Auto-Stoker Coal Boiler
By
Ecomax

Installation and Operating Manual

Manufactured by:
Location 1 Thomas Burns Street
Postal Dunedin 9016, New Zealand
Phone +64 3 477-7909
Fax +64 3 477-7908
www.allans.co.nz

Engineering / Sheetmetal / Long Run Roofing / Scaffolding / Christie Glasshouse and Garden Sheds / Ecomax Boilers
CAUTION

THIS APPLIANCE MUST BE INSTALLED BY APPROVED AND COMPETENT PERSONNEL ONLY. FAILURE TO INSTALL THE APPLIANCE IN ACCORDANCE WITH THESE INSTRUCTIONS AND LOCAL BUILDING REGULATIONS AND BY-LAWS WILL INVALIDATE THE WARRANTY.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

This appliance MUST be securely fixed to its support by means of mechanical fasteners. The use of adhesives is not considered a reliable means of fixing.

Any unauthorised modification to the appliance will invalidate the warranty.
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Introduction

Dear Customer,

Congratulations on choosing an Ecomax appliance to heat your home and hot water.

You have also purchased a New Zealand manufactured appliance with after sales service and parts readily available, unlike some imported central heating appliances.

The “Ecomax” Auto Stoker is used to supply hot water to central heating systems, which includes underfloor, radiators, fan convectors and domestic/commercial hot water all year round. It has the capacity to supply up to 26kW of energy, depending on coal quality.

Automatic coal stokers are the cleanest coal burning appliances on the market, as the air to fuel ratio can be set to achieve 95% combustion efficiency and 74% thermal efficiency with smokeless operation.

The unit uses between 5-7 kg of coal per hour (depending on quality) to produce up to 26kW of energy. The running costs can be less than one eighth of the price of electricity, and can be cheaper depending on regional coal prices.

The fire is mechanically fed with coal from a 500kg (up to 3000kg if required) hopper.

The automatic stoker will switch on and off automatically by thermostat and can operate for short periods of time every day without the need to re-light. In fact the stoker can shut down for up to 24 hours and then automatically re-light itself.

The unit is fully wired ready to plug into the wall, with a water thermostat and a boiler tube cleaning device with external lever. The boiler is fully insulated and has a durable powder coated cladding. Our quality controls ensure that with proper maintenance and care, you can expect years of trouble free operation.

An additional water pump must be supplied by the installer, which is piped to the water inlet (return) of the appliance. The pump must be sized to suit the overall system. The pump must be wired to the appliance, via the electrical strip connector inside the back panel.
Specifications

Electrical Specification: Single phase 230V 50Hz AC
Weight (Empty): 150kg
Water Capacity of Appliance (not including external pipework): 34 litres
Water Connections: ¾” BSP Female
Fuel Type: Pea sized coal only
Fuel Input (Max): 7kg/hr
Heat Output (Max): 26kW
Efficiency: 74%
Average Particulate Emission Factor: 1.2g/kg
Average Particulate Emission Rate: 57g/MJ
Ambient Operating Temperature Range: 0°C - 60°C
Test Report Number: ARS: 07/1636

Note: Performance may vary from tested values depending on the installation and quality of the fuel used.
Product Overview

Product Dimensions

![Diagram of product dimensions]
Product Description

- Scrubber Coils Spanner
- Flue Spigot
- Combustion Chamber Door
- Ash Pan
- Ash Valve Lever
- Boiler Hopper
- Coal Feed Screw
- Motor
- Gearbox
Component Description

**Burn Pot** - The coal is burnt in the burn pot with the air supplied through the air ports and the coal supplied from the coal screw below. The burn pot is made of cast iron and can be removed by cutting the three metal tags that are holding it in place with a cutting disc. Access can be gained through the top of the boiler.

**Retort** - Area surrounding the Burn Pot that supplies the primary air for combustion.

**Blower** - Supplies air for combustion and the smoke-back tube. The blower can be choked to properly tune the combustion rate of each batch of fuel.

**Coal Feed Screw** – This is the screw that feeds the fuel from the bottom of the hopper to the bottom of the Burn Pot. The helix flight is made of 5mm mild steel plate, and the shaft is made from Ø20mm bright mild steel.

**Ash Pan** - Removable pan underneath Combustion Chamber that collects the left over solid products of combustion.

**Coal Hopper** – The coal hopper can be supplied with the boiler. Standard capacities are 150 kg for bagged lots, 500 kg or 1,000 kg for trailer loads and 2,000 kg for truck loads. The hoppers have sloping sides at angles of no less than 50° so that they will empty fully. The large hoppers have self-supporting legs which must be secured to a suitable foundation. The large hoppers are constructed to be weather proof with lids, and are constructed from 3mm mild steel. Coal hoppers must not be constructed from combustible materials.

**Combustion Chamber** - Area where the fuel is burnt and initial heat transfer from the exhaust gases to the water takes place.

**Fully Water Jacketed** – The combustion area of the boiler is fully water jacketed with 6mm thick steel. Because the steel in the boiler is cooled by water, the steel does not become damaged by severe expansion and contraction, so a long operational life can be expected.

**Heat Exchanger Tubes** - Tubes where the secondary heat transfer from the exhaust gases to the water takes place, featuring scrubber coils to maximise heat transfer to the water.

**Scrubber Coils** – The scrubber coils are provided to reduce heat coring and increase efficiency by removing scale from the heat exchanger tube surfaces.

**Waterside Corrosion** – Once the water in the system becomes stagnant, little corrosion occurs but a rust inhibitor should still be used to prolong the life of the boiler.
Ash Removal – The ash is removed from the ash pan located in the bottom of the boiler. **Use leather gloves when handling the ash pan. Always allow ashes to cool properly (a minimum of seven days) in a non-combustible container before disposing of ashes according to local regulations.**

Flue – A stainless steel 150mm nominal diameter flue is recommended.

Insulation – 25mm fiberglass hot water cylinder insulation is used.

Smoke-Back Tube – A smoke-back tube is connected between the outlet of the blower and the top of the coal pipe. The purpose of the tube is to stop smoke from traveling back through the coal pipe to the hopper. It is vital this is kept clear of fines or any material that may block the tube.

Controller - Electronic unit that controls the operations of the appliance
Installation

Installation is carried out in the following steps:

- Determining the Coal Boiler’s installation location, taking into account flue position, accessibility for coal delivery to the hopper, accessibility for future servicing and availability of electrical connections and suitable locations for water piping and pressure relief
- Applying for consent from the appropriate local consenting authority
- Once consent is granted, installing the appliance in its final location
- Installing the flue
- Installing the sealed water circulating system
- Commissioning

Installation Location

Careful consideration must be made as to the location of the Coal Boiler. Noise sensitive areas, such as near bedrooms or living areas, should be avoided. Ideally it would be installed somewhere with ease of access in order to fill the appliance with fuel and service it easily, but somewhere such that children do not have access to it. The appliance should never be installed inside a dwelling, except in a purpose designed and built boiler room or shed.

The Coal Boiler site must be provided with permanent adequate ventilation. An area of 18,000 mm$^2$ (or the equivalent to Ø150mm, or a rectangle 180mm x 100mm ) is required. If the area under doorways is not sufficient, then ducts or louvres must be installed to maintain ventilation. Never allow the ventilation to be obstructed as this will adversely affect the performance of the Coal Boiler.

The Coal Boiler must be installed on a non-combustible base, ideally a concrete foundation. It must be securely fixed to this foundation in the event of an earthquake. If the Coal Boiler is to be installed on a heat sensitive floor covering, a floor protector must be installed. The minimum clearances to combustible surfaces around the Coal Boiler must be maintained for safety.

The Coal Boiler needs to be supplied with a standard electrical wall socket with isolating switch within 1m of the rear of the appliance.

The Coal Boiler must not be in an area where it will be subject to sustained, direct sunlight, especially on the controls. The Coal Boiler electronics are sensitive to both extremes of hot and cold, as well as excessive humidity. Mount the controller on a wall close to the boiler in a position sheltered from heat and dust.

The Coal Boiler must not be installed in an area where it can be rained upon, or have water dripping on it. It must not be in an area that may flood. Careful consideration must be given to the likely weather conditions in the Coal Boiler installation location,
for instance high wind areas may adversely affect the performance of the appliance through high back pressure in the flue. Cooling winds can also prevent the evacuation of fly ash in the flue, leading to restrictions in the flue over time.

**Floor Protector**

The New Zealand standard AS/NZS 2918:2001 states that if the appliance is to be installed on or within 500mm of any heat sensitive or combustible materials in the floor, then a floor protector will be required. The floor protector must extend underneath the appliance, and finish no less than 300mm in front of the Ash Pan. The floor protector must not be any less wide than the appliance, and extend at least 200mm from the side of the Ash Pan (unless it comes into direct contact with a wall or heat shield at a lesser distance).

**Coal Hopper**

The Hopper should be installed in a location that makes for ease of access for filling and cleaning. Never construct a Hopper from combustible materials.

It is essential that the Hopper is sealed at the bottom where it joins the Boiler Hopper. Condensation or rain running down the outside surfaces of the Hopper must not be allowed to enter the Boiler Hopper, otherwise excessive wear will occur.

Standard hoppers in 150kg, 1000kg and 2000kg are available through Ecomax. Many other non-standard hopper sizes are also available, including 3000kg double hoppers (for double boiler installations).
**Installation Clearances**

It is essential that the Coal Boiler is installed with AT LEAST the minimum clearances to combustibles as illustrated below. If possible, it is recommended that these dimensions are greater, to allow for better access during installation and servicing. In particular, ensure there is sufficient room to remove the Coal Feed Screw.

Clearances above the appliance can be any size, as long as they do not interfere with the opening of any of the doors, or access for servicing.

A flue liner is required if the flue is closer than 600mm to a combustible surface. Always ensure that there is sufficient provision made to disconnect the flue for the purposes of servicing.
Flue

This appliance is designed to be run with Ø150mm stainless steel flue with Ø250mm galvanised liner. Keep horizontal or inclined flue sections to a minimum, as accumulation of ash will occur in these sections and access for cleaning needs to be provided.

As the flues are provided by various manufacturers, the flue must be installed to AS/NZS 2918:2001. Some councils have their own specific rule on the height of the flue, but most follow Rule 4.5.6(b) and Schedule 6 and Section 4.9.1 of AS/NZS 2918:2001. Minimum clearances to combustible materials outlined in these and any local regulations must be maintained.

It is the responsibility of the installer to ensure that the installation is compliant with AS/NZS 2918 and all other relevant national codes and local body regulations.

Ecomax can supply a compliant flue kit that has been tested to AS/NZS 2918. A schematic of this flue kit is on the following page.

If the ceiling contains insulation (such as batts) then an insulation barrier will be required between the insulation and the flue liner.
Ecomax flue kit schematic:

- Cowl
- Dektite or suitable approved flashing
- Roof
- Increase from 1m minimum until clear within 3m of flue outlet
- Ø150 stainless steel flue
- Vented cap
- Triple lined for combustible ceiling penetration
- Ø250 galvanised flue liner
- 400mm Square ceiling plate
- 300 min.
Water Connection

The water system for the Coal Boiler must be a sealed, pressurised system. It must be sized appropriately for the dwelling and the expected heating load it will carry by a suitably qualified person. The expansion vessel should be at least 10% of the total volume of the system. The Coal Boiler contains 34 litres of water, not including external pipework. The flow and return connections on the rear of the appliance are ¾” BSP female threads.

DO NOT use an open vented system with a header tank, as this allows boiling of the water and a continuous supply of oxygen into the system, which will corrode the internal surfaces of the Coal Boiler & radiators.

The water system must be fitted with an air vent, or vents, to bleed the system on filling, as well as a pressure relief valve. The pressure relief valve must be vented to an area such that, if it was to relieve, could not cause damage to people or property. Ideally this would be somewhere outside.

The first two metres of pipework to and from the appliance must be in a high temperature resistant material such as copper. This is to protect the pipework from possible damage from over-temperature in the unlikely event of a power cut.

For the rest of the water piping, pipe made from material that has an oxygen barrier must be used, as internal corrosion of the Coal Boiler could otherwise occur. A rust inhibitor must be used to treat the water and prevent internal corrosion.

A draining valve should be fitted at the lowest point for servicing. The best type of valve is one in which the handle is removed so the system cannot be drained accidently. Pipe thermometers should be fitted to both the flow and return pipes so that the operator can check that the flow and return temperatures are not too low. The return should not be below 55°C when the pump is running. If the return water is too low, it is possible that the heating load & heat loss in the pipework has been underestimated, and the appliance will not be able to heat it.

It is recommended that an isolating valve be fitted on both the flow and return lines at the boiler connection to make future servicing significantly easier. The pump should also have isolating valves either side.

The plumbing work must be carried out in a proficient manner and be free of leaks. If the system needed regular topping up with fresh water due to leaks, oxygen would be introduced and internal corrosion of the Coal Boiler and radiators would occur.

The Coal Boiler requires a suitable pump to be installed, appropriately sized by the installer. The pump should be installed as per the pump manufacturer’s instructions. It must be electrically connected to the Coal Boiler via the connector inside the rear panel of the appliance. The Coal Boiler will switch the pump on and off depending on
the temperature of the water in the appliance. This ensures the Coal Boiler will get up to an ideal temperature operating range before it starts to circulate the water. If the pump is not connected to the Coal Boiler, the appliance may not be able to heat the water sufficiently and the warranty on the appliance may be voided. A mixing valve may also be used to maintain the water temperature in the water jacket.

During the process of filling the system with water, all the air needs to be bled out to prevent an air lock developing and water flow being inhibited.

Where possible all piping should be lagged. This will ensure the best possible thermal efficiency of the system, and make it cheaper to run.

A typical schematic for a domestic installation is shown below.
Note: Schematic depicted is an example only. It is the responsibility of the installer to design and install a suitable circulation system based on each installation’s unique conditions.

Installation Checklist

- Minimum clearances to combustibles checked
- Minimum clearance for removal of Coal Feed Screw checked
- Floor protector fitted (if required)
- Appliance securely fastened to support
- Water system sealed, pressurised, properly bled and leak tested
- Flue installed to AS/NZS 2918:2001 and/or any other local regulations
- Pressure relief valve installed and piped safely
- Water pump wired into appliance
- Appliance plugged into suitable wall electrical socket (NOT hard wired)
- Controller mounted on wall in accessible position
- Water temperature set at 75°C minimum (dependent on system design)
- Appliance run up to temperature at least once
- Customer shown basic operation of appliance
- Warranty card filled out
Operating Your Appliance

General Safety

The Coal Boiler is fully sealed, but during normal operation some of the panels may get hot. Do not stack or lean anything against the appliance, and make sure all combustible materials are at least to the minimum clearances stated in the Installation Clearances section. The appliance should never be used as a shelf or a bench. Do not keep bags of fuel leaning against or sitting on top of the appliance.

Never try to operate the Coal Boiler with any of the panels removed or doors open.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

When dealing with hot ashes make sure they are stored in a non-combustible container until completely cold, which should be a minimum of seven days. Dispose of ashes according to local body regulations.

Operating for the First Time/Priming

With suitable stone-free pea sized coal in the hopper, turn the Coal Feed Screw switch on and feed fuel right through from the hopper until it fills the burn pot completely. This may take a few minutes, and the Coal Feed Screw may automatically stop. This is due to the timer; if you wait it should turn itself on again or turn the switch on and off to restart the Coal Feed Screw. Fill the Burn Pot until fuel is in a mound just proud of the top of the Burn Pot.

To light the appliance, pile kindling on top of the coal, along with paper and/or firelighters. Light the kindling and turn on the boiler switch, starting the blower. Close the Combustion Chamber Door and allow the flame to establish. Once a solid ring of fire has been established around the entire outside of the Burn Pot, turn on the Coal Feed Screw switch.

General Operation

Once lit, the boiler will be able to be left to run on its own. The Timer will turn the Coal Feed Screw on and off to regulate the fuel input to the appliance. Once the water temperature in the water jacket gets hot enough, the pump will start up and start circulating the hot water to the heating system. This may switch on and off a few times until the entire system is up to temperature.
When the heating system is up to temperature and no more heat is required, the temperature in the water jacket will make the Blower and Coal Feed Screw turn off. The pump will continue running until the temperature in the water jacket has cooled enough. The flame in the Burn Pot will die off and the fuel will smolder for up to twenty four hours. Once the temperature in the water jacket has dropped enough the Coal Feed Screw and Blower will start up again, reigniting the flame and generating heat.

The boiler will need to be checked at least once a day with the Scrubber Coils moved up and down in the Heat Exchanger Tubes, the Burn Pot checked for stones or blockages and the general operation checked.

**Notes on Fuel Selection**

It is essential that the boiler is only used with the correct, pea sized coal. Ensure the fuel supplier is supplying the correct sized coal for a domestic boiler. The coal must not be damp or wet, as this will cause poor combustion and increase the chances of wear in the Coal Feed Screw.

Poor combustion can lead to too much smoke, and if the Smoke Back Tube is not clear then smoke can enter the Coal Feed Screw Pipe and Hopper and form condensation and metal wearing substances. If water is able to enter the Hopper through a poorly sealed lid, or a poor seal between the Hopper and the Boiler Hopper then similar problems can occur.
Optimising Boiler Operation

Each batch of coal will have slightly different burning characteristics. Each time a new batch is run through, check the flame in the Burn Pot. It should be a short, bright orange or yellow flame all the way around the outside of the Burn Pot, with darker, unburnt fuel coming up through the middle. There should not be unburnt coal in the Ash Pan.

If the flame is long, dark and sooty looking, and unburnt coal is observed in the ash pan it is running too rich. Reduce the fuel input by either decreasing the Coal Feed Screw ON time or increasing the Coal Feed Screw OFF time. Open up the plate on the Blower to allow more air into the combustion chamber.

If the flame is very bright and burning below the edge of the burn pot it may be running too lean. Increase the fuel input by either increasing the Coal Feed Screw ON time or decreasing the Coal Feed Screw OFF time. Close up the plate on the Blower by a small amount to allow less air into the combustion chamber.

Check on the flame again after about ten minutes and adjust the settings further if necessary.

It is essential for maximum efficiency that the flue and Combustion Chamber surfaces are kept as clean as possible.
**Maintenance**

Quick Reference

**YEARLY:** Clean flue and cowl
**YEARLY:** Remove top and clean out fly ash from top of Combustion Chamber

**MONTHLY:** Check Smoke Back Tube is clear

**DAILY:** Force Scrubber Coil Spanner up and down repeatedly

**YEARLY:** Scrape all build up from Combustion Chamber internal walls

**DAILY:** Scrape any clinker or stones from the air ports of the Burn Pot

**DAILY:** Open and close Ash Valve Lever

**DAILY:** Empty the Ash Pan, or after 20 hours burning

**YEARLY:** Clean and oil Blower

**YEARLY:** Scrape any coal dust from the inside faces of the hopper

**YEARLY:** Remove all fines from the Hopper base

**YEARLY:** Check the gearbox oil

**YEARLY:** Remove the Coal Feed Screw and inspect

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**Daily Maintenance**

Daily maintenance at least once a day is critical for the long life of the appliance. If this is not carried out, permanent damage may occur. Carrying out these tasks twice a day is recommended.

- Attach the Scrubber Coil Spanner and swing it up and down repeatedly to make the Scrubber Coils scrape any buildup from the inside of the Heat Exchanger Tubes. If this spanner jams, the Scrubber Coils will need to be freed manually. Never leave the Coils jammed.
- Open and close the Ash Valve by forcefully pushing The Ash Valve Lever in and out. This will allow any fines and ash under the Burn Pot to drop into the Ash Pan. Ensure the Ash Valve is Fully closed afterwards Otherwise the boiler will not be able to operate effectively.

- Clear the Burn Pot air ports of any clinker or stones. Make sure all the air ports are completely clear to ensure efficient combustion.

- Empty the Ash Pan (or after 20 hours burning). Ensure the Ash Pan seals with the bottom of the Combustion Chamber when replacing. Dispose of ashes safely once cooled.

**Monthly Maintenance**

- Disconnect the Smoke Back Tube from the top of the Coal Feed Screw Pipe and check it is completely clear of fines.
Yearly Maintenance
Yearly maintenance should be carried out before the start of the heating season to allow time to rectify any issues.

- Remove the top and clean out all the fly ash in the top of the Combustion Chamber. Remove the plate at the top of the Combustion Chamber so you can see the Burn Pot and scrape all soot build up from the internal walls.

- Check the door seals are intact, do not have gaps and are not excessively frayed on the: Combustion Chamber Door Ash Pan Top Plate

- Visually check the electrical wiring for any signs of damage.

- Check the condition of the Ash Pan. It should not be excessively warped, and it should slide easily into place. It must seal well against the bottom of the Combustion Chamber. Replace if necessary.

- Check the Burn Pot for signs of deformation and wear. If the air ports are deforming or enlarging, or the burn pot is splitting it will need to be replaced.

- Disconnect the Blower from the boiler and thoroughly clean it. Lubricate the fan cage by putting a few drops of oil on the motor shaft.

- Check the colour and level of the gearbox oil. It should be light and transparent.

- Check the Coal Feed Screw has not worn and can turn freely in the Coal Feed Screw Pipe. The flights should be a consistent thickness, diameter and pitch all the way along the shaft. If the flights are thin or the welds are broken, the Coal Feed Screw will need to be replaced.
Dislodging a Stone from the Coal Feed Screw

Turn off the boiler and disconnect the tension clip, and with a spanner rock the Coal Feed Screw back and forth until the stone is dislodged. Drive the stone through to the Burn Pot by turning the Coal Feed Screw with the spanner. Reattach the tension clip.

If the Appliance is to be Shut Down for a Long Period:

- Remove all excess soot from the boiler by cleaning the Heat Exchanger Tubes, scraping the sides of the Combustion Chamber, emptying the Ash Pan and cleaning the flue. If soot is left in the appliance, condensation can form which could produce acid and corrode the appliance.
- Unbolt the Scrubber Coils and thoroughly scrape the inside surfaces of the Heat Exchanger Tubes. Many people fabricate a tool to attach to the end of a power drill for this purpose.
- Leave the Boiler Door open for ventilation.
- Oil hinges.
- Remove all fuel from the Hopper and Coal Feed Screw. Coal can absorb moisture. The best way to do this is run the appliance until it runs completely out of coal. Vacuum or wipe as much dust from the hopper as possible.
- Turn the power to the appliance off and remove the plug from the wall.
- Note the system water pressure once the entire system has cooled.
Starting the Appliance After it has Been Shut Down for a Long Period

- Have the flue cleaned by an approved serviceman.
- Make sure the power is off to the appliance.
- Check for any signs of rust, moisture or condensation in the Hopper, Combustion Chamber, Heat Exchanger Tubes and the area around the Ash Pan. Remove any moisture. Ensure any potential source of moisture is removed.
- Check the Burn Pot is in good condition, with nothing blocking the holes, and no gaps where the Burn Pot seats on the Retort.
- Check the Ash Valve operation is free, but firm, and there are no gaps around the mating surfaces. Ensure the Ash Valve is fully closed.
- Check that the Scrubber Coils are all moving freely. If any of them are jammed or are difficult to move, they MUST be freed or replaced.
- Check the condition of the gearbox and motor. The oil should be clean.
- Plug the appliance back into the wall.
- Check the operation of the Coal Feed Screw without any coal in the appliance. You should be able to see the Auger turning slowly at the bottom of the Hopper.
- Still without any coal in the appliance, turn the appliance on. Listen for the Blower and make sure it sounds normal (no excessive rattling or vibration).
- Check the water pressure of the system. If it has dropped significantly, there may be a leak.
- Fill the Hopper with a small amount of fresh coal. Prime the system (see Operating for the First Time/Priming section).
- Run the appliance and check that it runs smoothly before filling the Hopper to the top with fresh coal.
## Troubleshooting

All corrective action should be taken while the appliance is cold.

<table>
<thead>
<tr>
<th>Observed Fault</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No heat from radiators/in house</td>
<td>No coal</td>
<td>Refill hopper with fresh fuel. Prime appliance as per <em>Operating for the First Time/Priming</em> section</td>
</tr>
<tr>
<td></td>
<td>Damp coal</td>
<td>Coal can absorb moisture from the atmosphere if left for too long. If smoke is coming from the hopper (blocked Smoke Back Tube), water will condense in the coal. All damp coal must be cleaned completely out of the Hopper, Coal Feed Screw and Burn Pot and replaced with fresh fuel. Ensure the holes in the Burn Pot have not become blocked.</td>
</tr>
<tr>
<td>Coal Feed Screw not turning</td>
<td></td>
<td>See below</td>
</tr>
<tr>
<td>Coal ‘bridging’ at bottom of Hopper</td>
<td></td>
<td>Hit side of Hopper to get coal to drop onto the Coal Feed Screw. When the Hopper is empty scrape the sides to make sure they are smooth. Remove build-up of fines at the bottom of the Hopper. Paint with non-stick surface paint, or fix thin Teflon sheets to the problem area.</td>
</tr>
<tr>
<td>Burn Pot blocked</td>
<td></td>
<td>Clear all clinker, coal and ash from Burn Pot with poker.</td>
</tr>
<tr>
<td>Blower detached or not running</td>
<td></td>
<td>Check Blower is securely attached. Check Blower runs and is not blocked, or running slowly. With your hand over the outlet, there should be a significant force from the airflow.</td>
</tr>
<tr>
<td>Pump continuously running</td>
<td></td>
<td>(Only if not using a mixing valve). The Pump must be connected to the appliance. If it is wired independently from the appliance the water will not have a chance to heat up.</td>
</tr>
<tr>
<td>Pump not running at all</td>
<td></td>
<td>Check pump connection to the appliance.</td>
</tr>
<tr>
<td>Airlock</td>
<td></td>
<td>A buildup of air in the water circulation system will prevent the water circulating throughout the whole system. If there is heat at only one end of a radiator the system may need to be bled.</td>
</tr>
<tr>
<td>Observed Fault</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pump water</td>
<td>The pump is factory set to turn on once the water temperature reaches 65°</td>
<td>The pump is factory set to turn on once the water temperature reaches 65° (unless using a mixing valve). This prevents too much cold water surrounding the Combustion Chamber and affecting combustion. The Blower and Coal Feed Screw are set to turn off at 75°. Residual heat should mean that the actual water temperature does not exceed 85° after these shut off. This may depend on the installation, if the water gets hotter than this then the boiler thermostat should be turned down. The hotter the water temperature, the better the response will be from the radiators in the dwelling.</td>
</tr>
<tr>
<td>temperature set</td>
<td>too low</td>
<td></td>
</tr>
<tr>
<td>Faulty Water</td>
<td>Replace Water Temperature Probe.</td>
<td></td>
</tr>
<tr>
<td>Temperature Probe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access doors open</td>
<td>Make sure Ash Pan, Combustion Chamber and Scrubber Chamber Doors are fully and completely closed and the seals are effective</td>
<td></td>
</tr>
<tr>
<td>Safety switch on</td>
<td>This is due to excessive heat in coal pipe, possibly fuel burning in coal pipe.</td>
<td>This switch requires manual resetting. Ensure the condition which caused the switch to trip is fixed before resetting it.</td>
</tr>
<tr>
<td>coal pipe has</td>
<td>tripped</td>
<td></td>
</tr>
<tr>
<td>tripped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water overtemperature</td>
<td>This may be due to water getting too hot or probe not properly seated in pocket</td>
<td>This switch requires manual resetting. Check the pressure relief valve has not opened and released excess pressure. If so the system will need to be refilled.</td>
</tr>
<tr>
<td>switch has</td>
<td>tripped</td>
<td></td>
</tr>
<tr>
<td>tripped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coal Feed Screw</td>
<td>Foreign object jamming Coal Feed Screw</td>
<td>See Dislodging a Stone from the Coal Feed Screw section</td>
</tr>
<tr>
<td>Screw not</td>
<td></td>
<td></td>
</tr>
<tr>
<td>turning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gearbox/motor</td>
<td>Disconnect the motor from the gearbox and turn on to see if the rotor still</td>
<td>Disconnect the motor from the gearbox and turn on to see if the rotor still turns. Replace if necessary. Remove the tension clip and turn the Coal Feed Screw with a spanner to check if it is jammed. Remove the gearbox from the Coal Feed Screw and turn the input shaft by hand. The output shaft should turn very slowly as the input shaft turns. Replace if necessary.</td>
</tr>
<tr>
<td>failure</td>
<td>turn. Replace if necessary. Remove the tension clip and turn the Coal Feed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Screw with a spanner to check if it is jammed. Remove the gearbox from the Coal Feed Screw and turn the input shaft by hand. The output shaft should turn very slowly as the input shaft turns. Replace if necessary.</td>
<td></td>
</tr>
<tr>
<td>Observed Fault</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tension clip</td>
<td>broken</td>
<td>Check to see if Coal Feed Screw has jammed before replacing.</td>
</tr>
<tr>
<td>Motor thermal</td>
<td>overload tripped</td>
<td>If the Coal Feed Screw is jammed and for some reason the tension clip doesn’t break, the resultant load on the motor can cause the thermal overload to trip. This can be an indicator of jamming, a worn Coal Feed Screw, no oil in the gearbox or many other problems. Ensure the cause is identified before resetting the switch.</td>
</tr>
<tr>
<td>Coal Feed Screw</td>
<td>worn out</td>
<td>Using wet coal or having a blocked Smoke Back Tube can cause condensation in the Coal Feed Screw Pipe, which will wear out the flights of the auger, jamming coal in the pipe and causing the drive to seize. If the Coal Feed Screw is worn (see Yearly Maintenance section) then it must be replaced</td>
</tr>
<tr>
<td>Smoke observed at</td>
<td>cowl or issuing from Boiler or Hopper</td>
<td>Smoke Back Tube blocked</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove Smoke Back Tube and check entire length for blockages. Check connection point on top of Coal Feed Screw Pipe and ensure it is completely clear of fines.</td>
</tr>
<tr>
<td></td>
<td>Smoke Back Tube blocked</td>
<td>Not enough air for proper combustion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Open plate on Blower to allow more air in for combustion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Clean Heat Exchanger Tubes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Clean flue and cowl</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Ensure area around appliance is completely clear of anything that could interfere with air flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Ensure room ventilation is adequate and not blocked</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Clean Burn Pot and Retort</td>
</tr>
<tr>
<td>Damp coal</td>
<td></td>
<td>Never use damp coal. All damp coal must be cleaned completely out of the Hopper, Coal Feed Screw and Burn Pot and replaced with fresh fuel. Ensure the holes in the Burn Pot have not become blocked</td>
</tr>
<tr>
<td>Ash Valve not</td>
<td>closed/damaged</td>
<td>The Ash Valve must be completely closed with no gaps, otherwise the Burn pot will not be able to get enough air and poor combustion will occur. If the Ash Valve is damaged and there is a gap between it and the bottom of the Burn Pot the Ash Valve will need to be replaced.</td>
</tr>
<tr>
<td>Observed Fault</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>-------------------------</td>
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</tr>
<tr>
<td>Burn pot has clinker</td>
<td>When cold, clean out Burn Pot and Retort of all ash/clinker.</td>
<td></td>
</tr>
<tr>
<td>(fused ash)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burn Pot worn out</td>
<td>Replace Burn Pot</td>
<td></td>
</tr>
<tr>
<td>Burn Pot retort</td>
<td>Open Ash Valve and clean out all ash inside.</td>
<td></td>
</tr>
<tr>
<td>blocked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Exchanger</td>
<td>Use the spanner to lift the Scrubber Coils up and down to scrape the Heat Exchanger Tubes. If they are jammed they need to be freed.</td>
<td></td>
</tr>
<tr>
<td>Tubes blocked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ash Pan too full</td>
<td>Remove Ash Pan and dispose of ash. Vacuum or brush all ash from Ash Pan area inside appliance when cold.</td>
<td></td>
</tr>
<tr>
<td>Burn Pot burnt out</td>
<td>If the Burn Pot has severely deformed it may need to be replaced.</td>
<td></td>
</tr>
<tr>
<td>Access doors open</td>
<td>Make sure the Ash Pan is fully sealed in place, the Combustion Chamber Door and plate at the top of the Combustion Chamber are fully and completely closed and the seals are effective</td>
<td></td>
</tr>
<tr>
<td>Door seal failure</td>
<td>Replace any missing or damaged seals</td>
<td></td>
</tr>
<tr>
<td>Buildup of clinker in</td>
<td>Boiler running cold</td>
<td>If the water in the water jacket is constantly low (below 65°) the boiler cannot run efficiently. Check that the pump is not running all the time, or adjust the mixing valve.</td>
</tr>
<tr>
<td>Burn Pot</td>
<td>Bad batch of coal</td>
<td>Reduce coal feed until coal is used up and purchase a different grade of coal.</td>
</tr>
<tr>
<td>Excessive noise or</td>
<td>Pump running continuously (unless</td>
<td>Pump must be wired to boiler as per wiring diagram.</td>
</tr>
<tr>
<td>vibration</td>
<td>using a mixing valve)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pump thermostat faulty</td>
<td>If the pump is not switching on and off as the boiler heats and cools, the pump thermostat may need to be replaced.</td>
</tr>
<tr>
<td></td>
<td>Thoroughly clean flue, cowl and appliance as per maintenance schedule</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appliance not fixed to floor</td>
<td>Check fastenings have not come loose.</td>
</tr>
<tr>
<td></td>
<td>Internal components loose</td>
<td>Thoroughly check all moving components and fastenings to make sure they are tight.</td>
</tr>
<tr>
<td>Observed Fault</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tension pins regularly breaking</td>
<td>Seam of coal with too many stones</td>
<td>Stones can be present in the fuel from the supplier or be picked up during transport.</td>
</tr>
<tr>
<td></td>
<td>Coal Feed Screw worn</td>
<td>Remove coal screw and check for wear, especially the first 100mm at the end of the screw under the Burn Pot. If there is excessive wear it will need to be replaced.</td>
</tr>
</tbody>
</table>
Wiring Diagram
Warranty

The following warranty is available to the first owner of each appliance during the period specified below at any Ecomax Ltd franchise dealer authorised to service the appliance.

The repair or replacement free of all charges including labour charges of that part if the appliance requiring repair or replacement is a result of defective material or workmanship in manufacture and/or assembly during a period commencing on the date of delivery of the appliance in a new and unused state to the first purchaser and terminating 12 months after that date.

Any part of the appliance repaired or replaced free of charge under the warranty will continue to have the benefit of such warranty during the balance of the warranty period.

The warranty does not extend to consequential loss or damage to either person/s or property, delivery or redelivery charges. It is not available free of charge if:

- Repair and/or replacement of parts and assemblies which are necessary due to normal wear and tear, such as:
- Cladding and body components, due to causes beyond the control of the manufacturer or its franchised dealers.
- Replacement or sealing except where due to faulty manufacture or assembly.
- Flues – cleaning of flues, removing of carbon build up from flues, weather cap and cowl.
- The appliance has been abused in any way or damaged by neglect, accident or improper use and has not been operated or maintained in accordance with the manufacturers recommendations.
- Damage from acts of God and natural phenomena such as earthquakes, floods, landslips, sound vibrations and other damage caused by extreme weather conditions.
- Damage resulting from theft or other criminal acts.
- The appliance has been used for purposes not specific to the private use of the purchaser.
- The appliance has been altered by changing the manufacturer’s specifications, the installation and use of parts and assemblies not genuine, non-approved for use by the manufacturer and the removal or change of the manufacturer’s identification number or marks.
- Fuel and accelerant are used which are not recommended by the manufacturer.
- Any repair and/or adjustment performed by a non-franchised dealer or installer or damage resulting there from. NOTE: In the case of unavailable emergency, the selling dealer can submit a claim for the work involved and it will be considered by the manufacturer on its merits.
**Owner Details**

<table>
<thead>
<tr>
<th>Serial Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Date</td>
<td></td>
</tr>
<tr>
<td>Installer</td>
<td></td>
</tr>
</tbody>
</table>