

Broadstone S

**Gas/Oil Fired Cast Iron Sectional Boilers
110kW to 130kW**

**Installation, Commissioning
and Servicing Instructions**

*NATURAL GAS I_{2H}
CLASS D (35 sec fuel oil)*

IMPORTANT NOTE

**THESE INSTRUCTIONS MUST BE READ
AND UNDERSTOOD BEFORE INSTALLING,
COMMISSIONING, OPERATING OR
SERVICING EQUIPMENT**

Customer Services

Technical Enquiries



01202 662527/662528

To supplement the detailed technical brochures, technical advice on the application and use of products in the Hamworthy Heating range is available from our technical team in Poole and our accredited agents.

Site Assembly



01202 662555

Hamworthy offer a service of site assembly for many of our products in instances where plant room area is restricted. Using our trained staff we offer a higher quality of build and assurance of a boiler built and tested by the manufacturer.

Commissioning



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Commissioning of equipment by our own engineers, accredited agents or specialist sub – contractors will ensure the equipment is operating safely and efficiently.

Maintenance Agreements



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Regular routine servicing of equipment by Hamworthy service engineers inspects the safety and integrity of the plant, reducing the risk of failure and improving performance and efficiency. Maintenance agreements enable our customers to plan and budget more efficiently.

Breakdown service, repair, replacement



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Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents throughout the UK.

Spare Parts



01202 662525

A comprehensive spare parts service is operated from our factory in Poole, providing replacement parts for both current and discontinued products. Delivery of parts and components is normally from stock within seven days. However, a next day delivery service is available for breakdowns and emergencies.

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THE BROADSTONE S BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE

THE GASED FIRED VARIANTS OF THIS BOILER ARE FOR USE ON GROUP H NATURAL GAS (2ND FAMILY). THE OIL FIRED VARIANTS ARE FOR USE ON CLASS D (35sec FUEL OIL). PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND RELATING TO SPECIFIC FUEL TO BE FIRED BEFORE FIRING BOILER.

THIS BOILER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.
EC TYPE CERTIFICATE No. E0112/5073
PRODUCT IDENTIFICATION No. 461AS112

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CONTENTS

	PAGE
1.0 INTRODUCTION	1
2.0 SUPPLY AND DELIVERY	1
3.0 POSITIONING, SIZE AND SPACE REQUIREMENTS	2
4.0 SITE LOCATION AND PREPARATION	8
4.1 Site Location	
4.2 Gas Supply	
4.3 Flueing	
4.4 Water Supply	
4.5 Electrical Supply	
5.0 BOILER ASSEMBLY	8
5.1 Assembly of Heat Exchanger	
5.2 Assembly of Boiler Casing Supports and Insulation	
5.3 Assembly of Boiler Casing	
5.4 Electrical Supply	
5.5 Filling the System	
6.0 COMMISSIONING	18
7.0 REPLACEMENT OF PARTS	19
APPENDIX 'A' – TECHNICAL DATA.....	21

PICTORIAL AND DIAGRAMMATICAL DATA

FIGURES		PAGE
Figure 2.1	Exploded View of Heat Exchanger	2
Figure 3.1	Broadstone S - Dimensional Overview	3
Figure 4.4	Overview of Valves & Circulating Pump	6
Figure 5.1.1	Fitting Ceramic Rope to Rear Casting	8
Figure 5.1.2	Applying Paste	8
Figure 5.1.3	Fitting Nipple to Housing	8
Figure 5.1.4	Tapping Nipple into Position	8
Figure 5.1.5	Fitting Intermediate Section	9
Figure 5.1.6	Tapping Intermediate Section into Position	9
Figure 5.1.7	Preparing Next Intermediate Section	9
Figure 5.1.8	Applying Ceramic Rope	10
Figure 5.1.11	Fitting the Fire Brick	10
Figure 5.1.12	Fitting Front Casting	10
Figure 5.1.14	Fitting Tie Rods	11
Figure 5.1.15	Fitting Rp 2" Cap	11
Figure 5.1.16	Fitting Door Eyelet	11
Figure 5.1.17	Fitting Divider Plates	12
Figure 5.1.18	Fitting Upper Casing Support Bracket	12
Figure 5.1.19	Fitting Lower Casing Support Plate	12
Figure 5.1.20	Divider Plate Fitted	13
Figure 5.1.21	Fitting Boiler Door	13
Figure 5.1.22	Boiler Door Fitted	13
Figure 5.2.1	Fitting Rear Casing Support Plate	14
Figure 5.2.2	Fitting Insulation	14
Figure 5.3.4	Fitting of Thermostat Capillaries	15
Figure 5.3.1	Exploded View of Boiler Casing	15
Figure 5.4.1	Electrical Wiring Diagram	16
Figure 5.4.2	Volt Free Contacts Diagram	17
Figure 7.1	Replacement of Parts (Boiler Body)	19
Figure 7.2	Replacement of Parts (Casing and Control Panel)	20
TABLES		
Table A1	Technical Data Chart	21
Table A2	Matched Burner / Boiler Combinations (Natural Gas)	22
Table A3	Matched Burner / Boiler Combinations (Oil)	22
Table A4	Oil Nozzle Selection	22

1.0 INTRODUCTION

1.1 The Broadstone S boiler range consists of 3 gas or oil fired cast iron sectional boilers with outputs ranging from 110kW to 130kW. Refer to Technical Data in Appendix A.

Broadstone S boilers can be used individually, or in a multi-boiler configuration, and are suitable for use on either open-vented or sealed low temperature hot water heating systems. For hot water production they can be used in conjunction with calorifiers or indirect hot water cylinders.

Portland and Weymouth pressurisation units are available from Hamworthy Heating Ltd for sealed systems.

1.2 Broadstone S sectional boilers can be supplied pre-assembled or unassembled ready for on-site assembly.

The heat exchanger consists of:

- a.** A front section.
- b.** Plain intermediate sections.
- c.** A rear section.

The complete assembly is held together by four threaded tie rods running the length of the heat exchanger.

The section to section flue gas seal is made by:

- d.** A mastic strip around the outer perimeter of each section.
- e.** A mastic strip around the perimeter of the combustion chamber of each section.

The sections are cast with extended surface fins to increase the heat exchange area and thus enhance thermal efficiency in use.

Broadstone S boilers have an operating efficiency of over 92% based on gross CV.

The heat exchanger assembly is completed by cast iron front and rear combustion chamber plates and access plates for the cleaning and inspection of the heat exchanger flue ways (on front and rear), all of which are internally lined with a ceramic fibre insulation board. The smoke box/flue connector is bolted to the upper part of the rear section and sealed with a ceramic fibre gasket.

The Broadstone S boiler can be fitted with either a high/low or modulating burner for operation on Natural Gas I_{2H} (Second Family) or high/low burner for operation on Class D (35 second) fuel oil.

The boiler is supplied with a pre-wired control panel which contains:

- a.** A fuse
- b.** An illuminated mains on/off switch
- c.** A boiler thermostat
- d.** A boiler run lamp
- e.** A temperature limiter (overheat thermostat) to shut down the boiler should the water temperature in the heat exchanger exceed 110°C - with manual reset.
- f.** An overheat lamp
- g.** An hours run meter
- h.** A water temperature thermometer (temperature gauge)
- i.** A flying lead and plug to connect to the burner
- j.** An additional thermostat, boiler run lamp, hours run meter and flying lead/plug for high/low burners (optional).
- k.** A volt free relay kit for normal run, overheat and lockout can be supplied as an optional extra.

The boiler is housed in a powder coated sheet steel casing which is supplied flat-packed for on-site assembly. Refer to Section 5.2 for casing assembly procedure.

2.0 SUPPLY AND DELIVERY

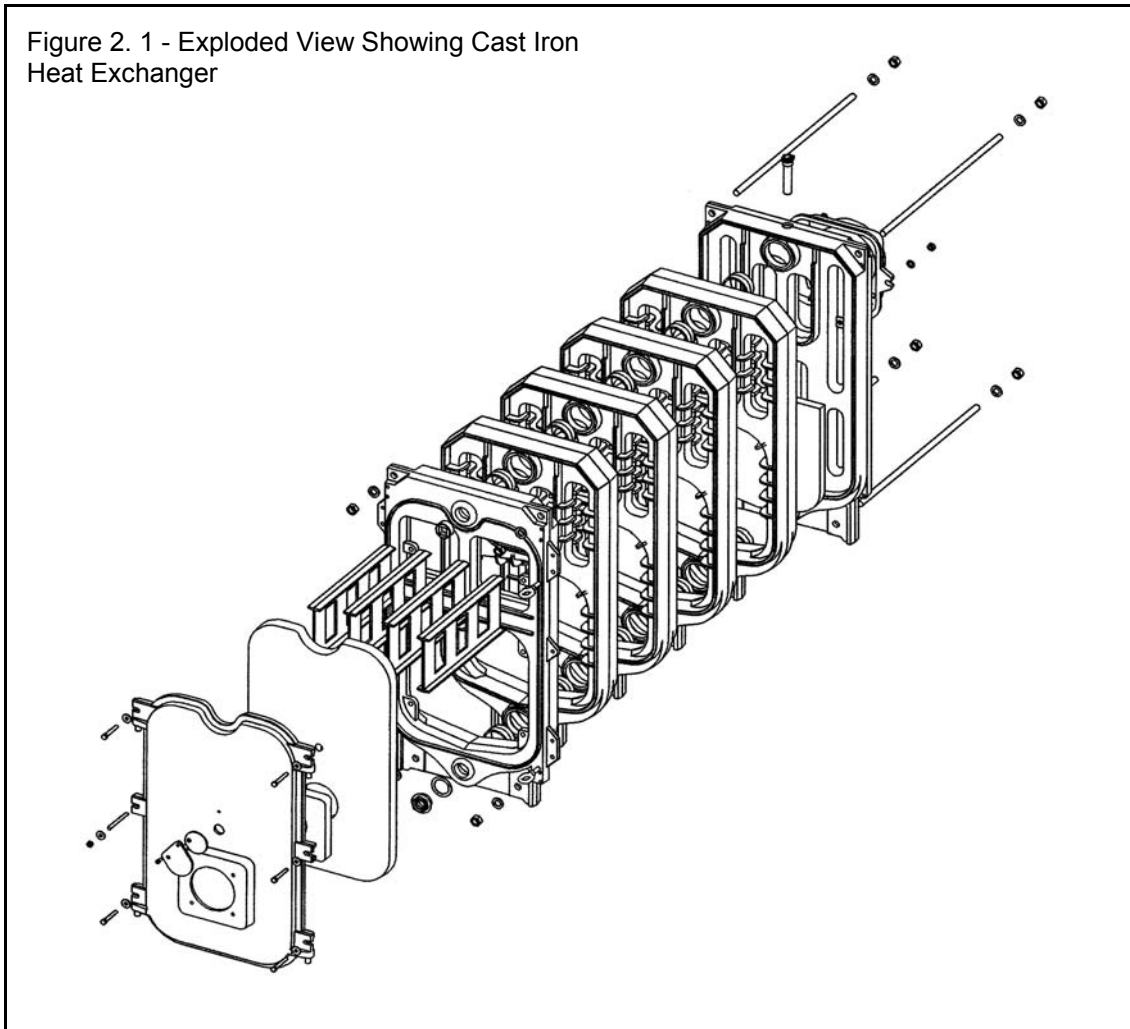
2.1 The boiler is normally supplied as a set of equipment comprising the following:

- a. Cast Iron Sections mounted on pallets
- b. Accessory kit and tie rods
- c. Casing panels and insulation blankets
- d. Control panel
- e. Matched burner: fuel oil or gas
- f. Flue collector box
- g. Oil burner nozzle(s) - where applicable

Remove all packing material and inspect the equipment to ensure that all parts are present and undamaged.

If in any doubt, DO NOT USE THE EQUIPMENT. Instead, contact HHL Technical Department.

Figure 2. 1 - Exploded View Showing Cast Iron Heat Exchanger



3.0 POSITIONING, SIZE AND SPACE REQUIREMENTS

3.1 General

The installer must make the necessary arrangements on site to ensure that the positioning and the fitting of the boiler, the supply of combustion air, ventilation of the boiler house, connection of the gas supply, the removal of the combustion gases via a flue system and the electrical connections are in accordance with the rules of the trade and the prevailing regulations.

Full details on the assembly of the boiler is given in Section 5 of this manual.

3.2 Positioning

3.2.1 The boiler must not be installed in areas where there is a significant risk of frost damage or where

there is a risk of the combustion air being contaminated with halogenated substances (e.g. chlorine, detergents, aerosols etc.) unless sufficient measures have been taken to ensure the supply of unpolluted combustion air.

3.2.2 It is important for the safe operation of the boilers that there is sufficient ventilation to the room in which the boiler is installed.

3.2.3 The boiler must be positioned in accordance with prevailing standards, as far as possible from any wall surface that may be damaged by heat, if necessary cover the wall with an insulated panel.

3.2.4 The boiler must be placed in such a way that it can be easily maintained and regularly checked.

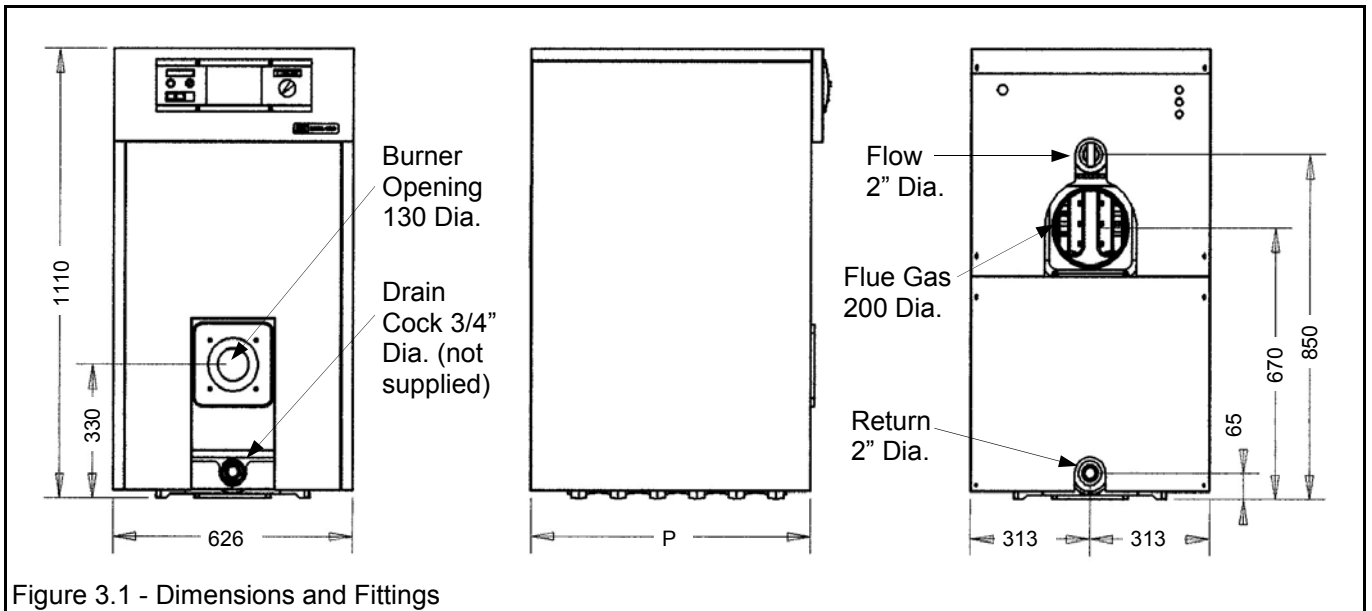


Figure 3.1 - Dimensions and Fittings

Model	No. of Sections	Heat Output	Boiler Dimensions			Combustion Chamber Dim.		
			Height	Width	Depth	Height	Width	Depth
S110	8	110kW	1110mm	626mm	937mm	420mm	370mm	719mm
S120	9	120kW	1110mm	626mm	1143mm	420mm	370mm	822mm
S130	10	130kW	1110mm	626mm	1143mm	420mm	370mm	925mm

Maximum Water Temperature: 90°C
 Maximum Installation Pressure: 4 bar

4.0 SITE LOCATION AND PREPARATION

4.1 SITE LOCATION.

The floor or plinth for the boilers must be both flat and level to ensure correct alignment of fittings and connections.

The floor or plinth must be sufficiently strong to support the weight of both the boilers.

The floor or plinth must be fireproof in accordance with BS 6644.

The plant room must have sufficient space for installation of boilers, pipework, pumps controls, flues ventilation, access and servicing and other items of plant.

4.2 GAS SUPPLY.

- Gas supply pipes must be in accordance with BS 6891 or IGE/UP/2.
- Gas connections to the burner must be sized correctly. See burner manufacturer's literature to correctly size.
- Gas installation must be soundness tested to BS 6891 or IGE/UP/1 & IGE/UP/1A.
- Gas installation must be purged to BS 6891 or IGE/UP/1 & IGE/UP/1A.
- Inlet gas pressure to boiler nominal 20mbar (minimum 17.5mbar) dynamic.
- Gas Supply Pipes should be suitable for an upstream pressure of 50mbar max. for Natural Gas.
- Boiler house gas isolation valve must be clearly identified and installed close to the entrance / exit.

4.3 FLUEING

- **Flue termination, routing and construction must comply with the requirements of the fourth edition of the Clean Air Act 1993, BS 6644 and IGE/UP/10.**
- **It is absolutely forbidden to reduce the diameter of the flue take-off between boiler and flue.**
- **Any flue must be self supporting and separable from the boiler for servicing requirements.**
- **Flue construction is recommended of a twin wall, insulated type to maintain buoyancy within the flue.**
- **Horizontal flue runs must be kept as short as possible and be inclined at minimum 2° towards the terminal.**
- **To ensure safe operation of the boiler, the chimney system shall be capable of the complete evacuation of the products of combustion at all times.**
- **The effective height of the chimney termination above the boiler flue outlet must be such as to allow sufficient buoyancy to overcome the resistance of bends, tees and runs of the flue pipe involved and should be sited in a down-draught free zone.**
- **Ensure that all flue and chimney seals are good.**

4.4 WATER SUPPLY

- Feed and Expansion tanks to comply with static height requirements of HSE document PM5.
- Cold feed and open vent pipes to comply with requirements of BS 6644.
- Pressurised system to comply with BS 7074.
- It is recommended that the system pipework is flushed twice before water treatment.
- In hard water areas precautions such as water treatment should be implemented to prevent the build up of sludge and scale.
- Leaks in the system pipework should be fixed to prevent dilution of water treatment.
- Flow and Return pipes are Rp 2". This size must be maintained throughout the system.
- The drain cock is sized at Rp 3/4"
- It is forbidden for the boilers to operate unless fitted with a circulating pump.
- Circulating pumps must be selected to ensure a temperature differential of between 5°C and 35°C

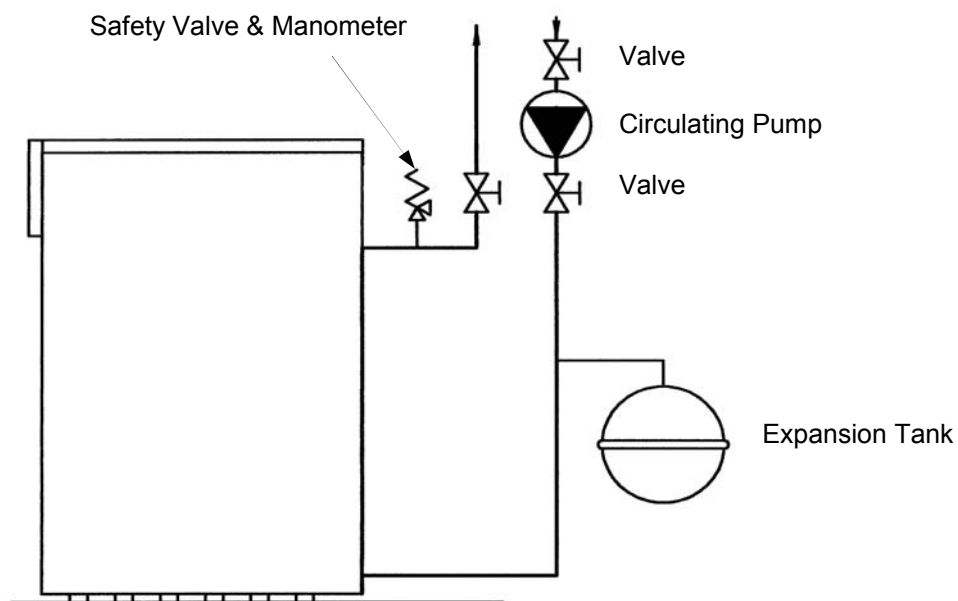


Figure 4.4

4.5 ELECTRICAL SUPPLY

WARNING! THIS APPLIANCE MUST BE EARTHED IN ACCORDANCE WITH IEE REGULATIONS

- **Boiler electrical supplies must not be switched by a time clock.**
- **Boilers are suitable for 230Volt, 50Hz supply.**
- **External fuses should be rated for 6 amps**
- **Wiring must be completed in heat resistant cable size 1.0mm² csa.**
- **Each boiler should have individual means of isolation.**
- **Electrical isolators must facilitate complete electrical isolation.**
- **Electrical isolators must have contact separation of minimum 3mm in all poles.**
- **Electrical isolators must be installed in readily accessible locations.**
- **Electrical supplies to boiler modules should only serve the boiler.**
- **Where volt free contacts are used, these too must be individually isolatable.**
- **Time clock control should be via the boiler modules stop/start circuit (230V).**

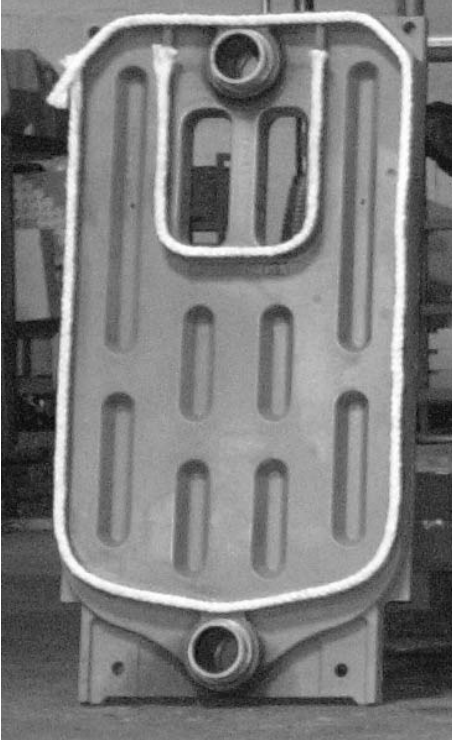
ADDITIONAL INFORMATION REGARDING ELECTRICAL SUPPLIES IS GIVEN IN BS EN60335, Part 1.

NOTE: The appliance must be isolated from the electrical supply if electric arc welding is carried out on connecting pipework.

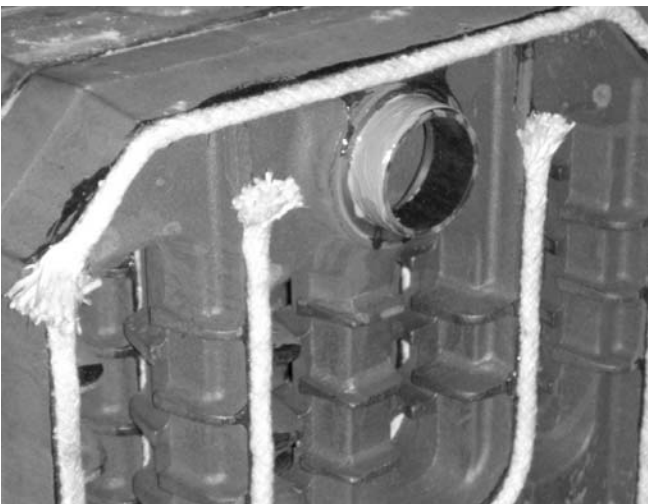
5.0 BOILER ASSEMBLY

5.1 - Assembly of Cast Iron Sections

5.1.1. Select the **rear section casting**. Apply mastic to all mating edges of the casting and fit ceramic rope as shown.



5.1.2. Select upper and lower rear nipples and apply a coating of paste as indicated above.



5.1.3. Loosely locate nipple into position in housing as shown above.



5.1.4. Using a 2 kg hammer gently tap the nipple into position.



5.1.5. Offer intermediate section to rear section and push firmly into position.



5.1.6. Using a 2 kg hammer tap the intermediate section into place.



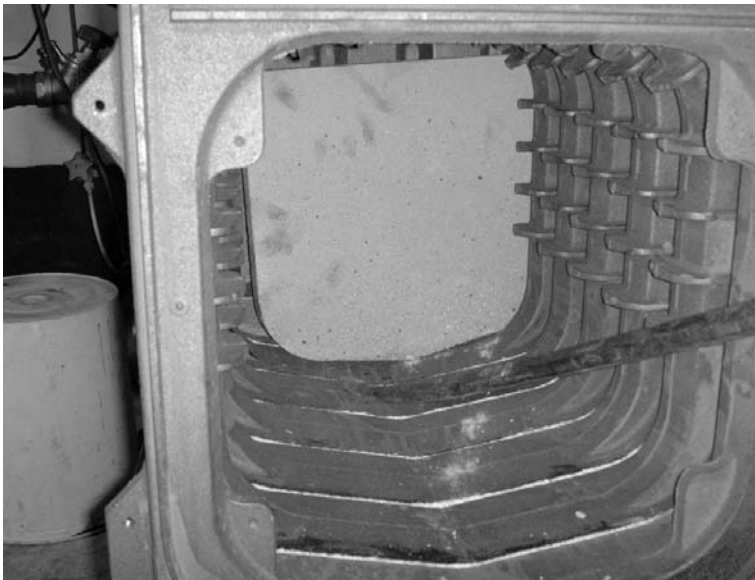
5.1.7. Prepare the mating edges of the intermediate section with mastic.



5.1.8. Apply the ceramic rope to the mating edges of the casting as shown.

5.1.9. Position next intermediate section following steps 5.1.5 and 5.1.6.

5.1.10. Continue to fit intermediate sections as previously described until the required number of intermediate sections have been fitted.



5.1.11. Fit fire brick into position inside boiler sections.



5.1.12. Fit Front Casting as previously described in steps 5.1.1 to 5.1.4.

5.1.13. Once all sections are in place, attach mounting bars to top and bottom as indicated and tighten.



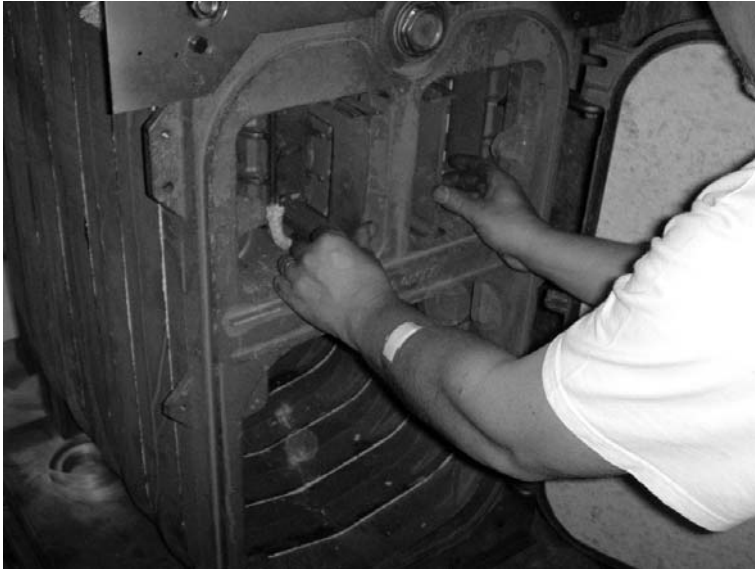
5.1.14. Fit 4 off tie rods and secure. Once tie bars are fully tightened, remove mounting bars and discard.



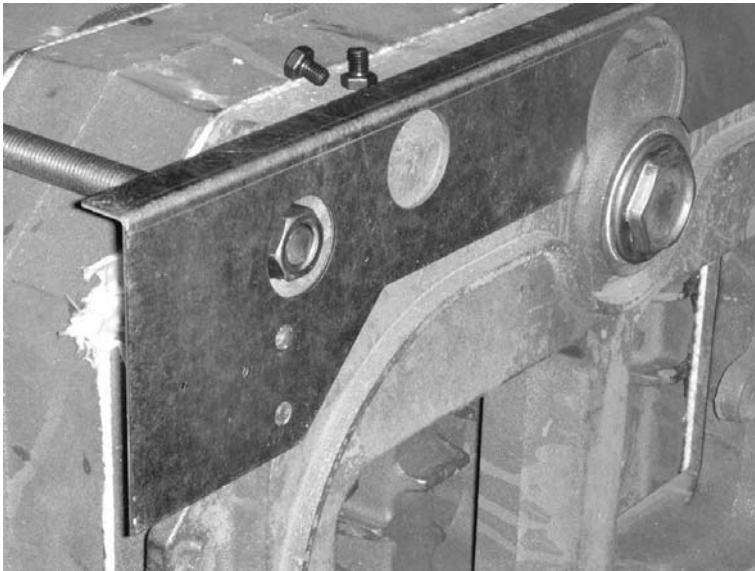
5.1.15. Fit Rp 2" cap as shown.



5.1.16. Fit door eyelet as indicated.



5.1.17. Select divider plate and fit as shown.



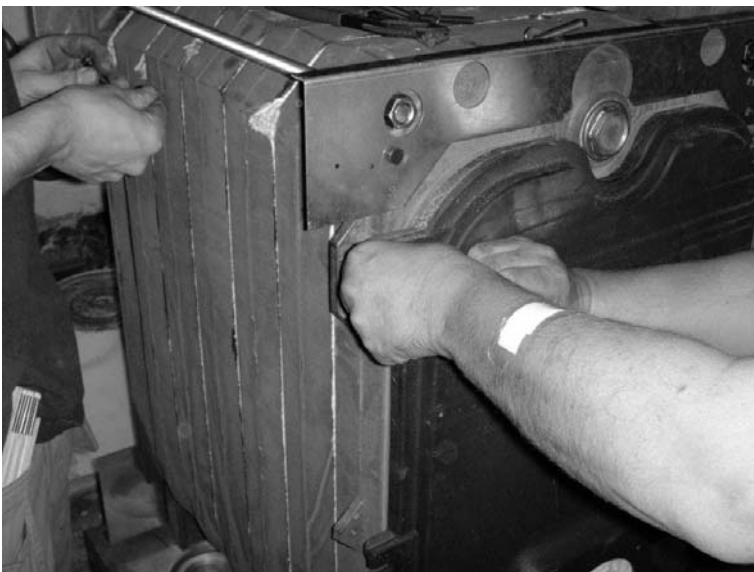
5.1.18. Fit casing upper support in position as shown using the hex head screws supplied.



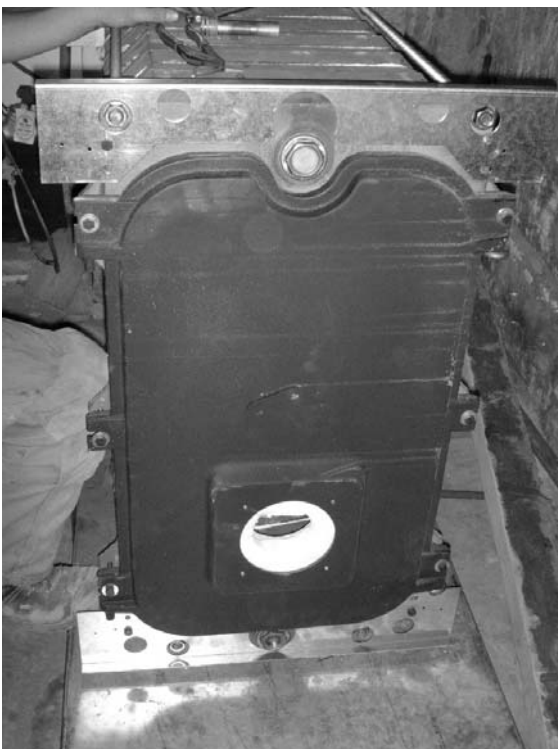
5.1.19. Fit casing lower support in position as shown using the hex head screws supplied.



5.1.20. Pictorial view of divider plate in position and casing upper stiffener fitted.



5.1.21. Select Boiler Door and offer up to boiler front casting.

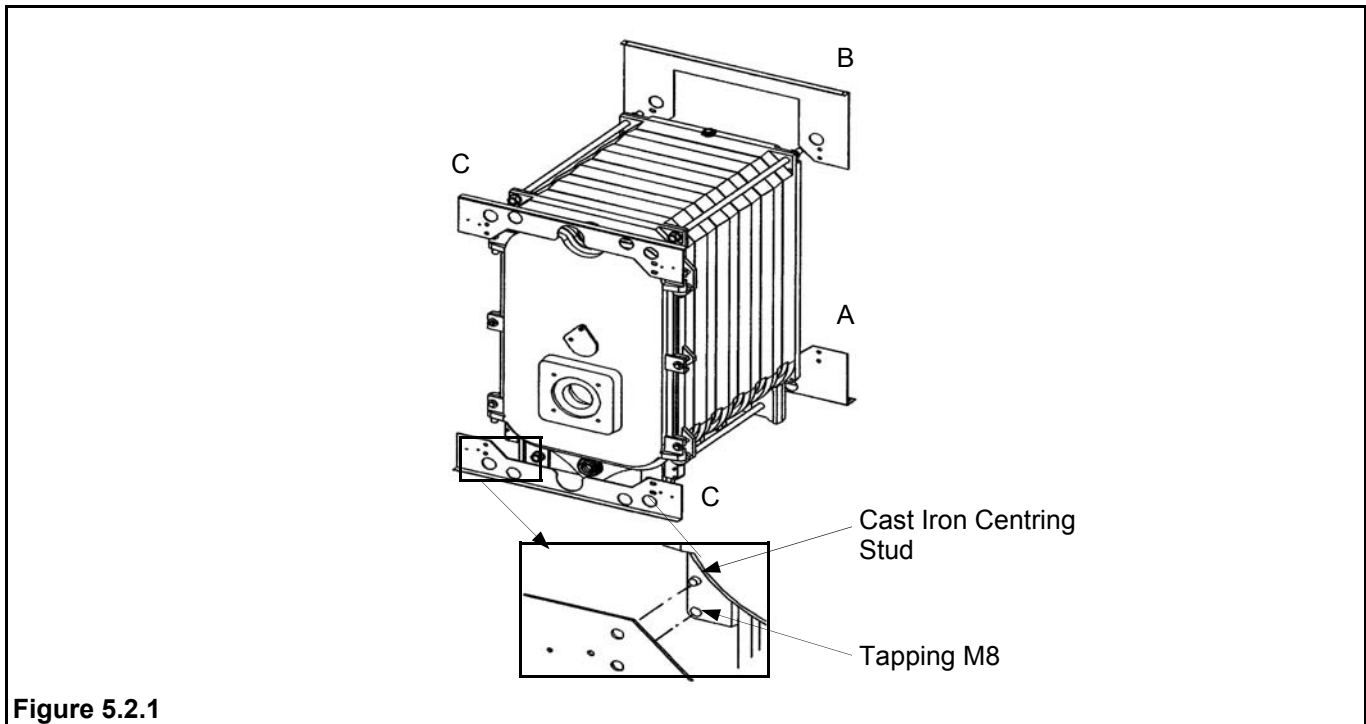


5.1.22. Secure door to front casting utilising 6 off bolts, nuts and washers supplied.

5.0 BOILER ASSEMBLY

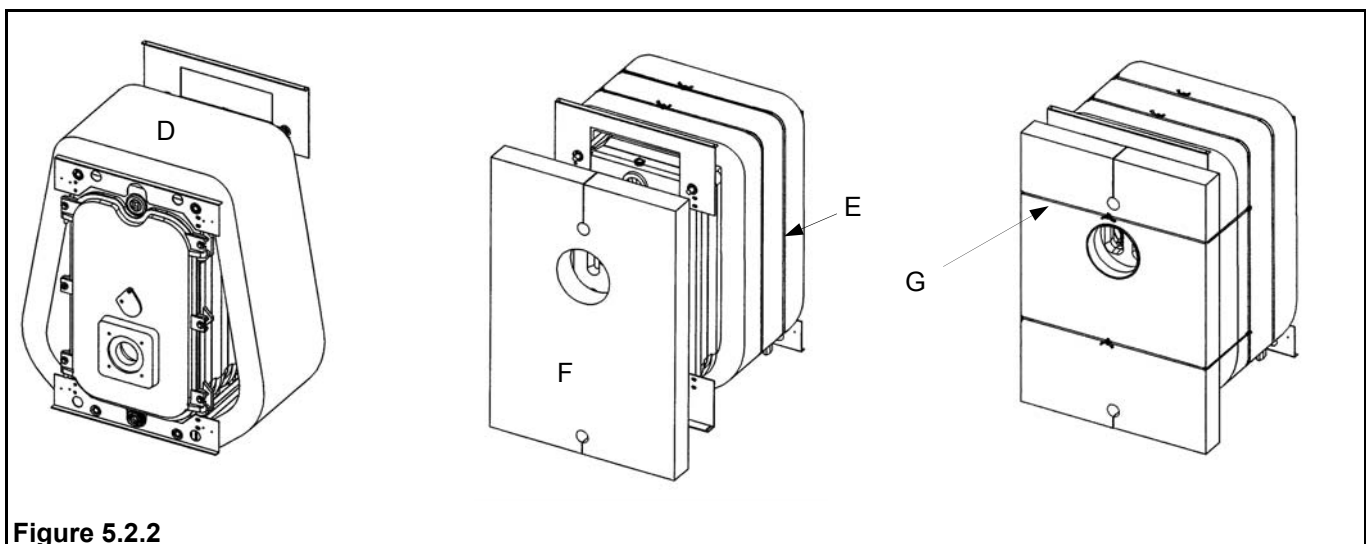
5.2 - Assembly of Boiler Casing.

5.2.1. Having fitted the upper and lower casing stiffeners (marked A and C) as detailed in section 5.1 proceed to fit the upper rear plate (marked B) using the bolts, nuts and washers supplied.



5.2.2. Fit the boiler insulation (marked D) around the heating sections, taking care not to let it get between the elements. Bind with tapes (marked E).

Place the pre-cut insulation on the rear of the heat exchanger (marked F). Attach with tapes (marked G).



5.2.3. Provide a coupling duct with a diameter of 200mm. Height of the axis; 670mm (see Figure 3.1 on page 3 of this manual). Place the flue coupling duct. Ensure air-tightness of the coupling to the chimney.

5.3. Assembly of casing covers.

5.3.1. Position left hand and right hand casing panels (marked H and I below) and secure to front and rear stiffeners using screws supplied.

5.3.2. Position and fit the bottom rear panel (marked J) on the side panels using the screws supplied.

5.3.3. Position and fit the top rear panel (marked K) utilising the screws supplied whilst aligning the top plate (K) with the bottom plate (J).

5.3.4. Position the control panel (marked L) and secure using screws supplied.

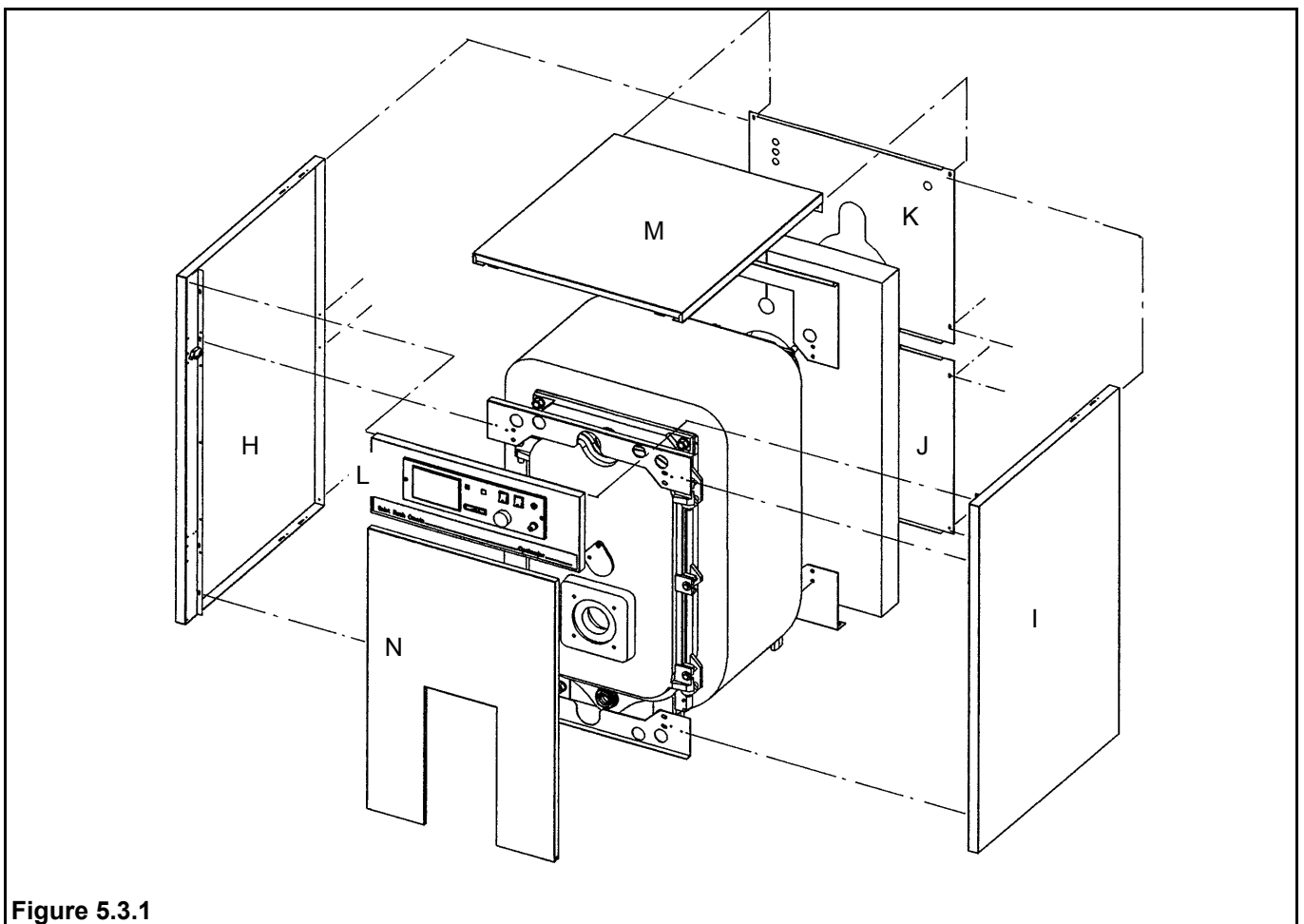
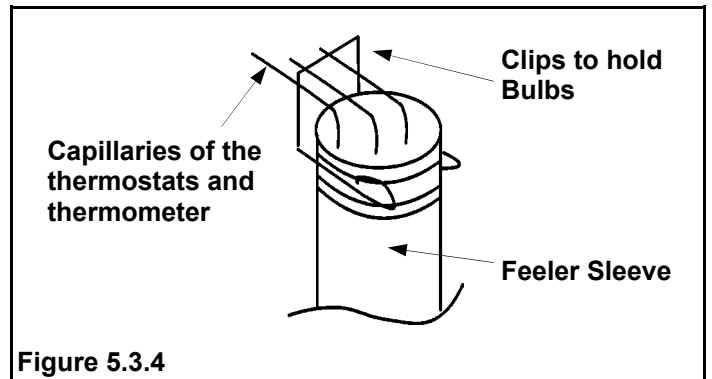
Note: Locate the boiler thermostat bulbs and position in the sleeve that has been provided for this purpose in the rear element of the cast-iron block as indicated in Fig. 5.3.4.

5.3.5. Position the top cover (marked M) and attach to side covers (H and I) using screws provided.

5.3.6. Position front cover (marked N) and affix with the 4 off small latches located on the side panels (H and I).

5.3.7. Fit burner carefully following instructions supplied with burner, ensuring that cables are routed via hole in casing front panel (Item N).

5.3.8. Having routed cables, fit 4 way and 7 way plugs to 4 core and 7 core cables carefully following wiring diagram shown in Fig. 5.4.1 on page 16 of this manual.



5.4 Electrical Installation.

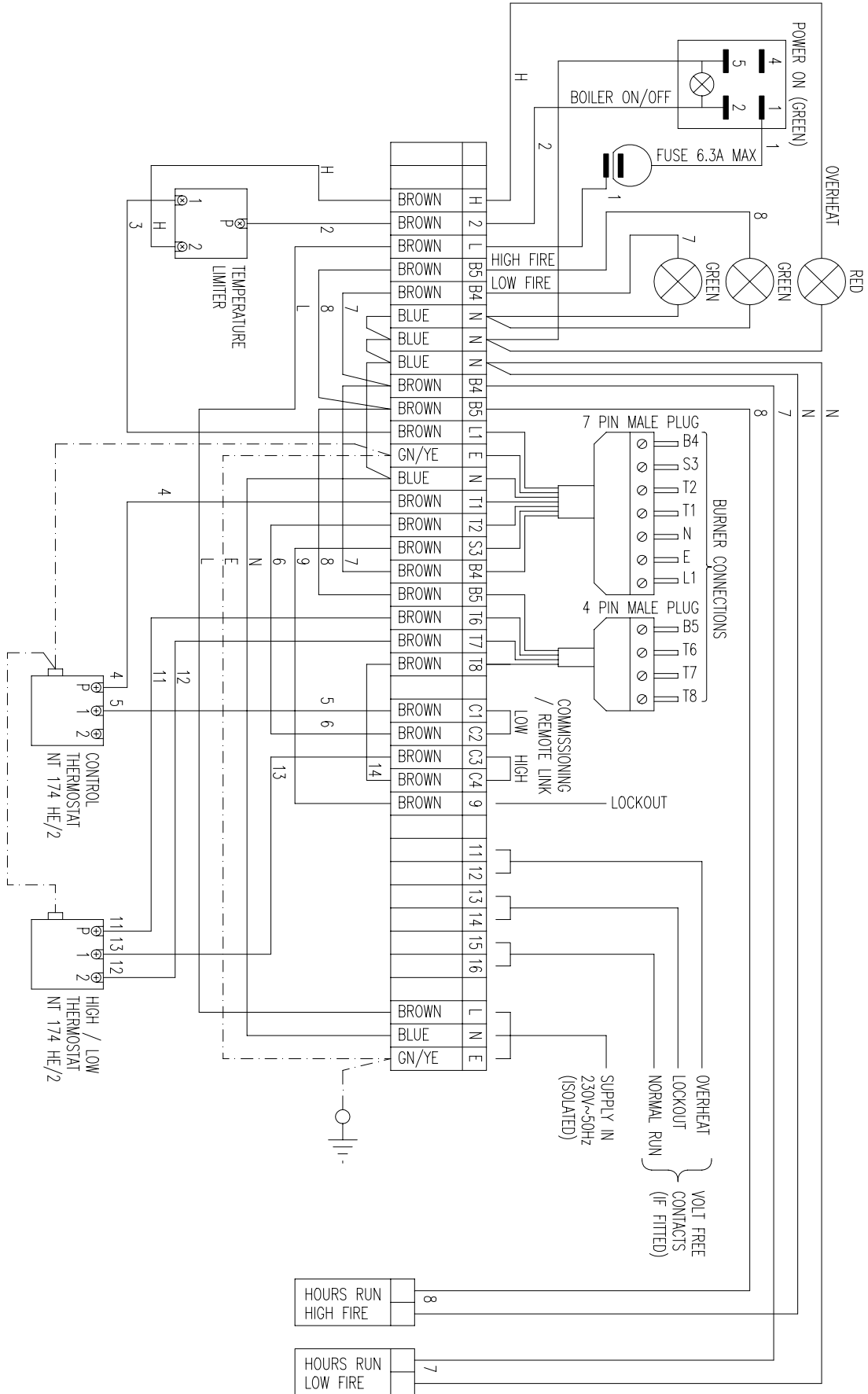


Figure 5.4.1 - Electrical Schematic

5.5 Filling the System

5.5.1. General Points

The installer must provide a safety valve in the flow outlet. The installation must be designed in such a way that the filling and addition of water to the system takes place as infrequently as possible and must always be strictly controlled. Any uncontrolled automatic filling of the system is strictly prohibited.

Should the boiler be connected to an existing heating installation, the system must be thoroughly flushed out in order to eliminate any impurities and sludge deposits which may be present. Such deposits, if allowed to remain, could accumulate in the boiler causing overheating, corrosion and noise.

In order to avoid the complete emptying of the system in the event of problems occurring it is recommended that isolating valves are fitted on the boiler flow and return connections and the use of flanges / unions to facilitate removal of the boiler.

Isolating valves should also be installed each side of the circulating pumps.

All necessary precautions must be taken to prevent;

- Gases in the top part of the boiler
- Deposits of sludge in the bottom of the boiler.

5.5.2. Filling the System

Prior to final filling of the installation it is recommended, both for new and existing installations, that the system is completely flushed out and the water tightness of the system verified.

The maximum working pressure of the system is 4 bar. However, it may prove necessary to adapt the operating pressure according to the characteristics of the installation, circulating pump and pressure of the expansion tank.

During filling and when water is added to the system it will always be necessary to vent the air from the installation. Significant additions of water to the installation may bring about premature deterioration of the boiler with a deposit of minerals substances present in the water. These deposits lead to thermal and mechanical constraints, which may go as far as resulting in the cracking of the cast iron sections of the boiler.

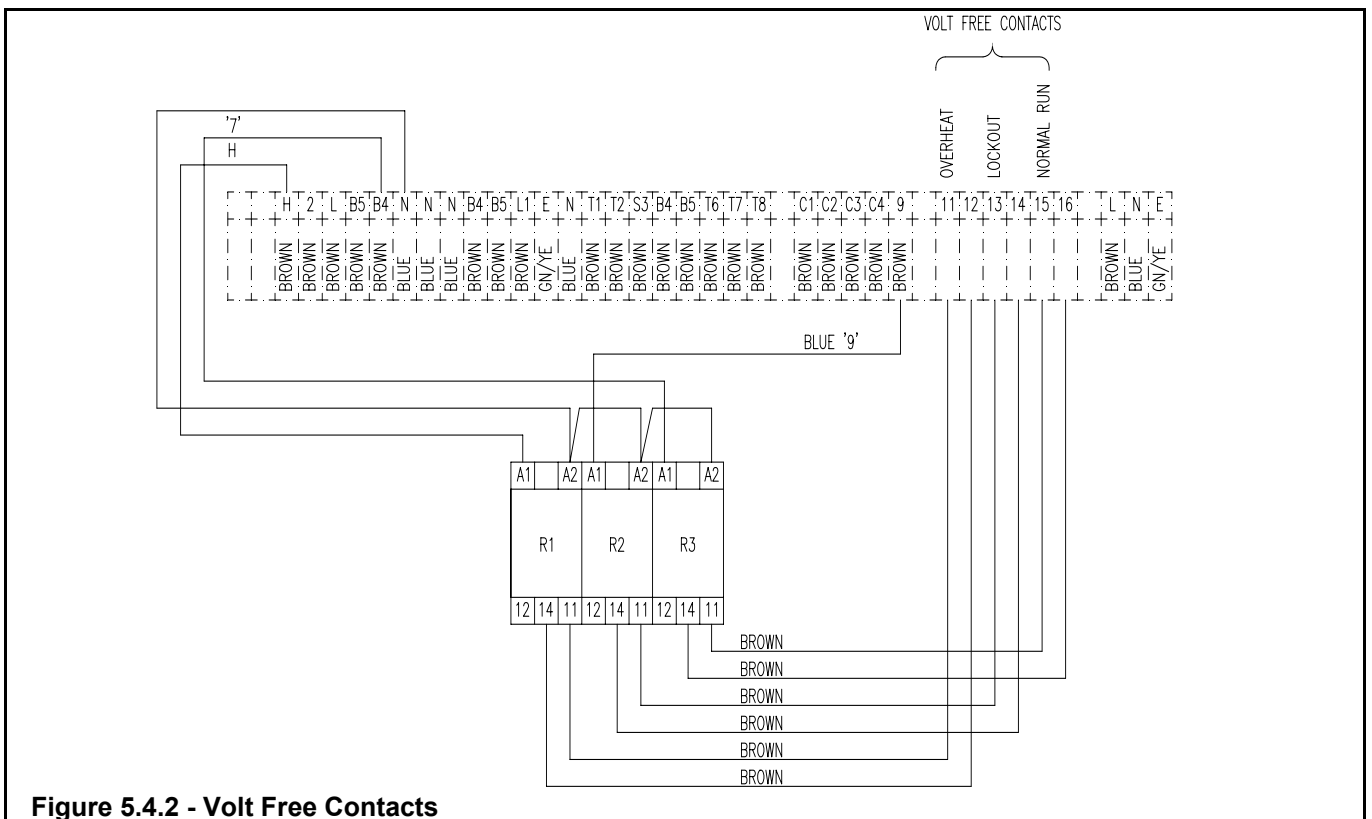


Figure 5.4.2 - Volt Free Contacts

6.0 COMMISSIONING

The following pre-commissioning check must be carried out before the boiler is commissioned.

6.1 Gas Supply.

Ensure that gas installation pipework and meter has been soundness tested and purged to IGE/UP/1 or IGE/UP/1A as appropriate. Test and purge certificates should be available for viewing.

6.2 Ventilation

Ensure that ventilation and air supply to plant room is correct.

6.3 Pipework, Valves and Pump

Ensure that;

- Pipework and valve arrangement is installed to Hamworthy Heating recommendations.
- Circulating system is full of water, vented and pressurised appropriately.
- Circulation pump is fitted, working and interlocked where required.
- Pipework connections to boiler are fitted correctly.
- All necessary isolation valves are open.
- Safety valve is correctly sized and located.
- Condense connections on boiler and flue are connected and piped to drain.
- Heat load is available.

6.4 Flue

Ensure that;

- Flue system is correctly designed and installed to suit boilers.
- Flue passages to chimney are clear.

6.5 Electrical

Ensure that;

- Electrical connections are correct and isolatable.
- External controls are operational.

6.6 Bringing Into Service

1. Switch on the furnace's main power supply switch (located in the switch box on the exterior of the boiler).
2. Switch on the main switch on the boiler control panel.
3. Set the regulation devices on the boiler to the heat demand position.
4. Check the operation of the heating system circulation pump.

7.0 REPLACEMENT OF PARTS

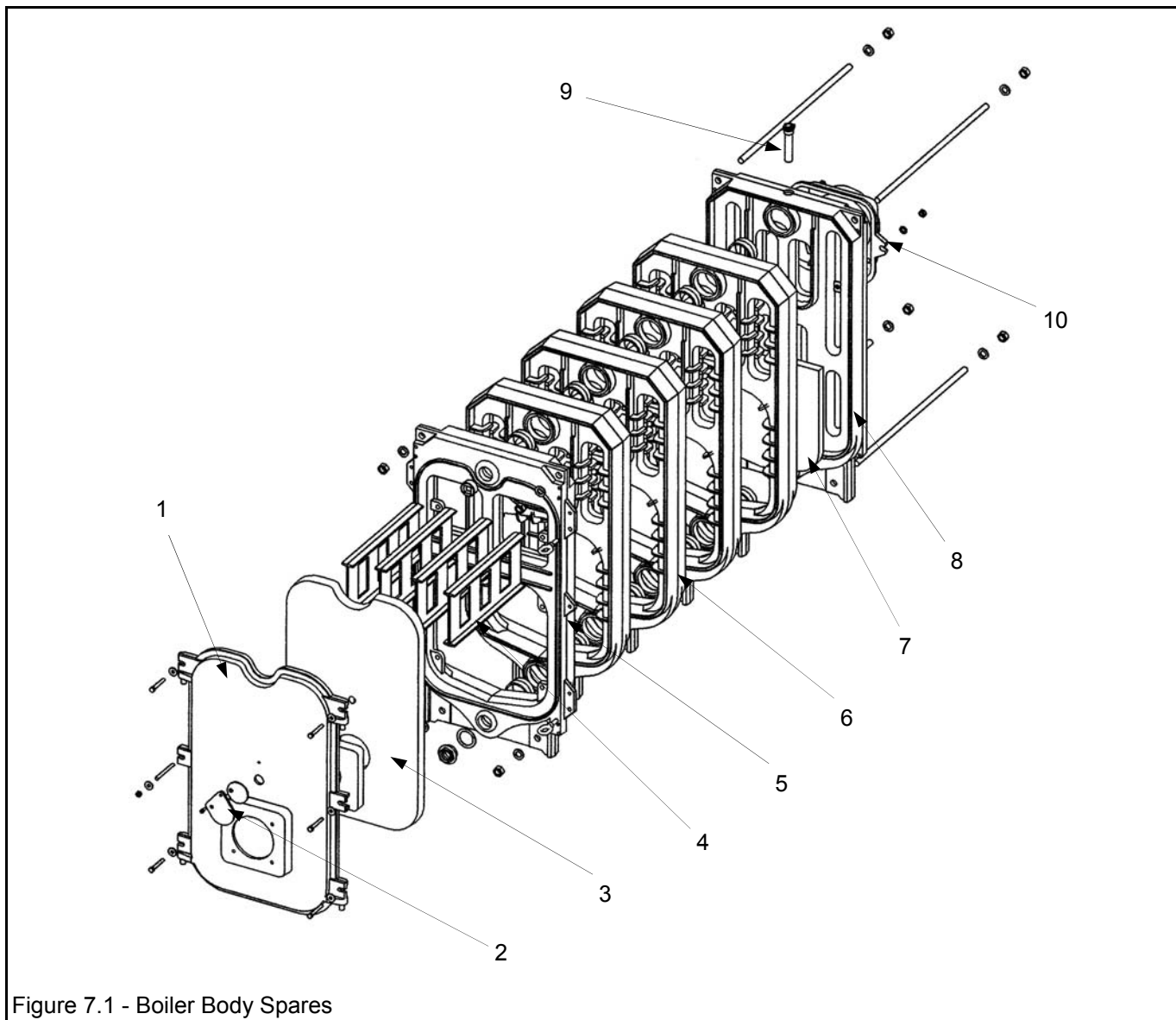


Figure 7.1 - Boiler Body Spares

Item No.	Description	HHL Part No.
1	Door	573405535
2	Flame Sight Plate	573405536
3	Door Insulation	573405537
4	Divider	573405538
5	Front Section	573405539
6	Intermediate Section	573405540
7	Combustion Chamber Insulation	573405541
8	Rear Section	574305542
9	Plunger 3/4"	573405543
10	Flue Box	573405544

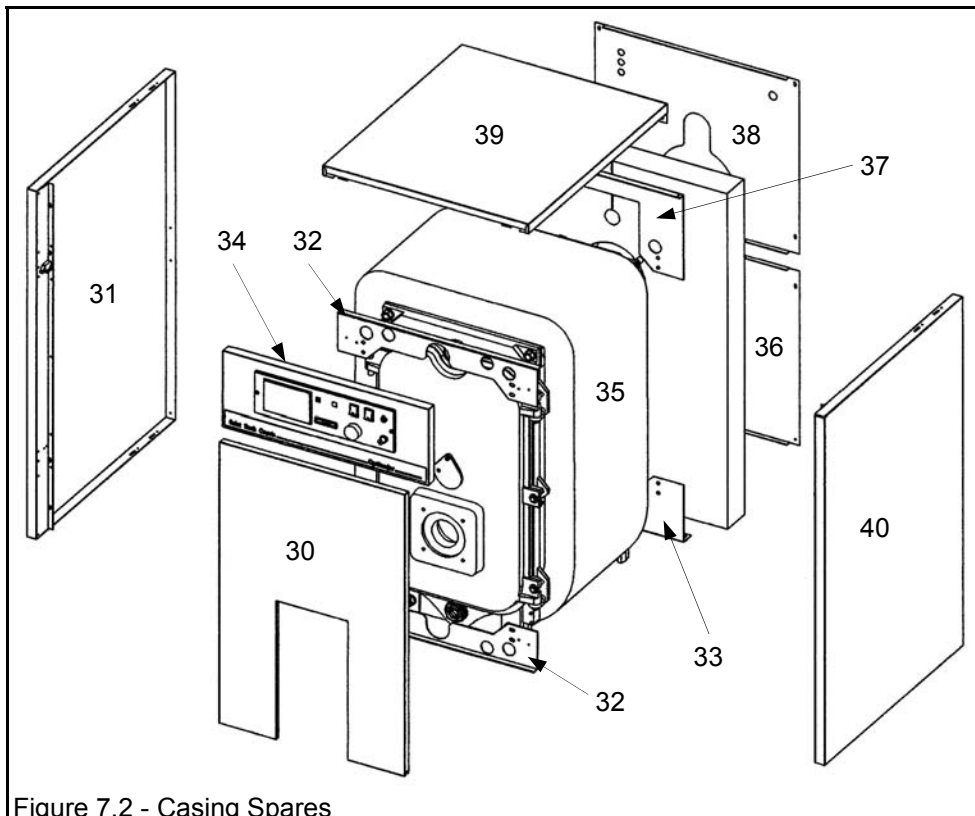


Figure 7.2 - Casing Spares

Item No.	Description	HHL Part No.
30	Casing Front Panel	573405545
31	Casing Left Hand Side Panel, Broadstone 110	573405546
31	Casing Left Hand Side Panel, Broadstone 120 and 130	573405547
32	Upper and Lower Front Fixing Plate	573405548
33	Lower Rear Fixation Plate	573405549
34	Control Panel Plate (Unwired)	573405550
35	Insulation 1000 x 1000 x 100mm thk	573405551
36	Lower Rear Casing Plate	573405552
37	Upper Rear Fixing Plate	573405553
38	Upper Rear Casing Plate	573405554
39	Top Cover, Broadstone 110	573405555
39	Top Cover, Broadstone 120 and 130	573405556
40	Casing Right Hand Side Panel, Broadstone 110	573405557
40	Casing Right Hand Side Panel, Broadstone 120 and 130	573405558
50	Control Panel c/w Wiring	563902228
51	Control Panel Illuminated Mains Switch	573405560
52 / 54	Thermostat	573405561
53	Boiler Thermometer	573405562
55	Safety Limit and Manual Reset	573405563
56	Run Timer	573405640

APPENDIX A - TECHNICAL DATA

Table A1 - Technical Details

Model		S110	S120	S130
Required Draught (mm WC)		3.0	3.7	4.6
Gas Side Resistance and Combustion and Chamber pressure (mm WC)		1.8	2.3	2.9
Combustion Circuit (dm ³)		72.9	82.9	92.8
T° flue - T° ambience	Gas	170	170	170
	Oil	185	185	185
Flue Gas Volume	Gas (m ³ /h)	156.9	171.2	185.4
	Oil (m ³ /h)	162.4	177.1	191.9
Heat Input Net	Gas (kW)	119.6	130.4	141.3
	Oil (kW)	124.6	135.9	147.3
Heat Input Gross	Gas (kW)	132.7	144.8	156.8
	Oil (kW)	132.7	144.8	156.8
Flow	Gas (m ³ /h)	12.7	13.8	15.0
	Oil (kg/h)	10.5	11.4	12.4
Water Resistance (mm WC)		53	69	87.5
Relative Standby Loss (%)		0.52	0.36	0.2
Water Capacity (litres)		62.5	70	77.5
Weight (kg)		495	545	595

Table A2 - Matched Burner/Boiler Combinations (Natural Gas)

BOILER MODEL	BURNER DETAILS			BOILER DETAILS		
	MAKE	MODEL	MODE	HEAT OUTPUT	MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)	
				(kW)	(kW)	GAS RATE m ³ /hr
S110	RIELLO NU-WAY	R40GS20D BG300T1S	HI/LO	110	81 54	8.5 5.7
S110	RIELLO	R40GS20/M	MODULATING	110	81	8.5
S120	RIELLO NU-WAY	R40GS20D BG400T1S	HI/LO	120	81 54	8.5 5.7
S120	RIELLO	R40GS20/M	MODULATING	120	81	8.5
S130	RIELLO NU-WAY	R40GS20D BG400T1S	HI/LO	130	81 54	8.5 5.7
S130	REILLO	R40GS20/M	MODULATING	130	8.1	8.5

Note:
To comply with the requirements of the Gas Appliance Directive, only the combinations listed above may be utilised for natural gas applications.

Heat input values quoted above are based on Natural Gas (G20) with a net CV of 34.06 MJ/m³ @ 1013mbar and 15°C.

Table A3 - Matched Burner/Boiler Combinations (Class D Oil)

BOILER MODEL	BURNER DETAILS			BOILER DETAILS		
	MAKE	MODEL	MODE	HEAT OUTPUT	MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)	
				(kW)	(kW)	GAS RATE kg/hr
S110	RIELLO NU-WAY	R40G20D B30 A2 T1S	HI/LO	110	95 50	7.9 4.1
S120	RIELLO NU-WAY	R40G20D B40 A2 T1S	HI/LO	120	95 89	7.9 7.4
S130	RIELLO NU-WAY	R40G20D B40 A2 T1S	HI/LO	130	95 89	7.9 7.4

NOTE! Heat input values quoted above are based on class D Fuel Oil with a net CV of 35.47 MJ/litre @ 15°C.

Table A4 – Oil Nozzle Selection

MAKE (type)	MODEL	MODE	QUANTITY	PART No.	DESCRIPTION
RIELLO (Danfoss/ Delavan)	S110	HI/LO	1	532904058	2.5 x 45°
	S120	HI/LO	1	532904058	2.5 x 45°
	S130	HI/LO	1	532904058	2.5 x 45°
NU-WAY (Monarch)	S110	HI/LO	1	532904028	2.25 x 60°
			1	532904073	1.25 x 60°
			1	532904074	0.75 x 60°
	S120	HI/LO	1	532904039	3.0 x 60°
			1	532904028	2.25 x 60°
	S130	HI/LO	1	532904039	3.0 x 60°
			1	532904028	2.25 x 60°

NOTES

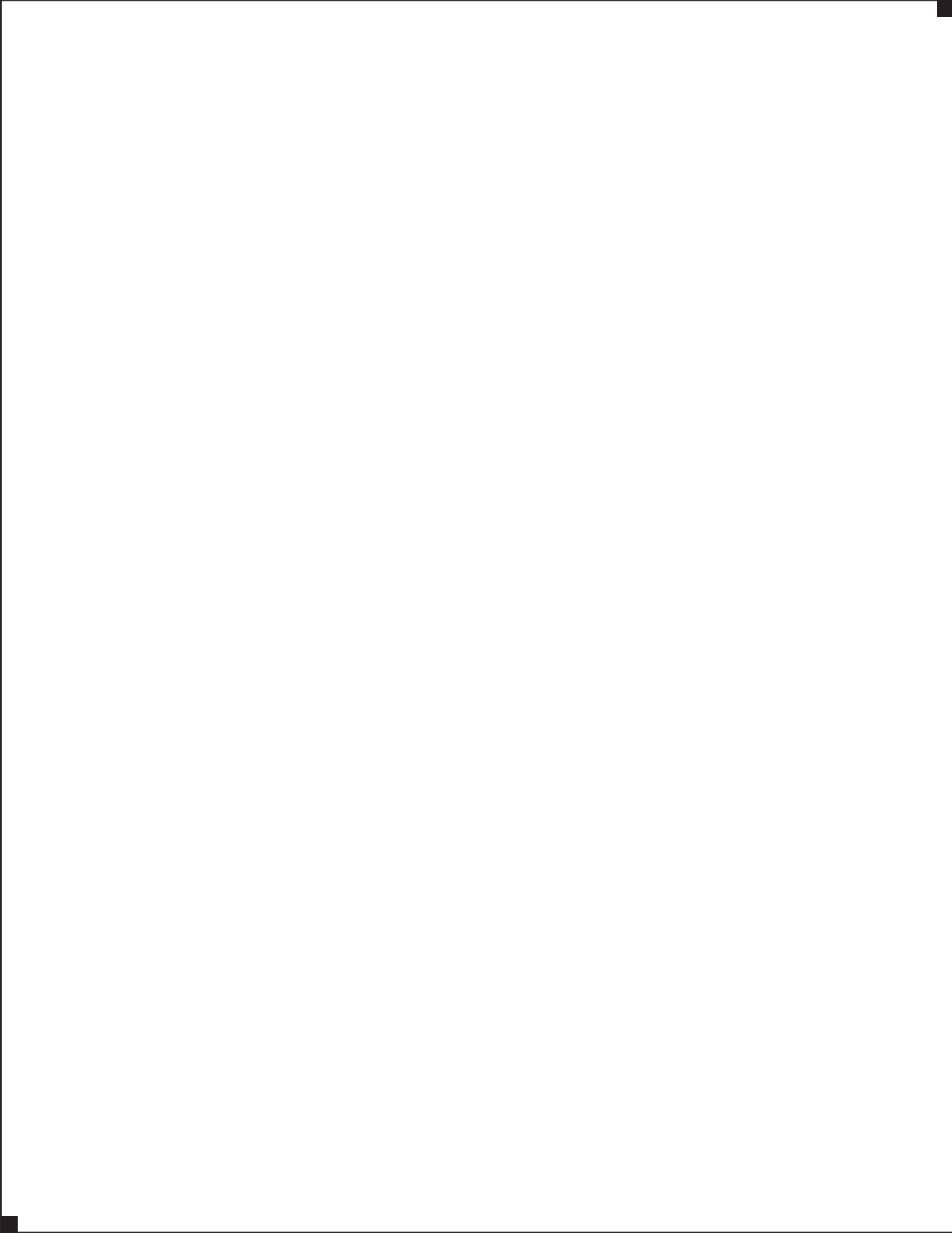
NOTES

USEFUL USER INFORMATION

INSTALLER	SITE ADDRESS

BOILER TYPE	BOILER SIZE(S)	UNIT NO(S).	SERIAL NO(S).	FLUE

Notes



Connect direct







Direct Dial Telephone and Fax Numbers



- boilers
- controllers
- water heaters
- pressurisation sets

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Technical enquiries	 01202 662527/662528	 01202 665111
Spare parts	 01202 662525	 01202 665111
Service department	 01202 662555	 01202 662522



- flue components
- packaged fan dilution systems
- bespoke flue components
- bespoke flue systems
- design and installation

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Associate Companies, Offices and Agents throughout the World.

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