Greenflame Eco
Wood Pellet Boiler 10-60kW

Installation, Operation and Servicing Instructions

PLEASE NOTE:

This product MUST be commissioned by a T R Engineering Ltd approved engineer.

INSTALLER
Have you been trained by T R Engineering Ltd to commission this appliance?
If you intend to commission and do not have a T R Engineering Ltd Cert No. Call now to arrange training on 0114 257 2300

Please read these instructions carefully before installing and operating this appliance.
TO BE RETAINED BY THE HOUSEHOLDER

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1. Introduction

Dear Customer,
We wish to thank you for choosing this Greenflame wood pellet boiler product from T R Engineering Ltd. **In order to get the best performance from your appliance we recommend that you read this booklet carefully before lighting the appliance for the first time.**
While thanking you again, may we remind you that the appliance **MUST NOT** be used by children and that they must always be kept at a safe distance from it.

Revisions to the publication
In order to improve the product, to keep this publication up to date the manufacturer reserves the right to make modifications without any advanced notice. Any reproduction, even in part, of this manual without the consent of T R Engineering Ltd is prohibited.

Care of the manual and how to consult it

- Take good care of this manual and keep it in a place which can be easily reached.
- If this manual should be lost or destroyed, or if it is in poor condition, ask for a copy from your retailer or directly from the manufacturer, providing identification data.
- Information which is essential or that requires special attention is shown in bold text.
- Italic text is used to call your attention to other paragraphs in the manual or for any additional clarifications.

	**ATTENTION** This warning sign indicates that the message to which it refers should be carefully read and understood, because failure to comply with what these notices say can cause serious damage to the boiler and put the user's safety at risk.
	**INFORMATION** This symbol is used to highlight information which is important for proper boiler operation. Failure to comply with these provisions will compromise use of the boiler and its operation will not be satisfactory.
	**OPERATING SEQUENCES** Indicates a sequence of buttons to be pushed to access menus or make adjustments.
	**MANUAL** Indicates that you should carefully read this manual or the related instructions.

T R Engineering Ltd

T R Engineering Ltd operates a policy of continuous development and improvement of our products and welcomes any feedback from our customers. Please forward your comments to:

T R Engineering Ltd
Unit 7, Newton Chambers Way
Thorncliffe Industrial Estate
Chapeltown
Sheffield
S35 2PH

Tel: 0114 257 2300
Fax: 0114 257 1419
E-mail: info@trianco.co.uk
Web: www.trianco.co.uk

2. Warnings and Guarantee/Warranty Conditions

2.1 Safety Instructions

Installation of the boiler, making electrical connections, checking its operation and maintenance are all tasks which should be carried out by qualified and authorised personnel.

Install the boiler in accordance with the regulations in force in your local area, region and country.

For the correct use of the appliance and to prevent accidents, the instructions given in this booklet must always be followed.
Use, adjustment and programming must be carried out by adults.
Errors or incorrect settings may cause hazardous conditions and/or poor operation.

Before beginning any operation the user, or whoever is preparing to operate the appliance, must have read and understood the entire contents of this instruction booklet.

All responsibility for improper use is taken entirely by the user and such use relieves T R Engineering Ltd of any civil or criminal responsibility.

Most of the surfaces of the appliance are extremely hot (the boiler door, the handle, smoke discharge pipes, etc). Avoid coming into contact with these parts, without adequate protective clothing or suitable implements such as gloves with thermal protection or implements which keep the hands cool.

Carefully explain this hazard to elderly people, disabled people and particularly to all children, keeping them away from the appliance while it is running.

Under no circumstances should the appliance be run with the door open.

Do not touch the appliance with wet hands, in view of the fact that it is an electrical appliance.

Before carrying out any cleaning or maintenance operation, make sure in advance that the appliance is isolated from the mains electricity supply, by removing the mains isolator fuse.

The appliance must be connected to an electrical system which is equipped with an earth conductor, as laid down in directive 73/23 EEC and 93/98 EEC.

The fuse must be of adequate rated capacity for the stated electrical power of the appliance.

Incorrect installation or faulty maintenance (not conforming to the requirements set out in this booklet) can cause harm to people, animals or property. In such cases T R Engineering Ltd is absolved from any civil or criminal responsibility.

Adhesive sealants and paints used in the manufacture of the product are cured and present no known hazards when used in the manner for which they were intended. The appliance contains no asbestos.

2.2 Operating Warnings

Shut the appliance down in the event of a breakdown or bad running.

Pellets must not be fed manually into the burner.

Accumulated un-burnt pellets in the burner after repeated failed ignitions must be removed before relighting.

Do not wash the inside of the heat exchanger with water.

Do not wash the appliance with water. The water could get inside the unit and damage the electrical insulation and cause electric shocks.

Do not put any fuel, other than wood pellets, in the hopper.

Install the appliance in a location which is suitable for fire-fighting and equipped with all services such as air and electricity supply and provision for discharging combustion gases.

If there is a fire in the flue pipe, extinguish the appliance, disconnect it from the power supply and never open the door. Then contact the competent authorities.

If the appliance is in storage, it should be in a place that is free of damp, and it should not be exposed to extremes of temperature.

It is inadvisable to base the appliance directly on a floor (if located indoors), and if the floor is made of flammable material, it must be suitably insulated.

Do not light the appliance with flammable materials if the ignition system breaks down.

Information

In case of any problems, get in touch with your dealer, or a qualified engineer authorised by T R Engineering Ltd and if a repair is necessary, insist on the use of original spare parts.

Use only fuel recommended by T R Engineering Ltd (ENplus-A1) may be used with this appliance. Failure to do so will invalidate the warranty.

Periodically check and clean the smoke outlet ducts (connection to flue pipe)

Accumulated un-burnt pellets in the burner after repeated ignitions must be removed before re-lighting.

Always keep the cover of the fuel hopper closed.

Keep this instruction manual safe because it must stay with the appliance throughout its working life. If the appliance is sold or transferred to another user, always make sure that the booklet goes with the product.

If it gets lost, ask T R Engineering Ltd or your authorised dealer for another copy.

2.3 Guarantee/Warranty Information

T R Engineering Ltd offers the following warranties on this appliance:

Leaks in heat exchanger – **5 years**

Faulty electrical components (motors, fan, controller) – **1 year**

Pump, Ignition element – **1 year**

From the date of first ignition of the appliance as proved by a valid commissioning report which the name of the installer/commissioning engineer and the date on which the commissioning took place. The guarantee is conditional on the commissioning report being filled in and returned to the manufacturer within 10 days and requires that the product be installed and commissioned by an approved T R Engineering Ltd installer according to the detailed instruction given in the instruction booklet supplied with the product.
The term 'guarantee' is to be understood to denote the free of charge replacement or repair of parts only, recognised to have been defective at the start by reason of manufacturing defects.

2.3.1 Limitations

The above guarantee does not cover parts subject to normal wear such as gaskets, fibre board on doors and any parts which can be removed from the firebox such as burner pot, baffles and ash box.
The replacement will be guaranteed for the remainder of the guarantee period starting from the date of commissioning of the product.

2.3.2 Exclusions

The warranty excludes all ancillary products associated with the system (e.g. flue pipes, external circulation pumps, bulk hoppers and augers, plumbing and electrical system). The warranty does not cover third party damage to the product or damage caused by the plumbing (an example would be an inappropriately sized expansion vessel) or electrical system. Warranty does not cover issues arising from pellets that do not conform to ENplus-A1.
Recommendations advised to the customer to be carried during commissioning must be completed and advised to your local dealer in order to validate the warranty.
The requirement for the flue installation, particularly in relation to draught, is the responsibility of the system owner. Compliance with Local Building Regulations must be adhered to. The warranty does not cover misuse of the product or sabotage.
T R Engineering Ltd refuses to accept responsibility for any damage which may be caused, directly or indirectly, by persons, animals or things in consequence of the failure to observe all prescriptions laid down in the instruction booklet, especially those concerning warnings on the subject of installation, use and maintenance of the appliance.
Damage caused by transport and/or handling is excluded from the guarantee.
The guarantee will be invalidated in the event of damage caused by tampering with the appliance, atmospheric agents, natural disasters, electrical discharges, fire, defects in the electrical system and caused by lack of, or incorrect, maintenance in terms of the manufacturer's instructions.

Claims under the Guarantee

The request for action under the guarantee must be addressed to the dealer/retailer, who will forward the claim to T R Engineering Ltd's technical assistance service. **T R ENGINEERING LTS DECLARES THAT THE APPLIANCE WHICH YOU HAVE PURCHASED COMPLIES WITH THE EEC DIRECTIVE 2004/108 EC AND 2006/95/EEC AND SUCCESSIVE AMENDMENTS.**

T R Engineering Ltd refuses to accept any responsibility in the event that the appliance or any other accessory has been improperly used or modified without authorisation. For all replacement of parts, only original T R Engineering Ltd spare parts must be used.

2.4 Clean Air Act 1993

Under the Clean Air Act 1993 local authorities may declare the whole part of the district of the authority to be a smoke control area. It is an offence to emit smoke from a chimney of a building, from a furnace or from any fixed boiler if located in a designated smoke control area. It is also an offence to acquire an "unauthorised fuel" for use within a smoke control area unless it is used in an "exempt" appliance (exempted" from the controls which generally apply in the smoke control area).

The Secretary of State for Environment, Food and Rural Affairs as powers under the act to authorise smokeless fuels or exempt appliances for use in smoke control areas in England. In Scotland and Wales this power rests with ministers in the devolved administrations for those countries. Separate legislation, the Clean Air (Northern Ireland) Order 1981, applies in Northern Ireland. Therefore it is a requirement that fuels burnt or obtained for use in smoke control areas have been "authorised" in regulations and that appliances used to burn solid fuel in those areas (other than "authorised fuels") have been exempted by an Order made and signed by the secretary of State or minister in the devolved administrations.
Further information on the requirements of the Clean Air Act 1993 can be found here: http://smokecontrol.defra.gov.uk/
Your local authority is responsible for implementing the Clean Air Act 1993 including designation and supervision.

The Greenflame ECO wood pellet boiler 10, 15, 25, 40 and 60kW have been recommended for exemption under section 21 of the Clean Air Act 1993 for use within UK Smoke Control Areas.

2.5 Customer Handover

After every commission the customer must be provided with training by the commissioning engineer. The following is a list of items which should provided be covered during product the induction with the customer:

- Provide a general overview of the product and identify the main components and their function.
- Illustrate how to turn on and off the appliance and adjust water temperature through the user menu.
- Demonstrate where and how to fill the appliance with fuel and advise of the correct quality of fuel to be used.
- Demonstrate how to clean down the combustion chamber by removing and replacing the baffles, emptying the ash containers in the main combustion chamber and lower ash chamber.
- Explain how to remove the burner grate and clear air holes to ensure goo combustion.
- Explain the various error codes that may appear and provide instruction on how to manage and clear messages. Provide warnings and on which error codes are system critical codes and should not be reset by the customer.
- The customer must be warned of the safety implications when handling hot ash and that heat proof gloves should be used.

The product warranty must be explained to the customer and they shall sign the commissioning report confirming that they have received instructions on how to operate the appliance, understand the risks when handling hot ash and agree to product warranty.
The warranty card and commissioning report shall be returned to T R Engineering Ltd by fax, email or post within 30 days from the commissioning date.

3. After Sales Service Information

A qualified field service engineer is available to attend a breakdown occurring during the boiler's guarantee period.
The boiler must be made available for attendance during normal working hours, Monday to Friday.

3.1 How to Report a Fault

Step 1
Contact your installation or service engineer, who should assess the unit and works carried out on the appliance prior to requesting the attendance of an engineer from T R Engineering Ltd.

Step 2
Please note that upon attendance by a T R Engineering Ltd engineer, a charge will be made where:

- The engineer finds no fault with the boiler.
- The cause of the breakdown is due to parts of the system not manufactured or supplied by T R Engineering Ltd.
- The boiler has not been commissioned by a qualified engineer.
- The boiler has not been serviced annually since installation.
- The breakdown occurs outside the guarantee period.
- The appliance has not been maintained correctly.
- A breakdown occurs as a result of work on the appliance by an unauthorised third-party.

Important:
Invoice for attendance and repair work by a third-party will not be accepted unless authorised in advance by T R Engineering Ltd.

3.2 Technical Assistance

A team of trained technical advisors are available to discuss any problem with the appliance. In many cases, the problem may be solved over the telephone, eliminating the need for an engineer's visit.

Before making contact, please have the following information ready:

- The appliance serial number or your unique customer identification number (issued upon registration of the appliance with T R Engineering Ltd).
- A description of the fault and any unusual behaviour by the boiler before the failure occurred.
- The installation and commissioning dates and the details of any annual services.

Appliance Serial No: _____
Cust. ID No: _____
Installation Date: ___/___/___
Commissioning Date: ___/___/___

Service Centre and Technical Support
Tel: 0114 257 2300 Fax: 0114 257 1419

Hours of Business
Monday – Thursday: 8:30am – 17:00pm
Friday: 8:30am – 14:30pm

4. Basic Usage Guide

To ensure correct and prolonged operations of the boiler please comply with the following rules:

- Only fuel approved by T R Engineering Ltd (ultimately ENplus-A1) may be used with this appliance.
- It is strictly forbidden to make any changes to the construction or settings of the boiler, this can result in damage of the auger supplying the fuel.
- The boiler must always be fitted with water circulation. Not providing water flow will cause overheating of the boiler, which in consequence may result in injury or damage to the material goods.
- Before starting up please make sure that the boiler room is properly ventilated and that air and exhaust ducts are always clean and permeable.
- It is crucial to follow all rules and instructions regarding installation (both central heating as well as electrical) and boiler usage.

4.1 User's Responsibilities

- The user is fully responsible for the usage and maintenance of the boiler.
- Not complying with rules might result in boiler malfunction, decrease efficiency as well as shorter life span.
- The boiler should only be operated by a competent person.

5. Technical Data

5.1 Pellets

Wood pellets are manufactured by hot-extruding compressed sawdust which is produced during the working of natural dried wood. The compactness of the material comes from lignin which is contained in the wood itself and allows the production of pellets without the use of glues or binders.
The market offers different types of pellet with characteristics which vary depending on what mixture of woods is used. The diameter varies between 6mm and 8mm, with a standard length in the range 5mm to 30mm. Good quality pellets have a density which varies between 600kg/m^3 and 750kg/m^3, with a moisture content which varies from 5% to 8% by weight.
Besides being an ecological fuel (exploiting timber residues to the maximum and achieving cleaner combustion than is possible with fossil fuel), the pellets also have technical advantages. While good quality timber has a calorific power of 4.4kW/kg (with 15% moisture, therefore after about 18 months seasoning), the equivalent figure for pellets is 4.9kW/kg.
To ensure good combustion, the pellet must be stood in an area that is free of humidity and protected from dirt. The pellets are usually supplied in 10kg bags, so storing them is very convenient.
Good quality pellets ensure good combustion, thus lowering the emission of harmful agents into the atmosphere.

The poorer the quality of fuel, the more frequently intervention will be necessary for cleaning the internal parts, such as the grate and the combustion chamber.

The main certifications of quality for pellets in the European market are ENplus-A1 and these ensure respect of:

- ✓ **Calorific Power**: 4.9kW/kg
- ✓ **Water Content**: max 10% of weight
- ✓ **Percentage of ashes:** max 0.5% by weight
- ✓ **Diameter:** 6mm
- ✓ **Length: max** 30mm
- ✓ **Contents:** 100% untreated wood, with no added bonding substances (bark percentage 5% max)
- ✓ **Packaging:** in sacks made of ecologically compatible or biologically decomposing material.

T R Engineering Ltd recommends using certified fuel in its appliances to ENplus-A1. The use of fuel of inferior quality or not conforming to the specification given above compromises the running of your appliance can therefore lead to the termination of the guarantee and of the manufacturer's responsibility for the product.

T R Engineering Ltd domestic pellet appliances run exclusively on pellets with a diameter of 6mm. It is recommended that the brand of pellets being used during commissioning are used during normal operation.

If you change your pellet supplier or brand, re-calibration may be necessary and a call-out charge will apply.

The Greenflame Eco has been recommended as suitable for use in smoke control areas when burning ENplus-A1 wood pellets.

5.2 Connection to the Flue

The proper draught conditions in the flue are critical for the efficient working of wood pellet boilers. The flue can exit the boiler house/garage through the roof or through the wall by using a bend on the flue. The combustion chamber works in negative pressure. The smoke duct for the discharge of fumes will also be under negative pressure when connected to an efficient flue pipe as directed.
All sections of the flue must be capable of inspection and removable to enable periodic internal cleaning.
Position the appliance bearing in mind all instructions and considerations above.

IMPORTANT!
THE FLUE IS AN INTEGRAL AND CRITICAL COMPONENT IN ANY SUCCESSFUL BIOMASS BOILER INSTALLATION. IN ORDER FOR YOUR BOILER TO OPERATE CORRECTLY, EFFICIENTLY AND SAFELY IT HAS TO BE CONNECTED TO A FLUE SYSTEM WHICH IS SUITABLE, CORRECTLY DESIGNED AND INSTALLED.

INCORRECT FLUE CONNECTIONS CAN LEAD TO CONDITIONS BEING CREATED WHICH CAN BE UNSAFE, DAMAGING TO YOUR BOILER AND INVALIDATE THE WARRANTY.

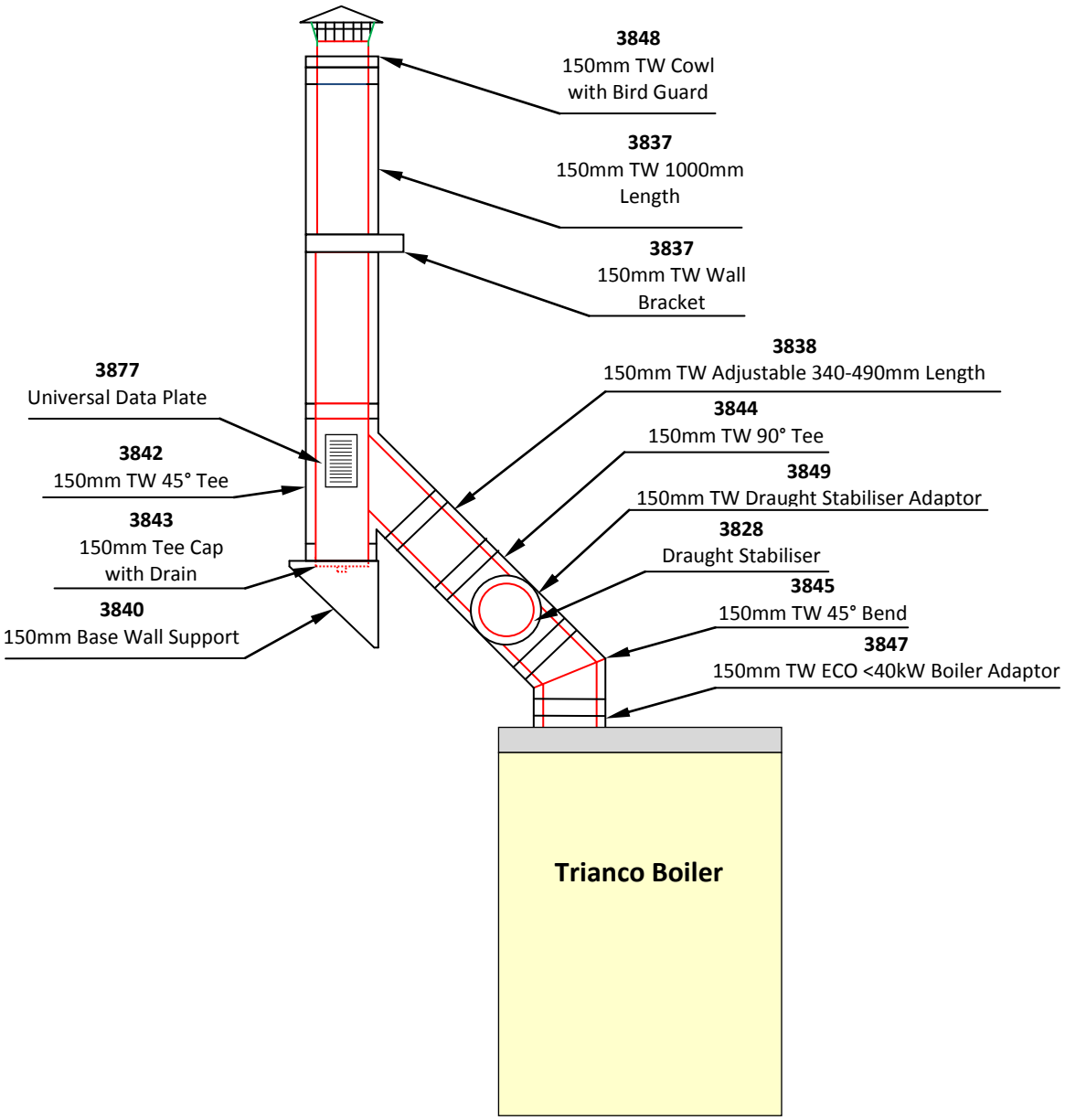
- Check for adequate ventilation. This must be clear at ALL times. You must make the customer aware of the needs to avoid any obstruction of the air inlet facility. If an internal boiler is asked to operate without sufficient ventilation for fresh air it will lead to potentially dangerous and damaging consequences.
- Ensure that the flue installation meets all requirements in terms of the use of bends, tees and restrictions.
- Every flue **MUST** include draught stabilisation, explosion relief, condensate collection and the correct protective cowl or terminal as required.
- Commissioning – the flue draught must be checked under both full load and part load conditions to ensure that there is the correct amount of draw in both cases. It is essential that the correct draw is achieved for both specified flue gas temperatures and that a draught stabiliser is used to avoid over drawing of the flue. Correct setting of the draught stabiliser is critical.
- All flues must be correctly insulated. A poorly insulated flue can lead to issues during operation of the boiler which may be damaging.
- Flue termination must be in accordance with building regulations and pay attention to pressure zones which may be induced by the building and surrounding topography.

IMPORTANT!
All 90° changes of direction in the flue pipe must be either removable or capable of inspection. For locating the boiler against a wall ensure adequate flue support using approved wall brackets.

IT IS ADVISABLE NOT TO EXCEED 8 METRES IN LENGTH AND REQUIRES A MINIMUM OF 3 METRES.

TEH BOILER REQUIRES A MINIMUM FLUE DRAUGHT OF 8Pa AND A MAXIMUM OF 20Pa.

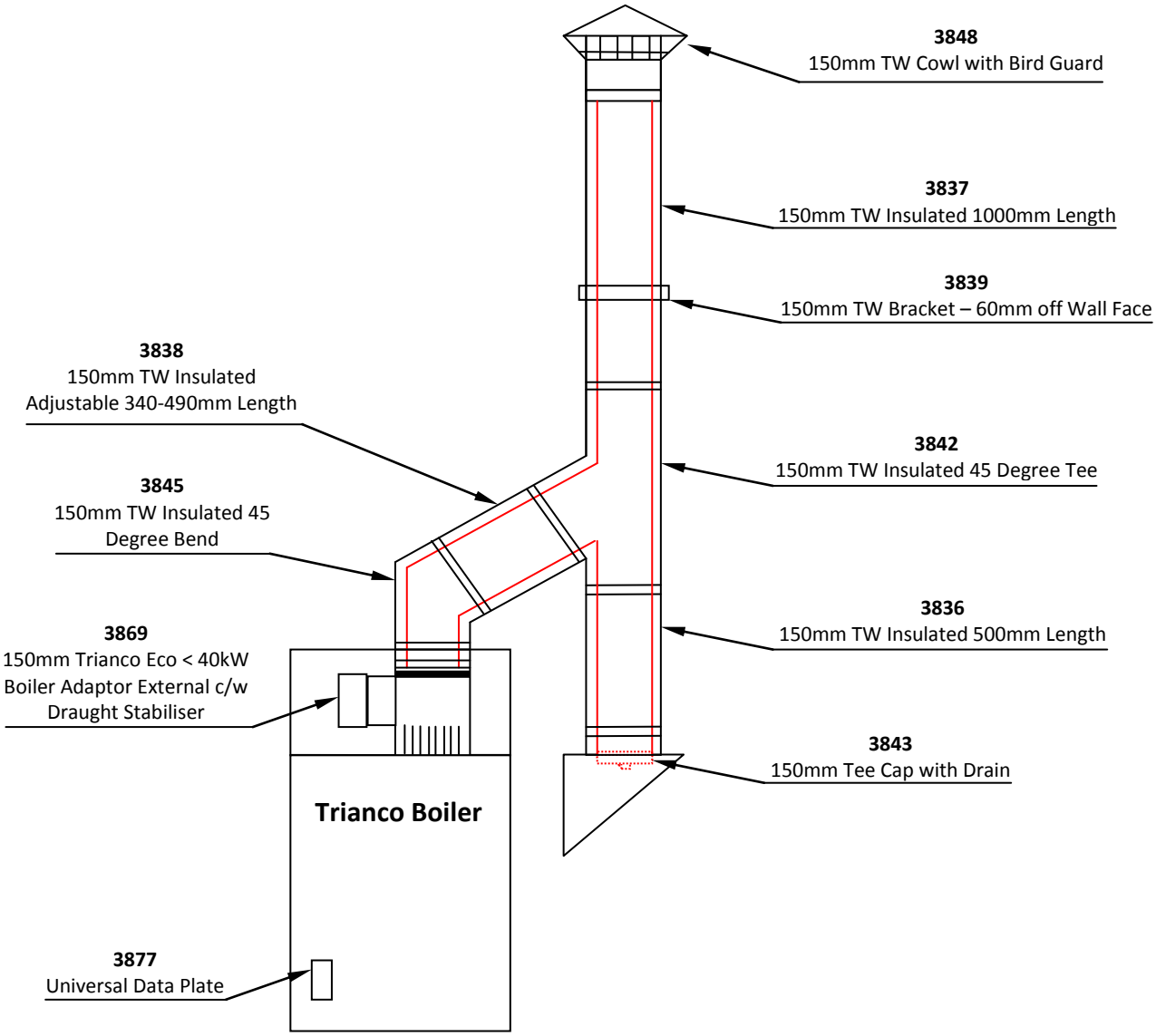
5.2.1 15-40kW Internal Boiler Flue Kit (Code 3810)



Flue Spares

3835	E2-150-250	150mm Twin Wall Insulated 250mm Length
3836	E2-150-500	150mm Twin Wall Insulated 500mm Length
3837	E2-150-1000	150mm Twin Wall Insulated 1000mm Length
3839	E2-150-BK	150mm Twin Wall Bracket – 60mm off wall face
3845	E2-150-45	150mm Twin Wall Insulated 45 Degree Bend
3846	E2-150-PL	150mm Twin Wall Insulated Probe Length
3848	E2-150-CLCBG-SF	150mm Twin Wall Cowl with Bird Guard
3877	ECP-1	Chimney Plates x 1
3870	E2-150-BK-EXT	150 Twin Wall Bracket Extension – 60-130mm off wall face
3871	E2-150-SLCK	150mm Twin Wall Structural Locking Band
3878	TEXPD-SS	Explosion Relief Door (Stainless Steel)

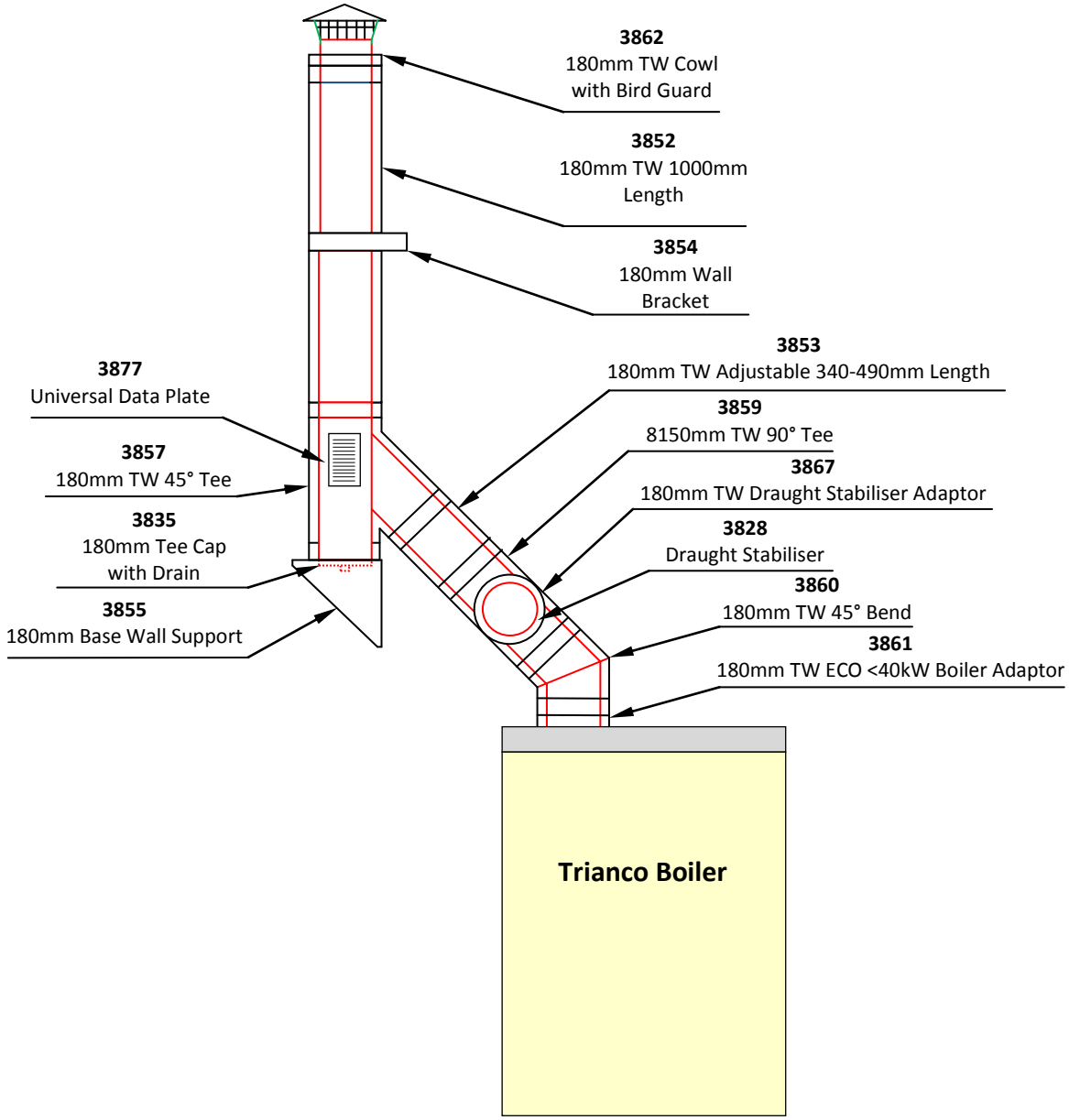
5.2.2 15-40kW External Boiler Flue Kit (Code 3810/E)



Flue Spares

3835	E2-150-250	150mm Twin Wall Insulated 250mm Length
3836	E2-150-500	150mm Twin Wall Insulated 500mm Length
3837	E2-150-1000	150mm Twin Wall Insulated 1000mm Length
3839	E2-150-BK	150mm Twin Wall Bracket – 60mm off wall face
3845	E2-150-45	150mm Twin Wall Insulated 45 Degree Bend
3846	E2-150-PL	150mm Twin Wall Insulated Probe Length
3848	E2-150-CLCBG-SF	150mm Twin Wall Cowl with Bird Guard
3877	ECP-1	Chimney Plates x 1
3870	E2-150-BK-EXT	150 Twin Wall Bracket Extension – 60-130mm off wall face
3871	E2-150-SLCK	150mm Twin Wall Structural Locking Band
3878	TEXPD-SS	Explosion Relief Door (Stainless Steel)

5.2.3 60kW Internal & External Boiler Flue Kit (Code 3811)



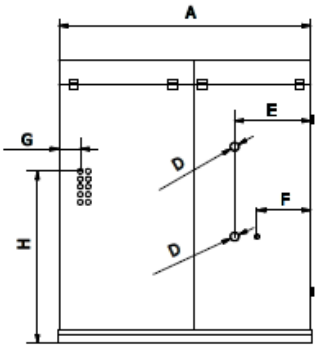
Flue Spares

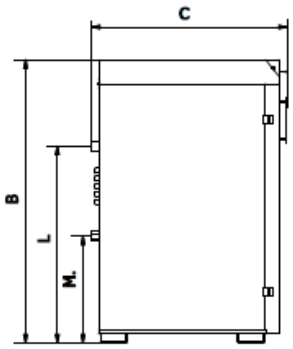
3850	E2-180-250	180mm x 250mm Twin Wall Insulated Flue
3851	E2-180-500	180mm x 500mm Twin Wall Insulated Flue
3852	E2-180-1000	180mm x 1000mm Twin Wall Insulated Flue
3854	E2-180-BK	180mm Twin Wall Bracket - 60mm off Wall Face
3860	E2-180-45	180mm x 45 Twin Wall Insulated 45 Degree Bend
3863	E2180-BK-EXT	180mm Twin Wall Insulated Bracket Extension – 60-130mm off Wall Face
3864	E2-180-SLCK	180mm Twin Wall Insulated Structural Locking Band
3865	E2-180-PL	180mm Twin Wall Insulated Probe Length
3877	ECP-1	Chimney Plates
3876	T2-180-IS45	180mm Twin Wall Insulated Mesh Sleeve 45 Degree
3878	TEXPD-SS	Explosion Relief Door (Stainless Steel)
3879	T2-180-IWS	180mm Twin Wall Intermediate Wall Support

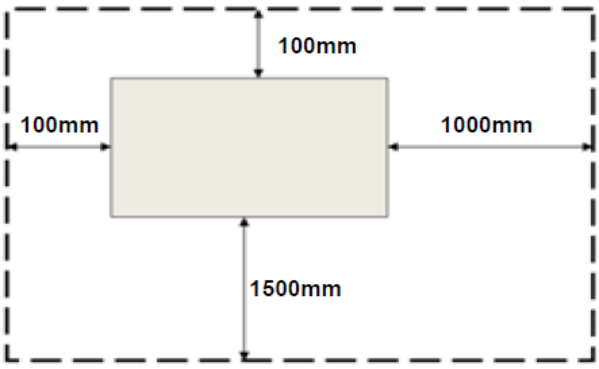
5.3 Basic Boiler Parameters

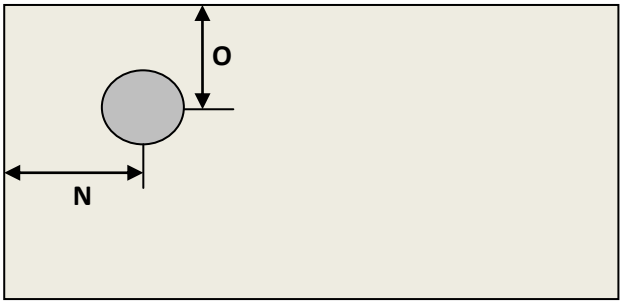
Model	10kW	10kW*	15kW	15kW*	25kW	25kW*	40kW	40kW*	60kW	60kW*
Power (kW)	1-10	1-10	1.5-15	1.5-15	2.5-25	2.5-25	3-40	3-40	4-60	4-60
Weight (kg)	320	335	320	335	320	340	375	400	420	460
Water Volume (m^3)	72	72	64	64	64	64	74	74	91	91
Flue Gas Outlet (kz-mm)	153	153	153	153	153	153	153	153	180	180
Width (A-mm)	1155	1460	1155	1460	1155	1460	1155	1460	1155	1460
Height (B-mm)	1275	1360	1275	1360	1275	1360	1375	1485	1375	1485
Depth (C-mm)	865	865	865	865	865	865	865	865	865	865
Flue Spigot Diameter (mm)	146	146	146	146	146	146	146	146	170	170
Minimum Height of the Boiler Room (mm)	1831	1916	1831	1916	1831	1916	1931	2041	1931	2041
Flue Gas Temp. at Minimum Operation (°C)	90	90	90	90	90	90	90	90	90	90
Flue Gas Temp. at Nominal Operation (°C)	120	120	120	120	120	120	120	120	120	120
Maximum Flue Gas Temp (°C)	130	130	130	130	130	130	160	160	180	180
Min/Max O^2 (%)	8-11	8-11	8-11	8-11	8-11	8-11	8-11	8-11	8-11	8-11
Hopper (kg)	100	214	100	214	100	214	127	221	145	292
Working Pressure (bar)	2	2	2	2	2	2	2	2	2	2
Min/Max Flue Draught (Pa)	8/20	8/20	8/20	8/20	8/20	8/20	8/20	8/20	8/20	8/20
Avg Fuel Consumption (kg/hr)	2.2	2.2	3.2	3.2	5.4	5.4	8.6	8.6	13	13
Efficiency (%)	95	91	95	91	95	91	95	91	95	91
Seasonal Efficiency (%)	82.9	82.9	82.6	82.6	82.7	82.7	83.1	83.1	79.6	79.6
Dimension (D-inch)	M 1 ¼	M 1 ¼	M 1 ¼	M 1 ¼	M 1 ¼	M 1 ¼	M 1 ¼	M 1 ¼	M 1 ¼	M 1 ¼
Dimension (E-mm)	340	340	340	340	340	340	340	340	340	340
Dimension (F-mm)	235	235	235	235	235	235	235	235	235	235
Dimension (G-mm)	95	155	95	155	95	155	95	155	95	155
Dimension (H-mm)	565	570	565	570	565	570	570	570	570	570
Dimension (I-mm)	330	330	330	330	330	330	330	330	330	330
Dimension (J-mm)	200	200	200	200	200	200	200	200	200	200
Dimension (L-mm)	885	885	885	885	885	885	985	985	1095	1095
Dimension (M-mm)	485	485	485	485	485	485	485	485	485	485
Dimension (N-mm)	340	340	340	340	340	340	340	340	340	340
Dimension (O-mm)	210	210	210	210	210	210	210	210	210	210

*= large hopper store capacity







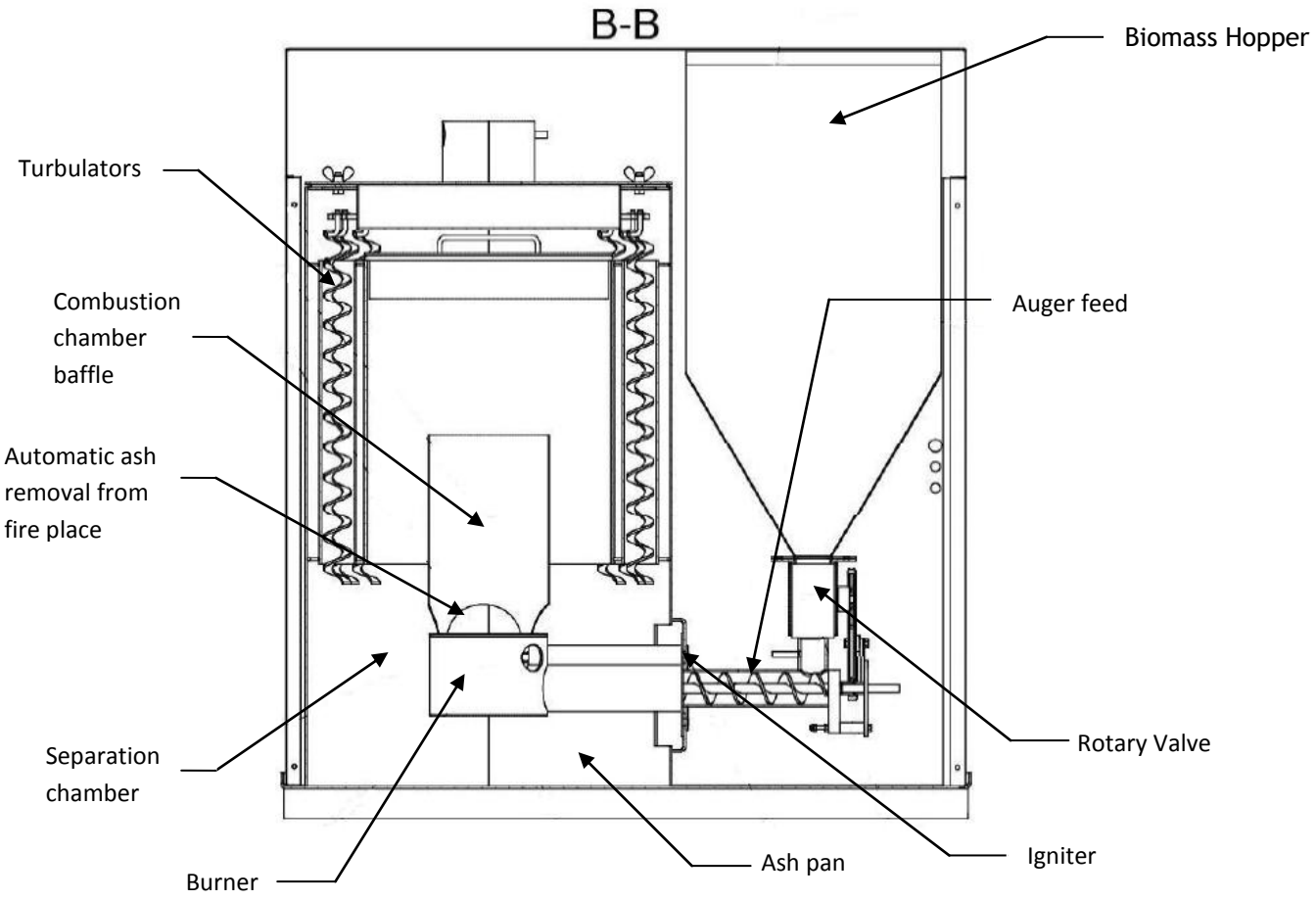


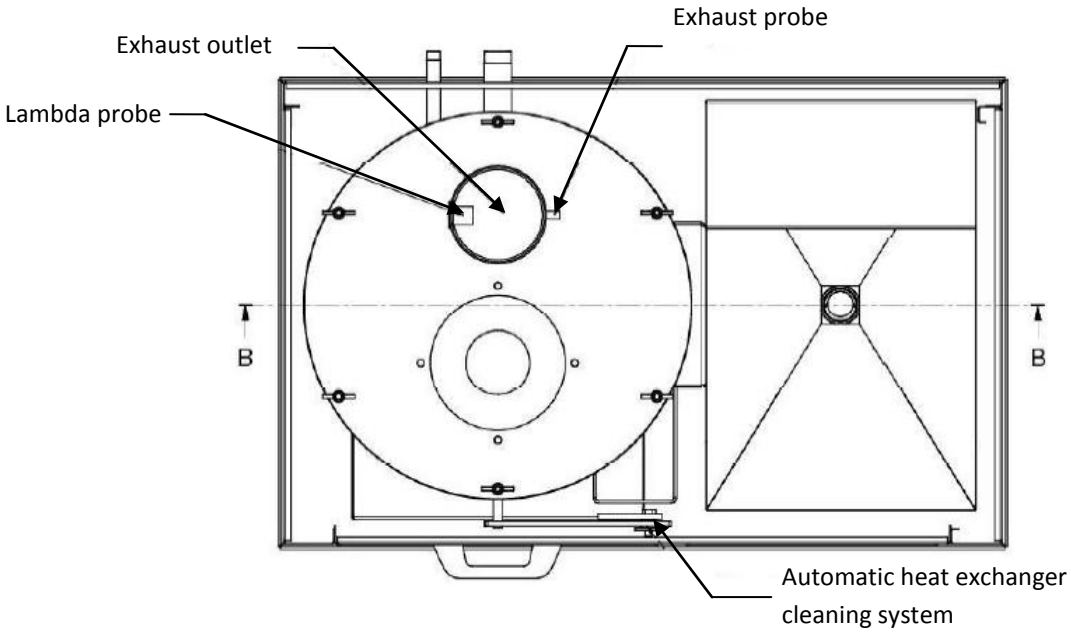
If the boiler has the large hopper then the clearance at the right hand side can be reduced to 400mm.

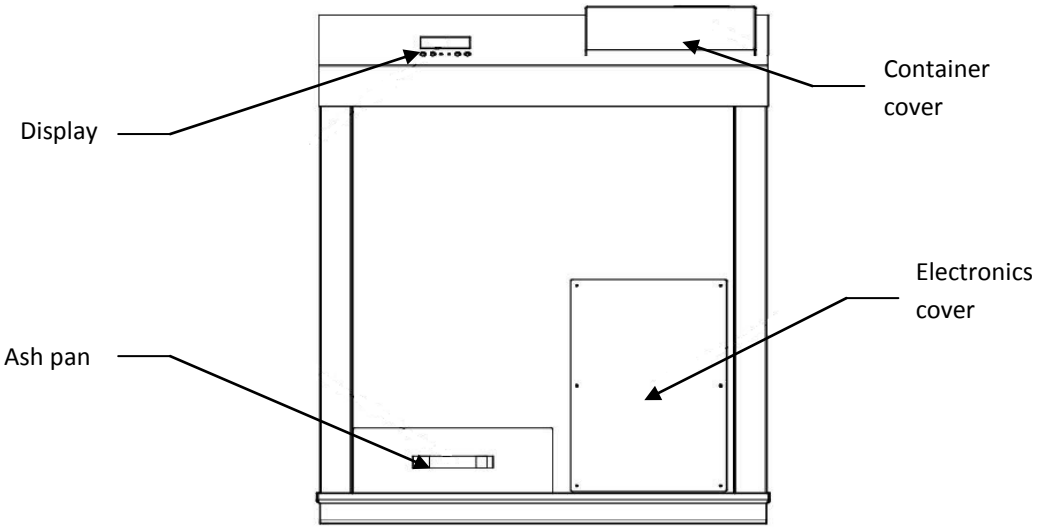
The lids and front doors may need to be removed for access through a standard doorway.

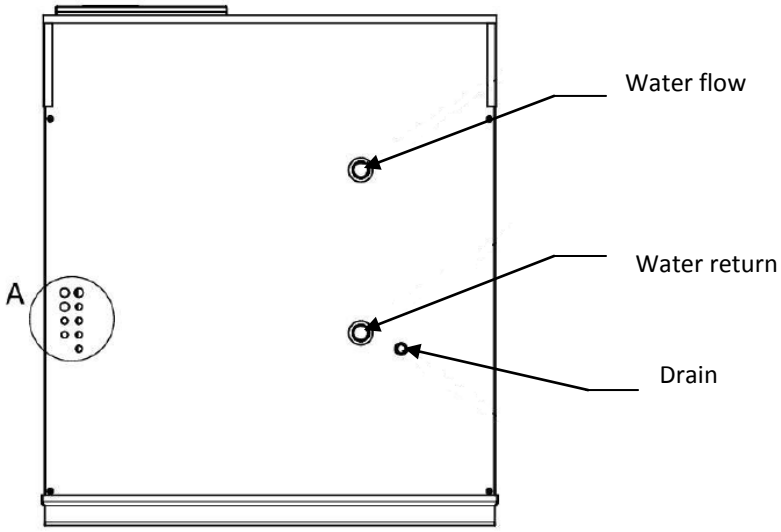
The above parameter comparison for Greenflame Eco pellet boilers is tentative. The manufacturer reserves the right to small variations to some values in the above table.

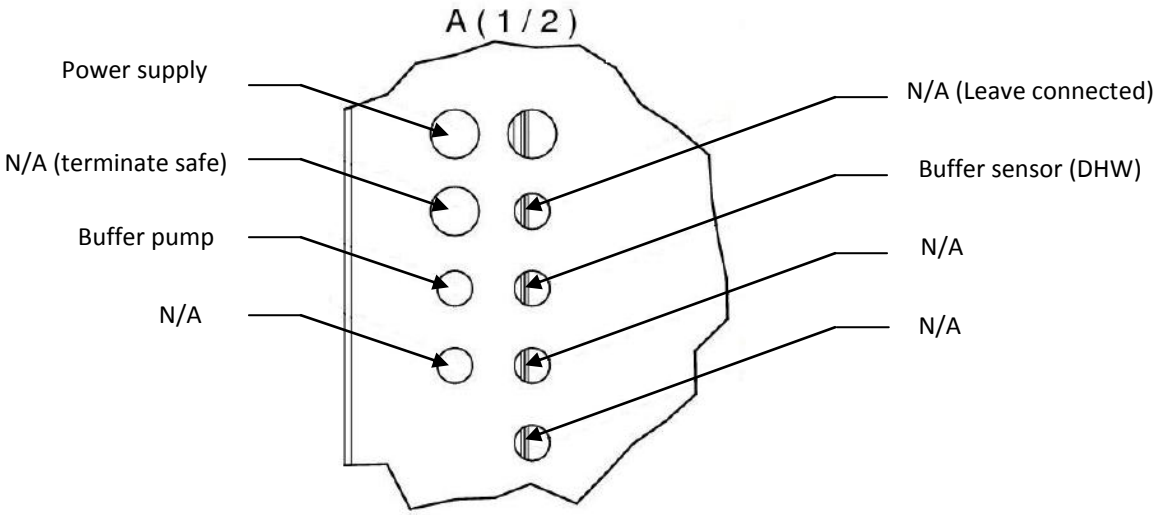
5.4 Construction of the Boiler






Display
Container cover
Electronics cover
Ash pan


Water flow
A
Water return
Drain


A (1 / 2)
Power supply
N/A (terminate safe)
Buffer pump
N/A
N/A (Leave connected)
Buffer sensor (DHW)
N/A
N/A

The above drawings show the main boiler elements. They have the following specifications:

- **Burner** – made out of steel. Its geometry is a result of numerous tests and measures. Equipped with air intakes on various levels which contribute to increased combustion efficiency. Biomass is transported from the hopper to the burner by means of the auger feed. On contact with embers and in connection with air supplied by many ducts the process of pyrolisis of biomass occurs. Exhaust fumes created in the process are directed through the heat exchanger to the chimney outlet through the chimney duct which is enhanced by a fan, which also serves a role for providing a sufficient amount of fresh air supplied for combustion is automatically matched by the controller based on exhaust fume measurements (oxygen content in exhaust fumes) provided by the Lambda probe.
- **Combustion Chamber –** made out of steel. From the moment of starting the ignition process it quickly gains high temperature, which in turn improves the combustion process and reduces the amount of un-burnt gas. It is also isolated between the flame and boiler wall.
- **Rotary Valve –** it is a factory assembled element. Ensures perfect tightness between the hopper and auger feed. Guarantees very precise dosage of pellets.
- **Ignitor –** allows for completely automatic ignition of the pellets**.**
- **Turbulator (Turbulators) –** designed to increase the effectiveness of heat exchange by momentarily slowing down the speed of exhaust flow. Additionally, they are periodically, automatically put in motion. Clearing the heat exchanger of ash.
- **Automatic Heat Exchanger Cleaning System (Turbulators Drive) –** a reduction unit controlled by automatics of the boiler, which propels the turbulators.
- **Exhaust Outlet –** contains a box that can be removed to gain access to the boiler. On top of the box there is an exhaust outlet and a turbine, responsible for the extraction of exhaust towards the chimney. The electric motor that is driving the motor is controlled by via a voltage regulator, which provides voltage based on the measurements provided by the Lambda probe. This solution has been used for many years. Bottom combustion has a lot of benefits and also prevents the fire getting to the pellet hopper.
- **Auger Feed –** Worm-gear that works in a sequential pattern depending on the demand of the burner. The auger provides a small amount of fuel that is released by the rotary valve. This allows operation under minimal load.
- **The Decantation Chamber –** expanding area located underneath the heat exchanger allows the deposition of unburned particles and dust hovering due to lower exhaust fume speed.
- **Ash Pan –** located under the burner. Collects ash that is removed from the burner, ash that drops by force of gravity and also ashes that origin from automatic heat exchanger cleaning.
- **Automatic Removal of Ash from the Fireplace –** occurs by the supplied pellet and also by fresh air flowing through the burner.
- **Lambda Probe –** located in the exhaust outlet. The purpose of the lambda probe is to control the content of oxygen in the exhaust. Using the measurements it allows the optimisation of the combustion process used for fuel. In combination with the temperature probe it guarantees correct boiler operation and doubles as a safety device.
- **Exhaust Probe –** pilots the ignition and also manages the power of the boiler. Another role is to protect the boiler from unforeseen temperature rise.
- **Display –** located on the front of the boiler. Allows browsing through and editing of the available control parameters.
- **Electronics Cover –** covers the electric box that the heart of the control circuit.
- **Pellet Hopper –** its capacity depends on the power of the boiler. Theres also possibility to connect it to an external feeder, which supplies fuel from a repository or large silo.

5.5 Boiler Equipment

A standard Greenflame Eco pellet boiler consists of:

- Burner
- Ignitor
- Lambda Probe
- Control M RS 420 Controller
- Flue Temperature Sensor
- Revolving Hatch
- Pellet Hopper
- Exhaust Fan
- Exhaust Fan Motor
- Cleaner Motor Reduction Unit
- Auger Motor Reduction unit

Additional Options:

- Pellet Silo
- Vacuum System & Pneumatic Supply

The 'Vacuum system' is an optional fuel transportation drive, available on all Greenflame models. The system ensures smooth transportation of pellet from fuel store to boiler. With sensor indication controlling and monitoring the fuel supply. Should the hopper empty the vacuum will automatically refill in defined periods of time. Auger systems are also available upon request.

6. Setting Up and Installation of the Boiler

6.1 Engineer's Responsibilities

The installation of the boiler can only be performed by qualified biomass engineers, complying with and in line with all rules, regulations and norms. The installer must also comply with all recommendations and directions provided by the boiler manufacturer. Specifically this applies to the instruction manual, boiler fitting method and its components and also all hydraulic systems.
For any discrepancies, inconvenience, damage and injuries that result from non-complying with regulations and recommendations found in this manual the installer takes the full responsibility.

6.2 Boiler Room

Internal pellet boilers should be fitted in a specifically allocated room (boiler room). The fuel deposit should also be located in an allocated room near the boiler, however, not closer than 400mm from the boiler. To ease access to the boiler and to enable maintenance, there should be at least 400mm of free space around the boiler. The boiler should be positioned on a non-combustible thermally isolated base, which should exceed the dimensions of the boiler by at least 200mm on all sides. If the device should be mounted in a basement it is advisable to put it on at least a 50mm height foundation.

It is mandatory to check if the boiler is perfectly horizontal and level to prevent air pockets creating.

During the installation of the boiler it is advisable to provide sufficient distance from inflammable materials, according to the level of flammability.

If the level of flammability of material near the boiler is unknown, the safe distance should be doubled (safe distance is 200mm).

It is mandatory to fully follow all instructions and recommendations regarding boiler rooms contained in this instruction manual as well as in Current Building Regulations.

6.3 Ventilation and Exhaust – Flue System

To ensure proper combustion it is necessary to prepare sufficient air supply (non closing opening) with a surface area of no less than 200cm^2 not higher than 1m above floor level. A permanent air entry opening or openings with a total free area of least 500mm^2 per kW of appliance rated output above 5kW. Proper combustion also requires a proper exhaust flue system. The role of the flue is to pipe away exhaust fumes. The flue required to complete this depends on:

- Temperature difference between exhaust and surrounding air.
- Usable flue height.
- Diameter of flue (no less than flue spigot diameter).
- Flue workmanship – as smooth as possible inner surfaces and air tightness.

Usable flue height is the difference between the highest point of the fireplace and flue outlet. In case of sloping roofs, flues should end around the crest, in the area of smooth wind flow – this way there's no interruption of air draught. It is always necessary to take into account the location and orientation of the building in relation to surrounding buildings. In most cases, to determine flue parameters should be calculated according to Current Building Regulations.

Improper cross-sectional area selection causes slowdown of exhaust fumes and in turn, deposition of ash inside the flue. If exhaust temperatures would drop below the dew point, the water vapours and sulphuric acid might cause damage to the wall.

6.4 Plumbing and Electrical Schematics

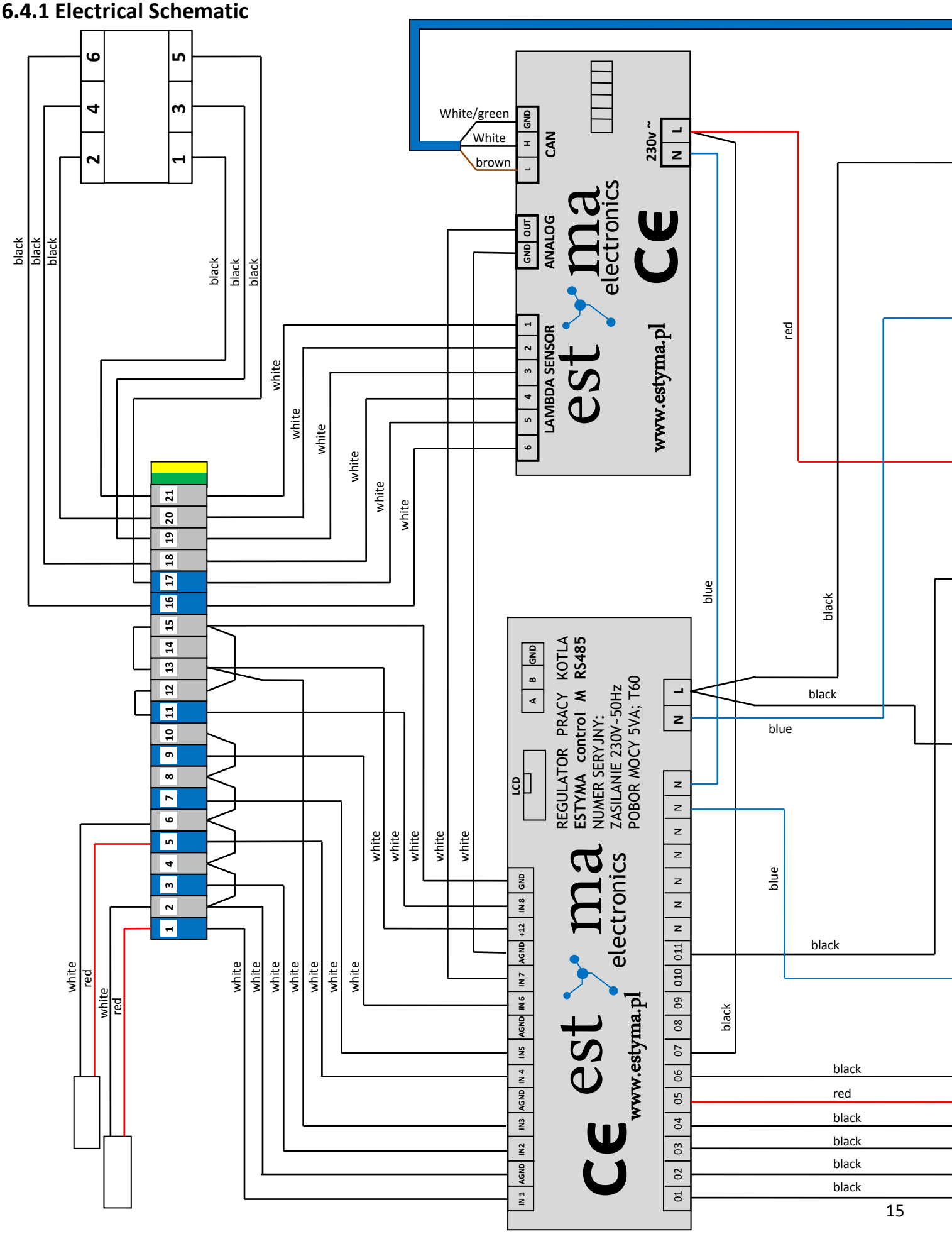
Pellet boilers must be installed according to valid rules and regulations by the authorised installation company. First start-up must be performed by a service trained engineer and authorised by T R Engineering Ltd that can show legitimate validation documents. The responsibility for proper boiler installation and repairs is held by the installation/servicing company, trained by the manufacturer and that has validation/authorisation. Any manipulation or changes made in electrical parts of the boiler, or connecting additional controller devices, might result in warranty loss.

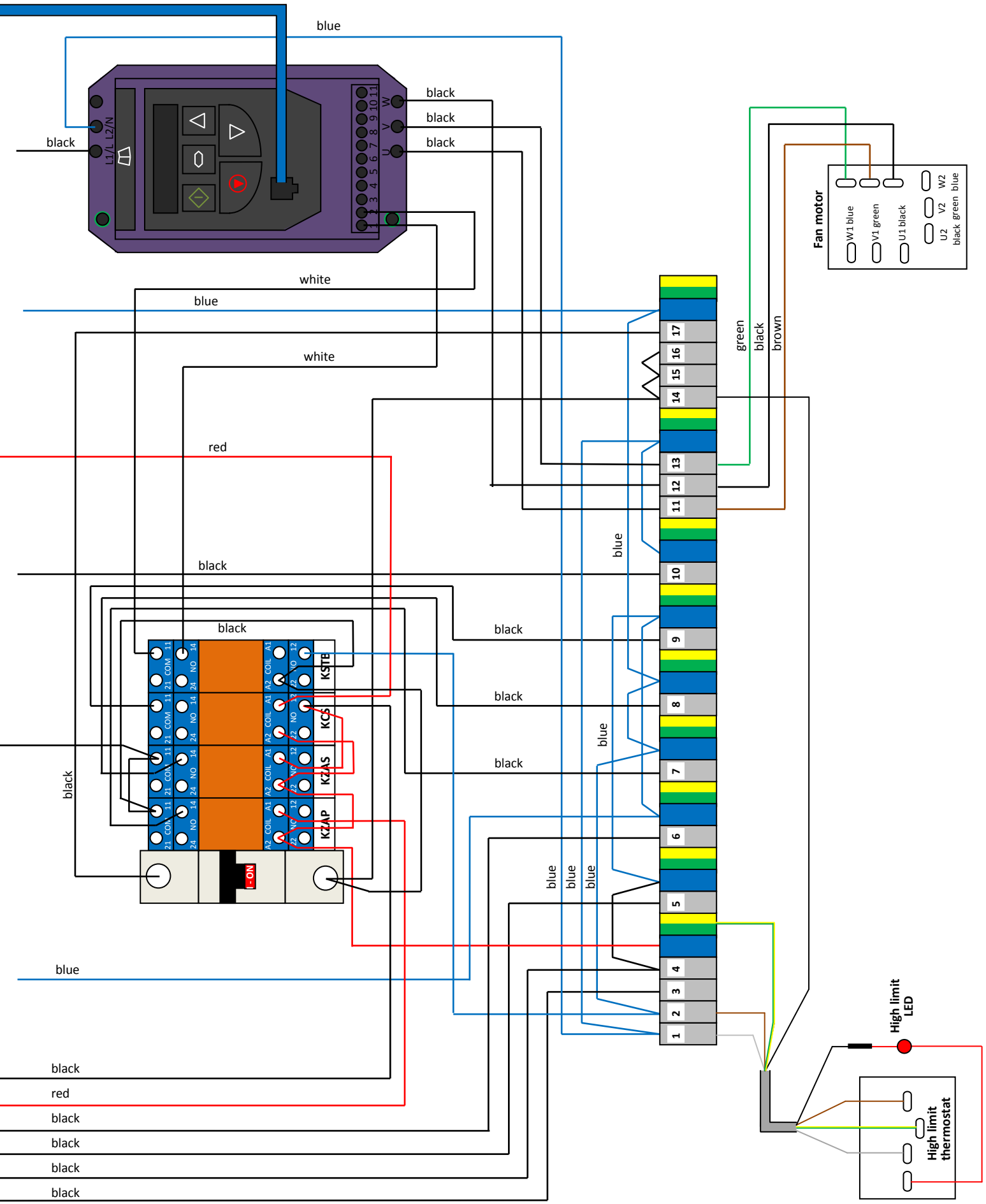
Finalisation and heat testing must be denoted on the boilers commissioning report. Lack of such information about start-up in the commissioning report might result in warranty loss.

Hydraulic systems should comply with BS 7593 and BS 5449 and be executed according to Current Building Regulations.

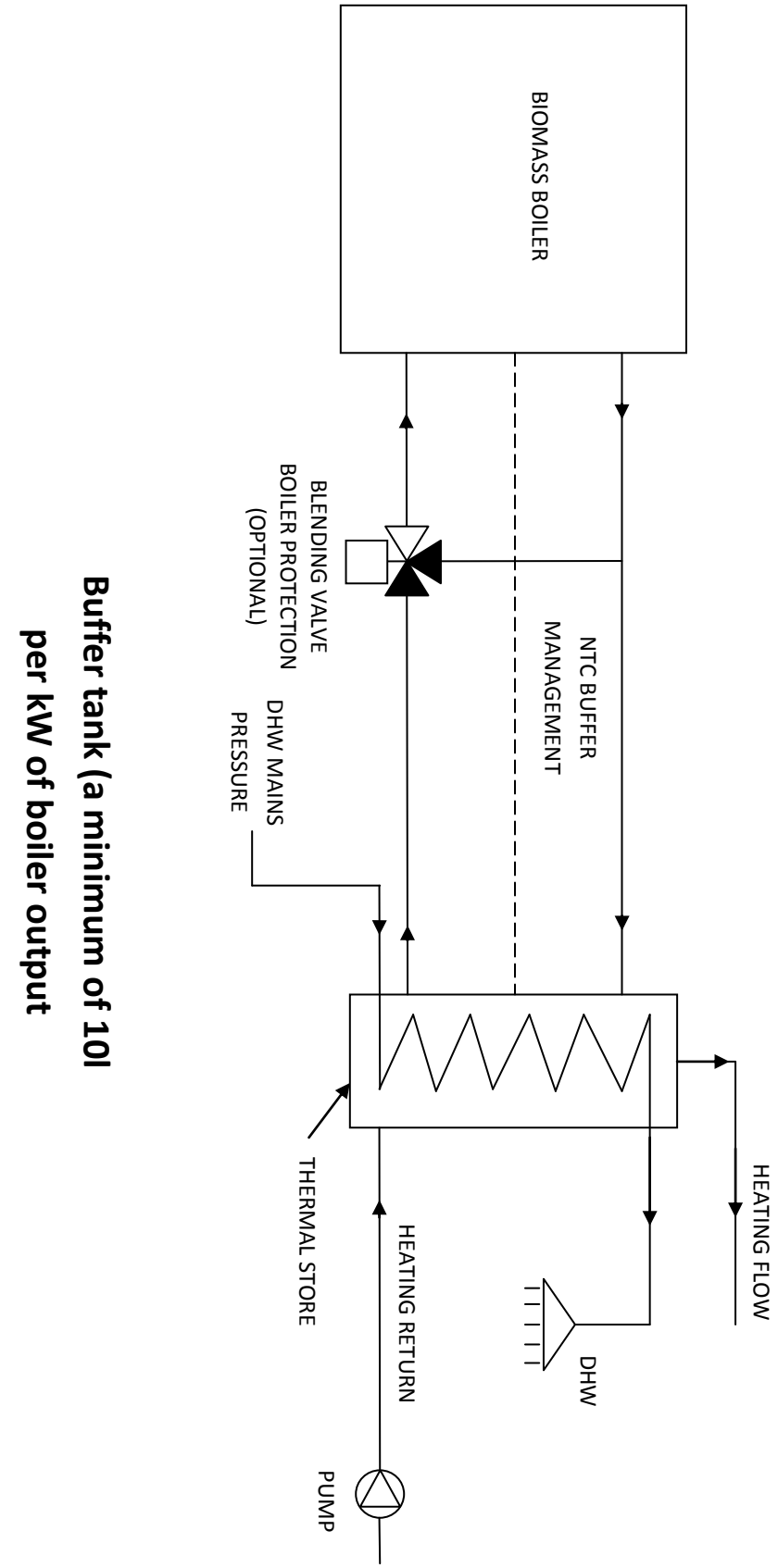
The boiler is dedicated to following the electrical parameters 230V/50Hz. Electrical systems should be executed by a qualified person that will create a 230V/10A double pole isolator, in an easily accessible place. Electrical supply of the boiler and lighting should be connected to separate circuits.

6.4.1 Electrical Schematic




blue
black
black
black
black
L1/L L2/N
U V W
white
blue
white
red
black
black
black
black
black
black
black
KSTB
KCS
KZAS
KZAP
I ON
green
black
brown
blue
blue
blue
blue
blue
black
red
black
black
black
black
Fan motor
W1 blue
V1 green
U1 black
U2 V2 W2
black green blue
High limit LED
High limit thermostat

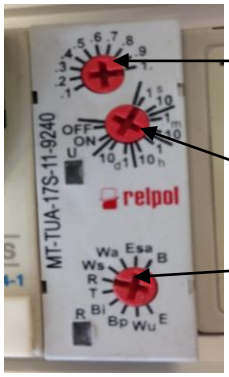
6.4.2 Plumbing Schematics



6.4.3 Auger Set-Up (Optional)

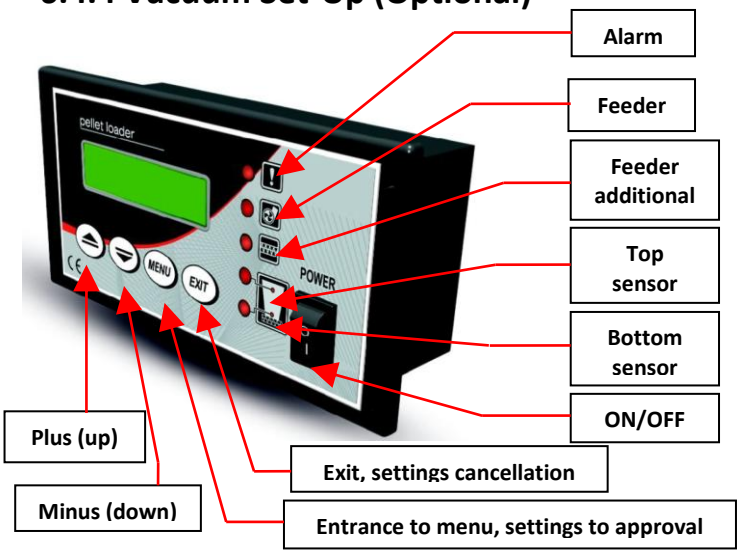
Mains In

To pellet sensor To auger



The auger should be set up so the finer timer is set at .2 and the course timer is at 10h. This will set the auger to come on after the sensor has been uncovered for 2 hours.
The pellet sensor should be placed inside the boiler hopper about a 1/3 of the way down from the top.

6.4.4 Vacuum Set-Up (Optional)



Installation of the Vacuum System

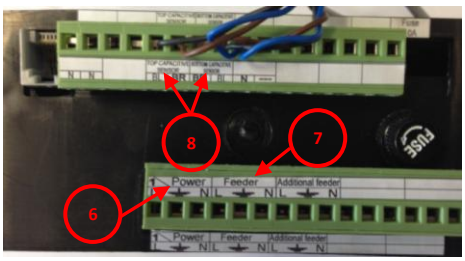
1. Remove the lid and leave the hinges on the hopper.

2. Remove gas strut from hopper lid.

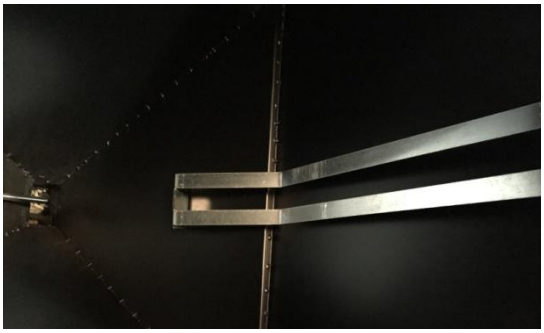
3. Locate vacuum unit to hopper.
4. Locate vacuum lid unit on to existing hinges on the hopper.

5. Locate pellet loader controller to lid using existing cut-out.

6. Remove 2 pin plug from power lead and connect to the power connections of the controller. Supply must come from a 13A switched fused spur.



7. Connect vacuum motor cable to feeder connections.
8. Using the long adjustable sensor bracket and back nuts fit the low sensor 250mm from the bottom of the hopper and the high sensor should be approximately half way up the hopper (high and low sensors can be identified from the controller connections).



9. Fit the vacuum pipe supplied with the unit to the motor connection on the back of the unit.

Controller Functions

Main Page

The main page is shown in the LCD display during normal operation with the following data displayed on it.

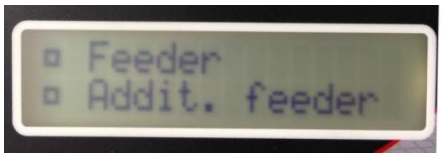
- Current time
- Feeder current (mA)
- Icon "(" (if the night mode is active)

By pressing the **MENU** button the sub-menu is entered or the selected option is activated. Press the **EXIT** button to exit the menu or cancel the setting.

Manual Operation

The controller is equipped with the manual operation mode for user's convenience. When using that function, each is turned on/off independently from the others.

By pressing the **MENU** button a motor of the selected unit (feeder/additional feeder or alarm) is activated and stays on until the **MENU** button is pressed again.



Clock

The user may define the current time by setting the clock. Clock setting is necessary for proper operation.

Day from...

This function is used to define the time when the controller will switch to the day mode.

Night from...

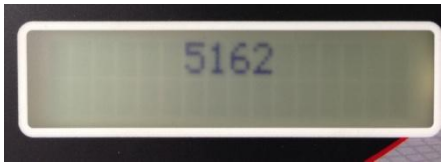
This function is used to define when the controller will switch to night mode. The controller will start the main hopper filling process half an hour before switching to the night mode.

Language

This function is used to select the language version of the controller menu.

System Menu

To access the system menu enter the password 5162.

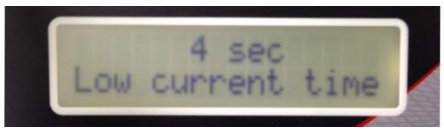


Low Current Threshold

To set this, monitor manual operation and when the vacuum store is full, take note of the mA value on the main screen i.e. 7078mA (A). This then needs to be set at 72 x 100mA so that when the value drops below this the vacuum will turn off after the low current time.

Low Current Time

This should be set at 4s so when the mA value drops below the threshold for 4 seconds the vacuum stops.



Pause Time

This should be set at 30s and is the time between cycles of the vacuum (this is when the vacuum store drops pellets into the main hopper).

Protection Time

This should be set at 5 mins so if the vacuum does not turn off after this time an alarm will show (this is usually due to lack of pellet, **Feeder Protection**).

Lower and Upper Sensors

Both of these values should be set to NPN.

Protections

To ensure safe and failure free operation, the controller is equipped with a number of protections. When an alarm occurs the buzzer goes off and a corresponding message appears on the display.

Feeder Protection

Where the auxiliary hopper is not filled for a long period (e.g. due to lack of pellet) the controller will turn the feeder off and an alarm will be activated.

Fuse

The controller is equipped with a 10A fuse to protect the controller.

CAUTION: This must be protected by a 13A fuse from a switched fused spur.

Maintenance

The pellet loader controller must be checked for any damage to its wires before and during the heating season. You should also check the mounting of the controller; clean it of dust and other contamination.

Technical Data

Specification	Unit	
Power Supply	V	230V 50Hz ±10%
Max Power Consumption	W	2000
Ambient Temperature	°C	5-50
Feeder Output Load	A	7
Feeder Additional Output Load	A	1
Fuse Insert	A	10
Height	mm	600
Width	mm	400
Depth	mm	400
Weight	kg	25

Assembly

NOTE: Installation should be performed by a fully qualified engineer.

DO NOT install the unit with the power on (make sure that the plug is disconnected from the main supply).
NOTE: Incorrect wiring may damage the controller.
The controller cannot be operated in a closed central heating system. The installation must include safety valves, pressure valves and a buffer tank to protect the boiler from water boiling in the central heating system.

6.5 Boiler Start-Up

The programmer is a modern microprocessor system which controls not only the boiler, but also the central heating system and domestic hot water.
The unit controls the amount of fuel fed through the auger and the air supplied to the combustion process. Thanks to solid stat relays (SSR's), the fan has variable speed control and the reliability of the unit controlling the auger motor is greatly increased.
Automatic Fuel Ignition – The control unit provides automatic fuel ignition.
Measurement of Waste Gas Temperature – The control unit measures waste gas temperature which is an essential parameter in a boiler with automatic start-up. Waste gas temperature readouts are very useful when inspecting the boiler and adjusting its operation.
Large Alphanumeric Display – facilitates communication between the unit and user.
Lambda Sensor – ensures optimum supply of air to the combustion process, thereby simplifying the work of the operator; it also reduces fuel consumption and improves combustion, reducing emissions of harmful substances to the environment.
Pneumatic Fuel Feeding Control System – allows the boiler to operate for long periods of time without the need to add fuel.
Heat Exchanger Cleaning Control System – ensures that the boiler retains high efficiency without the need to clean the exchanger.

Thanks to advanced operation algorithm and the possibility of controlling numerous parameters, the unit can be flexibly adjusted to the needs of the heating system.
The controller has an output testing function. The function is available in the **MAINTENANCE MODE** and checks the correctness of electrical connections and the working order of the controlled equipment (pumps, fan, auger, mixing valve actuator) prior to starting the boiler.

6.5.1 Operating the Unit

MENU NAVIGATION

Press "ENTER" to enter the main menu.
Brows the main menu using and buttons.
Press "ENTER" to enter the selected submenu.
Press "ESC" to enter a higher level. The main menu is shown in Figure 1.

Submenus are used to display and change operation parameters. In order to change a parameter, press "ENTER" . The parameter changed is displayed in cycles. In order to edit the parameter value, press or arrow buttons. When editing, you may cancel the changes by pressing "ESC" .
Press "ENTER" to approve changes. The boiler submenu is shown in Figure 2 as an example. The whole menu is shown in Figure 1.

NOTE!!! Data is saved whenever the main screen is displayed.

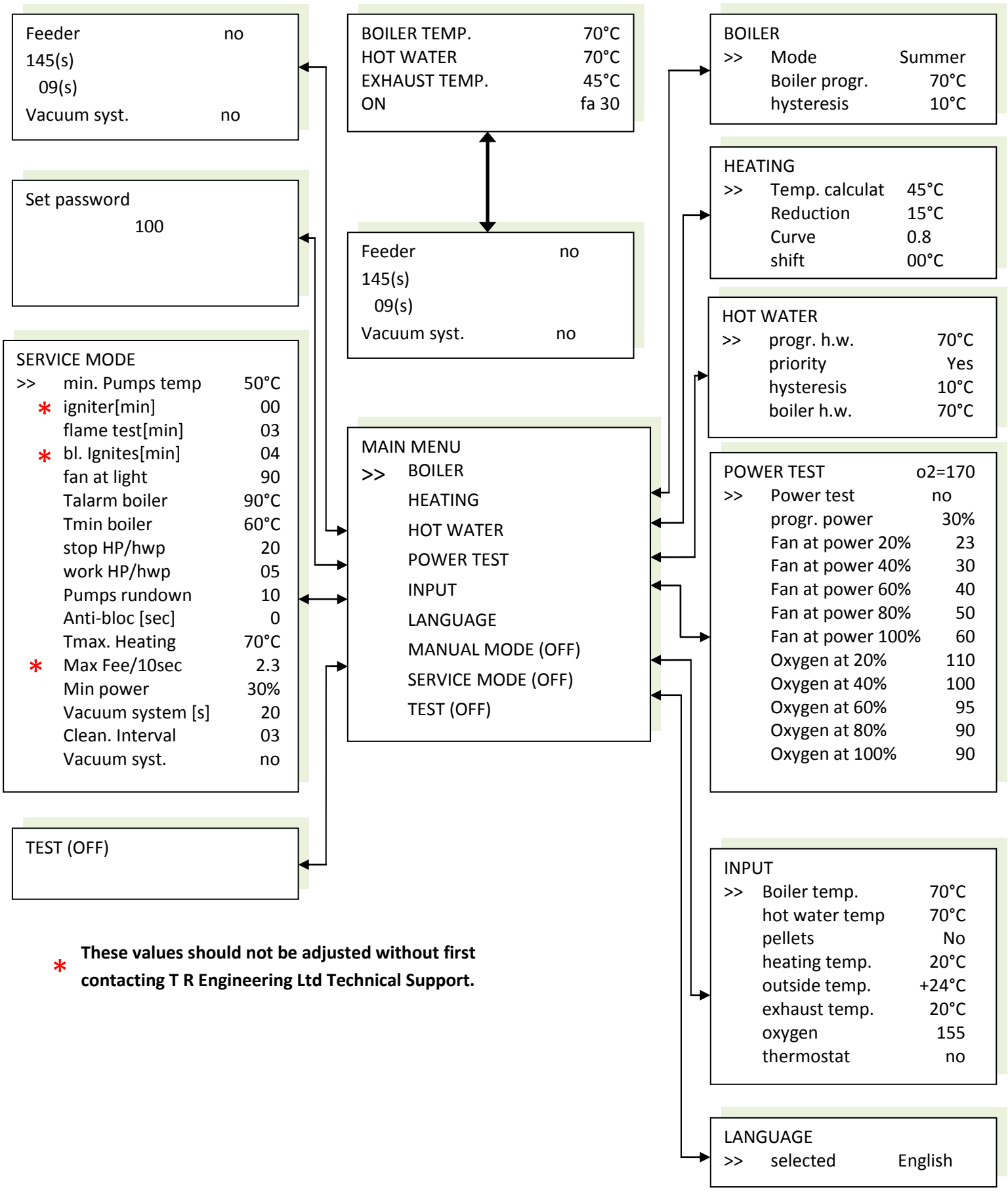
MAIN MENU
>>BOILER
HEATING
HOT WATER
POWER TEST
INPUT
LANGUAGE
MANUAL MODE (OFF)
SERVICE MODE (OFF)
TEST (OFF)

Figure 1: Main Menu

BOILER	
>>mode	Summer
Boiler progr.	70°C
Hysteresis	10°C

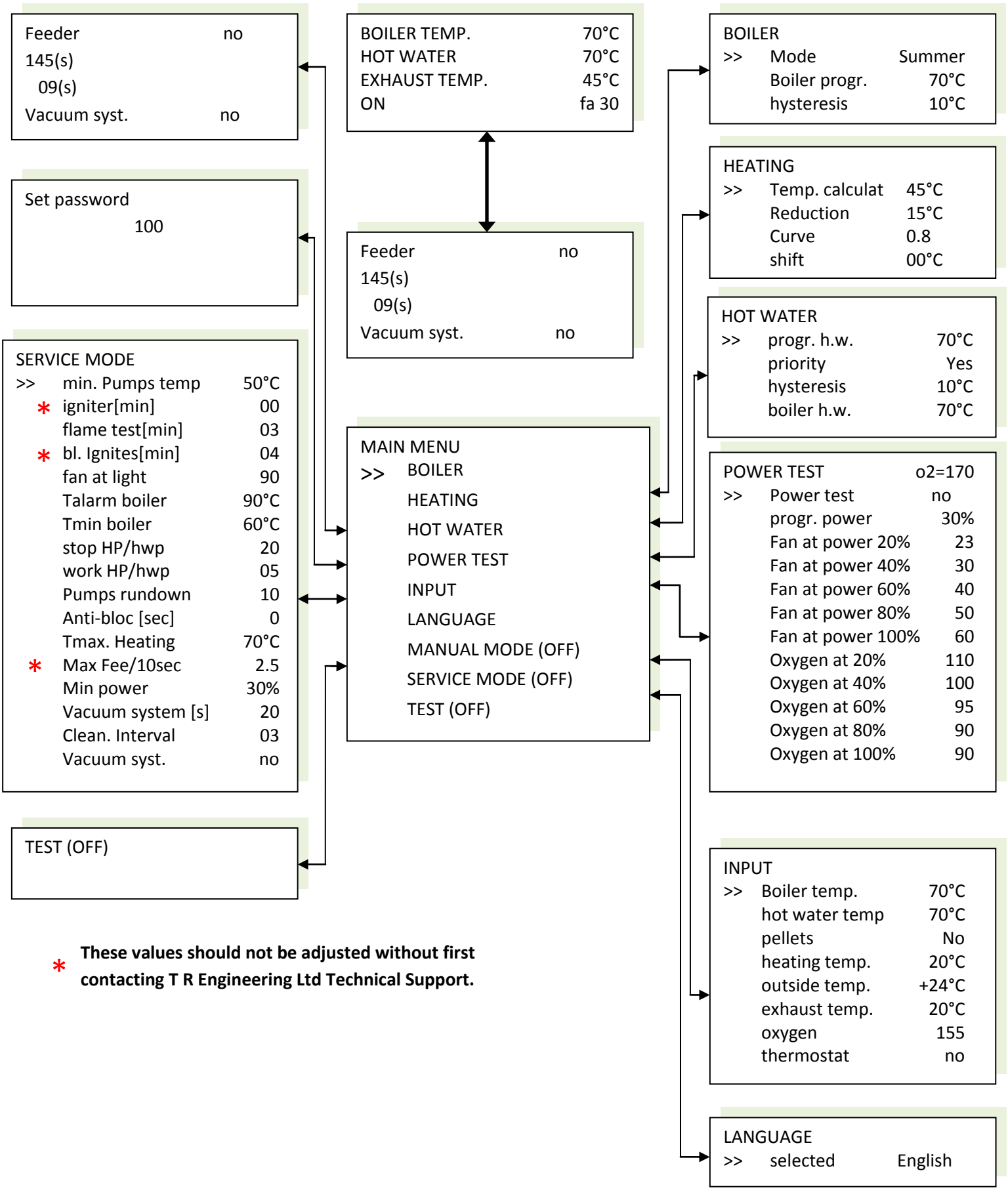
Figure 2: Boiler Submenu

Greenflame Eco 10kW Settings



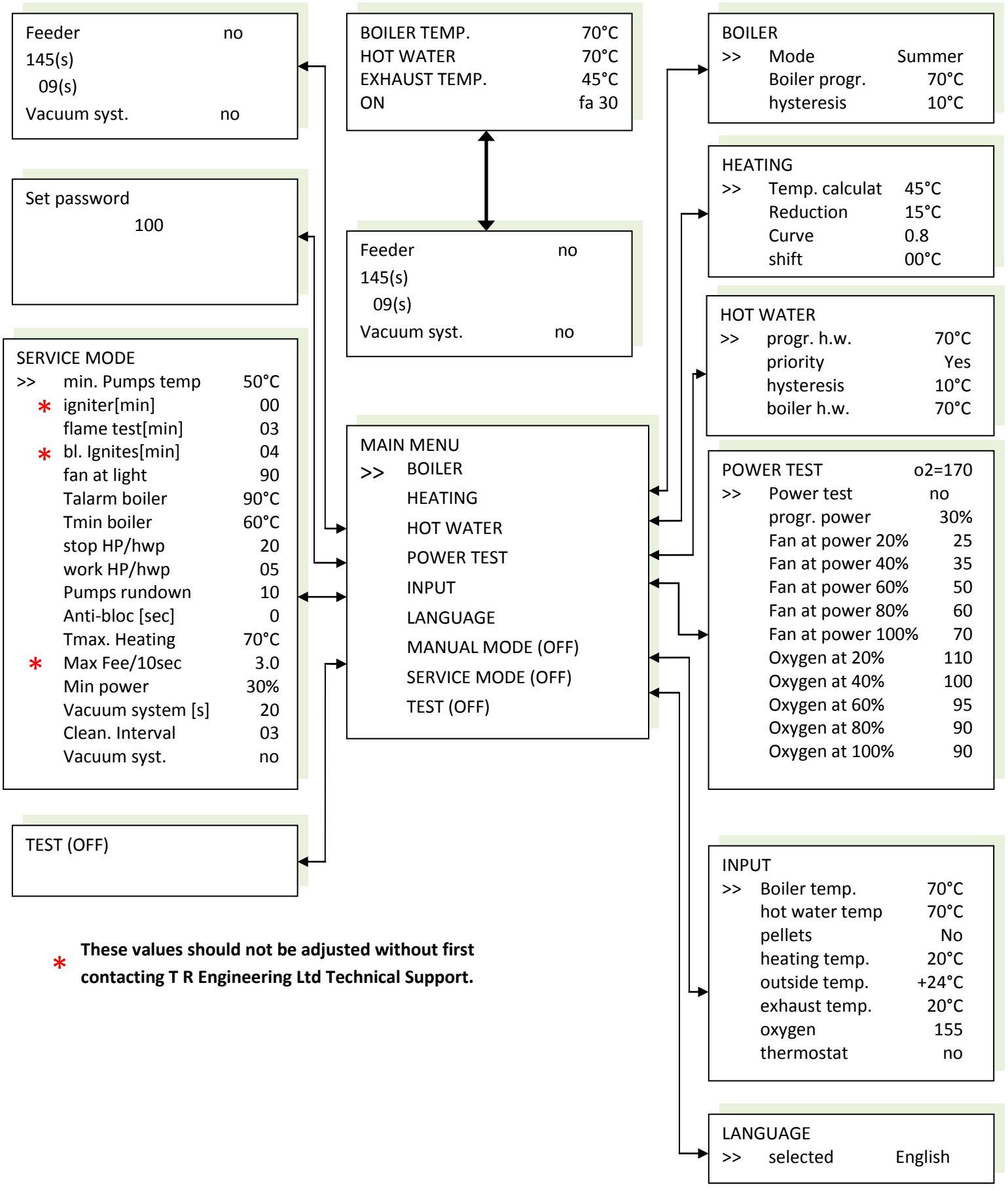
* **These values should not be adjusted without first contacting T R Engineering Ltd Technical Support.**

Greenflame Eco 15kW Settings



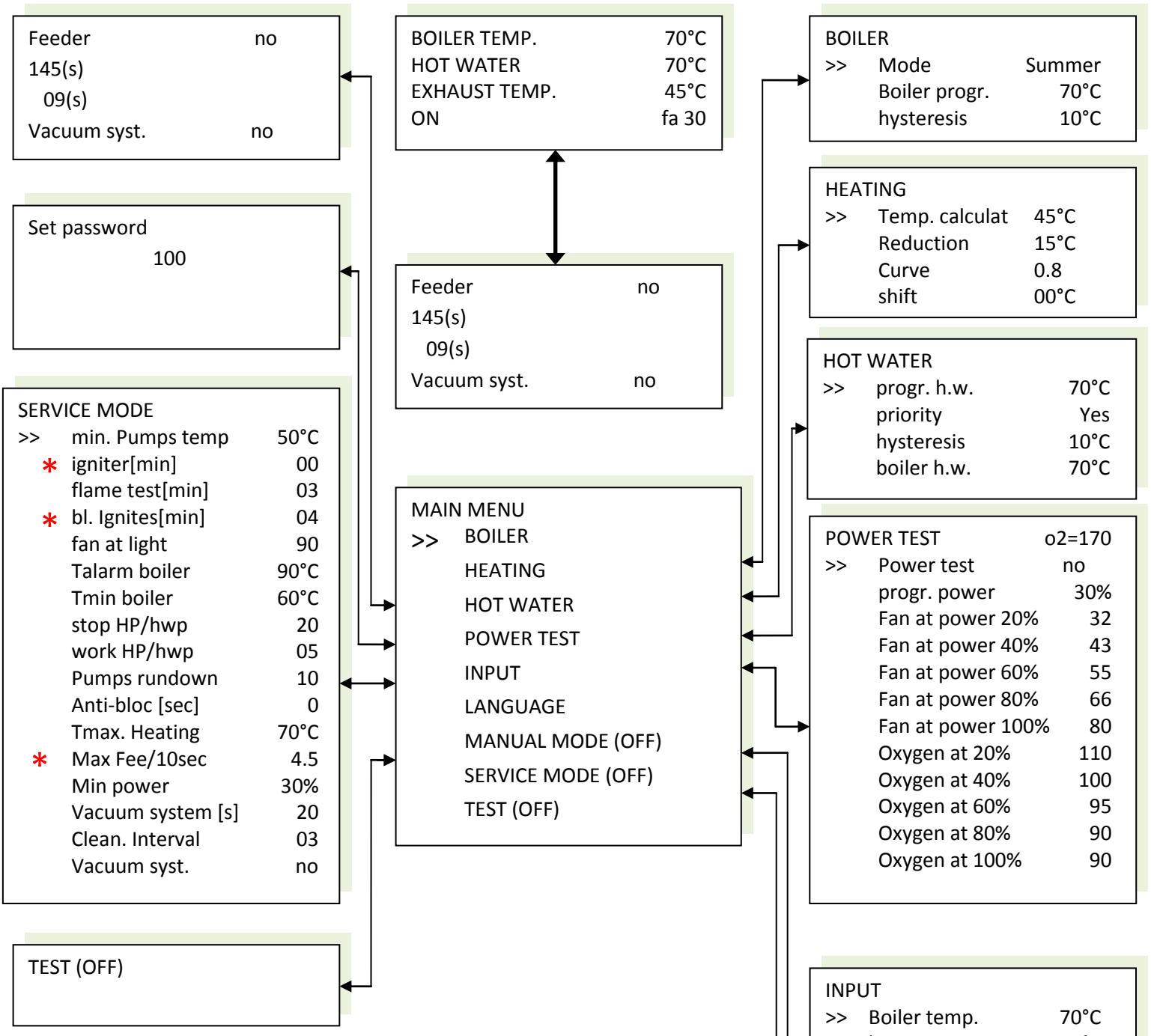
* **These values should not be adjusted without first contacting T R Engineering Ltd Technical Support.**

Greenflame Eco 25kW Settings



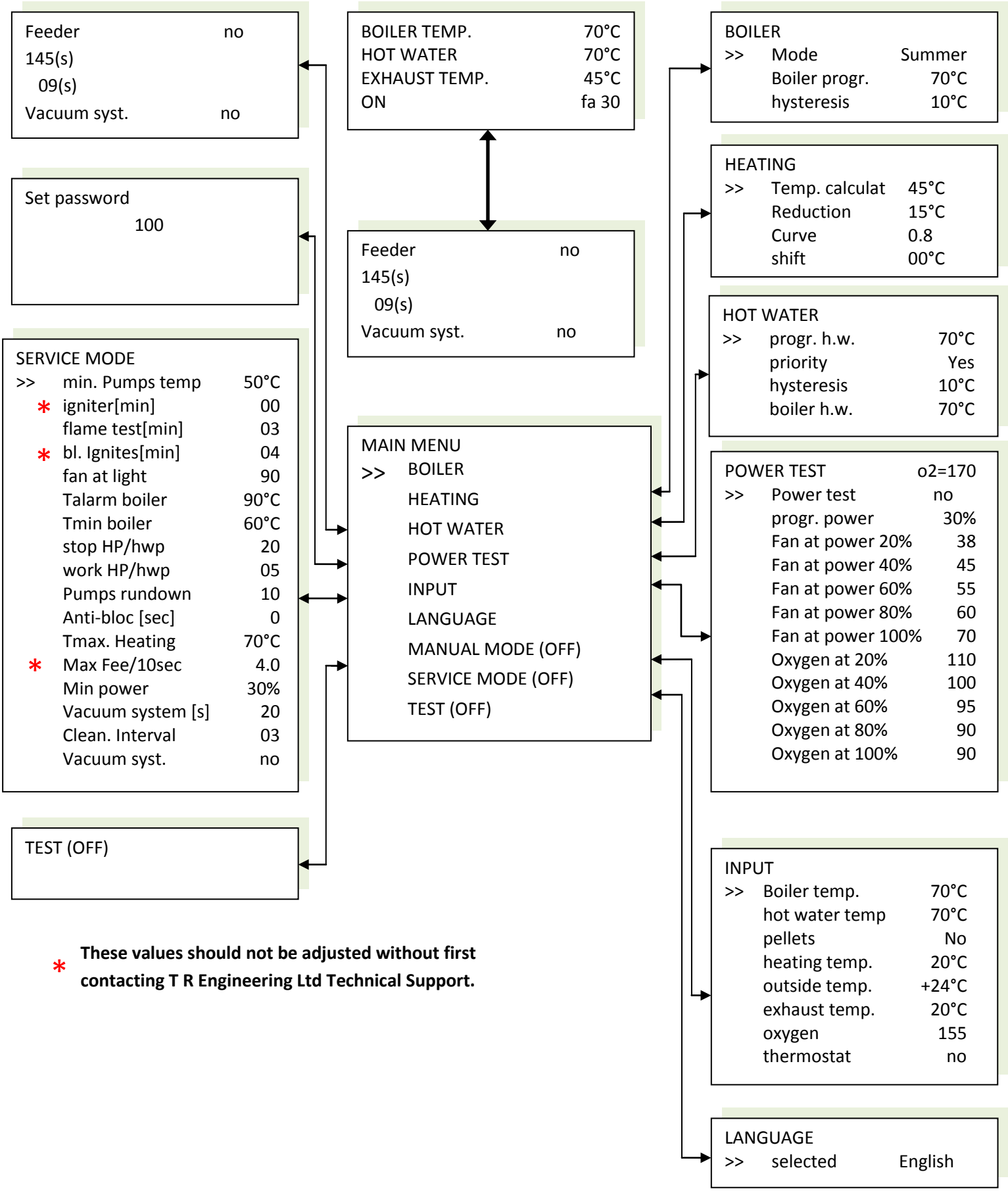
* **These values should not be adjusted without first contacting T R Engineering Ltd Technical Support.**

Greenflame Eco 40kW Settings



* **These values should not be adjusted without first contacting T R Engineering Ltd Technical Support.**

Greenflame Eco 60kW Settings



* **These values should not be adjusted without first contacting T R Engineering Ltd Technical Support.**

6.5.2 Amount of Air, Lambda Sensor – Power Test Mode

The combustion process requires the supply of oxygen, the amount of which depends on the type of fuel and the power of the heating unit. Therefore, the optimal amount of air should be set for each type of fuel and each burner power level. This should be down to the person who starts up the control unit. The parameters are saved in the non-volatile memory of the control unit. In order to set the optimal amount of oxygen, you should:

- Set the type of fuel corresponding to the fuel to be used.
- Turn on the control unit.
- Enter the **POWER TEST** submenu and run the "**power test mode**".
- Set the amount of air for 20, 40, 60, 80 and 100% of the burner power. The values will be calculated by approximation method from the selected curves. See Figure 4.

If the control system includes the optional Lambda module, oxygen values should be set in a similar fashion for the various burner power levels. The parameters should be set in line with the boiler manufacturer's specifications, or on the basis of the results of waste gas analysis at the different power levels.

If the fan power is controlled using the lambda sensor module, the fan power may be adjusted within the range ±10 adjustment units. This relationship is shown in Figure 5.

NOTE!! Turn off the chimney sweep mode once you have completed the adjustments.

When adjustments are made in the power test mode, automatic burner power control is deactivated so as to allow measurements and analyses at constant burner power.

POWER TEST		o2=170
>>	Power test	no
	progr. power	30%
	Fan at power 20%	38
	Fan at power 40%	45
	Fan at power 60%	55
	Fan at power 80%	60
	Fan at power 100%	70
	Oxygen at 20%	110
	Oxygen at 40%	100
	Oxygen at 60%	95
	Oxygen at 80%	90
	Oxygen at 100%	90

Figure 3: Power Test Submenu

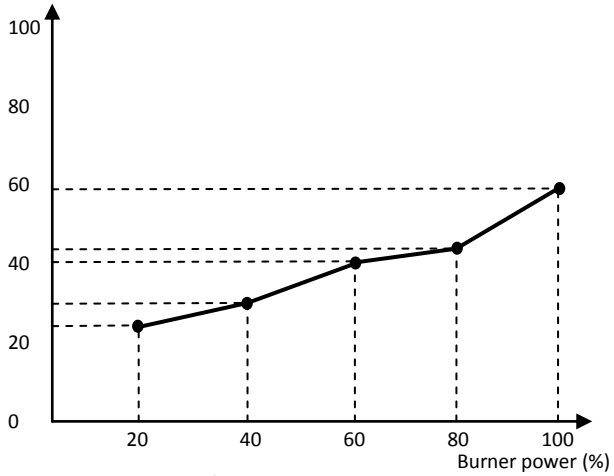


Figure 4: Blower Power Curve

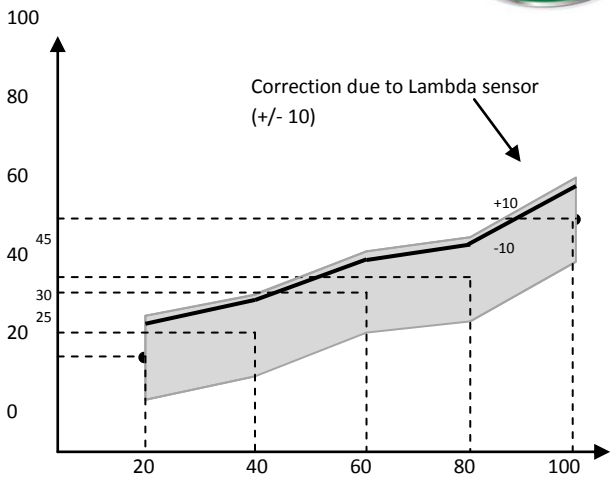


Figure 5: Blower power curve with Lambda-based control

6.5.3 Air during Ignition

The amount of required air for ignition is set separately because it differs from the amount of air during normal operation of the burner. Air amount during ignition is set using "**bl.ignites**" parameter in the "**SERVICE MODE**" submenu.

6.5.4 Pump

In order to be efficient and last longer, the boiler must operate within a certain temperature range. This is why the circulation pump should only run when the temperature exceeds a certain minimum level. The "**min. pumps temp**" parameter is available in the "**SERVICE MODE**" submenu. This should be set at 50°C.

6.5.5 Language Menu

The menu of the control unit is available in a number of languages: Polish, English, German and French. The preferred language may be selected in the "**language**" submenu. The default setting is English.

6.6 Start-Up

Press the "**ON/OFF/ESC**" button for 3 seconds in order to turn the control unit on or off. The current status of the unit is displayed on the main screen:

OFF – the control unit is turned off (only alarm functions are active while the fan and auger are controlled manually).

ON – the control unit is on.

NOTE!! When off is displayed on the screen, the control unit is actually in a standby mode and is energised; in case of an alarm, the control unit will initiate the appropriate remedial actions (i.e. it will either turn on the pump or the auger).

If you intend to not use the boiler for a considerable period of time, or to do any maintenance on the boiler, you must de-energise the control unit by isolating the power supply. The display (main screen) shows the current status of the different pieces of equipment.

Boilers with the M RS 240M control unit are ideal for domestic hot water both in the heating season and in other parts of the year. The following settings should be used.

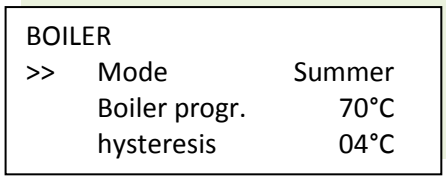


Figure 6: Hot Water Submenu

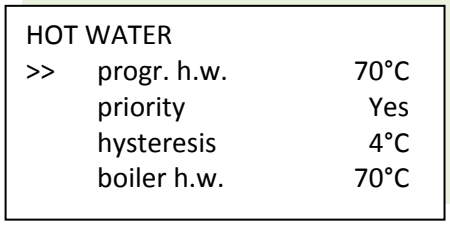


Figure 7: Hot Water Submenu

If the abbreviation of a particular piece of equipment is displayed, it means the control unit has turned it on.

ABBREVIATION	DESCRIPTION
HP (not used)	Central heating pump is on
WP	DHW circulation pump is on
Lig	Heating element is on
Fee	Auger is on
Fa20	Fan is on; current fan power level
00	Mixer closing
01	Mixer opening

Table 1: Equipment Abbreviations

6.6.1 First Boiler Ignition

If you work with an auger, you should fill the hopper full with fuel then turn the auger on manually in order to feed the fuel into the combustion chamber. To do this, you should select the "**manual mode**" submenu.

Press  to turn the auger on/off.

Press  to turn the suction on/off.

After you press the button, the auger will run for 30 seconds, filling the burner with pellets about half way. Once this happens, turn the boiler control unit ON; the fuel will ignite automatically.

6.6.2 Alarms and Safeguards

The flashing of the display screen of the control unit is an alarm signal. Press "**ENTER**" to display information about the alarm. The control unit activates the following types of alarms:

- **Boiler Overheating** – alarm is activated when the boiler temperature exceeds the "**Talarmboiler**" which may be set in the "**SERVICE MODE**" menu. When this happens, the control unit on the circulation pumps and keeps them running until the boiler temperature drops, regardless of the operating modes selected.

NOTE!! The circulation pumps will be turned on and will run in pre-alarm mode when the temperature rises to 2°C less than the boiler alarm temperature. If the temperature does not rise above the alarm level, information on the incident will not be saved in the control unit's memory.

- **No Light/No Fuel** – the alarm is activated if the suction system has made three consecutive failed attempts to ignite the fuel.

NOTE!! Once an alarm has been activated you should determine and eliminate its cause.

Accumulated un-burnt pellets in the burner after repeated failed ignitions must be removed before re-lighting.

- **The Independent Thermal Boiler Protection (ITBP)** – is dependent of the microprocessor system. An independent thermal switch will cut off the power supply to the fan f the boiler temperature exceeds 94°C.

6.6.3 Programmer Technical Data

PARAMETER	VALUE
Power Supply	~230V/50Hz ±10%
Power Uptake by the Controller	<5VA
Carrying Capacity of Outputs	
Central Heating Pump	100w
DHW Pump	100w
Lighter	400w
Blower	150w
Feeder Motor	200w
Automatic Exchanger Cleaning/Suction Motor	100w
Mixer Actuator	50
Boiler Temp. Setting Range	60-85°C
Domestic Hot Water Setting Range	35-70°C
Temperature Measurement Accuracy	±2°C
Ambient Temperature	0-60°C
Humidity	5-95%, no condensation
Boiler Alarm Temperature	80-95%

6.7 Restarting of the Boiler after Interruption caused by Lack of Fuel

In case of boiler extinguish caused by lack of fuel please follow the instruction below:

- Fill the hopper with fuel.
- Using the manual feed, transfer fuel until it reaches the burner.
- Remove ash raised from complete burnout of fuel from the burner.
- Start automatic mode.

6.8 Final Information Regarding Installation and Boiler Start-Up

To ensure prolonged, failure free operation of the boiler please follow the rules below:

- Supply sufficient chimney draught to allow optimal combustion.
- Secure the boiler from dampness and lack of chimney draught by means of an acid-resistant or ceramic chimney insert along with drainage of condensate to sewer.
- Position the boiler on thermally isolated flooring to prevent it from developing water droplets on its walls.
- Make sure that the central heating system is equipped with a valve positioned on the lowest pipe and as close to the boiler as possible.

- Remember that the start-up of the boiler should be performed only by personnel trained by T R Engineering Ltd with a current authorised service certificate.
- Remember that a heating test must be performed after boiler installation and must be noted on the warranty card.
- Remember that the boiler can only be operated by adults, after reading and understanding this instruction manual. **It is forbidden for children to get close to the boiler without adult supervision.**
- Shut down the boiler if any maintenance/repair work is performed in the room that would involve gluing, painting, etc. that might increase the risk of fire or explosion.
- Shut down the boiler during periodical service or boiler maintenance.
- Ignite the boiler using only the automatic ignition function. It is forbidden to use any solid or fluid inflammable substances in the vicinity of the boiler.
- Remember to keep the boiler temperature at 60°C and to utilise at least 45°C thermal protection at the water return duct.
- Remember that any intervention with electrical parts or the construction of the boiler is forbidden and might result in complete loss of warranty.

7. Cleaning and Maintenance of the Boiler

In order to prolong the lifespan of the boiler after every 1-2 weeks:

- Empty the ash pan of any burnt pellet using provided apparatus.

Every 8 weeks:

- Clean the burner with a stiff brush ensuring all air holes are clear.

Every 6 months:

- Regularly clean the extracting vent fan – the turbine and electric motor need to be removed and the dust removed using a vacuum cleaner.
- Regularly clean the lambda probe – remove dust using a vacuum cleaner and wipe using a soft, dry cloth.

In case of any improper behaviour in the process of combustion please contact your authorised service engineer that will perform complex diagnostics and maintenance of the boiler.

At least once a year please call your authorised service engineer for a service.

Service

1. Isolate the appliance from the mains supply and test safe.
2. Remove the first section of flue to allow for removal of the top of the boiler.
3. Unscrew high limit stat cap lock nut, withdraw limit stat from case and move to one side.
4. Remove limit lockout light from case.
5. Unplug ribbon cable from boiler programmer and lift lid to gain access to top of boiler.
6. Unplug the lambda probe. Remove the flue gas temperature probe and clean.
7. Carefully using a knife cut the insulation on the top of the heat exchanger around the outside, taking care around cables. Cut the insulation from the 12 o'clock position at the back of the flue spigot to the 6 o'clock position.
8. Using a 22mm spanner remove the lambda probe from the flue spigot. Clean with a soft brush.
9. Remove the previously cut insulation to a safe place for refitting when finished.
10. Using a 17mm spanner remove the four nuts holding the fan plate in position. Withdraw the fan and impeller from the top of the heat exchanger and clean using a stiff brush.
11. Vacuum the fan impeller recess.
12. Remove the nuts around the outside of the heat exchanger and lift off the top of the boiler.
13. Vacuum the top of the heat exchanger.
14. Using a 17mm spanner remove the nut on the turbulator ring at the 6 o'clock position and lift out the ring and turbulators. Clean turbulators.
15. Using a 17mm spanner remove the nuts holding the securing tabs for the centre heat exchanger lid. Lift lid and clean the underside.
16. Remove the boiler baffle and clean. Clean all heat exchanger surfaces.
17. Using a flue brush clean out all the flue ways around the outside edge of the heat exchanger.
18. On 10, 15 and 25kW models remove the plate on the underside of the burner and clean out the burner pot. On 40 and 60kW boilers access the burner pot from above. Make sure all combustion air holes are clear.
19. Clean out remaining debris from the burner area.
20. Re-assemble components in reverse order. Use heat resistant mastic on any disturbed joints and re-attach insulation using foil tape.

8. Spares List

Part No.	Description	Quantity
400800	Eco PCB	1
400820	Controller	1
400821	Lambda Sensor Module	1
400822	Inverter Control	1
400823	Auger Motor	1
400824	Fan Motor	1
400825	Lambda Probe	1
400826	Boiler Sensor (DHW/CH)	1
400827	Exhaust Sensor	1
400828	Ignitor	1
400829	Ribbon Cable	1
400838	Rotary Valve	1
400839	Auger	1

9. Service Schedule

Date of Repair	Description of Conducted Work	Stamp and Signature of Service Person

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