and clothing.
- Keep all chemicals out of the reach of children.

Storage Guidelines

- Store chemicals in their original, closed containers when not in use.
- Some boiler treatments may thicken or separate during storage; this does not affect performance.
- Before use, bring the product to room temperature and shake thoroughly.
- Do not allow chemicals to freeze.



Additional Information

For more information, please visit our website to order test bottle kits, access mailing labels, sign up for annual water test reminder emails, and download SDS documents. If you need further assistance with ordering, you may contact your local dealer or call Greentech Manufacturing at **866-361-7355**.

EMERGENCY PROCEDURE FOR CHEMICAL

EMERGENCY FIRST AID PROCEDURES FOR BOILER TREATMENT

EMERGENCY PHONE NUMBER

1-800-424-9300

INHALATION:

Remove from the area to fresh air. If not breathing, clear the airway and start mouth to mouth artificial respiration. GET IMMEDIATE MEDICAL ATTENTION.

EYE CONTACT:

Immediately rinse the eyes with water. Remove any contact lens and continue flushing for at least 15 minutes. Hold the eyelids apart to ensure rinsing of the entire surface of the eyes and lids with water. GET IMMEDIATE MEDICAL ATTENTION.

SKIN CONTACT:

Wash affected areas with large amounts of soap and water for 15 minutes. Remove contaminated clothing and shoes. GET IMMEDIATE MEDICAL ATTENTION.

INGESTION:

Give 3 to 4 glasses of water, but do not induce vomiting. If vomiting occurs, give fluids again. GET IMMEDIATE MEDICAL ATTENTION. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSING PERSON.

NOTE TO PHYSICIAN:

Introduction into the body may lead to the formation of Methemoglobin which in sufficient concentration causes Cyanosis. Since reversion of the Methemoglobin to Hemoglobin occurs spontaneously after termination of exposure, moderate degrees of Cyanosis should be treated only by supportive measures such as bed rest and oxygen inhalation. Thorough cleansing of all contaminated areas of the body including scalp and nails is of utmost importance. If Cyanosis is severe, intravenous injection of Methylene blue, 1MG/KG of body weight may be of value. Cyanocobalamin (Vitamin B-12).

WARRANTY

Greentech Manufacturing, Inc. ("Crown Royal Stoves") warrants to the original owner that the water jacket, firebox, and heat exchangers are free from defects in material and workmanship for a period of twenty (20) years from the date of purchase, subject to the prorated schedule set forth below. Parts manufactured by others, and certain other items specified herein, are excluded from this coverage. To validate and maintain this warranty, registration and a water sample must be completed within thirty (30) days of purchase and the owner must strictly comply with all requirements in the Owner's Manual. Additionally, annual water samples must be submitted, and water condition must be maintained as directed in each water test report. Failure to meet these requirements will void this warranty.

Year One Warranty

- Access doors, door gaskets, and refractory moldings are covered for one (1) year from the date of purchase.
- In the event of failure of the firebox, water jacket, or heat exchangers, Crown Royal Stoves will replace the unit with a functionally equivalent model, manufactured from new or operational used parts, at no cost to the original owner. The owner is responsible for removal of the old unit and installation of the replacement unit.

Years Two Through Five Warranty

- Repairs to the firebox, water jacket, and heat exchangers are covered 100%.
- If the unit cannot be repaired and must be replaced, the customer shall pay the difference between the original purchase price and the current purchase price of the replacement unit, plus freight and installation costs.

Years Six and Beyond (Prorated Coverage)

Year 6:	70% of the total weld repair cost.
Year 7:	50% of the total weld repair cost.
Years 8–9:	30% of the total weld repair cost.
Years 10–20:	20% of the total weld repair cost.
Year 21-Beyond	10% discount on the purchase of a new Crown Royal Stove, provided you are the original owner, removing a Crown Royal Stove from service, and replacing it with a brand new Crown Royal Stove from your authorized dealer.

Limited Component Warranty

- Electrical components factory-installed but manufactured by others (including but not limited to aquastats, temperature sensors, limit switches, and fans) are warranted by the original manufacturer for one (1) year from the date of purchase.
- Fuel auger assemblies and flighting have a one (1) year warranty from manufacturer's defects, not improper use.
- Cast iron shaker grates and actuators are components factory-installed but manufactured by others are warranted by the original manufacturer for five (5) years from manufacture date.
- New or refurbished replacement parts will be provided on an exchange basis. Shipping charges and labor are not included.

Exclusions and Limitations

Greentech Manufacturing, Inc. does not warranty:

- Damages caused by: improper installation, improper maintenance, operation outside of design or specifications, acts of God, accidents, abuse, misuse, misapplication, service performed by anyone other than an authorized dealer unless authorized in writing, modifications other than those authorized in writing, or if any serial number has been removed or defaced, by freezing, overheating, pressurization, warping and/or use of unauthorized fuels, negligence, deterioration due to lack of proper or ongoing maintenance, or damage caused by power surges or brown-outs.
- The cost of plumbing, replacement of antifreeze, shipping, labor or any other cost.
- The cost of maintenance, care, or parts identified as “wear items”.
- Unless otherwise stated here, replacement items are “parts only”, and do not include shipping, service calls, mileage, diagnostic, or labor.
- Any damage or cost which may occur from or during the operation of the stove, or damage incurred due to any heating system failure. Crown Royal Stoves cannot be used as the only source of heat; therefore, it is recommended that a back-up system is in place to prevent damages caused by mechanical failures.
- Exterior paint or finish.
- Corrosion failure caused by neglect or unauthorized fuel use.
- Ash corrosion on the inside fire drum and/or heat exchanger chambers.
- Omni-O firebed and upper air distributor components.
- The chimney must be covered when the unit is not in use. It is mandatory to install a chimney cap before operating the unit.
- When plumbing the back of the Crown Royal Stove, the first fitting connection must be stainless steel or brass. The use of any other materials will invalidate this warranty.

Replacement items (parts, components, or boilers) assume the remaining warranty of the original item, or ninety (90) days from the date of receipt of the part, whichever coverage is longer. Replacement items may be required to be returned to Greentech Manufacturing, Inc. or to your dealer, at Greentech's sole discretion, for testing, inspection, recycling, returning to the original manufacturer, or disposal. Equipment registration and required water sample testing must be on file prior to approval of any warranty claim. If an on-site repair is made, the customer is responsible for the transportation costs and labor. If the furnace needs to be repaired at the factory, it is the consumer's responsibility to pay all shipping charges to and from the factory. Greentech Manufacturing, Inc. specifically disavows any other representation, warranty, or liability related to the condition or use of this product, whether oral or written, expressed or implied. The purchaser assumes all responsibility and cost for the care, maintenance, and safe operation of the furnace, including the monitoring and adding of Control Chemical. Greentech Manufacturing, Inc. always has the right to decide if the stove will be repaired or replaced.

Important: Failure to use Crown Royal Stoves approved Control Chemical and submit annual water samples will void this warranty. Control Chemical can be purchased either from your authorized dealer or directly from Crown Royal Stoves.

This warranty is subject to change. For the most current information, please consult our website or your local authorized dealer

Obtaining Warranty Service

For assistance with warranty paperwork or claims, please contact your authorized Crown Royal Stoves dealer.



Warranty Claim Forms are available online at: <https://www.crownroyalstoves.com/parts-warranty-and-return/>

If you suspect a leak, please note that a warranty claim cannot be filed until the leak has been identified and supporting photos and videos have been provided.

If additional support is needed, you may contact the Service Department at Greentech Manufacturing, Inc.:

- **Phone:** 866-361-7355
- **Mail:** Greentech Manufacturing, Inc.
PO Box 1237
International Falls, MN 56649

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