OWNER'S MANUAL

Model: RS7500

Crown Royal Stoves™
STAINLESS STEEL

Crown Royal Stoves
20 YEAR LIMITED WARRANTY

made in the USA

Installation, Operation & Maintenance Manual

RETAIN THIS MANUAL
CONSERVEZ CE MANUEL
UL 391, UL 726 & CSA B366.1

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(ENCLOSED WARRANTY REGISTRATION AND DELIVERY FORM)

INTRODUCTION

Greentech Manufacturing would like to thank you for your recent purchase of a Crown Royal Stove. We sincerely appreciate the trust you have placed in us and we look forward to continuing to serve you. We know that you will be pleased with our continued commitment to your satisfaction while you enjoy the benefits of heating with a Crown Royal Stove. Crown Royal Stoves are manufactured with quality workmanship and designed to offer you value now and years to come. We are so confident in the quality of our stoves that each Crown Royal Stove comes with a 20 year limited warranty.
To ensure maximum benefits from your furnace, read complete manual prior to using or installing your furnace.

Always keep this manual for future references.

Crown Royal Stoves - Outdoor Coal Series

The outdoor series furnaces are designed to be located next to your fuel storage for convenience and are normally filled once or twice a day, depending on the temperature outside. Our outdoor series furnaces are often used to heat homes, garages, shops, barns, businesses, greenhouses, swimming pools, spas, domestic hot water, radiant in-floor heat and snow melt applications.

Specifications

	RS7200	RS7300	RS7400	RS7500
Estimated Btu's*	165,000	240,000	365,000	500,000
Heating Capacity	2,000-3,000	4,000-5,000	8,000-10,000	18,000-20,000
Dimensions	53" x 55" x 80"	53" x 68" x 80"	65" x 83" x 86"	83" x 85" x 101"
Weight	1250 lbs	1500 lbs	2140 lbs	3230 lbs
Chimney Size	6"	6"	8"	10"
Firebox Door Size	20" x 20"	20" x 20"	24" x 24"	32" x 42"
Supply/Return Size	(2) 1-1/4	(2) 1-1/4	(2) 1-1/4	(4) 1-1/4
Water Capacity	150 Gallons	200 Gallons	380 Gallons	620 Gallons

*Btu's are estimated and will vary with the type of fuel burned. Check and comply with local and state codes on approved fuels. Always comply with regulations associated with your area.

BEST BURN PRACTICES

Learn how to get the best burn possible from your Crown Royal Stoves.

1. **Instructions -** Read and follow all operating instructions supplied by Greentech Manufacturing Inc.

2. **Fuels -** Only burn coal which is the only approved fuel for your Crown Royal Stove. Burning materials not recommended play a major role in visible emissions. Never burn trash, plastics, gasoline, rubber, naphtha, household garbage, materials treated with petroleum products particle board, railroad ties and pressure treated wood, leaves, paper products or cardboard.

3. **Loading -** Burning coal creates visible emissions. In order to complete the combustion process, there is a minimum amount of space needed. For instance, if a person were to load a relatively small firebox completely and load a larger firebox with the same amount of fuel, with all of the other factors being the same, the larger firebox would burn cleaner. In the smaller firebox, the combustion process does not have enough room to expand, heat up and mix before exiting the firebox (insufficient time, temperature and turbulence). Just because a firebox is large does not mean that it should be filled completely. This large volume is used in part for what happens after it is loaded. Fireboxes should be loaded based on outdoor temperatures, and anticipated heat load required maintaining sufficient levels to ensure the fire doesn't go out before next fill.

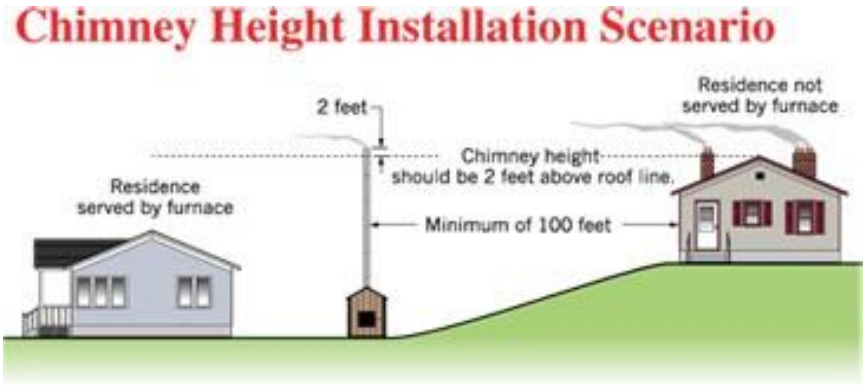
4. **Starting -** Never use gasoline, lighter fluids, chemicals, or oils.

5. **Furnace Sizing** - The size of a furnace should be large enough to provide sufficient heat without constant reloading. Targeted burn times are around 12 hours; an adequately sized furnace will provide enough heat for 90% of all heating days. Inadequate size of furnace will lead to unattended fires that leave colder fireboxes and relighting will be dirtier because the flame quenching on the cool firebox walls. A good rule to follow is that if the furnace cannot stay within 20% of its set temperature under regular reloading, then the unit is undersized and a larger furnace is needed.

6. **Operation -** Improper combustion air can be associated with several factors. Air inlet and chimney may be restricted by debris (creosote, ash, etc). A blower starts and stops properly and runs at proper speed. Door seal is in satisfactory condition.

7. **Maintenance -** Excessive ash buildup in grates and frames can cause combustion fan blockage resulting in restricting air flow. Excessive creosote buildup can be a result of restriction air flow from combustion fan, flame baffle or chimney blockage.

8. **Local and State Regulations - Always remember to comply with all applicable state and local codes.**



DANGER!!! Do not start fire with chemicals, volatile fluids, rubber, plastics or garbage. Only competent persons with a sound understanding of this heating method should operate this furnace. Improper firing could result in personal injury and/or damage to unit, and void warranty. **Do not burn garbage, gasoline, drain oil, naphtha, engine oil, railroad ties, particle board, leaves, cardboard, or any other flammable liquids.**

SAFETY INSTRUCTIONS & PRECAUTIONS

- All installation and operations must follow federal, provincial, state, and local codes for wire plumbing, and installing chimney.
- All work must be performed by qualified personnel only.
- Read and understand all precautions before operating the furnace.
- Furnace not to be used as a standalone unit. It is recommended that a backup system be in place.
- Retain this manual as long as you own your Crown Royal Stove. Carefully read and follow these directions. Regularly read over this manual to keep you informed.

DANGER!!! Do not start fire with chemicals, volatile fluids, rubber, plastics or garbage. Only competent persons with a sound understanding of this heating method should operate this furnace. Improper firing could result in personal injury and/or damage to unit, and void warranty. **Do not burn garbage, gasoline, drain oil, naphtha, engine oil, railroad ties, particle board, leaves, cardboard, or any other flammable liquids.**

WARNINGS!!

- All installations and operations of your furnace must follow STATE, PROVINCIAL and LOCAL LAWS pertaining to operations, wiring, plumbing, and building codes. The installation must be performed by a qualified installer.
- Only burn coal in this unit. (Check with provincial, state, and local regulations that obtain to banned fuels in designated locations)
- Do not install this unit on a combustible surface.
- All models operate at atmospheric pressure. DO NOT obstruct, block or plug the overflow vent tube in any way, which is located on top of the furnace.
- You must open the chimney flue before opening the furnace door.
- This unit cannot be hooked to a chimney already serving another appliance. When installing a chimney that is higher than twelve feet, guide lines must be used.
- This unit must never be pressurized.
- Do not use an automatic stoker with this unit.
- Risk of Fire: Do not operate with fuel loading and/or ash removal doors open. Do not store fuel or other combustible materials within marked installation clearances. Inspect and clean flues and chimney regularly.

CAUTIONS!!!

- Hot Surfaces: Keep children away. Do not touch during operation.
- Do not start or operate furnace without checking heating fluid.
- Check for buried cables and utility lines before digging trench.
- For safety and proper temperature control, keep fuel door closed tightly during operation.
- Do not fire up boiler until filled with water.
- Do not to start the unit during a prolonged power failure.
- Load fuel carefully to avoid injury to hands, fingers and other body parts that may come in contact with the unit's loading door opening.
- Cleaning of the heat exchanger, flue pipe, chimney and draft inducer if used, is especially important at the end of the heating season to minimize corrosion during the summer months caused by accumulated ash.
- When installing the heat exchanger, be sure none of the existing system safety controls are disabled.
- When installing heat exchangers do not tamper with existing controls. Wiring to existing blower can be done with a line voltage or low voltage thermostat.

PRE - INSTALLATION

All installation and operations must follow federal, provincial, state, and local codes for wire plumbing, and installing chimney. All work must be performed by qualified personnel only.

Location

When choosing the location of your furnace you should consider prevailing wind direction, distance from home for refueling and storage, and give consideration for any effect of your neighbors. Check with your homeowner's insurance company to ensure they will approve the location relative to the distance from building and combustibles. We recommend a minimum of 20 feet from any building being heated with this unit.

Minimum Clearances to Combustibles

Sides	Front	Back	Top	Chimney Connection
36 Inches	60 Inches	36 Inches	12 Inches	60 Inches

- Adhere to minimal clearances to combustibles stated in manual and accordance with local, state, provincial and federal building and fire codes.
- Prior to installation, contact you insurance provider to ensure that installation is in compliance to regulations and all terms have been met.

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

Blocks or Concrete Pad

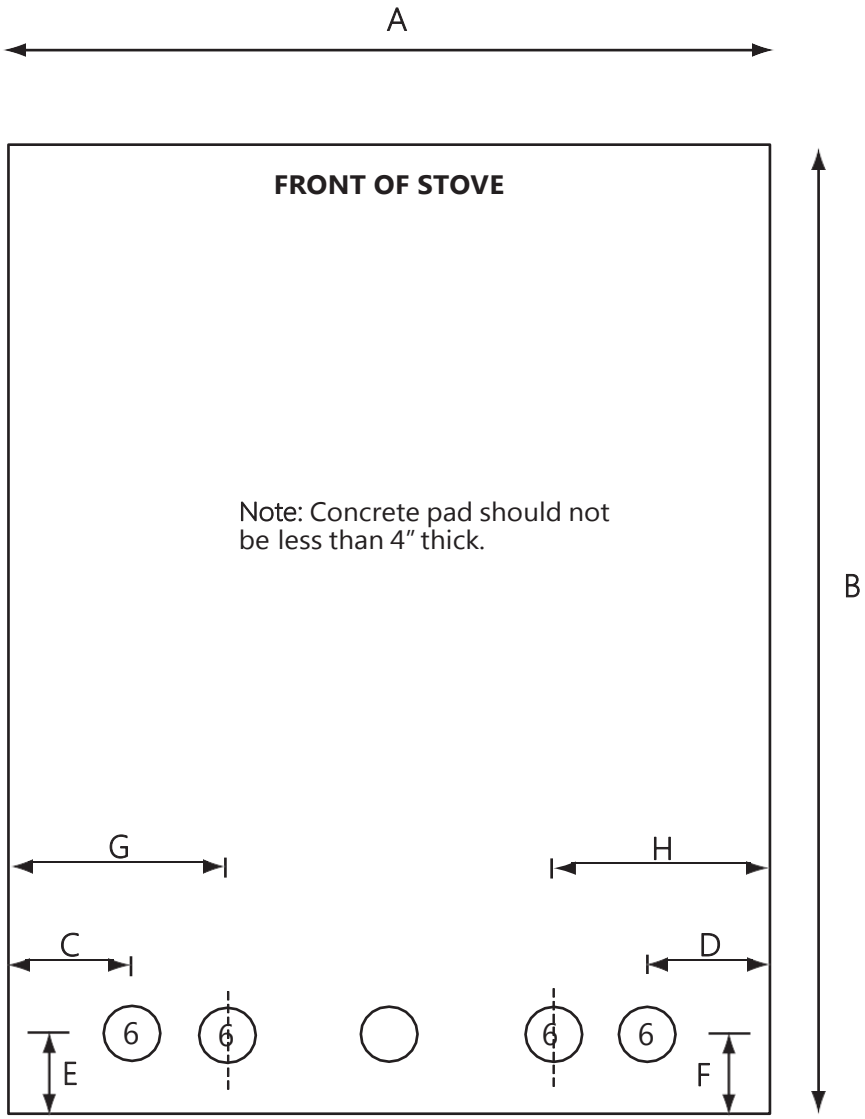
Inspect the ground conditions that you intend to install your furnace on. If the area is unstable or has a history of staying wet, you may have to improve the soil with gravel as well as raising the elevation. A cement pad of 4" - 6" inches should then be used. The furnace in most cases can be placed on four cement blocks and they should not be less than 24 inches wide, 24 inches long, 3 inches thick. Obtain the footprint of the model of furnace you have purchased. Place your blocks so that the legs will be in the center of them.

For a pad, the width need not be greater than the outside width of furnace. The length of pad should be as long as the outside length dimension and an added length is desirable as a work area at the loading door. A four-foot extension is most commonly used.

Refer to the next page for concrete pad dimensions.

WARNING!!! Do not install this unit on a combustible surface.

CONCRETE PAD DIMENSIONS



BACK OF STOVE

	RS7200	RS7300	RS7400	RS7500
A	53"	53"	65"	82"
B	56"	67"	83"	92"
C	18"	18"	18"	14"
D	18"	18"	18"	14"
E	9"	9"	12"	14"
F	9"	9"	12"	14"
G	-	-	-	28.75"
H	-	-	-	28.75"

Crown Royal Stoves
STAINLESS STEEL

CHIMNEY - REQUIREMENTS

Chimneys
The size and height all depends on the unit you have purchased and where the unit will be located. If the furnace is located within 300 feet of any residence, than the chimney stack must be at least two (2) feet higher than the peak of the tallest roof. It is recommended that only a double insulated, stainless steel, Class A chimney pipe to be used. The RS7200 & RS7300 use a six (6) inch diameter pipe, RS7400 uses an eight (8) inch diameter pipe; RS7500 uses a ten (10) inch diameter pipe. Contact your local dealer or Greentech Manufacturing, Inc for chimney purchase information.

- Installation of complete chimney flue is required.
- Adhere by local building codes and the National Fire Protection Association Rules Nos 31, 54 and 211.
- It is required to use Selkirk Chimney Systems; brand type is UT (Ultra Temp or Galva Temp).
- Selkirk Chimney Systems is a double insulated, stainless steel, Class A Chimney Systems that meets the requirements of UL103 and ULC-S629 and complies with the Chapter 11 of NFPA 211, Standard for chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
- Chimney termination caps are required; installation of spark arresters may be needed in high fire risk areas.
- Selkirk chimney comes in carious lengths, spanning from eighteen (18) inches to forty eight (48) inches. Install each section of piping by placing male and female sections together then twisting them to lock sections together. When installing your chimney piping, it is recommenced by many chimney suppliers to brace every eight feet. The chimney manufacture also recommends that the height of the piping does not exceed a total of forty 40 ft.

WARNING!!! This unit cannot be hooked to a chimney already serving another appliance.

- When installing chimney please refer to manufactures recommendations and requirements for adequate clearances.
- Furnaces come standard with the Selkirk brand, 6”, 8”, or 10” Anchor plate as well as an 18” chimney length.
- Additional chimney components and lengths are available from your local dealer or can be purchased direct from Greentech Manufacturing Inc. (Toll Free 866-361-7355)
- Do not attempt to fabricate your own adapters.
- Do not mix Selkirk Chimney with other manufactured brands.
- Do not use existing chimney that already connects to other appliances.
- A major cause of chimney-related fires is failure to maintain required clearances (air spaces) to combustible material. It is of the utmost importance that the chimney be installed only in accordance with the manufactures stated instructions. These instructions must be reviewed prior to installation of venting components.
- Inspections of chimney need to be performed at least annual to ensure of any obstructions due to creosote buildup. When necessary perform cleaning of chimney to prevent chimney fires.

CAUTION!!! Hot Surfaces: Keep children away. Do not touch during operation.

WARNING!!! Risk of Fire: Do not operate with fuel loading and / or ash removal doors open. Do not store fuel or other combustible materials within marked installation clearances. Inspect and clean flues and chimney regularly.

TRANSFER LINE - INSTALLATION

Underground insulated pipe is a crucial part of your installation. It is designed to transfer hot water from your furnace to your home, garage or shop. Selecting the correct underground pipe depends on several factors such as climate and distance. Choosing a pipe with the least possible heat loss is the most effective way to ensure your furnaces efficiency.

- Ridged Insulated Underground Tubing – Ridged insulated pipe manufactured with the highest possible R value ratings.
- Foam Filled Insulated Underground Tubing – Designed to respond to intensive environments and climates. Insulated with high quality closed cell polyolefin or polyethylene foam and shelled in a virgin plastic corrugated tile.
- Foil Wrapped Insulated Underground Tubing - Competitively priced closed cell polypropylene foil wrapped Insulation and sleeved in Heavy Duty UV protected drain tile.

Make sure your insulated underground tubing is equipped with at least one supply and one return pipe. This pipe should be at least one inch inside dimension; which is rated at 180 degrees F and 100 PSI continuous flow. Pipe should have a construction of polyethylene and an oxygen barrier.

Insulated underground tubing must be without any splices, couplings and joints. Both tubing and piping inside should be one continuous run. Underground insulated tubing needs to be free of damages or punctures that which would allow ground water or soil to come in contact inside insulation and piping. Allowing such contact will cause moisture to seep through the insulated pipe and result in extreme heat loss. Insulated underground tubing must remain water tight or will be required to be replaced.

Installation Requirements:

- The trench must be 24” deep and 8” - 12” wide. If possible have a gradual slope in your trench to allow drainage away from lines and out of the trench bottom. Place electrical supply in bottom of trench and cover with 6” of gravel or dirt. At this point a water barrier is required. Several methods are possible, but the most important factor is; if ground water comes in contact with your heating lines, it will be the greatest heat loss to your system. A minimum of R10 insulation value is recommended, and a water-tight vapor barrier such as a continuous poly tube of plastic PVC pipe to encase your insulation is a must. NOTE: If you need to bury lines under an area where vehicles will cross, you should increase the depth of trench to three feet or place planks over the trench in that area to spread the load and reduce the pressure generated on the lines.

- All wiring must conform to local codes. Use an electrical wire rated and approved for underground installations. This wiring can be placed in the same trench below the water lines. Use 12-2 UF wire with ground to provide power to the draft inducer blower, aqua stat, night light, etc. at the stove. This is satisfactory for most applications but a state certified electrician must be consulted.

- The supply and return tubing and the power wire can be lowered in the trench, brought through the buildings being heated, and extended a minimum of 36” out of the soil where the stove is to be placed. Seal the openings around the tubing where it enters the building and seal the tubing where it extends out of the ground at the location where the stove is to be placed.

- Connections to the furnace are clearly marked. The installation of isolation valves at both ends of the pump is recommended as well as a valve at the return line. This will allow you to shut off water supply for repair or if additional heating components are added to the system. It is recommended that piping used is able to withstand 100 PSI at 180 F, and is at least 1” (inch) in diameter. 1 1/4 ”(Inch) piping is recommended for larger systems. A single junction box at the rear of the furnace is included for your power supply, and should be connected by a qualified person.

- A hole large enough to accommodate two lines and insulation is required and attention to sealing this point of entry is very important. Be sure to bring pipes, insulation and vapor barrier completely through wall and seal from both sides.

INSTALLATION

Making Water and Electrical Connections at the Stove

- After the stove has been placed on the concrete or pads, remove the panel at the back of the stove.
- The return (cold water) pipe must be connected to the fitting at the upper position and the supply (hot water) at the fitting toward the bottom of the stove. If multi-pole locations are to be heated, tees must be added on both the supply (hot) and return (cold). It is necessary to use brass fittings between the stainless and other metals.
- The stove has been pre-wired at the factory; therefore it is only necessary to connect the common from the wire from the trench to the common from the stove, neutral to neutral, ground to ground. Ensure that the connections are water tight.
- Return the panel to the back of the stove.

Piping Inside the Building

It is recommended that piping used is able to withstand 100 PSI at 180 F, and is at least 1" (inch) in diameter. 1 1/4 "(Inch) piping is recommended for larger systems.

- For each building, a circulation pump is needed. The pump can be located on the supply side (hot water).
- Before each pump, a filtering device must be installed. This filter will minimize the contaminants in the water and maximize the life of the circulation pump.
- If the central heating system in the building is a forced air furnace, it is important to select the appropriate water to air exchanger. Contact your heating contractor for proper size. The coil is to be installed in the furnace plenum. If there is an air conditioning evaporator coil in the plenum, install the water to air coil after the a/c coil.
- If the central heating system is a hot water boiler system, a water to water heat exchanger is needed. The water from an open system will contaminate the closed system if the waters are mixed together.
- It is advisable to install ball valves, isolation flanges, etc. to make the removal and the replacement components easier.

Wiring Inside the Building

- The electrical wiring must be done by an experienced HVAC technician to ensure the system will operate as desired and is safe.
- It is recommended that the circulation pump or pumps run continuously.
- The existing forced air circulation blower needs to be wired through the circuit board to a 24 volt wall thermostat which is dedicated for this purpose. The other wall thermostat which is for the forced air (Oil, LP, NG or Electric) is left intact. The new 24 volt wall thermostat will cause the circulation blower to run without the burners coming on. An experienced HVAC technician needs to perform the wiring.
- The electrical for a boiler system is more complicated because the existing boiler wall thermostat is used but the burners on the (Oil, LP, NG or Electric) boiler are not to operate when the water from the water stove is to provide heat. It is necessary to have an experienced HVAC technician wire this configuration.
- If air conditioning is used you must add a relay DPDT to prevent the condenser from turning on when the fan is energized.

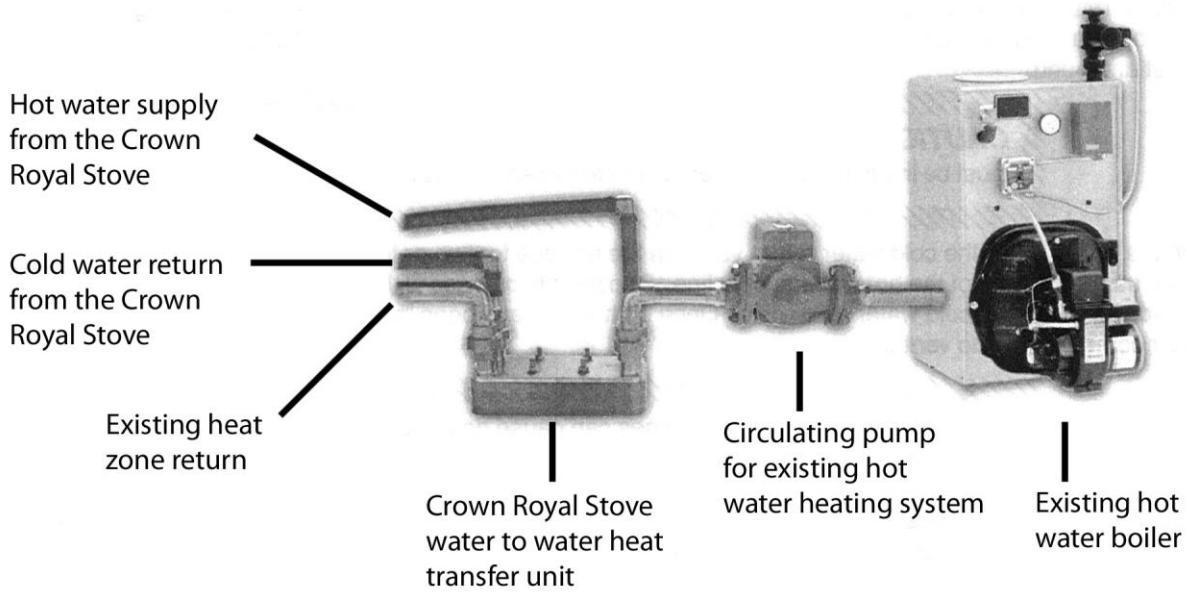
Electrical Requirements

- Electrical Rating: 120 AV Volts, 6 AMPS, 60 Hz. Wire must be rated and approved for direct burial if it is to be buried in the same trench as the water lines. Boiler power connection box is located at rear of boiler inside back cover. Minimum supply 15 AMPS. Maximum device 15 AMPS. **USE COPPER CONDUCTORS ONLY.**

EXISTING HOT WATER HEAT - INSTALLATION

ALL INSTALLATIONS AND OPERATIONS MUST FOLLOW FEDERAL, PROVINCIAL, STATE, AND LOCAL CODES FOR WIRING, PLUMBING AND INSTALLING CHIMNEY. ALL WORK MUST BE PERFORMED BY QUALIFIED PERSONAL ONLY.

It is recommended that piping used is able to withstand 100 PSI at 180 F, and is at least 1" (inch) in diameter. 1 1/4 "(Inch) piping is recommended for larger systems.



The Crown Royal Stove shall be installed without interfering with the normal delivery of heated water from the original boiler.

The Crown Royal Stove shall be installed without affecting the operation of the electrical and mechanical safety controls of the original boiler.

The Crown Royal Stove shall have provisions for preventing, or adequate water capacity within the boiler to prevent damage from loss of circulation due to electrical power failure.

The Crown Royal Stove shall be installed without changing the function of the controls or rewiring the original boiler. A wiring interconnection is permitted. The electrical system of both boilers shall be powered from a single branch circuit without exception.

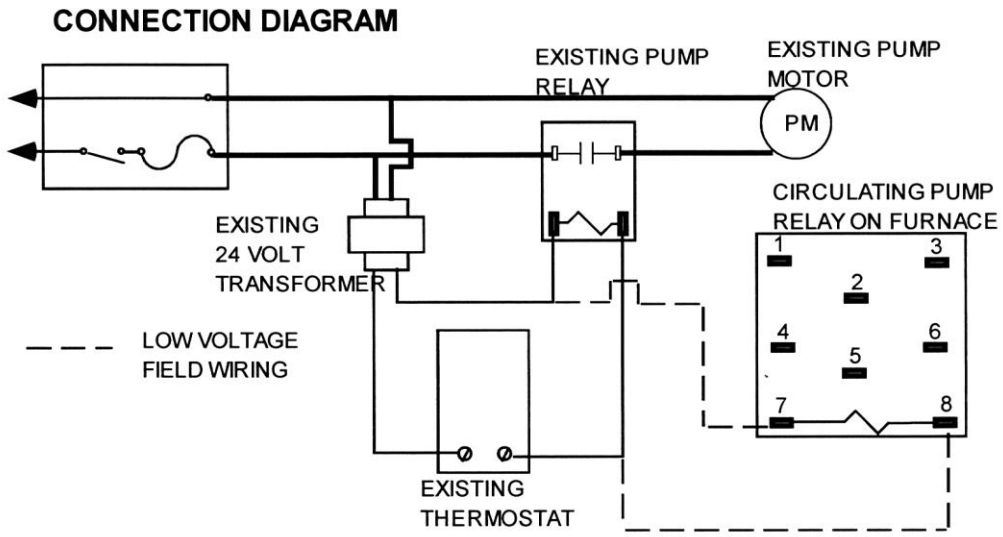
FOR UNITS USED IN CANADA THE FOLLOWING IS RECOMMENDED:

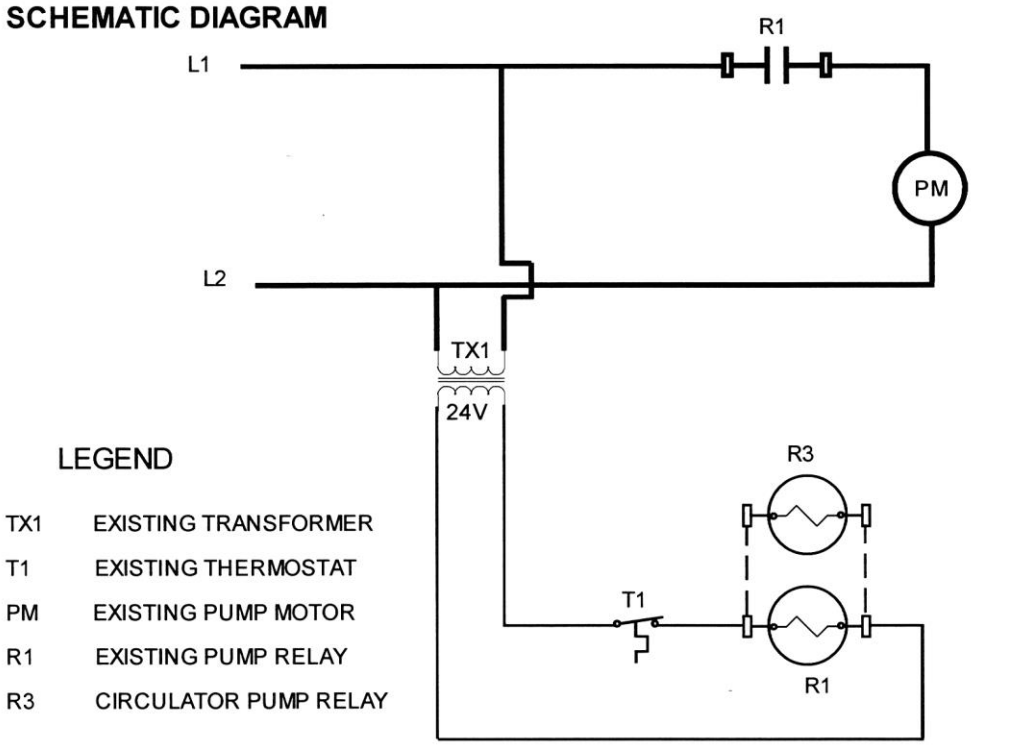
- Operate the existing boiler periodically to ensure that it will operate satisfactorily when needed.
- Do not relocate or bypass and of the safety controls in the existing boiler installation.
- The operation of the existing gas boiler must be verified for acceptable operation before and after installation of the Crown Royal Stove by a gas fitter who is recognized by the regulatory authority.
- Do not connect to any chimney or vent serving a gas appliance.
- Ensure the installation complies with the requirements of CAN/CSA-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).

WIRING DIAGRAM FOR GAS BOILER - INSTALLATION

Put 'strap on Aqua stat on the supply side of the water-line from outdoor furnace. Run thermostat wire from the 'strap on Aqua stat to R and G of fan control center. Run 115V power to white and black wire of fan center coil. Break one wire of gas boiler Aqua stat. Hook one side of wire to brown wire of fan control center contact. Hook other side of gas boiler Aqua stat wire to black on fan control center contact. Set 'strap on Aqua stat to close at 100-120 degree.

Connection to Hydronic System with exisiting 24 Volt Transformer



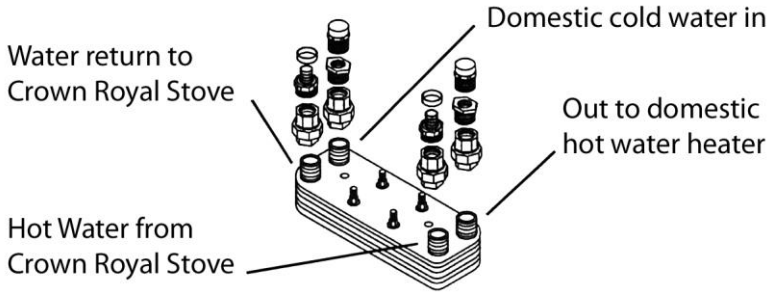


DOMESTIC HOT WATER & FORCED AIR - INSTALLATION

ALL INSTALLATIONS AND OPERATIONS MUST FOLLOW FEDERAL, PROVINCIAL, STATE, AND LOCAL CODES FOR WIRING, PLUMBING AND INSTALLING CHIMNEY. ALL WORK MUST BE PERFORMED BY QUALIFIED PERSONAL ONLY.

DOMESTIC HOT WATER

The Domestic Hot Water Flat plate Kit consists of a Water to Water Heat Transfer unit and the fittings needed to hook it up. The unit goes on top of the domestic hot water heater and is connected as shown below.

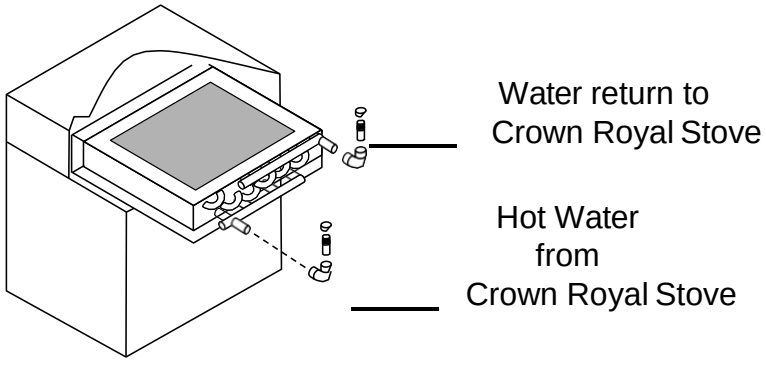


EXISTING FORCED AIR

A water to air heat exchanger is inserted in the existing plenum. In most cases the heat exchanger is placed in a horizontal position, keeping all four sides level. The air must be forced through the finned area of the heat exchanger evenly. The hot water line coming from the hot - water tube enters the bottom fitting of the heat exchanger and exits the top fitting, which returns to the furnace. If the plenum is too large or too small, it must be altered to fit the heat exchanger properly.

After installation of the add-on water to air exchanger, the air flow must be increased to fuel the furnaces, electric furnaces, and electric/gas furnaces. Methods of doing this are:

BELT DRIVE SYSTEM: Blower pulleys and motor pulleys may be changed but the electric current flowing through the motor shall not exceed the nameplate rating. (A blower motor or larger power may be used.)
DIRECT DRIVE SYSTEM: The motor shall not be changed, however the speed of the motor may be increased.



THE HEAT EXCHANGER: Air blows through the heat exchangers grill taking the heat from the water heated grill and blowing it into your existing ductwork.

CAUTION!!! When installing heat exchangers do not tamper with existing controls. Wiring to existing blower can be done with a line voltage or low voltage thermostat.

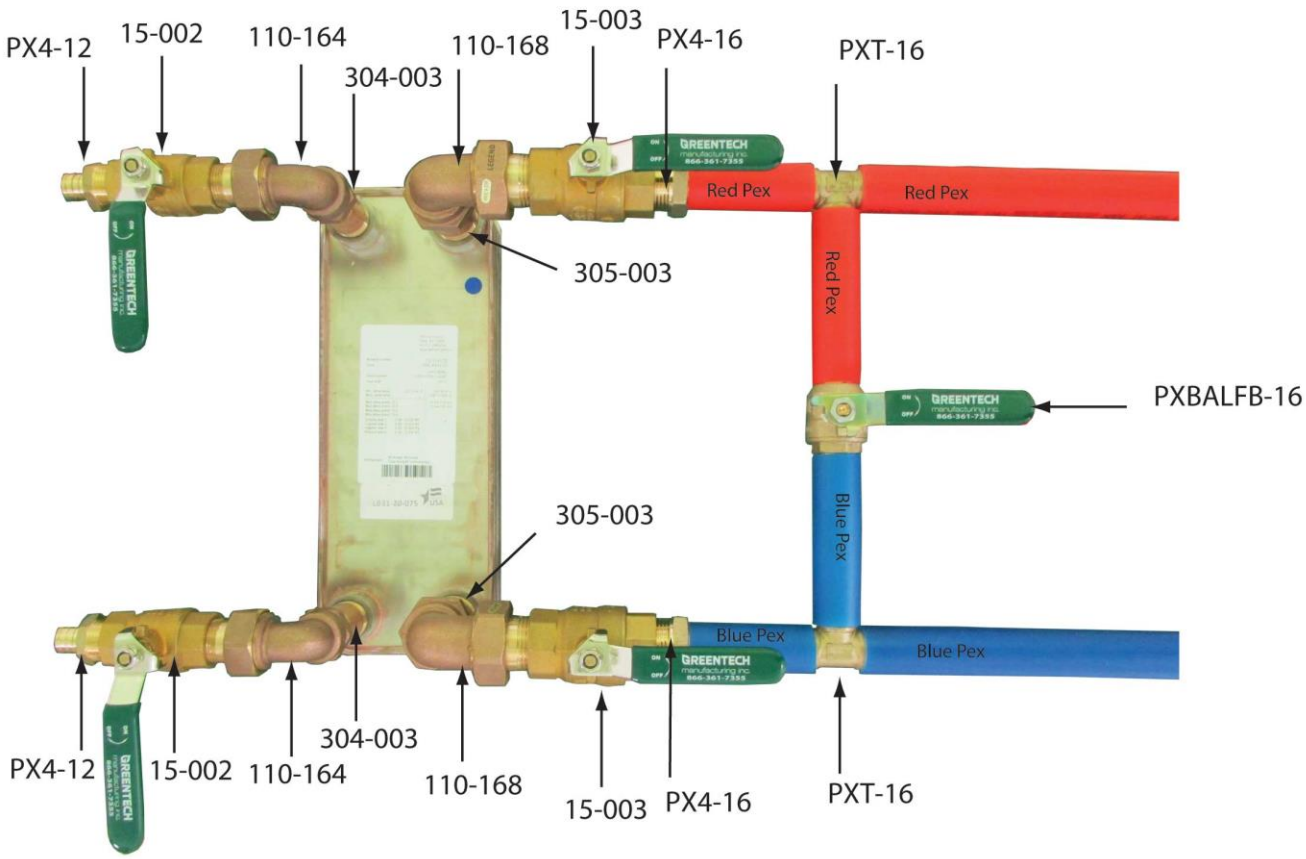
NOTE: Wire thermostats according to directions provided by the manufacturer.

BRAZED PLATE - INSTALLATION

Brazed Plate Water to Water Exchanger

The Brazed Plate water to water exchanger can be installed on either the cold side or the hot side of the hot water heater. If installed on the cold side, the hot water heater needs to be left on to maintain the temperature in the hot water heater. If installed on the hot side, the hot water heater needs to be turned off and the hot water heater is now a reservoir.

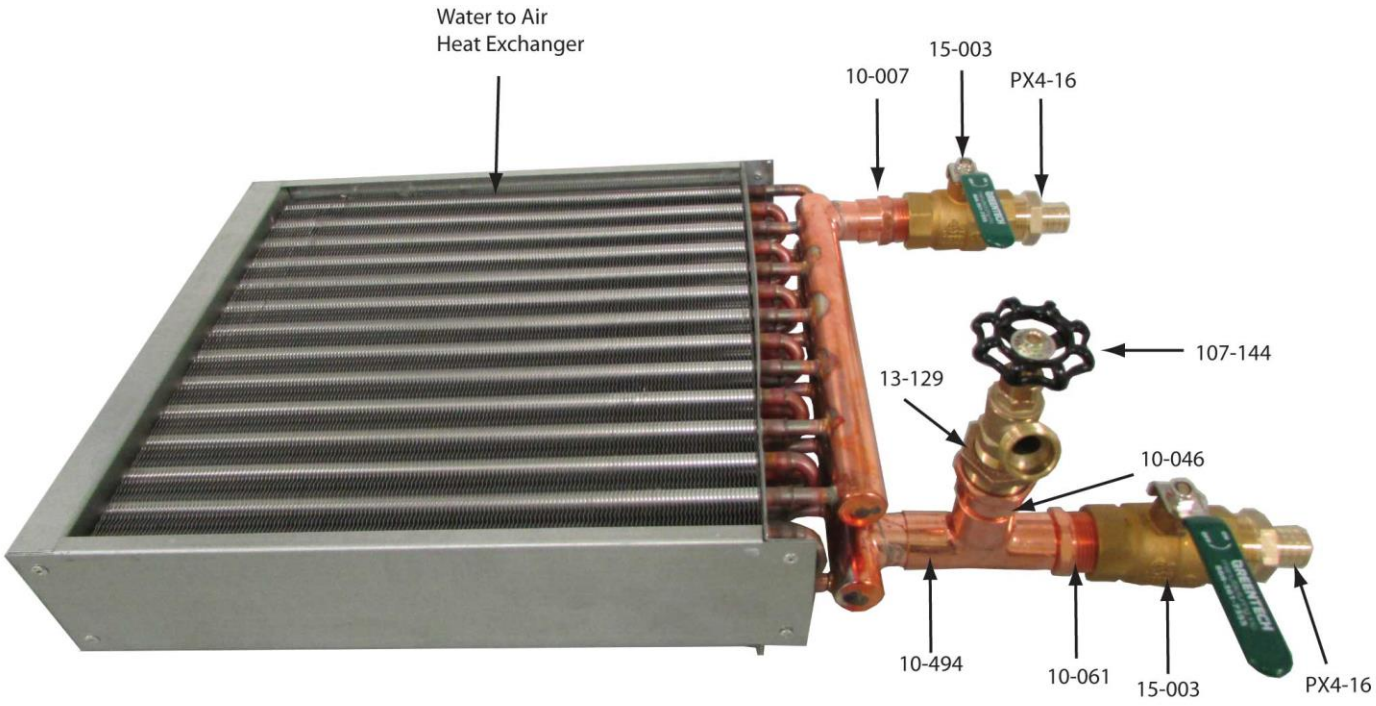
DOMESTIC SIDE **BOILER SIDE WITH BYBASS**



PART NUMBER	DESCRIPTION
PX4-12NL	¾” PEX X MALE ADAPTER (NO LEAD)
15-002	¾” BALL VALVE (NO LEAD) FIP X FIP
110-164	¾” UNION ELBOW IPS
304-003	¾” X 2-1/2” RED BRASS NIPPLE
110-168	1” UNION ELBOW IPS
305-003	1” X 2-1/2” RED BRASS NIPPLE
15-003	1” BALL VALVE (NO LEAD) FIP X FIP
PX4-16 NL	1” PEX X MALE ADAPTER (NO LEAD)
PXT-16 NL	1” PEX X 1” PEX X 1” PEX TEE (NO LEAD)
PXBAL-16 NL	1” PEX X 1” PEX BALL VALVE (NO LEAD)

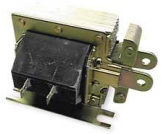
WATER TO AIR SETUP - INSTALLATION

Water to Air Heat Exchangers are for use in your hot air plenum of your existing forced air furnace, to transfer heat into your existing forced air system.



PART NUMBER	DESCRIPTION
10-007	1-1/4” COPPER ADAPTER C X FEMALE
15-003	1” BALL VALVE FIP X FIP
PX4-16	1” PEX X MALE ADAPTER
107-144	¾” MALE BOILER DRAIN MNPT
13-129	1” X ¾” BRASS HEX BUSHING
10-046	1” COPPER FITTING ADAPTER FTG X FEMALE
10-494	1” X 1” X 1” COPPER TEE
10-061	1” COPPER ADAPTER FTG X MALE
15-003	1” BALL VALVE FIP X FIP

Stove Components

	Electronic Temperature Control System		Limit Switch		Thermowell
	Upper Blower		Lower Blower		Solenoid Damper Motor
	Fan Speed Control		Silicone Covered Door Rope		High Temperature Silicone
	3 Way Toggle Switch		Crown Royal Grate Crown Royal Frame		Sight Tube 6”
		Ash Pans 490088 – RS7200 490055 - RS7300 490049 – RS7400 490084 – RS7500		490043 Upper Blower Damper Plate – 3.75” 490043 Lower Blower Damper Plate – 4.5”	
	Control Chemical & Water Test Bottles – Free Annual Water Testing				

CONTROL PANEL

The control panel door is to be shut when fueling the firebox and at all other times except when using the controls.

The aqua stat powers the inducer draft blower to maintain the desired water temperature. The aqua stat is set at 160°F at the factory, which means the inducer will run until the water in the jacket reaches 160°F. As the outside air temperature drops as the season progresses into the winter the settings can be raised to a high of 180°F. The reason the aqua stat is set lower is that it is not necessary to have a high temperature in the fall and spring. Therefore, the stand by heat loss is reduced. Only qualifed personal should be adjusting the temperature controls.

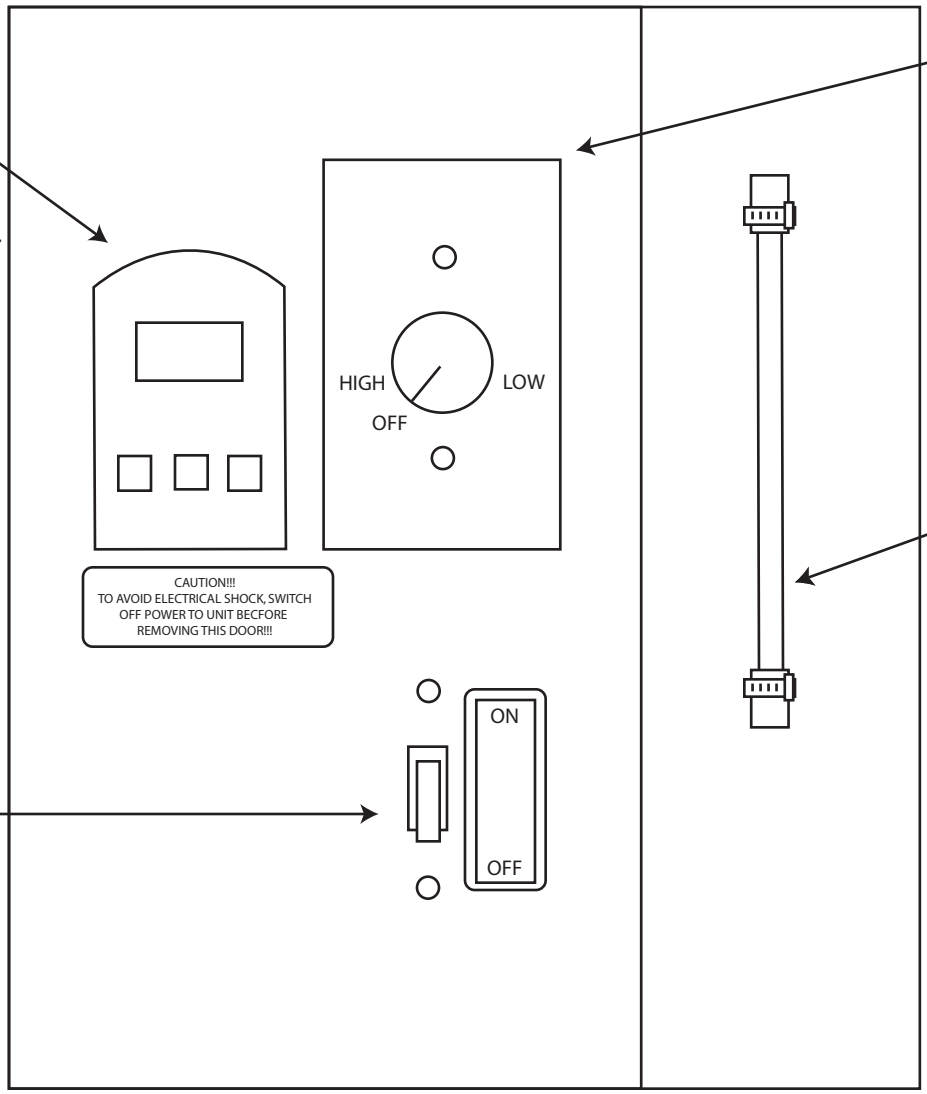
The on and off switch is to shut the power off to the inducer blower when the firebox is being filled. The outside light is wired so it can be turned on and off at a remote location.

AQUA STAT

Controls the water temperture inside the water jacket. Factory set at 160°F with a 10° differential.

REOSTAT

This controls the main blower speed and is used to introduce air under the grates.



SIGHT GLASS

Indicates the level of water in stove. Add water so that the entire tube is always full.

FAN/LIGHT SWITCH

Controls both fan and light. Ensure switch is in the light position before opening fuel door. This shuts the fan off and turns on light. Always put the switch in the fan position after refueling.

P: 866-361-7355 **F:** 218-283-5786 **W:** www.crownroyalstoves.com
Greentech Manufacturing, Inc. 2716 Crescent Dr International Falls MN 56649

FILLING THE WATER JACKET

Your outdoor furnace has a vent pipe that protrudes through the roof and is behind the chimney. By placing a garden hose in this pipe you can fill your furnace to the proper water level. Because this furnace is an open-to-atmosphere system, it is normal that water will have to be added annually. Depending on circumstances, 5 or 10 gallons is not unusual. To make this procedure more convenient, a boiler drain valve (tap, faucet) can be installed into the return furnace line allowing you to connect a double female (automatic washing machine hose) between it and your domestic supply line.

On your initial filling of your furnace make sure to inspect all connections in your system for leaks. In your system a bleeder valve should have been installed at the highest point. This will allow you to remove any air from the system. **CAUTION - do not fire furnace until it is filled with water.**

Allow furnace to run for two days and check water levels and fittings for leaks. If all is okay, you now should add the manufacturer's recommended water treatment.

FIRING THE FURNACE

The furnace will continue to feed an air supply to the fire until your aqua-stat shut off temperature is reached (180F). On this initial start up the water jacket will reach what is called the dew point. This creates sweat inside the fire box which may last a couple of days and is normal.

Although everyone has different methods of firing, filling your furnace to capacity reduces the efficiency of the furnace. It is better to load twice a day with less fuel than once a day filling to capacity. Smaller fuel loads burn hotter, cleaner and more thoroughly. By burning off more of the gases (smoke), you enhance the overall efficiency of your system by reducing creosote and increasing heat transfer to the water.

OPERATION

DAILY FUELING & FIRING ROUTINE

Prior to opening the fuel door, pull the damper plate rod out, open the control panel, turn the inducer fan switch off and wait 60 seconds. After the 60 seconds has passed, open the fuel door slowly and stand behind the door so that the door is between you and the fire box. Allow another 60 seconds to pass before raking the coals, shaking down the ashes and filling the fire box. Failure to wait may cause an injury from a fire flare back.

Since the inducer blows air into the ash pan area it is critical to remove the ashes daily even though the ash pan area is not full. Store ashes in a covered metal container until all cinders have thoroughly cooled prior to dispersal.

Do not load the fire box more than thirty percent (30%) with coal. If additional fuel is added you will not maintain a hot enough burn and your efficiency rate will deteriorate. Only add enough coal to provide heat until the next fueling time. Overfilling the fire box will cause the fire to smolder, create excessive creosote and result in more fuel being consumed.

SAFETY

Whenever the loading door is to be opened, it should always be cracked slightly to allow oxygen to enter and burn off any combustion gases that are present before fully opening. Failure to do this could result in sudden ignition of the unburned gases when the door is opened.

A stove should never be filled with excess coal so that the flue gas exit is blocked or impeded in any way. Burning coal generates carbon monoxide and if the flue gas exit is blocked the carbon monoxide can be forced into the area the stove is heating and have fatal consequences.

WARNING!!! Risk of Fire: Do not operate with fuel loading and/or ash removal doors open. Do not store fuel or other combustible materials within marked installation clearances. Inspect and clean flues and chimney regularly.

CAUTION!!! Hot Surfaces: Keep children away. Do not touch during operation.

STARTING DURING A PROLONGED POWER FAILURE

During a prolonged power failure, where no power is being sent to the furnace, do not load with new fuel or try to start a new fire. It is recommended that you contact your local dealer or Greentech Manufacturing, Inc. to find out what size of generator is needed to keep your furnace running. Once an approved generator is connected to the stove, the unit may be started normally.

CAUTION!!! Do not to start the unit during a prolonged power failure.

OPERATION

STARTING A COAL FIRE

Starting a coal fire takes time and patience. It is a learning process; coal burns entirely different than wood.

To begin take around eight sheets of newspaper, crumble into balls and place on the top of the grates in your stove. Next, lay fine kindling on top of the paper. The kindling must be dry and not larger than ¾" in diameter. Layer the kindling in crisscross fashion to allow good air flow. Open the draft control fully, this can be found on the front of your stove above the firebox door. Now, close the loading door and allow the kindling to catch fire.

After a few minutes, open the loading door an inch or two for several seconds before opening completely. This method will allow smoke to clear away from the door opening before the loading door is completely opened. Add smaller compact pieces of hardwood when the kindling fire is burning hot. Keep the draft controls fully open to establish a hot fire quickly. Wait until the hardwood has burned long enough to start breaking off into hot coals. Add more hardwood if needed.

When there is a well-established wood fire going with plenty of red hot wood coals, start adding coal (nut is preferred over stove size), small amounts at a time. Wait until the first layer of coal catches and is starting to glow orange, then add another layer. Adding too much coal too quickly at this stage might smother the fire and you will have to start over. Once these layers of coal are glowing orange, continue to add coal until the entire grates are covered - several inches thick minimum.

Once the coal fire is well established, the entire grate area must be kept covered or the coal will not keep burning. Keep the draft controls open. Once the coal is completely covering the grates and glowing orange you can load more coals and shut the damper controls.

Do not fill the unit with more coal than as stated below.
RS7200:60 LBS. RS7300:60 LBS. RS7400: 80 LBS. RS7500: 100-150 LBS.

MAINTENANCE

Usage of authorized Control chemical is required in all Crown Royal Stoves. To uphold your warranty annual water testing is necessary.

Do not allow moisture to come in contact with ashes in firebox. It is mandatory to have a rain cap on the termination of your chimney.

Frequently check for accumulated soot, creosote, and ash build-up until experience shows how often cleaning is necessary.

Check daily for creosote build-up until experience shows how often cleaning is necessary. Be aware that the hotter the fire, the less creosote is deposited, a weekly cleaning may be necessary in warmer weather, while a monthly cleaning may be adequate in the coldest months. Have a clearly understood plan of how to handle a chimney fire.
See Below (RUNAWAY CHIMNEY FIRE)

Daily Maintenance

- Check water level and add as necessary.
- Remove collected ash from the shaker grates and ash pan.
- Check if temperature setting corresponds to thermometer.
- Check for ash buildup in firebox and clean as necessary (Use a metal container to empty ashes into.)

Note: Unit must be shut down in order to fill up and clean the ash pan!

Weekly Maintenance

- Check air bypass tubes and chimney; remove any creosote, soot or ash build-up that may have occurred.
- Check fan and solenoid to ensure proper air velocity is happening at ejection points.

Monthly Maintenance

- Check the water sight tube and add water until excess flows from the overflow pipe located in front of the chimney.

Annually Maintenance

- Lubricate fan, solenoid shaft and shaker grate.
- Check fan and solenoid to ensure proper air velocity is happening at ejection points.
- Check the door gasket and replace if needed.
- Clean out any ash buildup from back.
- Check blower motor bushings and oil as needed.
- Check air bypass tubes and chimney; remove any creosote, soot or ash build-up that may have occurred.
- At the end of the season, thoroughly clean out all the ashes in the firebox and chimney.
- Place a chimney cap on the chimney in order to keep rain from entering the firebox.

Remember: Your preventive maintenance program will give you years of trouble free service.

Off Season Maintenance

- At the end of the heating season, shut off the pump, empty the fire box of all ash, remove the creosote, clean the damper plate and clean the chimney. Remove and clean the inducer blower, clean the ash pan area, check the door gaskets and replace as necessary.

- Drain the system, refill to the top, treat and test the water, turn on the circulation pump for at least four hours to mix the treatment thoroughly, check for leaks and then shut the pump off.

- Care for the exterior of your furnace is minimal. The unit may be washed using water and a mild non-abrasive cleaner suitable for painted surfaces. Avoid direct water pressure to electrical components and connections.

CONTACT YOUR LOCAL DEALER FOR ANY QUESTIONS REGARDING MAINTENANCE.

CAUTION!!! Make certain that all electrical power to the furnace and components are shut off before washing.

MAINTENANCE

ASH REMOVAL, ROTATION & DISPOSAL

CAUTION! Ashes should never be allowed to accumulate above the top of the pan. Ashes in contact with the bottom of the grates act as an insulator, thus intensifying the heat on the grates and could cause warping. With an excessive ash buildup, primary combustion air is restricted and the unit's output will be reduced. Warped grates are easily recognized by the extreme damage.

Ash removal should be done weekly to maintain a good ash rotation. This is done by shaking the rocker grates so the ashes will fall through the grate into the ash pan below. Open the ash pan door and remove the ash pan and place ashes into a metal container with a metal lid.

This closed metal container of ashes should be placed on a noncombustible floor or on the ground, well away from all combustible materials until final disposal. Ashes should remain in the closed container until all cinders have cooled, in an area that is at least sixty (60) inches from the front of the stove and thirty six (36) inches from the sides or back of the stove.

CAUTION: Hot coals can last for days. Disposing of them improperly or to soon can cause a fire.

WARNING!!! RISK OF FIRE

With the exception of the start-up and ash removal periods, the ash pan and loading doors should never be left open. This unit should never be left unattended with any of the doors left open.

CAUTION: Always close the ash pan door or serious overheating will occur and damage the unit.

CREOSOTE FORMATION & REMOVAL

When fuel is burned, organic vapors and tar combine with expelled moisture forming creosote, which clings to the interiors of the stove. Creosote vapors condense in the relatively cool chimney of a slow burning fire; as a result creosote accumulates on the flue lining. When creosote ignites it creates an extremely hot fire and can cause damage to the stove and/or persons. The chimney and its connectors should be inspected at least twice a month, during the heating season, to determine if a buildup is occurring. If creosote has accumulated it should be removed to reduce the risk of a chimney fire.

RUNAWAY CHIMNEY FIRE

To avoid a chimney fire, ensure that daily, weekly, monthly and annual maintenance techniques are being followed.

If a fire is to occur, close the dampers, shut down the power to the unit, and ensure the firebox & ash pan doors are securely shut. This will eliminate new oxygen from being introduced into the firing chamber, thus killing both the chamber and chimney fires.

TROUBLESHOOTING

If the furnace fails to heat up:

- Check fire.
- Check fan for operation.
- Check that solenoid damper is open to allow air velocity.
- Check water level of furnace.
- Check for creosote blockage at chimney and bypass trough.
- Check temperature setting.
- Check for power at furnace.

If furnace water is hot, but buildings do not have heat:

- Check pumps and check for closed valves.
- Check filter or Y-Strainer for flow blockage.
- Check for air in system at exchanger by bleeding off.

If furnace boils:

- Check that door is closing properly and that door gasket is completely sealed.
- Check that the ash pan door is properly closed and the gasket is completely sealed.
- Check that the solenoid damper plate is opening and closing without hang-ups.
- Check that the flexible air duct is connected to the blower and the bottom elbow of the furnace.
- Check that the temperature settings are correct and water levels.

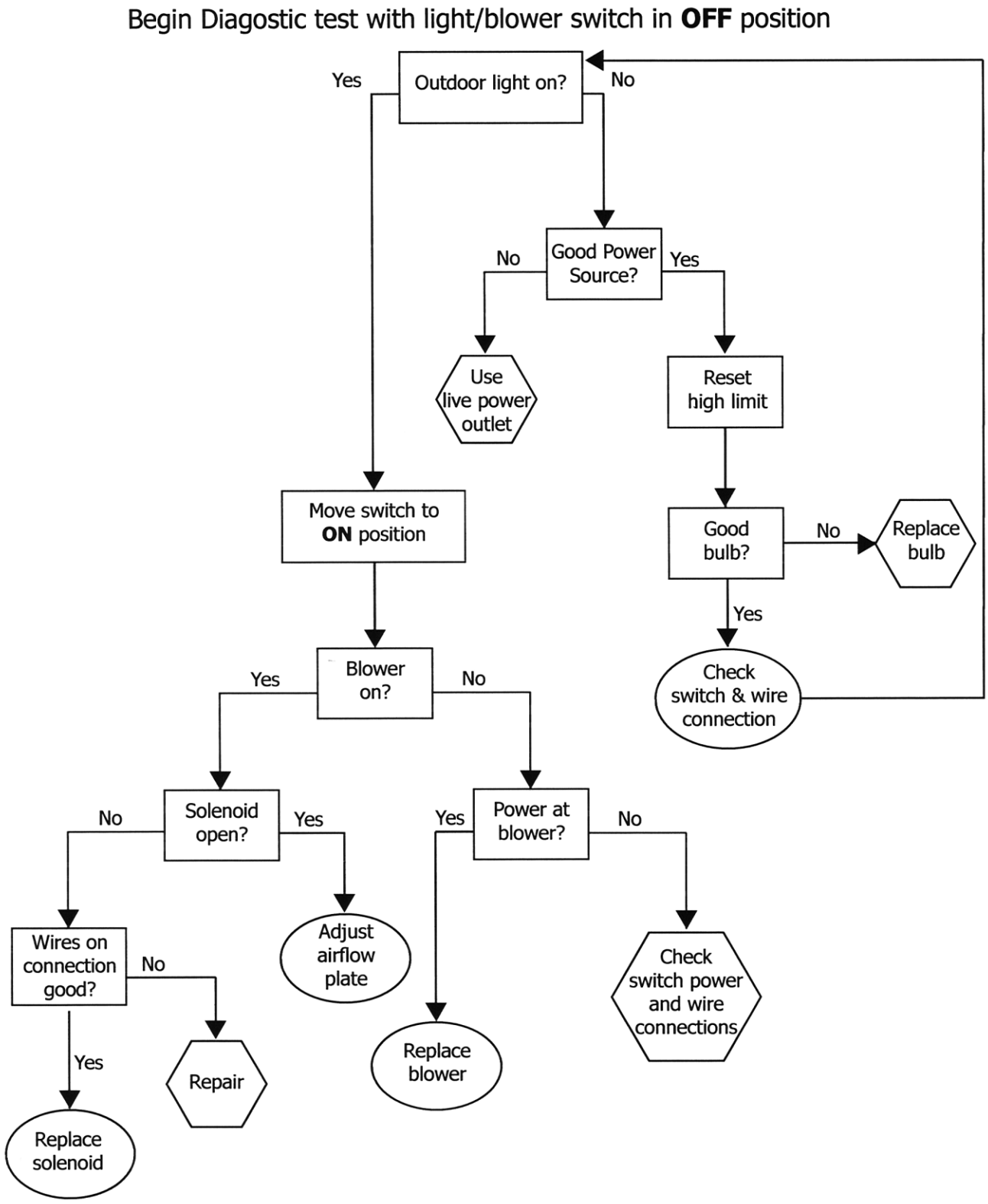
If furnace has shut down:

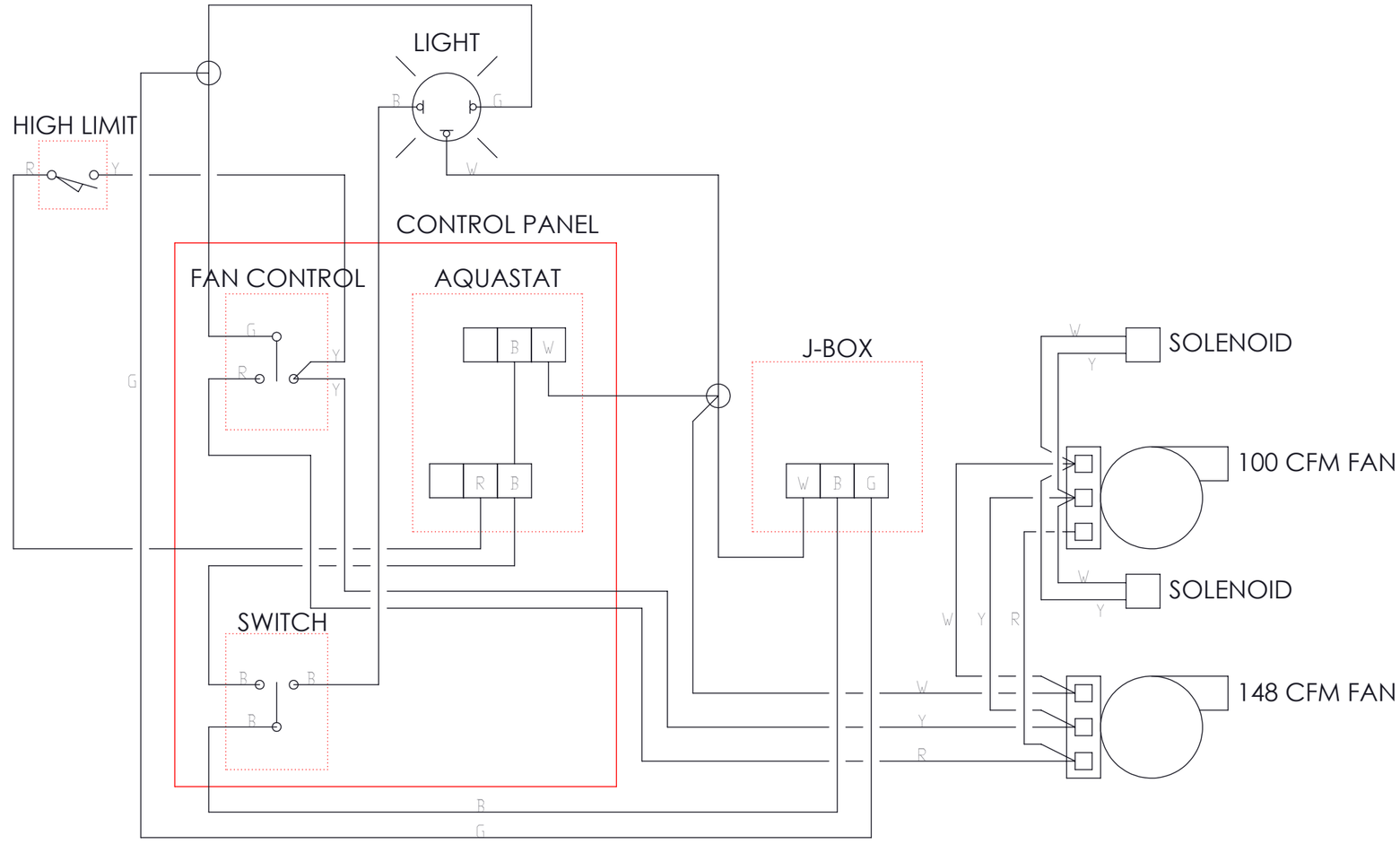
- Check to ensure that the unit has power (does the outside light work).
- Check the water temperature (furnace has a high temperature cut-out of 190 degrees F.).
- If all the checks have not corrected the problem have a qualified technician check the control panel.

Blower will not come on:

- Check to see if the high limit switches may be shut off because of water temperature is higher than aqua stat setting.
- Wait and allow water to cool down. Reset snap disc.

Electrical Trouble Shooting Flow Chart





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GREENTECH
MANUFACTURING INC.
www.green-techmfg.com
P:866.361.7355 F:218.283.5786

TITLE: RS7200 - RS7400 ELECTRICAL SCHEMATIC

MATERIAL

SIZE	DWG. NO.	REV
B	SCHEMATIC	1

April 2004

Smoke Troubleshooting Checklist For Outdoor Furnaces

I. Installation Issues (Improper Smoke Dispersal)
   A. Chimney height relative to nearest downwind neighbor
      1. If located 50 feet or less to any residence not served by the furnace, it is recommended that the stack be at least 2 feet higher than the eave line of that residence.
      2. If located more than 50 feet but no more than 100 feet to any residence, it is recommended that the stack be at least 75% of the height of the eave line of that residence, plus an additional 2 feet.
      3. If located more than 100 feet but no more than 150 feet to any residence, it is recommended that the stack be at least 50% of the eave line of that residence, plus an additional 2 feet.
      4. If located more than 150 feet but no more than 200 feet to any residence, it is recommended that the stack be at least 25% of the height of the eave line of that residence, plus an additional 2 feet.
   B. Furnace located in sheltered area; insufficient wind to disperse smoke.
   C. Furnace sizing. Similar to other heating appliances, furnace should be properly sized based on the estimated heat loss of the served structure.

II. Fueling Issues
   A. Burning less than optimal wood
      1. Moisture content: Optimal moisture content should be between 20% and 30% (seasoned wood)
      2. Species: Hardwoods generally tend to burn cleaner than softwoods
      3. Size: Larger pieces of wood tend to burn cleaner than smaller pieces
   B. Burning less than optimal fuel loads
      1. Loading: Firebox should be loaded based on outdoor temperature, anticipated heat load requirements and the manufacturer's instructions. Do not overload the chamber.
      2. Charging intervals: Firebox should be charged regularly at the intervals specified by the manufacturer's instructions. Optimally, the firebox will be charged "hot," i.e., the fire will not go out between chargings.
   C. Burning improper fuels
      1. Only burn fuels approved by the manufacturer
      2. Do not use volatile starters (such as lighter fuels, gasoline, chemicals) unless approved by the manufacturer
      3. Do not burn the following:
         a. Trash or household garbage
         b. Plastics

c. Gasoline
d. Rubber or tires
e. Naphtha
f. Material coated with petroleum products (e.g., particle board, railroad ties, pressure-treated wood)
g. Leaves
h. Paper products or cardboard

III. Operational Issues

A. Improper combustion air – Natural Draft Units (No Blower):
1. Air inlet not restricted by debris (creosote, ash, etc.)
2. Flame baffle/flue not restricted by debris
3. Chimney not restricted by debris
4. Door seal in satisfactory condition (provides air-tight seal when door is shut)
5. Air inlet (damper or flapper) operates properly (opens/shuts per manufacturer's instructions, provides air-tight seal when shut)
6. Door seal in satisfactory condition (provides air-tight seal when door is shut)

B. Improper combustion air – Forced Draft Units (Blower):
1. Verify combustion blower operates in accordance with the manufacturer's instructions
    a. Blower starts and stops properly
    b. Combustion blower wheel spins properly
    c. Blower runs at proper speed – verify voltage to blower motor
2. Combustion blower tube not restricted by debris (creosote, ash, etc.)
3. Flame baffle/flue not restricted by debris
4. Chimney not restricted by debris
5. Air inlet (damper or flapper) for blower operates properly (opens/shuts per manufacturer's instructions, provides air-tight seal when shut)
6. Door seal in satisfactory condition (provides air-tight seal when door is shut)

C. Verify controls operate in accordance with the manufacturer's instructions
1. Water temperature controls set properly
2. Draft controls set properly

IV. Maintenance Issues

A. Verify that the furnace is being maintained in accordance with the manufacturer's instructions. Specifically, inspect:
1. Excessive ash buildup
    a. Grates blocked, restricting air flow
    b. Combustion fan blocked, restricting air flow
2. Excessive creosote buildup
    a. Combustion fan blocked, restricting air flow
    b. Flame baffle blocked, restricting air flow
    c. Chimney blocked, restricting air flow

V. Discussion

Wood, like other fuels is made up of various amounts of carbon, hydrogen, and other elements. The burning of wood is a chemical reaction that depends on many factors. The essential factors to complete wood burning are time, temperature, and turbulence. Some other factors to take into consideration are: intake air; amount and placement, density and moisture content of the fuel, size of the firebox compared to the size of the wood load, and adequate room for the combustion process to take place.

The smoke that is seen coming out of a chimney is essentially a combination of unburned fuel (carbon and hydrogen) and moisture in the form of water vapor. The reason for the smoke is usually attributed to: (i) not enough time for complete combustion, (ii) not enough mixing (turbulence) to complete the chemical process, (iii) not enough temperature to get the fuel to that chemical conversion stage, or (iv) a combination of the above. In many cases, excessive smoke can be reduced by adopting practices that improve complete combustion, reducing visible emissions in the form of smoke.

A. Fuel

1. Moisture Content

Moisture content of the wood, either too high or too low, will affect the amount of visible smoke. Wood with a low moisture content (less than 10%) will burn relatively quicker, resulting in some of the fuel going up the chimney in the form of smoke, i.e., time was insufficient to complete the burn process. Wood with a moisture content too high (more than 35%) can quench the flame causing smoke, i.e., temperature was insufficient to burn completely.

Wood moisture in the 20% to 30% range can be the best of both scenarios. It is dry enough to burn without quenching the flame, yet the moisture is high enough to self-regulate the burn, giving it plenty of time to complete combustion.

2. Density

The density of wood plays a part in the combustion process in the same way as moisture content. Softwoods are by definition less dense and tend to burn more rapidly than hardwoods. Softwoods tend to create more smoke – due generally to insufficient time to complete the burn. Denser hardwoods will burn more slowly and evenly, allowing more time for the conversion of fuel to heat.

3. Size

The size of the wood can also be a factor in the amount of smoke produced. The surface area of a piece of wood is one of the factors that will affect burn rate. Larger diameter logs tend to burn slower than smaller logs, allowing for a more complete burn.

4. Improper Fuels

Burning materials not recommended by the manufacturer can play a major role in visible emissions. Materials such as plastics, garbage, rubber tires, and even wood products such as cardboard and paper that may be coated with petroleum products may emit excessive smoke.
Fire starters such as gasoline, oil, and other chemicals can also make an ordinary wood fuel load seem very dirty once burned. If people who own outdoor furnaces start fires with some kindling and load with wood fuel as recommended above, they can eliminate a lot of the smoke that others see and the problems that go with it.

5. Loading

The amount of wood loaded into an outdoor furnace in relation to the firebox size also has an effect on visible emissions. For every size of wood load there is a minimum amount of space needed to complete the combustion process. For instance, if a person were to load a relatively small firebox completely and load a larger firebox with the same amount of wood, with all of the other factors being the same, the larger firebox would burn cleaner. In the smaller firebox, the combustion process does not have enough room to expand, heat up, and mix before exiting the firebox (insufficient time, temperature, and turbulence). Just because a firebox is large does not mean that it should be filled completely. This large volume is used in part for what happens AFTER it is loaded.

B. Furnace Size

The size of a furnace should be large enough to provide sufficient heat without constant reloading. If the target burn time is 12 hours, an adequately sized furnace will provide enough heat for 90% of all heating days. There will always be the extraordinarily cold days for which no one can plan. A small furnace that needs constant reloading will unavoidably be left unattended and will lose much of its available heat. In these situations, the firebox is left relatively cold and restarting will be dirtier because of flame quenching on the cool firebox walls. A good rule to follow is be that if the furnace cannot stay within 20% of its set point under regular reloading, then it is undersized and a larger furnace is needed.

C. Chimney Considerations

Although chimney height has little to do with overall emissions, it should be considered in ALL installations of outdoor furnaces. Installers and dealers should first take a look at the proposed location and take a few things into account. Location of nearby buildings, structures, and natural geography all affect the furnace’s ability to draft. While higher is generally better, it is sometimes tough to convince the furnace owner to add length to the chimney because of the extra cost.

VI. Conclusions

The proper use of an outdoor furnace can significantly reduce the visible emissions that it produces. Simple fuel considerations with regard to moisture content, size, and amount help hinder the production of smoke and ultimately help improve efficiency. Other obvious ways to

help reduce smoke is to only burn fuels recommended by the manufacturer and to not overload the furnace. In addition, the furnace size should be properly matched to the heat load so that cold starts and overfilling are avoided. Chimney height should be in accordance with the state and local codes, as well as surroundings, including neighbors. These areas, along with the "Best Burn Practices for Outdoor Furnaces," can greatly help in providing clean, safe heat from all outdoor wood burning furnaces.

HPBA/JHGAdmin/102

**PLEASE NOTE – THIS SMOKE TROUBLESHOOTING CHECKLIST FOR OUTDOOR FURNACES WAS REFERENCED FROM THE HPBA. ALTHOUGH IT SAYS WOOD, THIS INFORMATION IS GOOD FOR ALL OUTDOOR FURNACES. REMEMBER YOUR FURNACE BURNS COAL ONLY.

AUTHORIZED FURNACE TREATMENT

Greentech Manufacturing Inc. requires the usage of authorized furnace treatment to be used in all Crown Royal Stoves. Treatment is to be added to furnace water upon initial start up and is required to remain at satisfactory levels thought the life of the stove.

To ensure the maximum efficiency and longevity of your Crown Royal Stove, water treatment is crucial. Treating systems with authorized furnace treatment will prevent corrosion and scale buildup. Calcium and magnesium are commonly found in many water supplies. These impurities cause layers of scale that not only decrease heat transfer efficiency but cause pitting on the interior water jacket. Over time constant pitting will result in leaks. Once authorized treatment is added it creates the necessary barrier needed to prevent the breakdown of metals. Premature corrosion is a result of not treating the water with correct corrosion resistant inhibitor or with the wrong dosage.

Water Treatment and Testing Required on all Crown Royal Stoves

All Crown Royal Stoves are required to be shipped with initial recommended gallon(s) of authorized treatment. Crown Royal Stoves are backed with a 20 Year Limited Warranty. To retain warranty on Crown Royal Stoves it is required to use recommended treatment and submit annual samples for testing. Failure to maintain treatment at recommended levels and annual water testing will result in a voided warranty.

- Specifically designed for Crown Royal Stoves, closed-loop design.
- Helps protect system from scale, sludge and corrosion.
- Vapors help prevent corrosion throughout the furnace.
- Economical – one gallon/3.78 liters treats 300 gallons/1134 liters of system capacity.
- FREE Water Testing and sample bottles.

Sample Bottles

Two sample bottles and labels are found with each gallon of treatment. For additional bottles or labels please contact your local dealer or call 866-361-7355.

Warning

Read the entire label located on Control treatment before opening or using this product. Keep out of the reach from children. Do not mix with any other chemicals. Contains Sodium Nitrate and Potassium Hydroxide. Avoid contact with skin, eyes and clothing. Undiluted product causes severe skin and eye irritations. Wash thoroughly after handling. Do not swallow. Swallowing may cause nausea, vomiting, weakness and lowered blood pressure. **MADE IN U.S.A.**

Storage

Keep container closed when not in use. When product is stored it may separate or thicken. This will not harm the performance. Before using, warm to room temperature and stir thoroughly. Keep from freezing.

FURNACE TREATMENT PROCEDURE

Initial Start-up Procedure for Water Treatment
All Crown Royal Stoves purchases are required to purchase authorized water treatment for initial start-up. With each gallon of treatment you will be provided with two sample bottles and furnace information forms.

- Before adding treatment fill furnace with water and circulate for 48 hrs.
- Check for any leaks before adding treatment.
- Add initial dosages of treatment for the following models:
    - RS7200 – Add ¾ gallon
    - RS7300 – Add 1 gallon
    - RS7400 – Add 2 gallons
    - RS7500 – Add 3 gallons
    - RS7300E – Add 1-1/2 gallons
    - RS7400E - Add 2 gallons
- Follow procedure for collecting water sample below.

Procedure for Collecting Water Samples

- Turn off furnace, and circulate for 24 hours to ensure complete mixture of water and treatment.
- Collection of sample can be done from drain line or other convenient location.
- Allow 30 seconds of drainage before collection of sample.
- Use provided 4 oz sample bottle to retrieve water sample.
- Fill out provided Furnace Information Form and attach to sample bottle.
- Mail water sample to designated testing facility found on provided Furnace Information Form.
- Testing facility analyzes the conductivity, PH and nitrate levels of water sample.
- Testing results are provided on all samples within 4-6 weeks.
- If testing results are unsatisfactory, recommendations of additional treatment will be given.
- These recommendations will need to be preformed and a retest is required to maintain warranty.
    - Low Levels – Additional treatment is to be added to system and a retest is required.
    - High Levels – Water will need to be drained and replaced with fresh, untreated water and a retest is required.

When collecting water samples turn off furnace and allow water to reduce in temperature. When water is reduced to a safe temperature, collect sample.

WARNING!!! Hot water and surfaces may cause burns. Use extreme care with collection of water sample.

Mailing Samples - Testing results are emailed to customers who provide emails on the Furnace Information form or mailed to the address given within 4-6 weeks. It is owner's responsibility to ensure they receive testing results and follow recommendations. When mailing samples to testing facility it is recommended to mail with tracking capabilities. If test results are not received within 4-6 weeks please call 866-361-7355.

Additional Dosage Requirements • If system/furnace experiences leak or requires water to be added, add treatment at the rate of ½ oz per gallon of water added. • If furnace system is drained for any reason, refer to initial start up procedure of Water Treatment.

MANDATORY WATER TREATMENT & TESTING

IMPORTANT

Mandatory Yearly Maintenance Dosage and FREE Water Testing

It is required annually to add treatment and send water sample to authorized testing facility to retain warranty of furnace. Water testing is free to all Crown Royal Stove customers for the life of the stove. **Failure to maintain treatment recommendation levels and submit annual water samples will result in a voided warranty.**

- Annually add ¼ of the required amount of treatment yearly, this will keep levels balanced.
- Follow directions for collection of water sample and mail to facility for testing annually.

Purchasing Water Treatment

Water Treatment is specially formulated for Crown Royal Stoves. To uphold warranty no other chemical may be substituted. We encourage customers to contact your local dealership or call 866-361-7355 to purchase additional water treatment when needed.

For additional free sample bottles and labels please contact your local dealer or call 866-361-7355.

EMERGENCY PROCEDURE FOR CHEMICAL

EMERGENCY FIRST AID PROCEDURES FOR FURNACE 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 Methemoglobim 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, 1 MG/KG of body weight may be of value. Cyanocobalamin (Vitamin B-12), 1 MG Intramuscularly, will speed recovery. Intravenous fluids and blood transfusion may be indicated in very severe exposures.

20 YEAR LIMITED WARRANTY

Thank you for making the choice to purchase your new Crown Royal Stove. We are certain that you will find great satisfaction with your stove's ongoing reliability and performance.

Greentech Manufacturing, Inc. warrants this furnace, to the original owner, to be free of defects in material and workmanship for a period of twenty (20) years from the date of purchase.

One Year Warranty

- On Electrical Components - Parts Only—aqua stats, thermostats, fans and pumps are guaranteed by the manufacturer for a period of one (1) year from the date of purchase. Parts will be replaced on an even exchange, excluding shipping charges and labor.
- The loading & heat exchanger door, ash pan, door gaskets and ceramic moldings are warranted for a period of one (1) year from date of purchase.

Five Year Warranty

- Shaker Grates - the cast iron rocker grates are warranted for five (5) years 100%. This warranty excludes any warping or deterioration from ash corrosion.

If there is a leak in the fire box, water jacket or heat exchanger on your Crown Royal Stove during the:

- First (1) year - Greentech Manufacturing, Inc. will replace the unit at no cost to the original owner. The owner is liable for the un-installation of the old unit and the installation of the replacement unit.
- Two to five (2 - 5) years—If the unit is to be replaced the customer shall pay the difference between the original purchase price of the old unit and the new purchase price of the replacement unit, plus freight and installation.
- Sixth (6) year— Greentech Manufacturing, Inc. will pay a percentage of the total cost of the fire box and outer drum. Our percentage paid is as follows: year 6 –70%, year 7 – 50%, years 8-9 – 30%, years 10-20 – 20%. After the twentieth (20) year, Greentech Manufacturing, Inc. will give 10% off the purchase of a new stove.

Not Warranted

- Greentech Manufacturing, Inc. does not warranty parts damaged by freezing, overheating, pressurization, warping and/or use of unauthorized fuels or abuse.
- Greentech Manufacturing, Inc. is not responsible for the cost of plumbing, replacement of antifreeze, shipping, labor or any other cost other than the replacement of the part or furnace.
- Greentech Manufacturing, Inc. is not liable for any damage or cost which may occur from or during the operation of the furnace, or damage incurred due to any heating system failure. These furnaces are not intended to be the only source of heat; therefore, it is recommended that a back-up system is in place to prevent damages caused by lack of heat.
- No unauthorized adjustments or repairs will be covered by warranty.
- Greentech Manufacturing, Inc. does not warrant exterior paint or finish, any damage caused by negligence and deterioration due to lack of proper ongoing maintenance, overheating, physical damage caused by abuse or freeze up, unauthorized work or modifications to the furnace, damage to the fire-box due to power surges or damage caused by burning unauthorized fuels.
- Ash corrosion on the inside fire drum in not warranted. To prevent ash corrosion, rotating or raking ashes forward must be done as described in the manual. The Crown Royal Stove is designed to be the least susceptible to corrosion; therefore, most corrosion is covered under this warranty.

The chimney must be covered when the unit is not in use. It is mandatory that a chimney cap be installed before operation of the unit. If an onsite 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 responsibility of the consumer 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.

The purchaser assumes all responsibility for the care, maintenance and safe operation of the furnace including the monitoring and adding of an approved boiler treatment. All instructions must be followed in the operator's manual, Control Chemical utilized and water samples tested annually and the warranty registration must be on file at Greentech Manufacturing, Inc. To qualify for warranty Greentech Manufacturing, Inc. always has the right to decide if the stove will be repaired or replaced. To validate this warranty, registration must be completed within thirty (30) days of purchase date, dealer's invoice attached and mailed to:

Greentech Manufacturing, Inc. • P.O. Box 1237 • International Falls, MN 56649

This Warranty is subject to change. For updated warranty information contact Greentech Mfg, Inc.

Failure to use Control Chemical in your furnace and to send in annual water samples will void this warranty—NO EXCEPTIONS!

Warranty Claim Form

Date: _____

Distributor/Dealer Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Customer's Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Claim conditions apply and cannot exceed warranty statement and procedure policy! Please send this form, bill of sale and pictures back to jessica@green-echmfg.com. Warranty work completed without prior authorization may be denied.

(Process from start to finish - When reviewing all information sent in by customer, we make sure the stove is registered in original owners name, verify mandatory chemical was added to the system and yearly test results were sent in and came back satisfactory. After approved you find a local welder to give an estimate to repair the stove, which we approve and tell you the percentage covered. This warranty is prorated so it will be covered by a percentage. After you pay the bill you submit a copy and check is submitted back to you. Complete process usually takes 30 days. Under some circumstances, we may require furnace to be shipped back to our facility.)

Model: _____ S/N: _____

Purchase Date: _____ Install Date: _____

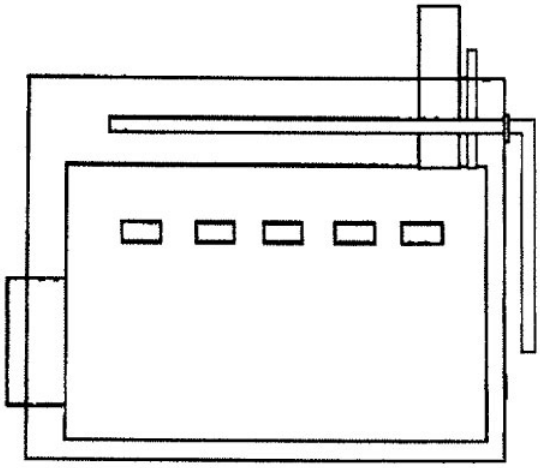
Description of Claim: _____

Warranty Claim Form

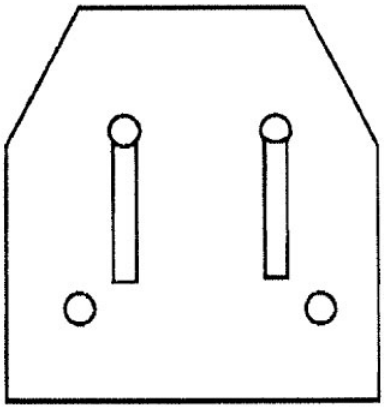
Have you turned in a warranty claim before? YES or NO
If yes, is the leak in the same place? Yes or No

Additional Notes or Comments:

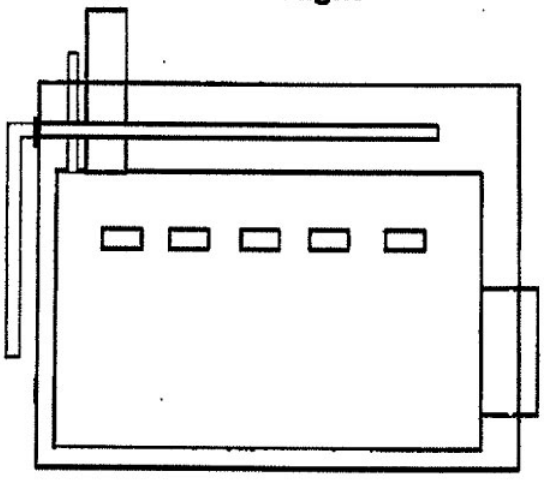
Repair Required:



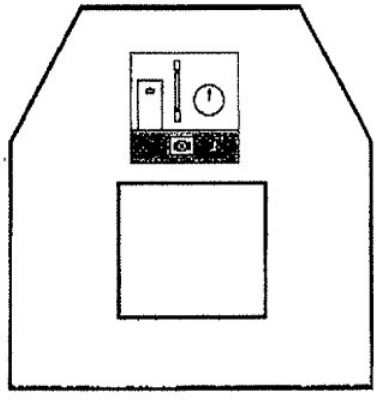
Front Right



Rear



Front Left



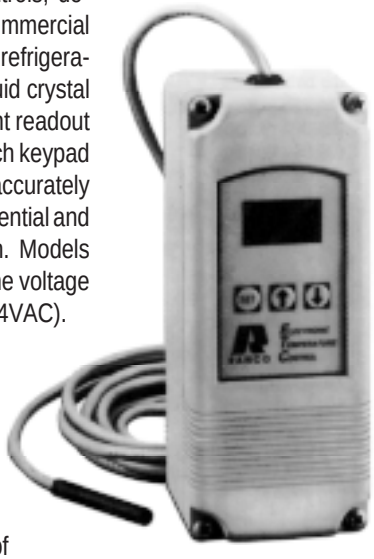
Front

Form No. 7515003-001 Rev. C

ETC SINGLE STAGE ELECTRONIC TEMPERATURE CONTROL

PRODUCT DESCRIPTION

The Ranco ETC is a microprocessor-based family of electronic temperature controls, designed to provide on/off control for commercial heating, cooling, air conditioning and refrigeration. The ETC is equipped with a liquid crystal display (LCD) that provides a constant readout of the sensed temperature, and a touch keypad that allows the user to easily and accurately select the set point temperature, differential and heating/cooling mode of the operation. Models are available that operate on either line voltage (120/208/240 VAC) or low voltage (24VAC).



APPLICATIONS

With its wide temperature setpoint range and selectable heating or cooling modes, the ETC can be used for a wide variety of applications including refrigerated display cases, walk-in and reach-in refrigerators, milk coolers, refrigerated warehouses, chillers, beer and beverage coolers, tank heating, space and return air temperature control and condenser fan cycling.

FEATURES

- Wide setpoint temperature range (-30°F to 220°F) and differential adjustment (1°F to 30°F).
- Simple keypad programming of setpoint temperature, differential and cooling/heating modes.
- LCD readout of sensor temperature, control settings, relay status and onboard diagnostics.
- Remote temperature sensing up to 400 feet.
- SPDT output relay.
- User-selectable Fahrenheit/Celsius scales.
- Lockout switch to prevent tampering by unauthorized personnel.
- Choice of line voltage and low voltage models available.
- Optional 0 to 10 volt analog output available for remote temperature indication.

SPECIFICATIONS

Input Voltage	120 or 208/240 VAC (24 VAC optional), 50/60 Hz
Temperature Range	-30°F to 220°F
Differential Range	1°F to 30°F
Switch Action	SPDT
Sensor	Thermistor, 1.94 in. long x 0.25 in. diameter with 8 ft. cable
Power Consumption	120/208/240 VAC: 100 Milliamps 24 VAC: 2 - 6 VA

Relay Electrical Ratings

	120V	208/240V
NO Contact		
Full-load amps	16 A	8 A
Locked rotor amps	96 A	48 A
Resistive amps	15 A	8 A
Horsepower	1 hp	1 hp
NC Contact		
Full-load amps	5.8 A	2.9 A
Locked rotor amps	34.8 A	17.4 A
Resistive amps	5.8 A	2.9 A
Horsepower	1/4 hp	1/4 hp

Pilot Duty: 125 VA at 120/208/240 VAC

Control Ambient Temperature	
Operating	-20°F to 140°F (-29°C to 60°C)
Storage	-40°F to 176°F (-40°C to 80°C)
Ambient Humidity	0 to 95%, RH, Non-condensing
0 to 10 V Output Impedance	1K
Enclosure	NEMA 1, Plastic
Agency Approvals	UL Listed, File E94419, Guide XAPX CSA Certified, File LR68340, Class 4813 02

ETC ORDERING INFORMATION

Code Number	Input Voltage	No. of Stages	0 - 10 V Output
ETC-111000-000	120/240	1	No
ETC-111100-000	120/240	1	Yes
ETC-112000-000	24	1	No
ETC-112100-000	24	1	Yes

OPERATION

Liquid Crystal Display (LCD)

The LCD display provides a constant readout of the sensor temperature and indicates if the output relay is energized. When the **S1** annunciator is constantly illuminated during operation, the relay is energized. The display is also used in conjunction with the keypad to allow the user to adjust the setpoint temperature, differential and heating/cooling modes.

Control Setup

The temperature setpoint refers to the temperature at which the normally open (NO) contacts of the output relay will open. Determine the load (s) to be controlled and the operating mode required, cooling or heating. Refer to Figure 1 for a visual representation.

- When the cooling mode is chosen, the differential is above the setpoint. The relay will de-energize as the temperature falls to the setpoint.
- When the heating mode is chosen, the differential is below the setpoint. The relay will de-energize as the temperature rises to the setpoint.

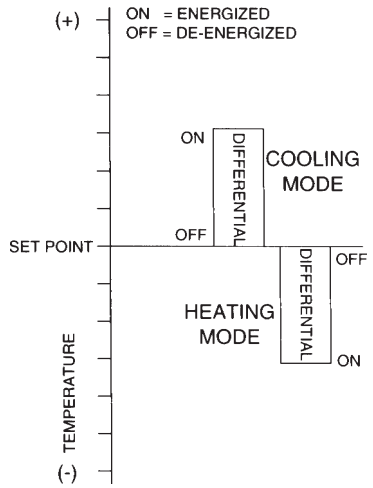


Figure 1: Setpoint and Differential Settings. Diagram indicates relay on and off points in either the heating or cooling modes.

Programming Steps and Display

The ETC can be programmed in four simple steps using the LCD display and the three keys on the face of the control.

Step 1- To start programming, press the **SET** key once to access the Fahrenheit/Celsius mode. The display will show the current status, either **F** for degrees Fahrenheit or **C** for degrees Celsius. Then press either the up ⬆ or down ⬇ arrow key to toggle between the **F** or **C** designation.

Step 2- Press the **SET** key again to access the setpoint. The LCD will display the current setpoint and the **S1** annunciator will be blinking on and off to indicate that the control is in the setpoint mode. Then press either the up ⬆ key to increase or the down ⬇ key to decrease the setpoint to the desired temperature.

Step 3- Press the **SET** key again to access the differential. The LCD will display the current differential and the **DIF 1** annunciator will be blinking on and off to indicate that the control is in the differential mode. Then press either the up ⬆ key to increase or the down ⬇ key to decrease the differential to the desired setting.

Step 4- Press the **SET** key again to access the cooling or heating mode. The LCD will display the current mode, either **C1** for cooling or **H1** for heating. Then press either the up ⬆ or down ⬇ key to toggle between the **C1** or **H1** designation. Press the **SET** key once more and programming is complete.

Step	Annunciator	Description	Display
1	**F** or **C**	Fahrenheit or Celsius Scale	F
2	**S1** (blinking)	Setpoint Temperature	S1 70
3	**DIF 1** (blinking)	Differential Temperature	DIF 1 5
4	**C1/H1**	Cooling or Heating Mode	C1

NOTE: The ETC will automatically end programming if no keys are depressed for a period of thirty seconds. Any settings that have been input to the control will be accepted at that point.

All control settings are retained in non-volatile memory if power to ETC is interrupted for any reason. Re-programming is not necessary after power outages or disconnects unless different control settings are required.

Lockout Switch

The ETC is provided with a lockout switch to prevent tampering by unauthorized personnel. When placed in the **LOCK** position, the keypad is disabled and no changes to the settings can be made. When placed in the **UNLOCK** position, the keypad will function normally.

To access the lockout switch, disconnect the power supply and open the control. The switch is located on the inside cover about 2 inches above the bottom. (see Figure 2). To disable the keypad, slide the switch to the left **LOCK** position. To enable the keypad, slide the switch to the right **UNLOCK** position. All ETC controls are shipped with this switch in the **UNLOCK** position.

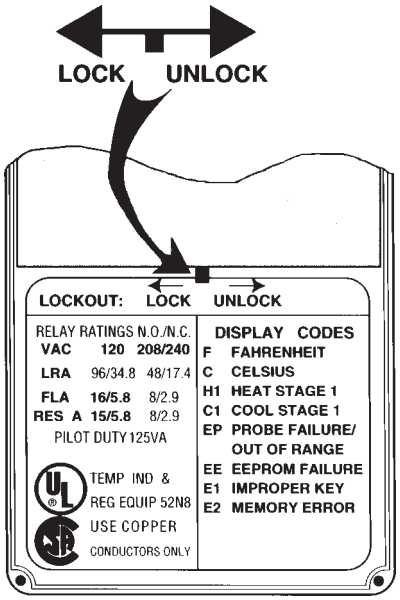


Figure 2: Lockout Switch

TROUBLESHOOTING ERROR MESSAGES

Display Messages

E1 - Appears when either the up ⬆ or down ⬇ key is pressed when not in the programming mode.

To correct: If the E1 message appears even when no keys are being pressed, replace the control.

E2 - Appears if the control settings are not properly stored in memory.

To correct: Check all settings and correct if necessary.

EP - Appears when the probe is open, shorted or sensing a temperature that is out of range.

To correct: Check to see if the sensed temperature is out of range. If not, check for probe damage by comparing it to a known ambient temperature between -30°F and 220°F. Replace the probe if necessary.

EE - Appears if the EEPROM data has been corrupted.

To correct: This condition cannot be field repaired. Replace the control.

CL - Appears if calibration mode has been entered.

To correct: Remove power to the control for at least five seconds. Reapply power. If the **CL** message still appears, replace the control.

INSTALLATION INSTRUCTIONS

IMPORTANT

1. All ETC series controls are designed as operating controls only. If an operating control failure could result in personal injury or loss of property, a separate safety control and /or alarm should be installed.

2. The schematic drawings and other information included in these installation instructions are for the purpose of illustration and general reference only.

3. These instructions do not expand, reduce, modify or alter the Ranco Terms in any way; and no warranty or remedy in favor of the customer or any other person arises out of these instructions.

4. Ranco ETC controls have been approved by Underwriter's Laboratories as UL listed; however, approval does not extend to their use for any other purpose. Ranco assumes no responsibility for any unconventional application of its control unless such application has been approved in writing by Ranco.

5. It is the responsibility of the installer and the user to assure that his or its application and use of all Ranco products are in compliance with all federal, state and local requirements, including, without any limitation, all requirements imposed under the National Electric Code and any applicable building codes.

CAUTION

To prevent possible electrical shock or equipment damage, disconnect electrical power to the unit before and during installation. **DO NOT** restore electrical power to unit until the control is properly installed and the cover is assembled. **DO NOT** locate the control in an explosive atmosphere as a safety hazard can result due to possible spark generation in the control. Controls are not to be located in areas of significant moisture, dirt or dust, or in a corrosive explosive atmosphere. Use of control in such environments may result in injury or damage to the persons or property (or both) and are likely to shorten the control life;
Ranco assumes no responsibility for any such use.

CONTROL MOUNTING

Mount the ETC to a wall or any flat surface using a combination of any two or more of the slotted holes located on the back of the control case. The control's components are not position sensitive,but should be mounted so that they can be easily wired and adjusted. Avoid excessive conditions of moisture, dirt, and corrosive atmosphere.

The ETC has provisions for 1/2 inch conduit connections. The conduit hub should be secured to the conduit before securing the hub to the plastic housing of the control. When using the conduit entry in the rear of the case, a standard plug should be inserted into the conduit hole in the bottom. Caution should be exercised not to damage the control circuit board or wiring when installing a conduit connector.

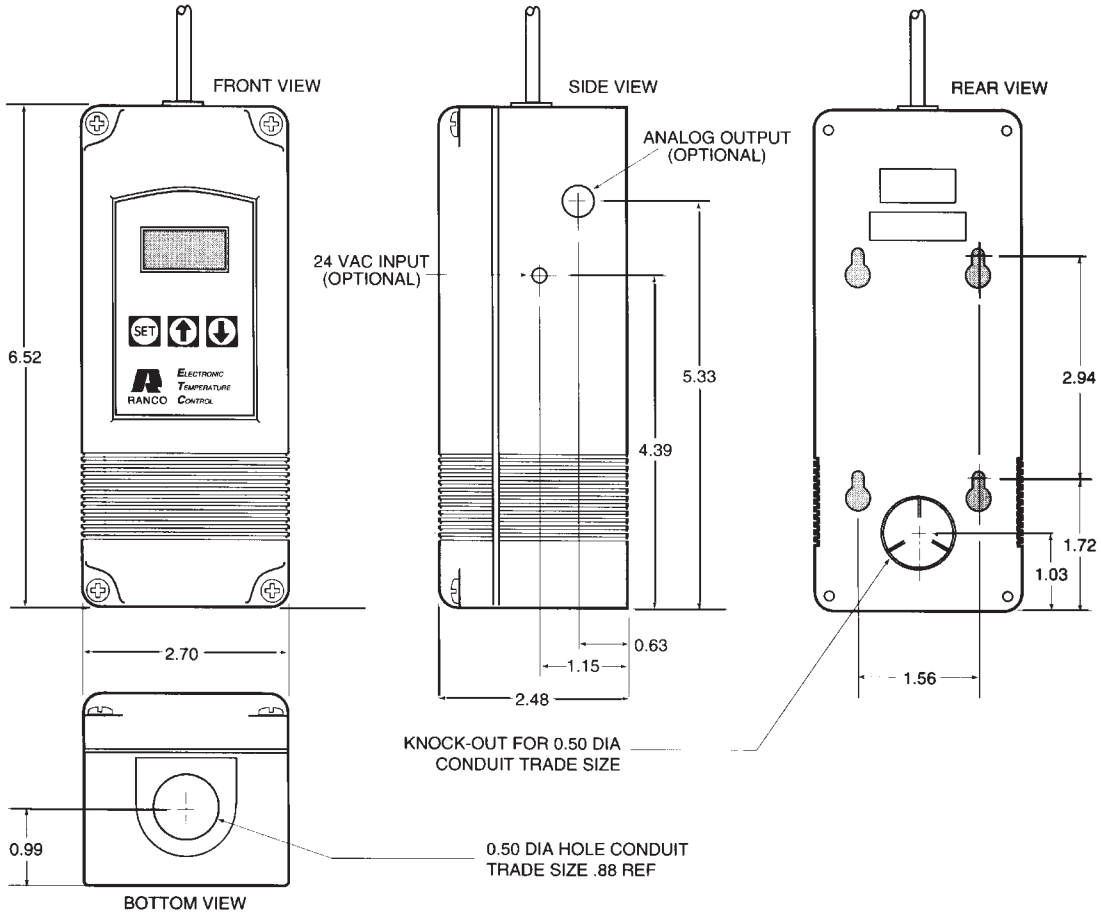


Figure 3: Dimensions (Inches)

CONTROL WIRING

General

- All wiring should conform to the National Electric Code and local regulations.
- The total electrical load must not exceed the maximum rating of the control (see Specifications).
- Use copper conductors only.
- Electrical leads should not be taut; allow slack for temperature change and vibration.

Input and Output Wiring

For typical wiring diagrams, refer to Figures 4, 5 and 6. All connections are made to the power (lower) circuit board. When using the 24 VAC powered models, the 24 VAC input lines must enter through the sidewall of the case. Refer to figure 3 for location of the entry hole.
Figure 7 for wiring.

Analog Output

ETC models are available with an optional 0 to 10 volt analog output. This signal is a linear representation of the sensor temperature with 0 volts = -30°F and 10 volts = 220°F. See figure 8 for wiring information and figure 3 for location of the entry hole. The reference for this output is designated by the "-" symbol on the wiring diagram. The output signal is designated by the "+" symbol.

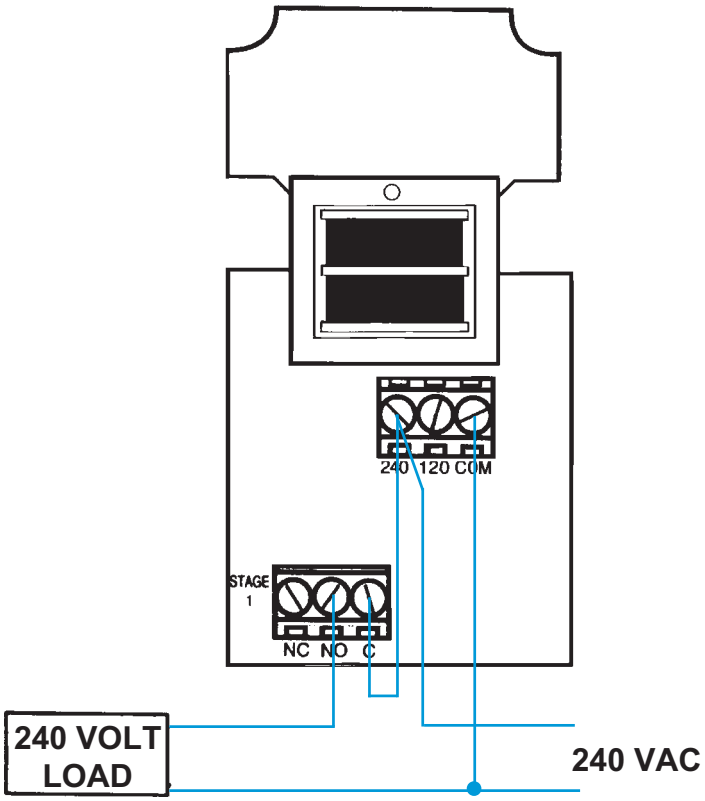


Figure 5: Typical Wiring Diagram for 240 VAC Power Input and Line Voltage Switching.

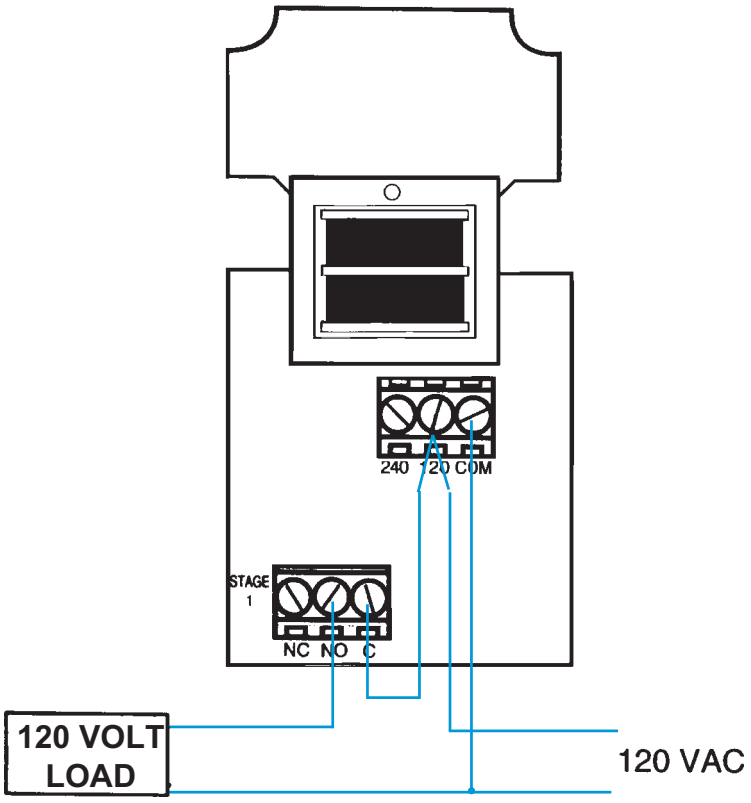


Figure 4: Typical Line Voltage Wiring Diagram.

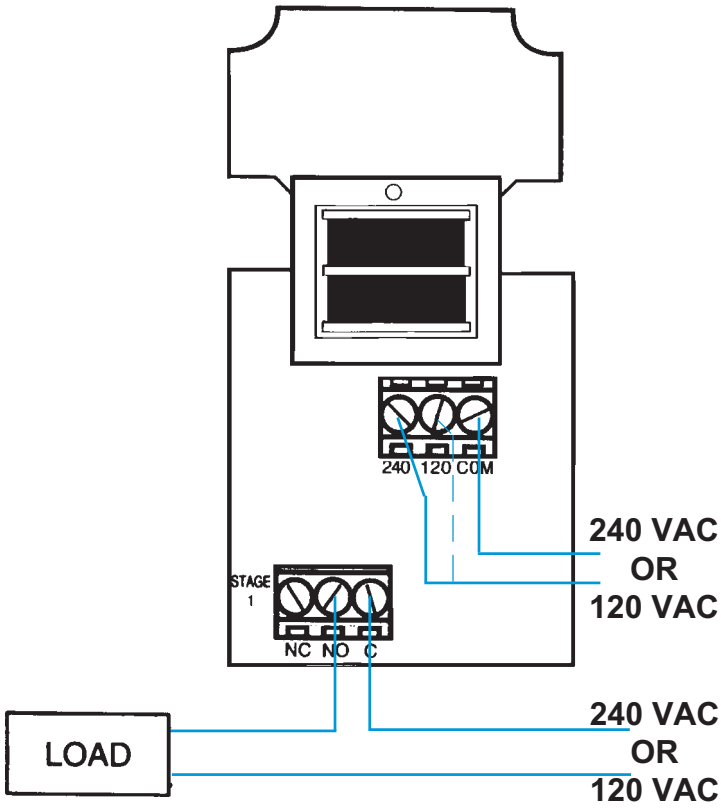


Figure 6: Different Voltage to Control and Different Voltage Load.

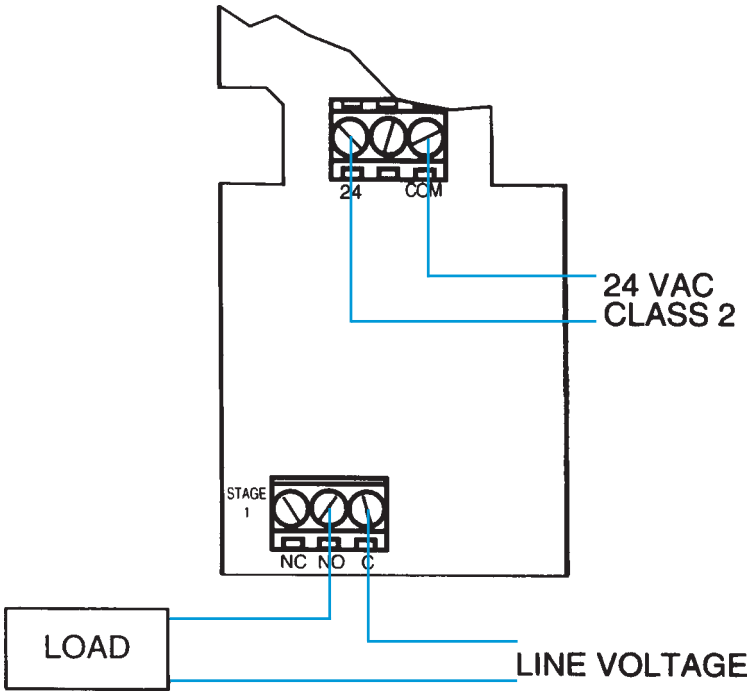


Figure 7: Typical Wiring Diagram for 24 VAC Power Input and Line Voltage Switching.

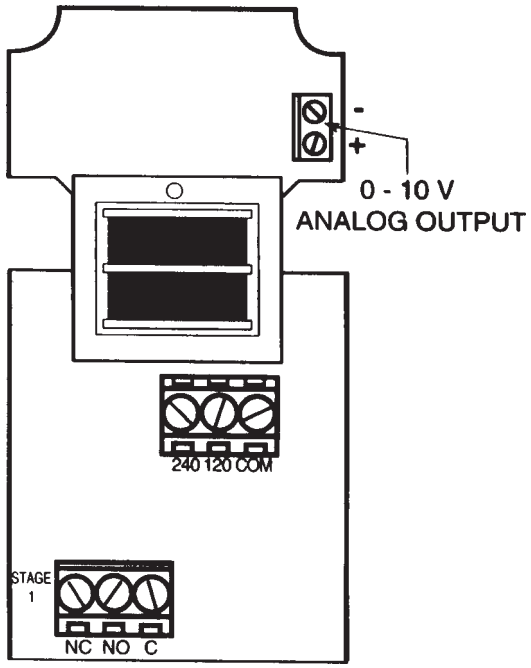


Figure 8: 0-10 V Analog Output Located on Power (Lower) Circuit Board.

FIELD REPAIRS

Field calibrating or repairs to the ETC control must not be attempted. Sensors and replacement controls are available through Ranco wholesalers.

SENSOR MOUNTING

For space sensing, mount the sensor where it will be unaffected by heat/cool discharge or radiated heat sources. Spot sensing requires the sensor to be in good contact with the surface being sensed. The sensor can be inserted in a bulb well for immersion sensing.

EXTENDING SENSOR

CAUTION: Sensor wiring splices may be made external from the control. **DO NOT** attempt to unsolder the sensor at the control circuit board!

CAUTION: Disconnect power to control before wiring to avoid possible electrical shock or damage to the controller.

Additional cable can be spliced to the sensor cable to increase the length beyond the standard 8 feet. It can be extended up to 400 feet. The cable should be at least 22 AWG or larger to keep additional resistance to a minimum.

All splices and wire lengths added to the sensor cable should be made according to acceptable wiring practices and should conform to the National Electrical Code and local regulations. Use copper conductors only. Shielded cable is not required.

Checkout Procedure

1. Before applying power, make sure installation and wiring connections are correct.
2. Apply power to the control and observe one or more cycles of operation.
3. If performance indicates a problem, check sensor resistance to determine if sensor or control is at fault.
4. To check sensor resistance, disconnect sensor and measure the resistance across the leads while measuring temperature at the sensor.

TEMPERATURE AVERAGING

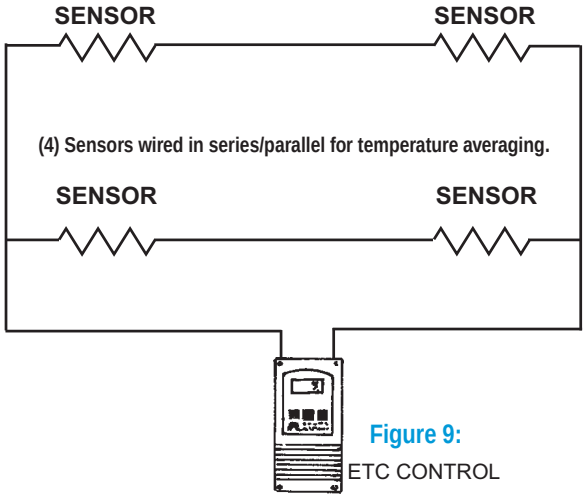


Figure 9:

Replacement Sensor - Order Part No. 1309007-044

SPECIFICATIONS

The 1309007-044 sensor is a negative temperature coefficient (NTC) thermistor sensor. The sensor resistance decreases with temperature increase. It is .25 x 1.94 long with 8 feet #22 AWG cable. The thermistor has a reference resistance of 30,000 ohms at 77°F (25°C).

IMPORTANT

The schematic drawings and other information included in these instructions are for the purpose of illustration and general reference only. Ranco assumes no responsibility for any unconventional application of this control, unless such application has been approved in writing by Ranco.

Deg. C.	Deg. F.	RES. Nom.
-40	-40	1,010,000
-30	-22	531,000
-20	-4	291,200
-10	14	166,000
0	32	97,960
10	50	59,700
20	68	37,470
25	77	30,000
30	86	24,170
40	104	15,980
50	122	10,810
60	140	7,464
70	158	5,200
80	176	3,774
90	194	2,753
100	212	2,036
110	230	1,531

Figure 10 :
Resistance vs Temperature of 1309007-044. Sensor including 8 foot cable.

RANCO

Ranco North America
8115 U.S. Rt. 42 North
Plain City, Ohio 43064

Invensys
An Invensys Company

OWNER'S MANUAL