



Portage & Main ENVIRO CHIP 500 Automatic Chip Burning Furnace



Please Save These Instructions For Future Reference

Preface

Dear New Enviro Chip 500 Owner,

Thank you for purchasing your new Portage & Main Enviro Chip 500 Wood Chip Burning Unit.

Please take a few minutes to read this manual. It will help you understand the set up procedure, operation, and maintenance of your “Enviro Chip 500”.

A properly set and maintained Stoker will give the best performance and preserve the life of your new furnace/boiler.

Any additional advice that you may need which is not found in this manual may be obtained from your local dealer or from the factory.

Sincerely,

Piney Manufacturing Ltd.
Box 130
Piney, MB
R0A 1K0

Notice to the Reader

Piney Manufacturing warrants all Portage & Main Outdoor Water Furnaces Models. Piney Manufacturing does not warrant any of the supporting products described within this Operation and Maintenance Manual.

All contents, descriptions, directions, diagrams and recommendations within this manual are solely for suggested operation and maintenance policy.

Also, Piney Manufacturing, shall not be liable for any special, consequential, or exemplary damages, resulting in whole or part, from the readers/operators neglectful use, based upon the material within this operation and maintenance manual.

Operator(s) of a OWHH is/are responsible for operation in a manner that does not create a public or private nuisance condition. Meeting the distance and stack height recommendations from the manufacturer and requirements in applicable state/province and local regulations may not always be adequate to prevent nuisance conditions in some areas due to terrain or other factors.

Methods of operation outlined within this Operations and Maintenance Manual, have proven to be effective for Piney Manufacturing Ltd. for the sole purpose of the operation of the Portage & Main Outdoor Furnace—Optimizer 250.

Formulas and figures listed in this Operations and Maintenance Manual may be approximated and should be read as such.

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Getting Acquainted

Before you begin installing your new Enviro Chip 500, please take a few minutes to read though this manual. It contains information and tips for installing the stoker and a few suggestions on ways to make better use of the energy available from your Chip burner.

Figure A – Enviro Chip 500 Stoker

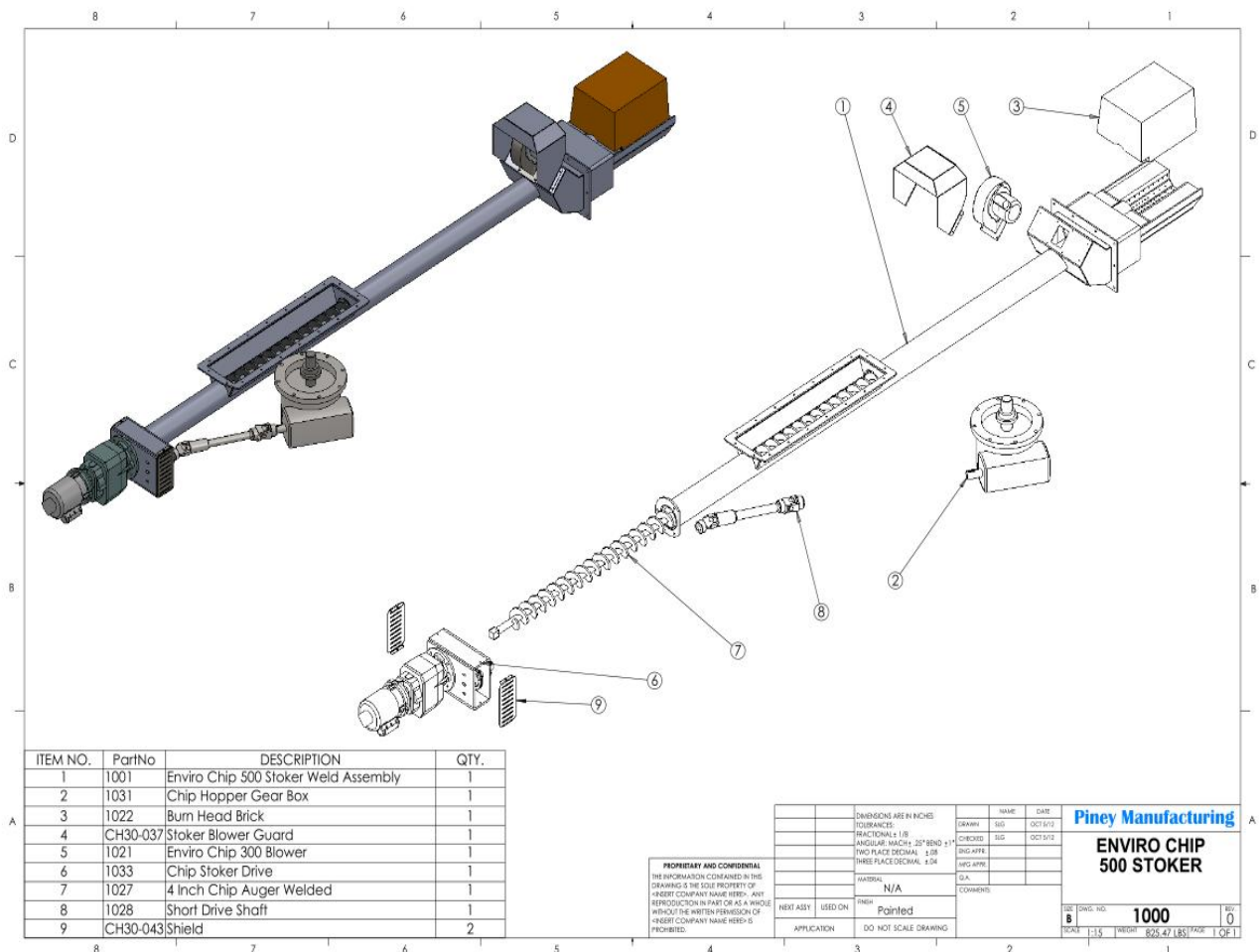


Figure B – Enviro Chip 500 Motor and Gear Drive Assembly

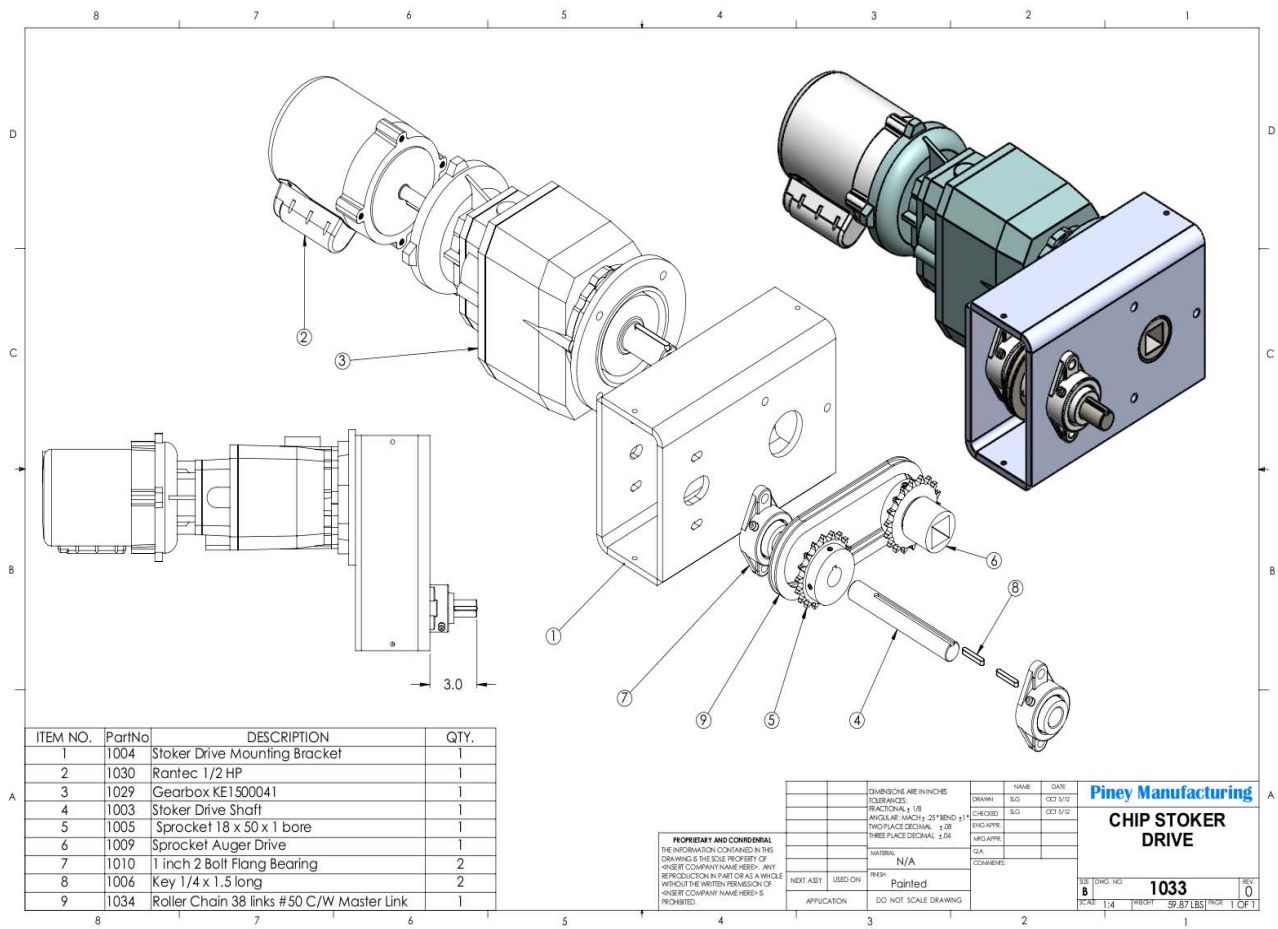
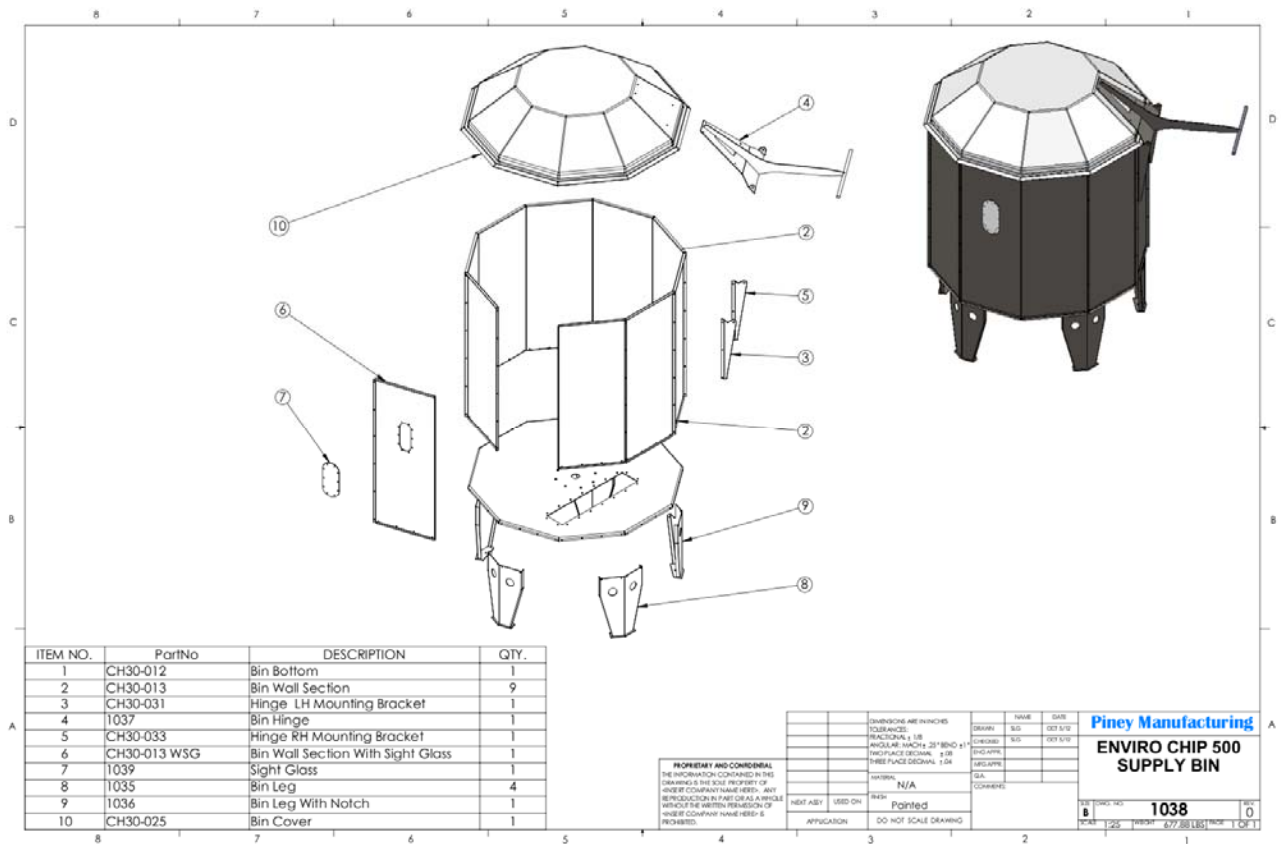


Figure C – Enviro Chip 500 Chip Bin Assembly



Getting Started

Note: The Enviro Chip 500 is EPA Phase 2 qualified for use as an out door furnace only. Installation must be in accordance with local or provincial codes that may be different from this manual. Check with your insurance company regarding regulations which apply to installations in your area.

Chip Storage: The Enviro Chip 500 comes with a storage bin that will need to be assembled on site. The chip storage bin requires a level pad. We recommend that this unit be set on a concrete pad approximately 8ft wide by 18ft long.

Preparation: Follow the installation directions for your Enviro Chip 500

Foundation: Concrete is recommended.

Recommendation: We recommend a hot water circulation loop that will dissipate at least 10% (ten percent) of the estimated heat output of the outdoor water furnace in the event that circulation is reduced because of electrical power failure. This loop shall be such that it can only be made inoperative by a deliberate manual action. The minimum pipe to be used should be 18mm (.75 inch) in diameter, room temperature of 65 F (18C) and mean water temperature of 180 F (82C). This loop should be positioned above the water furnace with features that promote natural thermal circulation of the water. The recommended piping should be such that excessive pressure will no develop in any portion of the water furnace or system.

Connecting Power Supply: The Portage & Main Enviro Chip 500 requires (120 Volt 10 Amp power supply) at the stoker control box. Refer to Figure D for wiring instruction. This should be done so that the boiler can be disconnected remotely, in an emergency situation. (Cutting off power supply away from the Outdoor Water Furnace)

Note: Electrical hook-up should be done in accordance with Part 1 of the Canadian Electrical Code and any Local Codes having jurisdiction.

Installation: The installation is only to be performed by a qualified installer. The boiler part of the whole setup needs to be put into place before we do any thing at all. Once the furnace is placed in proper position (clearance to combustibles and ash removal distance to the outside wall) slide the stoker under the chip bin and bolt into place as shown in drawing. This can only go one way with the proper end of the stoker facing the proper end of the chip bin (pay special attention when placing stoker under the bin).

Next you must insert the burnhead end of the stoker into the boiler (**apply silicone on the flange that attaches to the boiler to prevent any air leaks**) and bolt it into place with the 3/8 x 1" bolts that have been provided.

You now have only the short drive shaft to install and make the wiring connections as shown in the drawing. The short drive shaft runs from the drive end of the stoker to the gear box under the chip bin.

Once the above is completed, you can install the panels that form the chip bin and the chip bin lid. Pay attention as to where you want the sight window to be when you are done and also how you want the lid to open.

Also the chip bin lid has a shut down safty switch that needs to be installed, so that when the lid is

open the unit shuts down.

Clearances to combustibles are:

- Back and sides 18 inches (46 cm)
- Front 48 inches (122 cm)
- Top 18 inches (46 cm)
- Flue pipe 18 inches (46 cm)
- This appliance is to be mounted on a non combustible floor (concrete slab). The slab should extend 16 inches (400mm) in front and 8 inches (200mm) on either side of the ash removal doors.

The chimney should be type HT (Selkirk Chimney) 6 inch. 1 piece is provided.

Always operate the stoker furnace in a safe manner. Have a clearly understood plan to handle a chimney fire or any fire at all.

Turn power off, close all doors, and manually close all dampers, in the case of a run away fire.

Requirements for Canadian Installation

Do not connect this unit to a chimney flue serving another appliance.

WARNING—Risk of fire. Surfaces are hot. Keep children away. Do not touch during operation.

Do not operate with fuel loading or ash removal doors open.

Do not store fuel or other combustibles with in marked installation clearances.

Inspect and clean flues and chimneys regularly this is especially important at the end of each heating season to minimize corrosion during the summer months caused by accumulated ash.

This furnace may be connected to an existing boiler system. The “boiler add-on” shall:

- Be installed without interfering with the normal delivery of heated water from the original boiler.
- Be installed without affecting the operation of the electrical and mechanical safety controls of the original boiler.
- Provide for a change over from one fuel to the other without requiring manual adjustments of any control or component other than the thermostats.
- Have provision for preventing or adequate water capacity within the boiler to prevent damage from loss circulation due to electrical power failure.
- Be installed without changing the function if 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.

Additional Instructions:

1. Operate the (Gas, Oil, Electric) boiler periodically to ensure that it will operate satisfactorily when needed.
2. Do not relocate or bypass any of the safety controls in the original (Gas, Oil, Electric) boiler installation.
3. The operation of the gas boiler must be verified for acceptable operation before and after installation of the add-on appliance by a gas filter that is recognized by the regulatory authority.
4. Do not connect to any chimney or vent serving a gas appliance.

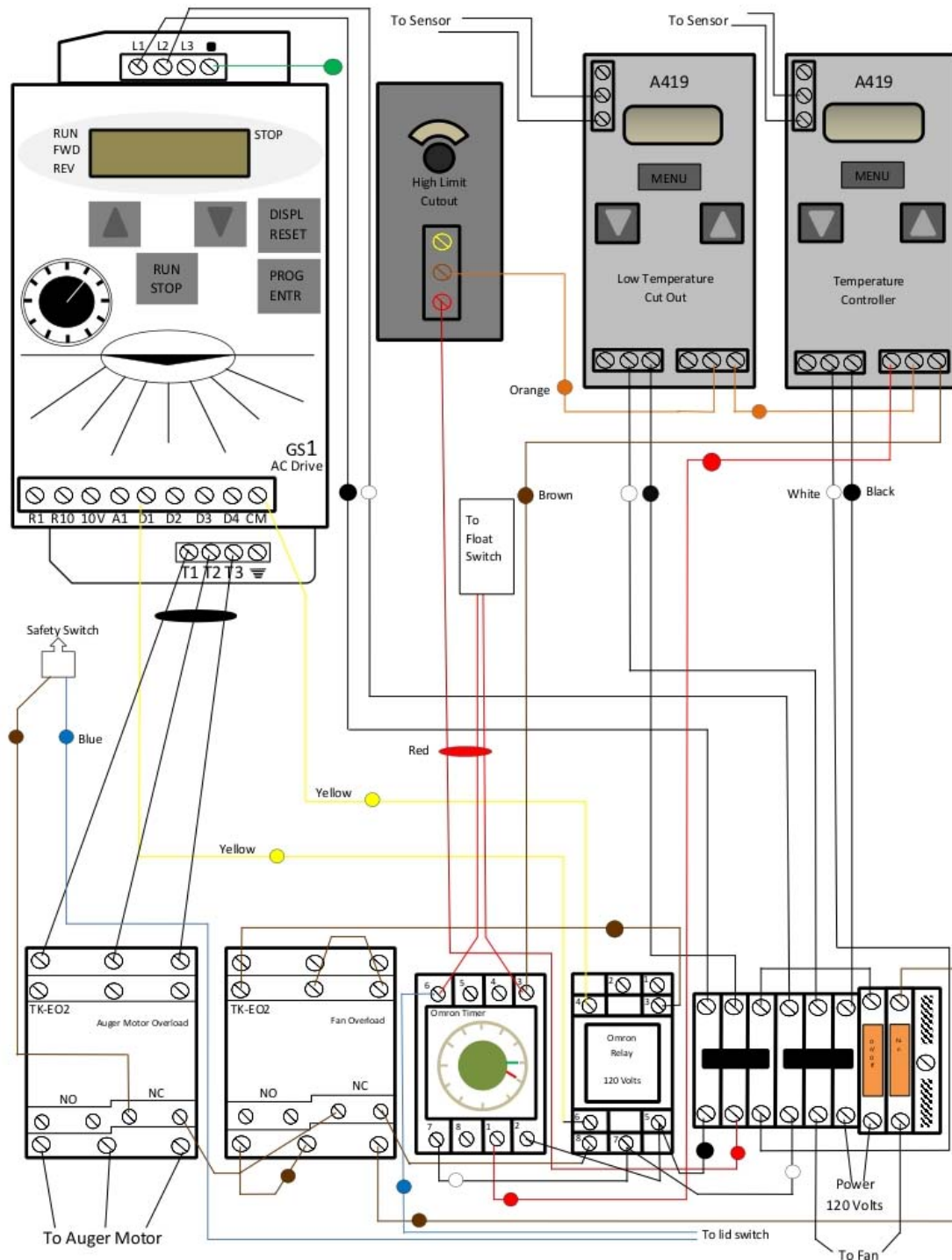
The installation should comply with requirements of CAN/CSA-B365, and changes to the installation should comply with CSA B139

(For oil-fired), C22.1 (for electric), or CAN/CGA-B149.1 or CAN/CGA-B149.2

(For gas-fired).

Low Water Shut Off: The Portage and Main Enviro Chip 500 is equipped with a low water shut off switch, the boiler has to be filled to the proper operating level for the boiler to operate. This will also prevent any damage from over-heating the boiler.

Enviro Chip 500 Wiring Diagram



Underground Insulated Pipe Trench

- Pre-insulated pipes such as Urecon Dual Pex Flex, properly sized for circulation requirements, are recommended to convey the hot water from the outdoor water furnace to each building. The piping should be laid in a flat trench eighteen (18) inches to thirty six (36) inches deep. If high water table is encountered, the trench may be shallower, traffic permitting. It is to your advantage to be down deeper at the boiler/furnace especially as it makes the bend easier.
- Use water tight pipe insulation is recommended as all Styrofoam will absorb water to the point it becomes very poor insulation. Only use in high dry well drained areas if using at all.
- ALL PLUMBING MUST BE DONE ACCORDING TO APPLICABLE LOCAL CODES.

Water Fill-Up

- After installing the Water Furnace in place and connecting to it the supply and return pipe(s) to and from the various buildings to be heated, IN ACCORDANCE WITH APPLICABLE LOCAL CODES, the heating installation is ready to be filled with water.
- Before filling the Water Furnace with water, make sure all valves are in “closed” position, and unused supply and return outlets in the control panel of the outdoor water furnace are tightly capped or valves installed for future use.
- A permanent water supply to the Outdoor Water Furnace is recommended by tapping into the water mains and connecting it to the top of the Outdoor Water Furnace through a manually operated shut-off valve. Use only good quality water. Do not use water with iron, minerals, or hard water. Do **not** use reverse osmosis water. Filtered rain water is usually the best.
- Add water until the entire heating installation is filled and the level gauge on top of the outdoor water furnace shows almost full. This is to allow for water expansion as it is heated.
- Before starting the outdoor water furnace, make sure the entire heating installation is properly vented to facilitate the circulation of water in the heating loop(s).
- Ensure water trap and discharge pipe are properly installed and unobstructed to release any pressure build-up in the outdoor water furnace.

Corrosion Control

To control corrosion in the Portage & Main Outdoor Water Furnace we recommend the following:

- Always use Certified Boiler Treatment. Submit water sample for testing annual through your dealer. Keep your **records**.
- Always maintain the proper water level.
- Add a commercially available antifreeze solution to the water in the order of thirty (30) per cent, during the initial water fill-up. Optional.
- When adding large make-up water quantities to compensate for evaporation and to maintain proper water level, use the same ratio of antifreeze solution to the make-up water. For smaller make-up water quantities, no antifreeze solution is required.
- If sedimentation occurs after the initial few weeks, the water should be treated chemically to adjust its pH level. Consult your dealer for water analysis and treatment.
- Keep ashes to minimal. Do not burn garbage.

Fuel Types

1. Your Portage & Main Enviro Chip 500 Water Furnace with the stoker attachment is designed to burn a wide variety of wood chips.
2. Make sure the wood chips you use have been run through at least a 2 inch chip or mulch screen.
3. Moisture content and chip size will have a effect on the performance and effeicentsy of this boiler.
4. Contact your authorized dealer or the factory if you have any questions about fuel types.

Staring The Fire

1. Before you fill the hopper with wood chips and turn the stove power supply on.
2. Insure that the auger is inserted into its drive key in the back of the chip bin, if the drive is turning the auger than this is OK. This can be done by watching the auger through the fire door.
3. Set the aqua stat at 160 degrees F. Turn the power supply off when fuel begins to spill onto the burn head.
4. Once the power supply had been turned off ,use a small amount of wood pellets or wood kindling placed on top of the head to start a fire. Make sure that the fire is as close to the auger where the chips spill onto the burn head as possible.
5. Turn the stove on and turn the auger speed down with the variable speed dial the control box. Run the fan until wood pellets or wood kindling are thoroughly lit. If necessary reduce the fan air flow by closing the fan damper.
6. Once the fuel is properly lit, speed up the feed auger for a little more fuel. Watch the Stocker for a few hours, making sure that the fire does not move away from the front of the auger. The main fire should stay directly in front of the feed auger. If the fire moved ahead of the front of the auger, you may be running the feed auger to fast. Follow the instructions in the following pages to set controls for continued operation.

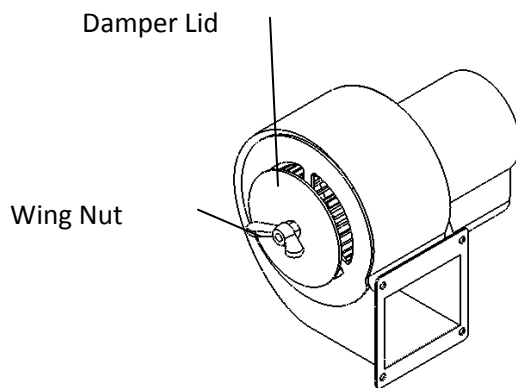
CAUTION: The Enviro Chip 500 Water Furnace is not to be manually and automatically fueled simultaneously

WARNING: Do not fire this boiler during prolonged power failure.

Fuel Feed Adjustment

Air Regulating: Run the stove from 1 to 4 days to determine a heat load and then make final fuel and air adjustments. Experiment and observation will be necessary to achieve the most economical operation. Try to set the feed rate so that it is on most of the time. Use as little air as possible to burn the fuel you are using. Adjust the air flow by rotating the air flow damper on the fan housing. Too much air results in excessive fly ash and wasted energy. Too much air will blow the unburned fuel off the head. Too little air gives a smoky fire with soot accumulation in the furnace, and chimney as well as unburned fuel piling inside the stove. Lock the air flow damper in place with the wing nut after adjustments are complete (See Figure E).

Figure E Air Flow Damper Adjustment



Fuel Feed Regulation: The fuel feed rate on your Stoker can be adjusted to suit the type of fuel being used and change the rate of energy it produces. Fuels with a lower energy value or if more energy is demanded of your stove require a faster fuel feed rate. You can adjust your feed rate automatically with a variable speed dial located in the control box.

End of Heating Season

- Clean out all ashes (Wet ash could cause corrosion.)
- Clean and cover chimney
- Oil heat exchanger and furnace floor where ash collects

Maintenance:

Lubrication--Both gearboxes should be checked once a month. Remove the plug from the gearbox housing. The oil level should be near the top of the plug opening. Fill if necessary.

Cleaning--Turn the stoker power off. Open the firebox door and heat exchanger doors. Using the round flue brush. Clean the fly ash off the inside heat exchanger tubes. Remove all the ash from the ash pan and ash pan area. The chimney should be checked and cleaned each time the ash is cleaned out. Inspected all seals on all doors regular, and keep them in good condition.

OPERATING INSTRUCTIONS

1. The Enviro Chip 500 Water Furnace may be connected to an existing boiler system. Burn natural chip-fuel only. Cover chipped fuel to protect it from fall rains and snow.
2. Do not use chemical substances or liquid fuels to start or enhance the fire.
3. Do not burn garbage, liquid fuels, engine oil, naphtha or other flammable materials, which may cause a fire or an explosion or cause corrosion.
4. The Enviro Chip 500 has a air flow adjusting damper the blower fan
5. To adjust the air flow turn the damper to the desired airflow.
6. Clean the heat exchanger regularly to remove accumulated ash. Flue pipe and chimney need to be cleaned periodically.
7. Clean the Outdoor Water Furnace and cap the chimney at the end of each heating season to minimize corrosion during summer months.
8. Always maintain the Outdoor Water Furnace, flue pipe and chimney in good condition.
9. Do not load the Outdoor Water Furnace with chipped fuel during an electrical power failure. Do not leave fire door open.
10. For safety do not store any fuel or combustible materials within the installation clearances of the outdoor water furnace.
11. Keep firing, and heat exchanger doors tightly closed at all times for safety.
12. Always keep (hot coals) on the burn head; the furnace works best when this ash bed is kept. Keep the ash area below the firepot clean and free from ash in the summer months to prevent corrosion
13. Have a clear understood plan to handle a runaway fire or chimney fire, like turn off the power, etc.

SAFETY WARNINGS

- **NEVER LEAVE CHILDREN UN-ATTENDED NEAR THE BOILER.**
- **NEVER ADD WATER WHEN OUTDOOR WATER FURNACE TEMPERATURE IS CLOSE TO 212 °F AS IT MAY RESULT IN STEAM FLASHING.**
- **NEVER PREFORM ANY SERVICE OR MAINTENANCE WORK BEFORE WATER TEMPERATURE DROPS BELOW 100 °F.**
- DO NOT store combustible materials or liquids near the Outdoor Water Furnace.
- DO NOT burn any materials other than natural wood.
- DO NOT use flammable liquids or materials to start or to enhance the fire.
- DO NOT leave wood loading door open or unlatched.
- DO NOT open the loading door too quickly to avoid blowbacks which could cause severe burns.
- ALWAYS check water level, aquastat and damper setting for a proper and safe operation.
- Lock doors with your own locks if required.
- Never allow unauthorized opening, filling or servicing of the furnace
- DO NOT touch any part on the front of the Outdoor Water Furnace, which are not insulated to avoid skin burns.
- ALWAYS store ashes in tightly covered metal containers away from combustible materials.
- It is not designed to be used as an incinerator.

Note: Always keep an eye on the fly ash throughout the system. If properly maintained it will operate trouble free.

Aqua Stat Control Settings: Set the Temperature control aqua stat to 160 degrees F. Set high limit at 200 degrees F. The differential in the temperature control aqua stat can be set between 1 and 30 degrees F. This is a good feature for warmer weather to make the stove cycle more often.

The control box is also equipped with a OMRON Timer, which overrides the aqua stat control, to make the water furnace cycle. The OMRON timer is factory set to cycle for 30 seconds (thirty) every 30 minutes (thirty).. This is for burn back prevention and to insure a minimum fire.

Note: It takes as much fuel to heat water from 160 to 180 degrees F as it does to heat it from 70 to 160 degrees F.

Settings

The A419 control functions

Setpoint (SP) establishes the temperature value at which the equipment is switched on or off, depending on the user selected mode of operation. Setpoint range is -30 to 212°F or -34 to 100°C (in 1 degree increments).

If Setpoint mode is set to cut-in, setpoint is the temperature value at which the control closes the Normally Open (N.O.) contacts. If Setpoint mode is set to cutout, setpoint is the temperature at which the N.O. contacts open.

Differential (dIF) established the difference in temperature between the cut-in value and cutout value. The differential is set relative to Setpoint and may be set from 1 to 30 F° or C° (in 1 degree increments).

Anti-Short Cycle Delay (ASd) established the minimum time that the outplay relay remains de-energized before the next on-cycle. The **ASd** does not allow the output relay to re-energize until the programmed time delay has elapsed. The delay is activated when the control is first turned on and every time an on-cycle ends. When the delay is activated, the LCD alternately flashed the sensor temperature and **ASd**. The anti-short Cycle Delay range is 0 to 12 minutes (in 1minute increments).

Sensor Failure Operation (SF) establishes how the A419 control's output-relay operates the equipment in the event of a sensor or sensor wiring failure. The user may select to run the equipment continuously or to shut it down. When the control detects a sensor circuit failure, the LCD flashes SF alternately with OP (if the sensor circuit is open), or **SH** (If the sensor circuit is shorted). Before indicating a failure, the control implements a 1-minute delay, which allows verification of failure condition and avoids nuisance failure indications.

Temperature Offset (OFS) establishes a set secondary **Setpoint** and **Differential** values that may be invoked to control an application when a circuit is closed between the binary input (**BIN**) and common (**COM**) terminals (and **BIN** appears on the display). See Figure 3. Offset range is 0 to 50F° or C° (in 1-degree increments). A typical application might use a switching time clock to invoke night-setback temperature settings.

IMPORTANT: Make sure the Touchpad Lock jumper is installed (unlocked) before attempting to adjust the A419 control functions.

Changing the A419 Control Temperature Units

The A419 control is factory set to display Fahrenheit temperature. To change to Celsius, press **Up** and **Down** (arrows) simultaneously. Press them again to display Fahrenheit units. Verify that the control is displaying the desired temperature units before setting the Setpoint.

Setting the A419 Control Setpoint Value

To view and adjust Setpoint, follow these steps:

1. Press and hold MENU (about 2 seconds) until the display flashes SP.
2. Press MENU again to display the existing setpoint value.
3. Press Up or Down (arrows) to change the setpoint value.
4. Press MENU again to save the new value. The display returns to the sensed temperature.

Note: If no setup entry is made for 30 seconds, the control reverts to the (normal) temperature display.

IMPORTANT: If MENU is not pressed after changing the setpoint value, the control will revert to the preciously programmed setpoint value

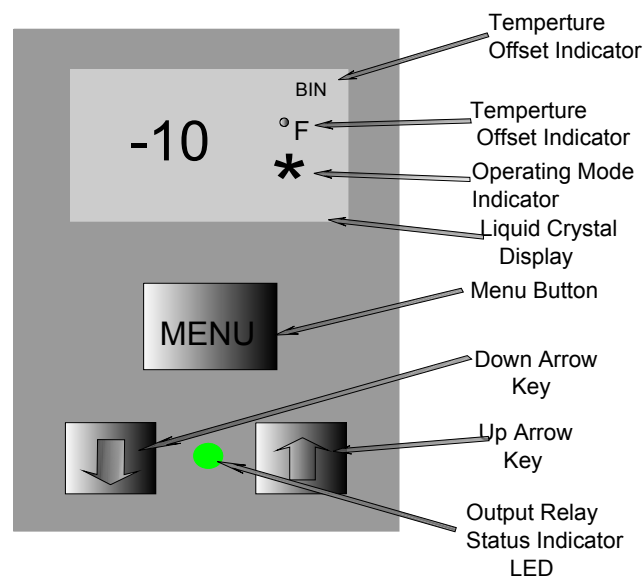


Figure 6: Liquid Crystal Display, Touchpad, and LED Indicator

Settings on the Other A419 Control Functions

To set the Differential, Anti-short Cycle Delay, Temperature Offset, or Sensor failure operation, use the following method.

1. Press and hold Menu until the display changes to flashing SP. (This takes about 2 seconds.)
2. Press Up or Down (arrows) repeatedly until the desired function is displayed. (See Table 3.)
3. Press Menu to display the functions current value.
4. Press Up or Down (arrows) until the desired value is displayed
5. Press MENU to save the new value. The display returns to the sensor temperature.

IMPORTANT: If MENU is not pressed after changing the settings, the new settings are not saved and the control reverts to the previously programmed setting values.

NOTE: If no setup entry is made for 30 seconds, the control reverts to the (normal) temperature display.

NOTE: Any saved A419 control settings are non-volatile and remain in the control's memory during power interruptions.

IMPORTANT: Do not set Setpoint and Differential values which (when totaled) fall out of A419 control's Setpoint range (-30 to 212 °F [-34 to 100°C]). The control will not function properly if Cut-in or Cutout values are outside of the control's Setpoint range.

Checkout

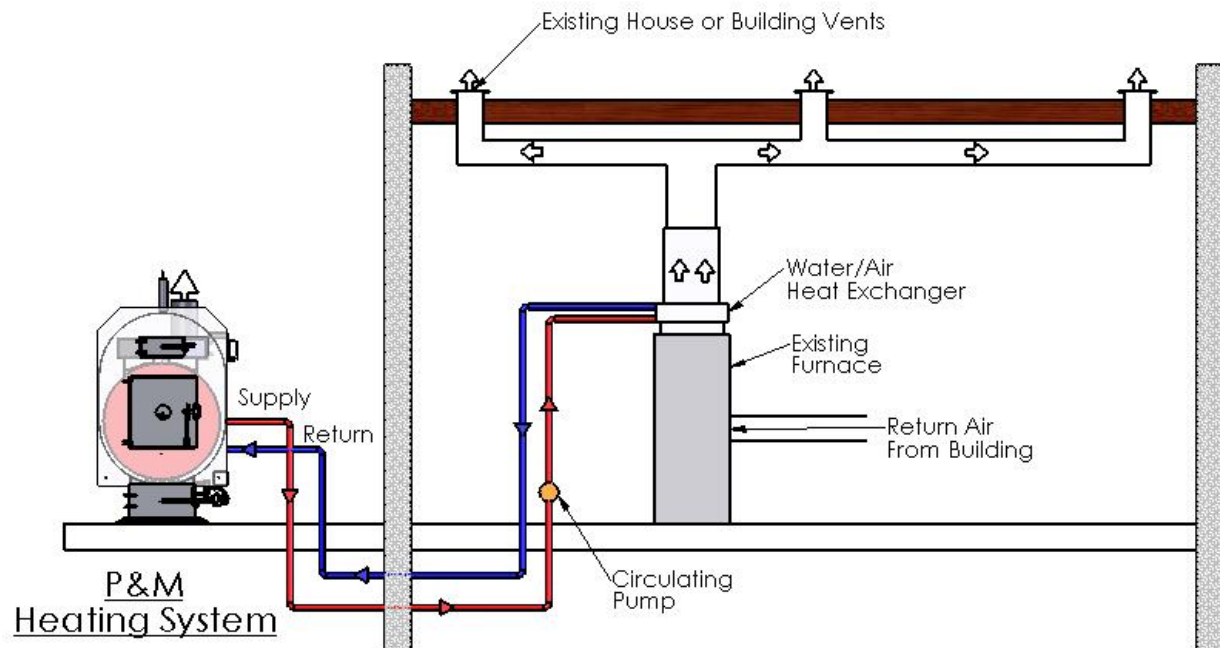
Before applying power, make sure installation and wire connections are corrects for your application. Then power, operate and observe the system and A419 control for at least three complete operating cycles before leaving the installation.

Table 3: Display Symbols, control Function, Ranges, Unites, Values, and Factory

Display Symbol	Control Function	Range – Units/Value	Factory Set Value
SP	Setpoint*	-30 to 212 - °F (-34 to 100 - °C)	30
dIF	Differential*	1 to 30 – (F° or C° in 1-degree increments)	5
ASD	Anti-short cycle Delay	0 to 12 – (in 1-minute increments)	1
OFS	Temperature Offset	0 to 50 (F° or C° in 1-degree increments)	0
SF	Sensor Failure Operation	(No range) – 0 = output relay de-energized 1= output relay energized	1
F or C	Temperature Units	(No range) - F° or C°	F°
BIN	Temperature Offset Indicator	(No range) – BIN is displayed and the A419 control operates on the secondary setpoints when the circuit between the BIN and COM terminals is closed.	N/A
Snowflake or flame picture	Cooling or Heating Mode of Operation	(No range) – A Snowflake (Cooling Mode) is displayed when the Jump1 jumper is removed. A Flame (Heating Mode) is displayed when the Jump1 jumper is installed.	Snowflake (Cooling Mode)

*The sum of the Setpoint and Differential values must be within the Setpoint range, or the control may not function properly.

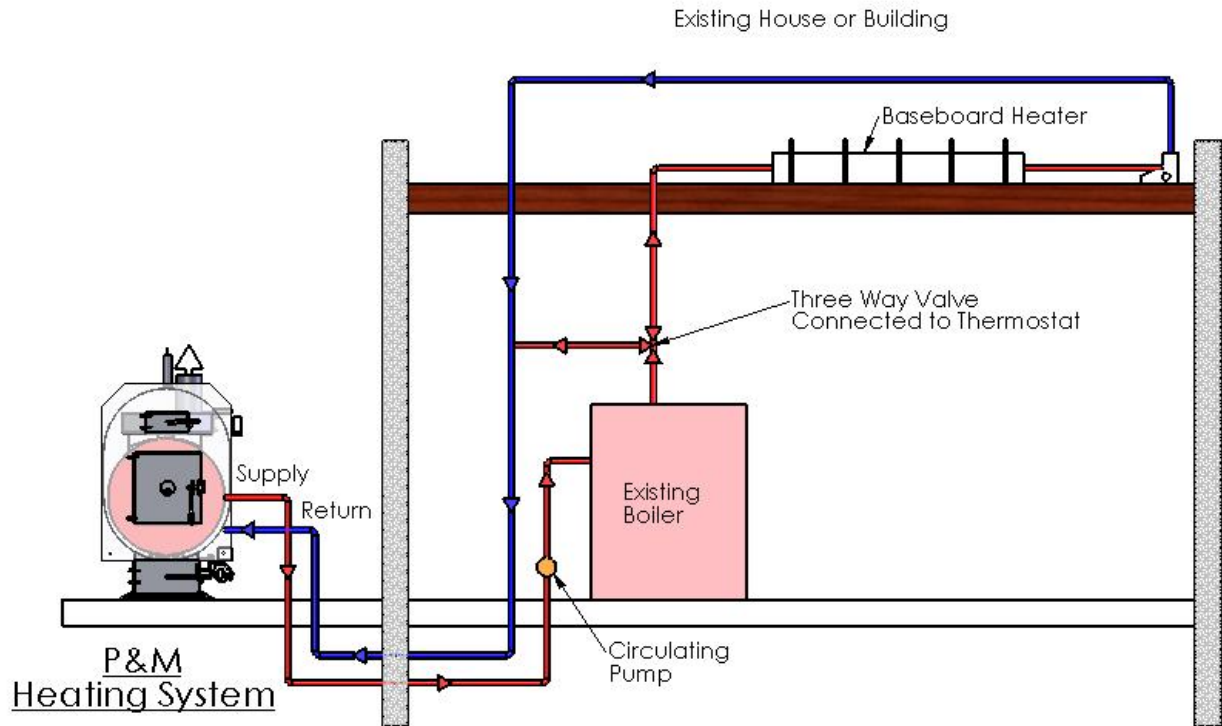
CONNECTING THE P&M SYSTEM



CONNECTING TO AN EXISTING FORCED AIR SYSTEM

SCHEMATIC #1 - Schematic Drawing for Illustration Purposes Only

CONNECTING THE P&M SYSTEM

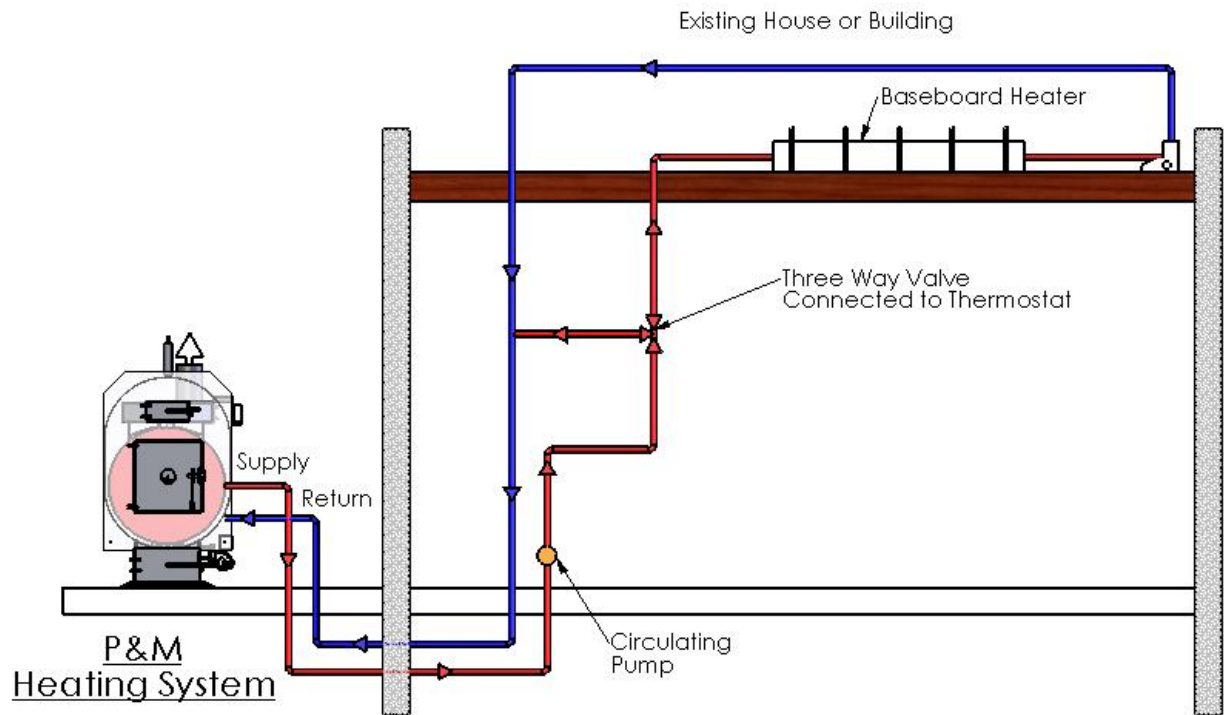


CONNECTING TO AN EXISTING BOILER / BASEBOARD SYSTEM

SCHEMATIC #2 - Schematic Drawing for Illustration Purposes Only

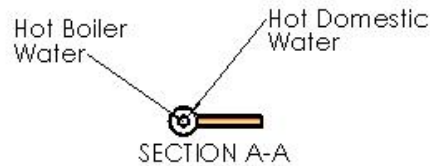
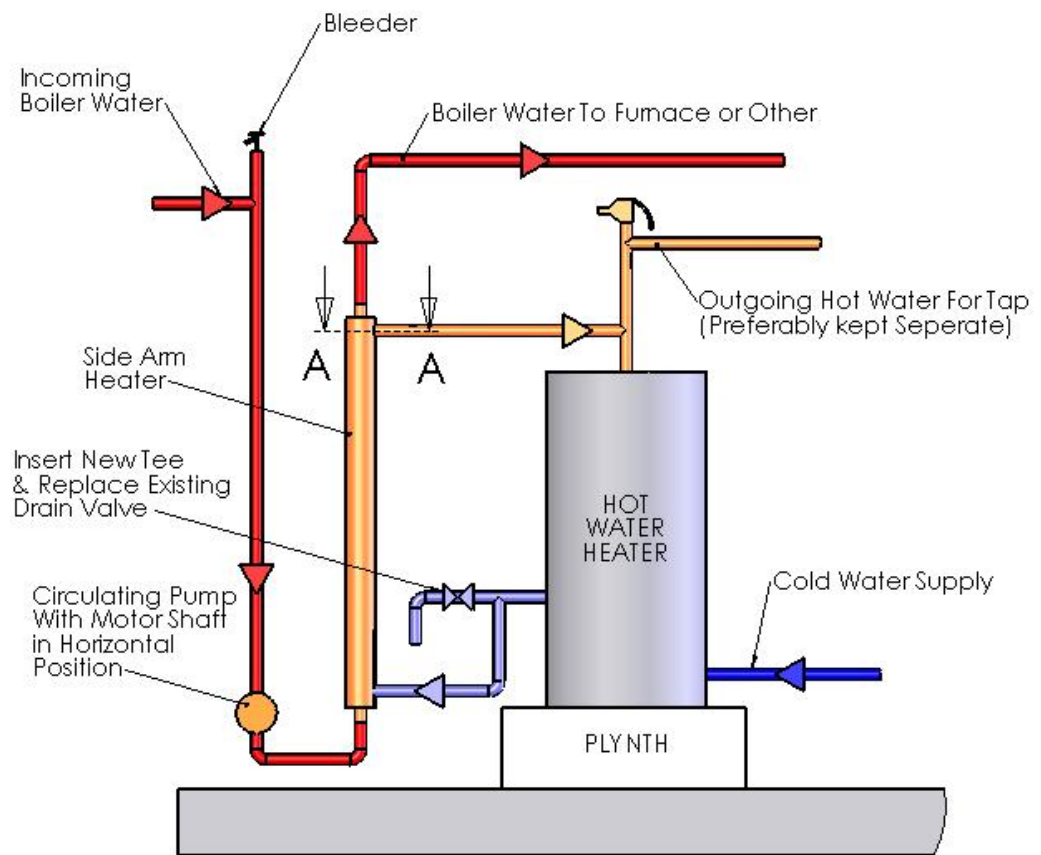
Note: To maintain the integrity of the fluids in each boiler system a flat plate heat exchanger is required.

CONNECTING THE P&M SYSTEM



CONNECTING TO A NEW BASEBOARD SYSTEM

SCHEMATIC #3 - Schematic Drawing for Illustration Purposes Only



NOTE!

It is suggested that the hot water heater be raised on a plynth as shown, to give max. length of side arm heater. (5 feet long if possible)
Top outlet should be as close as possible to the top of the water heater

SCHEMATIC #4 - CONNECTING SIDE ARM HEATER TO DOMESTIC WATER TANK

PROBLEM	POSSIBLE CAUSE	SOLUTION
Can't get water to circulate	<ul style="list-style-type: none"> • No power to pump • Air in system 	<ul style="list-style-type: none"> • Check electrical supply • Install bleed valves in pipe rise or high point • Bleed off trapped air through the bleeder valves
Overheating (Boiling)	<ul style="list-style-type: none"> • Aqua stat/Limit not operating properly • Water not circulating 	<ul style="list-style-type: none"> • Check pump settings Replace if defective • Check pump operation • Purge air from system
Moisture Inside Stove	<ul style="list-style-type: none"> • Condensation 	<ul style="list-style-type: none"> • There may be some condensation when stove is first heated up, it should disappear once the water and stove is warmed up
Can't keep fire burning	<ul style="list-style-type: none"> • Not using enough heat • Automatic timer not set to run long enough or defective • Aqua stat not operating properly • No draft 	<ul style="list-style-type: none"> • Increase automatic run time by one (1) increment • Same • Replace if defective • Check electrical supply • Check setting • Replace if defective • Extend chimney • Check for plugged chimney
Not enough domestic hot water (Sidearm applications only)	<ul style="list-style-type: none"> • Hooked up incorrectly • Stove temperature not hot enough • Extra high demand 	<ul style="list-style-type: none"> • Check sidearm installation matches instructions under "Connecting For Domestic Water Heating" • Important that connection is made close to the water heater • Balancing valve should be adjusted to approximately 10% open • Check temperature settings on stove and adjust if necessary Note: Use a tempering valve if water is above 140 degrees F • Turn on water heater • Install bronze circulating pumps on domestic side to get faster recovery • Get larger storage tank for hot water

PROBLEM	POSSIBLE CAUSE	SOLUTION
Pump seizing up	<ul style="list-style-type: none"> • Corrosive water • Rusty water • Use of Automotive anti-freeze • Air leak in suction side of pump 	<ul style="list-style-type: none"> • Have the PH levels checked regularly & adjusted as needed • Install screen before pump • Flush system • Remove & install approved glycol • Check & repair all connections on lines • Do not install air vents on supply line before pumps
Water at stove hot but can't get enough heat in building(s)	<ul style="list-style-type: none"> • Pump sized wrong • Radiator too small or partially plugged • Pump not running • Valves Closed • Air in lines 	<ul style="list-style-type: none"> • Have pump sized by dealer or factory taking into consideration pipe size, distance from furnace to radiator, radiator pressure drop • Check with dealer or factory • Install high capacity pump or install radiator with lower flow resistance • Replace with larger radiator • De-lime radiator & check water quality in boiler • Check power supply • Open valves • Purge system
Not enough heat	<ul style="list-style-type: none"> • Stove too small for application • Fly ash buildup on water jacket • Incorrect combustion air flow 	<ul style="list-style-type: none"> • Install larger stove • Clean fly ash from water jacket • Adjust flow control (See "Stoker Adjustment-Air Regulation") • Adjust auger speed (See "Stoker

	<ul style="list-style-type: none"> • Incorrect auger speed setting 	Adjustment Coal Feed Regulation”))
Feed auger doesn't turn but motor & drive pulley's turn	<ul style="list-style-type: none"> • Shear pin broken 	<ul style="list-style-type: none"> • Remove shear pin cover & replace shear pin (See Figure S for shear pin location) • Make sure auger can turn freely

TROUBLESHOOTING AND SOLUTIONS

Main Principles to Remember

- ◆ Enough chipped Fuel.
- ◆ Enough Water.
- ◆ Fans On – Air Must Get In.
- ◆ Fans Off – Air Must Stay Out.
- ◆ Water Temperature between 175 and 185 degrees Fahrenheit.

PROCEDURES ARE REFERENCED TO PORTAGE & MAIN OUTDOOR WATER FURNACE™ “OPERATORS AND MAINTENANCE MANUAL” WHICH COMES WITH EVERY NEW PORTAGE & MAIN OUTDOOR WATER FURNACE™ OUTDOOR WOOD FURNACE.

MANUALS ARE AVAILABLE SEPARATELY.

Trouble	Possible Cause	Solution
Too Little Heat	<ul style="list-style-type: none"> • Fire is out • Low water level or water leaks • Power failure • Circulating pump failure • Air traps in system • Fan is not running • Malfunction of heating appliances in building 	<ul style="list-style-type: none"> • Add wood/build fire • Check leaks then add water • Check electrical circuits • Check pump, repair or replace • Vent System • Inspect fan/replace • Repair, adjust or replace heating appliance
Too Much Heat	<ul style="list-style-type: none"> • Draft damper actuator stuck in open position • Air leaking through wood door • Aquastat malfunction • Thermostat inside house malfunction • Ash door not shut tight • Too much supply water going into certain heating appliances • Water controls in the building • Outdoor temperatures are warmer and supply controls have not been adjusted 	<ul style="list-style-type: none"> • Clean, lube and re-install • Clean metal to metal surface • Check Aquastat • Check Thermostat • Check gasket on ash door • Adjust water flow to heating appliances • Add controls to control hot water flow for heat • Adjust water flow
Water Boiling	<ul style="list-style-type: none"> • Fan running constantly • Aquastat malfunction • Charging door open • Damper actuator lid stuck open • Draft Flapper not closing 100% • Blower Flapper Assembly plate not tight • Ashes holding flapper open in air box(s) • Door gasket damaged • Water level is low • Creosote buildup on burn chamber door frame preventing door seal • Too little heat drawn off • Circulating pump not functioning 	<ul style="list-style-type: none"> • Aquastat malfunction • Check Aquastat • Close door tightly • Clean, lube and re-install • Clean, lube or replace • Tighten wing nuts • Clean out ashes • Replace gasket • Add water • Remove creosote from door frame • Consult dealer • Replace circulation pump
Furnace boils or rattles before it reaches maximum operating temp.	<ul style="list-style-type: none"> • Improper Antifreeze 	<ul style="list-style-type: none"> • Use recommended Antifreeze
Burn Chamber door pops or rattles	<ul style="list-style-type: none"> • Loading wood too close to the burn chamber door • Very hot burning fire • Aquastat malfunction 	<ul style="list-style-type: none"> • Load your wood back away from the burn chamber door • Mix in some bigger or less cured wood • Replace Aquastat
Creosote Buildup	<ul style="list-style-type: none"> • Air leaking through wood door • Burning unseasoned wood • Ashes in air box • Chimney plugged • Chimney not insulated or damaged • Burning high pitch bearing wood such as Pine or Balsam 	<ul style="list-style-type: none"> • Clean metal to metal surfaced • Use seasoned wood • Clean air box • Clean chimney • Insulate or repair chimney insulation • Use mix of dry and harder wood such as Poplar, Birch, Tamarack, Oak, Elm, Ash, etc.

Furnace has excessive moisture in the burn chamber	<ul style="list-style-type: none"> • Chimney is plugged • Heat Exchanger tube(s) are plugged • Ashes in air box • Too many ashes in the furnace • Excessive moisture in wood • Water temperature not being held in the 175 -185 ° F range 	<ul style="list-style-type: none"> • Clean chimney • Clean heat exchanger • Clean air box • Clean out ashes • Use dryer wood • Contact your local dealer
Blower continues to operate and display shoe a higher than set point temperature	<ul style="list-style-type: none"> • Water level is low • Defective Aquastat 	<ul style="list-style-type: none"> • Add water • Replace Aquastat
Too much smoke come out burn chamber door while loading	<ul style="list-style-type: none"> • Opening burn chamber door when there is still woodfuel inside • Burning wet wood or unseasoned wood • Opening door within two minutes of the blowers turning off • Water temperature is low • Leaking water line • Burn chamber has a air leak • Draft fan has not been turned off while loading • Furnace is boiling (could happen when your away, sleeping or at work) • Very slow leak somewhere in the system • Someone is taking hot water from the system when needed 	<ul style="list-style-type: none"> • Do not add so much wood fuel all at one time • Add dryer, seasoned woodfuel • Open door sooner or wait for the next cycle to start • Fuel fire • Fix leak in water line • Check seals. Run a smoke check • Turn off fan before loading/charging furnace • Add water. Complete a full furnace check on all the system • Check/tighten any leaking fittings • Add water
Smoke from the chimney is an annoyance	<ul style="list-style-type: none"> • Chimney is not high enough • Improper location of furnace(trees, buildings, winds neighbors) • Draft blower has just turned off • Burning garbage 	<ul style="list-style-type: none"> • Add Chimney extension • Possibly relocate furnace. Select furnace location carefully. • Smoke will dissipate • Do NOT burn garbage
Burning what seems to be a lot of wood	<ul style="list-style-type: none"> • Losing heat into the ground • Ground water extracting heat from lines • Wood is to dry • Piece of wood to small • Fire too hot-caused by to much air from blowers • Using more heat in the building than you realize 	<ul style="list-style-type: none"> • Re-insulate water lines • Drain ground water • Burning to fast and hard • Add larger piece of woodfuel • Restrict air flow • Consult your dealer
Cannot get building(s) warm enough.	<ul style="list-style-type: none"> • Insufficient heating devices in building(s) • Improper installation of heating devices • Heating devices need maintenance • Water Temp not running between 175 	<ul style="list-style-type: none"> • Adjust devices/Install more • Correctly install heating devices • Maintain heating devices • Consult your dealer • Check circulating pumps.

	<ul style="list-style-type: none"> - 185° F • Insufficient water circulation from furnace • Unbalanced supply water distribution • One appliance getting more than it's share of the total flow of hot water • Thermostat or controls in building are defective • Faulty electrical supply • Indoor forced air furnace fan is full of dirt or the filter is plugged and therefore the air flow is reduced going through the coil • Improper installation of coil in forced air furnace • Too small a coil in forced air furnace • Inadequate baseboard 	<p>Replace if needed</p> <ul style="list-style-type: none"> • Is a line kinked? • Is there air in the system? • Need a larger pump? • Are lines too small? • Pump has a restriction in the intake? (piece of plastic or foil) • Rebalance and distribute water from outdoor furnace • Balance the system by adjusting the flows of water to the different heat appliances • Balance the system by adjusting the flow of water to the different heating appliances. • Replace thermostat and controls • Check electrical connections • Clean • Correct installation • Reseal coil and replace • When a water-to-water heat exchanger is installed, a temp drop of 20-30 degrees may be experienced.
Not enough domestic hot water	<ul style="list-style-type: none"> • Hot water heater is too small • Manifold not balanced properly. One appliance is getting more than it's share of the total water flow • Outdoor furnace water temperature is not consistently between 175 – 185 degrees F. • Over time with some water conditions, the sidearm will clog up with scale and restrict or shut off the flow completely through the sidearm 	<ul style="list-style-type: none"> • Water to water exchanger needs to have a pump installed • Balance the system by adjusting the flow of water to the different heating appliances.
Water temperature	<ul style="list-style-type: none"> • Inadequate rate of flow of water 	<ul style="list-style-type: none"> • Flow should be at least 15

does not correspond with the aquastat settings	allowing layering of water temperatures. • Faulty aquastat	gallons per minute. Check pump and installation • Replace aquastat
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Piney Manufacturing

Attention:

Dear Stoker Owner and/or Dealer:

We are pleased that you have chosen to use our product. We are always looking for ways to save energy costs for our customers.

Any solid fuel that has a lot of moisture will waste energy. Before any solid fuel burns the moisture needs to evaporate in order for it to burn. The process of evaporation will cause condensation and black soot in the firebox. You could also be wasting energy just to dry the fuel; up to 30% could be wasted. Augers and air slots will clog up.

Thank you for taking the time to read this manual. **Every furnace that we ship out gets a manual shipped with it, make sure that you read it and send in the warranty registration. Warranty can be refused if the unit is not registered with the dealer within 30 days of the purchase.**

Portage & Main Outdoor Water Furnace Enviro Chip 500 Automatic Stoker

Portage and Main Outdoor Water Furnaces are designed for burning chipped bio-mass fuels. or authorized fuel only. The burning of any other materials or any modifications of the furnace will void this warranty.

The electrical components such as the temperature control, fans, etc., are warranted by their manufacturer for a period of one year or as stated by the manufacturer.

All gaskets, seals, etc., are warranted by Piney Manufacturing Ltd. for a period of one year from the date of purchase. The stoker head and brick are consumables; therefore have no warranty.

Piney Manufacturing Ltd. does not warranty parts damaged by freezing, overheating, pressurization, abuse, use of unauthorized fuels, or lack of maintenance. The Portage & Main Outdoor Water Furnace with automatic stoker is designed to be a long lasting simple to operate furnace. Proper care and maintenance as outlined in the manufacturer's maintenance instructions should be followed. The Portage & Main Outdoor Water Furnace must be filled with water that meets recommendations outlined in the Portage & Main Outdoor Water Furnace Manual. Failure of proper maintenance such as maintaining water quality by using the recommended water type and/or the addition of chemical as required will shorten the life of the outdoor water furnace. An annual sample of water's condition must be sent in for free testing. Details of this procedure can be obtained from your local P&M authorized dealer or from factory representative. Inhibitors must be added to the recommended levels as advised by PM authorized representative. Location and operating environments of the furnace may cause corrosion which is beyond our control.

Any furnace which is determined to be defective in material or workmanship, within five (5) years and returned to Piney Manufacturing Ltd, at their request, will be repaired or replaced, at the option of Piney Manufacturing Ltd., with no charge to the original customer, provided that the adequate certified boiler treatment levels as defined by P&M representative, continuous and proper operation of side stream filter system, proper continuous electrical grounding, recommend and approved shut down procedures have been adhere to. Continuous circulation of pumps will also make pumps last longer.

In year six (6) through the life of the product, Piney Manufacturing will compensate a pro-rated share of any repair or replacement cost. The proportionate charge will be equal to the appropriate percentage of the list price of the product at the time of the warranty claim is made, and will be determined as follows: 6th year 60%; 7th year 50%; 8th year 40%; 9th year 30%; year 10th and beyond 10%. No cash surrender value at any time. Piney Manufacturing Ltd reserves the right, to replace or repair, the parts at its sole discretion.

In addition to the warranty above, the Piney Manufacturing Ltd. warranty does not cover: Components that are part of the heating system (products), used for installation of the Portage & Main Outdoor Water Furnace—underground insulated pipe, radiators, heat exchanger that may be part of the part of the heating systems (products); the workmanship of any installer of Portage & Main Outdoor Water Furnace(s).

In addition, this warranty does not assume any liability of any nature for unsatisfactory performance caused by improper installation or operation; any costs of labor for removal and reinstallation of the alleged defective furnace or part, transportation to Piney Manufacturing Ltd. if necessary, and any other materials necessary to perform exchange; any products that have a failure or malfunction resulting from improper or negligent operation accident, abuse, freezing, over-heating, poor water quality, misuse, unauthorized alteration or improper repair or maintenance; improper adjustments, control settings, care or maintenance. Information is in the installation manual and other printed/technical information provided with the product or direct from Piney Manufacturing Ltd.

If warranty requires replacement of any part, Piney Manufacturing Ltd. will take responsibility for the actual cost of the replacement part only as laid out in the warranty condition. No other warranty is expressed or implied. Piney Manufacturing Ltd. is not responsible for the cost of plumbing, replacement of antifreeze, shipping costs or any other indirect cost associated with the replacement of the part. Outdoor furnaces are not intended to be the only source of heat; therefore, it is recommended that a back-up system be in place to prevent damages caused by lack of heat.

Piney Manufacturing Ltd. is not liable for any accidents which may occur from the operation of the furnace, or damage incurred due to heating system failure. The purchaser assumes all responsibility for the care, maintenance and safe operation of the furnace.

Piney Manufacturing Ltd. specifically disavows any other representation, warranty or liability related to the condition or use of the product. Any complaints or litigation must be filed in Manitoba, Canada.

To validate this warranty, your registration must be completed within thirty (30) days of purchase date and faxed to Piney Manufacturing Ltd. 306-922-1662, with a copy of your sales receipt, showing your date of purchase.

This warranty is non-transferable. Warranty valid in Canada and United States of America for indicated Portage & Main Outdoor Water Furnaces. This warranty has no cash value.

Effective September 2012

Portage and Main Outdoor Water Furnace Enviro Chip 500 with Automatic Stoker Warranty Card

Purchaser's Name: _____

Address: _____

Phone: _____

Model: _____ Serial No. _____

Date of Purchase: _____

Dealer: _____

Address: _____

Dealer's Signature: _____

Date: _____

This warranty card must be completed and returned to Heat Smart Plus by fax to

1-306-922-1662 with a copy of the sales receipt within 30 days of sale date.

"I have read, understood and accept the conditions of this Warranty."

Customers Signature: _____

Date: _____

Warranty provided by Piney Manufacturing Ltd. who reserve the right to replace or repair the parts at its sole discretion.

Records & Notes