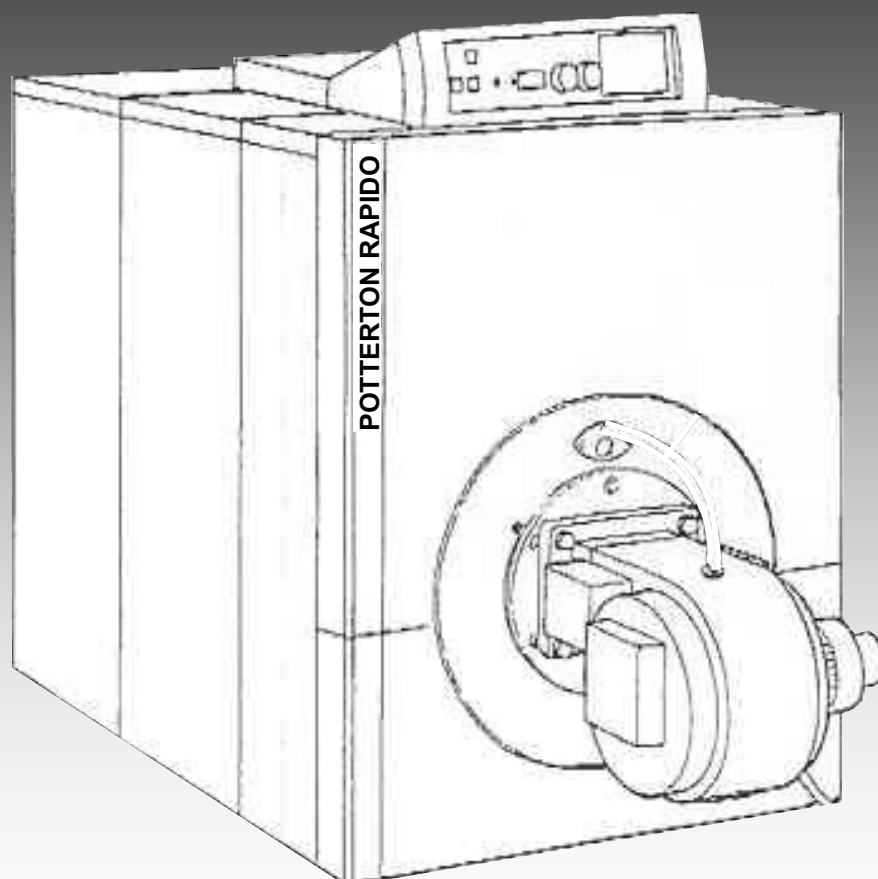


RAPIDO f220

INSTALLATION, OPERATION & MAINTENANCE MANUAL



APRIL 2005

POTTERTON
COMMERCIAL

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Fig.1 – General Data and Dimensions

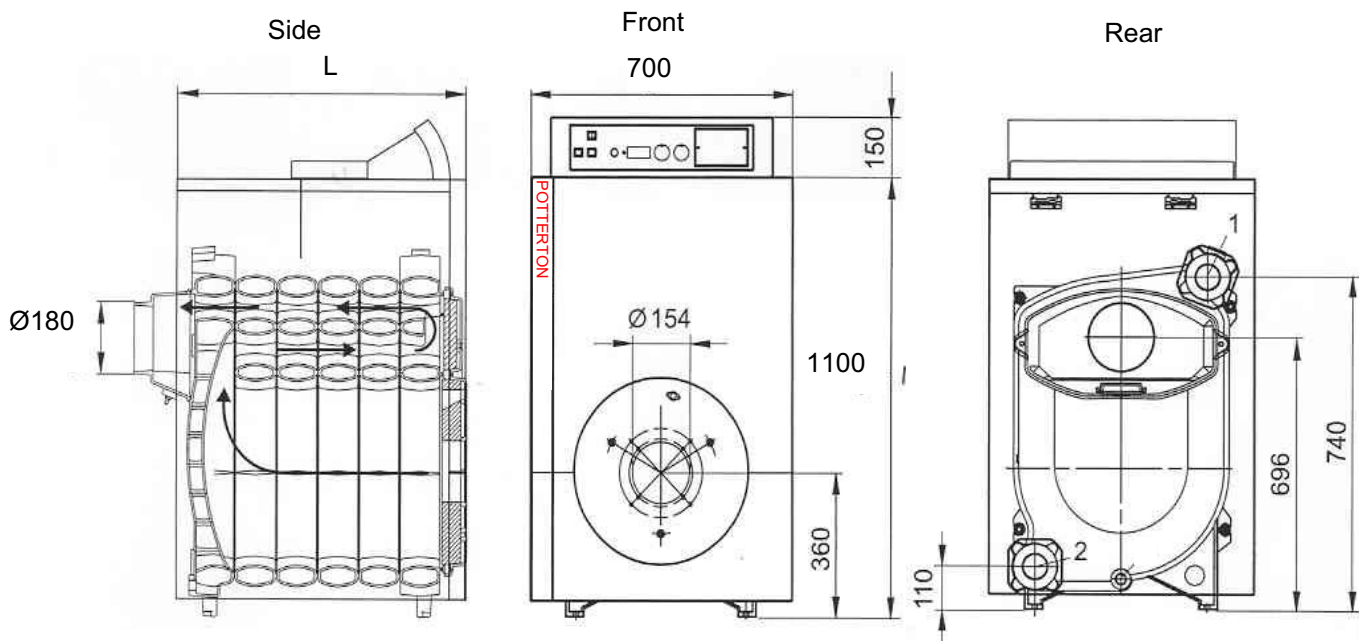


Table 1 – Boiler Dimensions

No of Sections		7	8	9	10	11	12	13
L (Length)	mm	880	990	1100	1210	1320	1430	1540
1+2 (Flow & Return)	mm	DN65						

Table 2 Combustion Chamber Data

Combustion Chamber Data			7	8	9	10	11	12	13
Model									
Mean Diameter	mm		460						
Cross Sectional Area	m ²		0.41						
Length (X)	mm		810	920	1030	1140	1360	1470	1520
Volume	m ³		0.33	0.38	0.42	0.47	0.55	0.60	0.62
Resistance	mbar		2	2.5	2.7	3	3.7	4.5	8.5
Flue Gas Temperature (Gross)	°C		175						
Efficiency	(Nett)	%	92						
	(Gross)	%	Oil 85.3, Gas 82.1						
Percentage CO ₂	Oil	%	12						
	Gas	%	9.5						

Table 3 – Technical Data

Number of Sections		7	8	9	10	11	12	13	
CE Number									
Output	kW	90	105	125	145	165	190	215	
Fuel Consumption	Gas Oil	m ³ /hr lit/hr	10.3 10.14	12.06 11.83	14.36 14.09	16.66 16.34	18.97 18.60	21.83 21.42	24.7 24.23
Input (Gross)	Gas Oil	kW kW	109.6 106.7	127.7 123.1	151.8 146.3	175.8 169.4	199.8 192.6	229.8 221.5	259.7 250.2
Input (Net)	Gas	kW	99.8	115.1	136.8	158.4	180.1	207.1	234
Maximum Design Pressure	Bar	4							
Minimum Operating Pressure	Bar	0.3							
Nominal Flue Connection Size	Ømm	180							
Flue Gas Volume	m ³ /hr	136	160	190	220	250	288	326	
Flue Draught Requirements		0-4 mm all Models							
High Level Natural Ventilation to BS6644	cm ²	382	420	475	530	585	652	720	
Low Level Natural Ventilation to BS6644	cm ²	764	840	950	1060	1170	1304	1440	
Mechanical Inlet to BS6644	m ³ /sec	0.098	0.115	0.137	0.158	0.180	0.207	0.234	
Water Connection Size	BSP	DN65							
Minimum Water Flow at 20°C Δ t	lit/sec	1.07	1.25	1.49	1.72	1.96	2.26	2.55	
Water Flow at 11°C Δ t	lit/sec	1.94	2.27	2.71	3.14	3.57	4.11	4.65	
Hydraulic Resistance at 11°C Δ t	kPa	0.66	0.82	0.89	0.99	1.22	1.48	2.81	
Cold Feed Size to BS 6644 Minimum Bore	mm	25		32					
Open Vent Size to BS 6644 Minimum Bore	mm	32		38					
Safety Valve Size to BS6644 Nominal Size	mm	19							
Maximum Flow Temperature	°C	90							
Minimum Return Temperature	°C	55							
Dry Weight	kg	542	595	648	701	754	807	860	
Water Content	kg	52	64	76	88	100	112	124	
Power Requirements		Standard 230V 1Ph 50Hz, Fused 6.3A							
Natural Gas Supply mbar	Min Max	17 25							
Oil Supply bar	Min Max	0 0.69							
Efficiency	Net	92							

See page 3 for explanatory notes

Conversion tables on inside back cover

1. FUEL CONSUMPTION

Gas fuel consumption is based on natural gas with a gross calorific value of 38.6 MJ/m³. The gas rate should be corrected for meter supply pressure particularly on high-pressure supplies to prevent over-firing.

Fuel oil fuel consumption is based on Class D (35 second) gas oil with a calorific value of 58.24 MJ/lit and a density of 0.855 kg/lit, Kerosene (Class C2) has a calorific value of 53.22 MJ/lit and a density of 0.795 kg/lit.

2. MINIMUM OPERATING PRESSURE

This is the minimum operating pressure of the boiler with pumps operating (NOT static pressure). The requirements of the Health & Safety Executive guidance note PM5 regarding maximum operating temperatures should be observed.

3. BOILER FLUE CONNECTION

This is the nominal flue size of the flue connection spigot. Actual flue size required to achieve correct draught and operation under all running conditions may need to be increased.

4. FLUE GAS VOLUME

Flue gas volumes are given at STP (standard temperature and pressure [15°C and 1013.25 mbar]). Typical flue gas temperatures are given in Table 2.

5. NATURAL VENTILATION

The sizes indicated are free grille areas and are based on a single boiler installation.

6. MECHANICAL VENTILATION

The volume given is for a single boiler installation.

7. WATER CONNECTION SIZES

The boiler water connections are flanged with PN6 DN65

8. WATER FLOW RATES

Water flow rates are given for boiler flow and return temperature differences of 11°C.

9. COLD FEED/OPEN VENT/SAFETY VALVE SIZES

Sizes indicated are minimum sizes for single boiler installations.

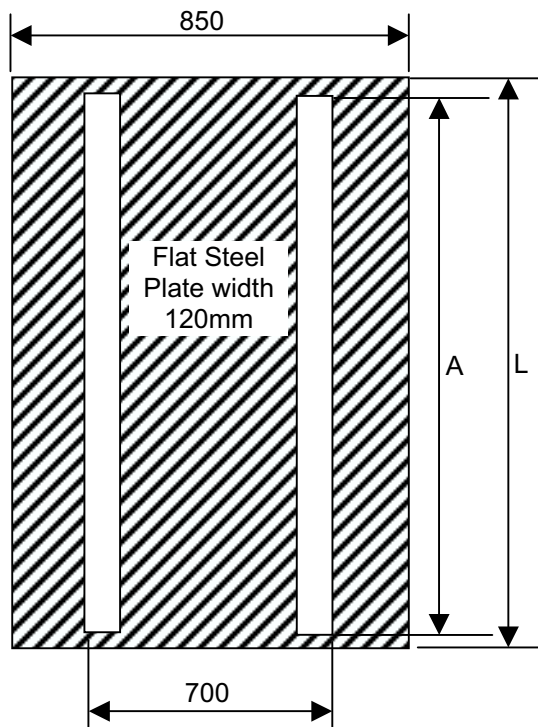
10. MINIMUM RETURN TEMPERATURE

If system return temperatures below 55°C are required then contact the Potterton Commercial Technical Department.

11. WEIGHT

The dry weight is exclusive of the burner and gas train, see burner card for relevant burner weights. Each section measure approximately 613 mm x 130 mm x 750 mm and the weights are 65 Kg (front and inters) 85 kg (rear).

Fig. 2 – Boiler Feet Details



F220	7	8	9	10	11	12	13
A	1140	1270	1400	1530	1660	1790	1920
L	910	1040	1170	1300	1430	1560	1690

No special plinth is required for this boiler, a simple dry base is sufficient. It is however recommended that a 50mm base be provided, provision must be made to allow free movement of the boiler on its base.

CLEARANCES

The minimum boiler room clearances for access, erection and maintenance are as follows: -

- REAR - 500 mm or sufficient to make flue and water connections.
- SIDES - 100 mm + burner projection on one side, 300 mm on the other side.
- FRONT - The length of the boiler to allow for cleaning, 1000 mm minimum.

BURNER INFORMATION

For general dimensions and specification for the Potterton Rapido F220 burner please contact Potterton Commercial Technical Department (08706 002322).

The burner should be fitted in accordance with the instructions in section 4.

The burner unit should be commissioned in accordance with the manufacturers instructions supplied with the burner to obtain the combustion figures see section 5. Burner commissioning requires specialist knowledge and equipment, we therefore strongly recommend that the services of the Potterton Service Department should be used.

GENERAL

This boiler is **NOT SUITABLE** for installation in a normally occupied area (i.e. kitchen).

A **LIFETIME GUARANTEE** is available on this boiler, please refer to our standard terms and conditions for details.

The Potterton F220 is a cast iron sectional boiler available in outputs from 90kW (7-section model) to 215kW (13-section model). The heat transfer surfaces of the F220 have been specially designed to maximise the boiler efficiency and the combustion chamber capacity ensures environmentally sound combustion reducing CO and Nox emissions. Specially designed and pre-wired control panels allow full boiler control.

The boiler has match tested package burner, available to Natural Gas, LPH, 35 Second and 28 Second Oil. The package burner is supported by the front water section to which is supported by the front waterway section to which it is attached by hinges on one side and locking nuts on the other. Hinge points are interchangeable allowing for left or right hand door opening by turning the door assembly through 180° at erection stage.

The F220 is suitable for use on fully pumped open vented systems or a sealed system with a maximum design pressure of 4-bar (60 p.s.i).

The F220 boiler is an overpressure type with 3-pass flame design. The first pass is in the combustion chamber, the second and third in the convection tubes, where the turbulence to achieve high heat transfer is generated by the extended surface area achieving efficiencies of 93% (net), 84% (gross).

The F220 is constructed with BS1452 Grade 220 cast iron heat exchanger, constructed in accordance with EN303.1. The boiler package meets Gas and Oil requirements of M&E3 and the burners EN767.

The waterway sections are joined by steel taper nipples and secured with tie rods. The combustion chamber is sealed by ceramic fibre rope.

The powder coated mild steel casings have an 80-mm fibre warp around the castings, thus reducing fuel consumption and emissions.

The F220 is supplied assembled.

Standard Supply

- Boiler
- Cleaning Tools
- Casing
- Control Panel
- Burner

Controls

The F220 range is supplied as standard with an integral control panel, which is fitted with, control thermostat, high/low thermostat, thermometer and burner on/off switch.

A 240V single phase supply is taken to the control panel.

Option Extras

- Volt free contacts

Shipping – Packaging

The boiler package is delivered with sections assembled on one pallet with the burner separately either in a carton or pallet.

It is recommended that the manufacturer's trained engineers should carry out commissioning, as this will make valid the LIFETIME GUARANTEE, details on the rear of this manual.

Installation

Before starting work a risk assessment should be carried out on the boiler and its access to determine and ensure a safe installation and working environment.

Any persons installing or working on the boiler must be qualified and competent and in the case of gas fired boilers attention is drawn to the mandatory requirement of C.O.R.G.I. Registration and qualified to ACS CCN1 & CODNCO1 or COCN1 & ICAE1 & CCP1 or CIGA1 for LPG CONGLP1. Also they must be electrically competent and adhere to the IEE regulations.

Manual Handling – Any persons or person moving or lifting the boiler or any part of it, should be trained in manual handling techniques and if necessary use suitable lifting equipment to reduce the risk of injury to themselves or other people.

The installation should comply with relevant British Standard Specifications, Codes of Practice and current Building Regulations, together with any special regional requirements of the Local Authorities, Gas Undertaking and Insurance Company. All electrical wiring must comply with the IEE Regulations for the Electrical Equipment of Buildings.

The installation of the boiler must be in accordance with the relevant requirements of:

Health and Safety at Work Act 1974.

Building Regulations 1991.

Electricity at Work Regulations 1989.

Management of H & S at Work Regulations 1992.

Manual Handling Regulations 1992.

Model Water By-Laws 1986.

BS 7671: 1992 – Requirements for Electrical Installations, IEE Wiring Regulations 16th Edition.

BS 6644: 1991 – Installation of Gas Fired Hot Water Boilers for Inputs between 60kW and 2MW.

BS 7074: 1989 – Part 2 – Application Selection and Installation of Expansion Vessels and Ancillary Equipment for Sealed Water Systems.

BS 6880: 1988 – Codes of Practice for Low Temperature Hot Water Systems.

BS 779: 1989 – Cast Iron Boilers for Central Heating and Indirect Hot Water Supply (Rated Output 44kW and above).

CP 342.2 – Centralised Hot Water Supply

Gas Safety (Installation & Use) Regulations 1994.

IM/11 Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters.

IGE/UP/1 – Soundness Testing & Purging Procedure for Non-domestic Installations.

IGE/UP/2 – Gas Installation Pipework, Boosters and Compressors for Industrial and Commercial Premises.

Manufacturer's notes must not be taken in any way as overriding statutory obligations.

Boiler Siting and Base.

The boiler should be sited in accordance with BS 6644: 1991 with respect to protecting the boiler from damage, air for combustion, clearances for service and access, temperature, noise levels, the disposal of boiler water and the effects of flooding of the boiler house or seepage from a roof top boilerhouse. See Fig 3 for required boiler clearances for service and access.

A level non-combustible floor capable of supporting the weight of the boiler filled with water, see technical data table, together with any additional weight bearing down on the base from connections, burner etc., must be provided. This should be of an adequate height of the floor so as to be raised in case of flooding, but also low enough to allow ease of erection. This should be typically a 50mm concrete plinth with an area equal to that of the plan of the boiler.

For certain special installations a sound proof plinth may be necessary and a metal plinth resting on anti-vibration pads is recommended in these instances.

Consideration should also be given to fitting steel strips beneath the boiler feet for boiler base protection, see Fig.3 for base details.

The boiler has a water-cooled base and no special insulation is required. When preparing a site, reference should be made to Local Authorities and Building Regulations 1992.

Before any work takes place Risk Assessments should be carried out, to determine what possible risks are associated with the work which is taking place.

LPG boilers should not be installed in basements/below ground or in a well.

For further advice on Installations, refer to Technical Bulletins 1-4.

VENTILATION

Safe, efficient and trouble free operation of conventionally flued boilers is vitally dependent on the provision of an adequate supply of fresh air to the room in which the appliance is installed. Account must also be taken of any other fuel burning appliance existing or to be fitted when designing the ventilation and combustion air systems.

IMPORTANT: The use of an extractor fan in the same room as the boiler (or in an adjacent room in communication) can, in certain conditions, adversely affect the safe operation of the boiler and therefore must be avoided.

Further guidance on ventilation for gas appliances is provided by BS 6644: 1991. For oil see relevant Standard.

FLUE

To ensure safe and satisfactory operation the chimney system, which may be individual or common in the case of modular boilers installations, shall be capable of the complete evacuation of combustion products at all times. The effective height of the chimney terminal(s) above boiler(s) flue outlet(s) shall ensure sufficient buoyancy to overcome the resistance of the bends, tees and runs of the flue pipe installed and shall terminate in a down draught free zone. The number of bends used should be kept to a minimum and runs of flue pipe less than 45° to the horizontal should be avoided in order to comply with the recommendations made in BS 6644: 1991 and British Gas Publication IM/11 "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters". The third edition of the 1956 Clean Air Act Memorandum and the Building Regulations should be strictly observed and approval obtained where applicable, combustion chamber details are given in Section 1. The flue system must be designed to work specifically to remove the products of combustion.

IMPORTANT: 90° square bends must not be used on the flue system, including the boiler, flue spigot, a straight length followed by an "easy sweep" or lobster back bend should be used.

FLUE SIZE CONSIDERATIONS

Nominal flue connection sizes are given in Table 3, these sizes refer to the boiler flue connection spigot.

The actual size of the flue system will depend on individual site applications. Below are general considerations on sizing flue systems.

Horizontal Flue Runs

Horizontal flue runs are not recommended particularly over 3m in length, where these are unavoidable advice should be sought from a flue system specialist.

Common Flue Systems

Where multiple boilers are installed on a common flue system then the flue system should be designed to ensure the correct operation of the flue on varying load conditions. In particular that the appliance flue draught is within the operating parameter under full load and partial load conditions. For safe and reliable operation of the boiler plant it is recommended that the variance in flue draught available at each appliance under full and part load operation is designed to a minimum.

(It is essential that the services of a specialist flue system manufacturer are sought for the design of common flue systems).

For further information regarding ventilation and flueing see Potterton Technical Bulletin No.4, current issue or see relevant British Standard publication BS6644: 1991.

THE ABOVE RECOMMENDATIONS ARE FOR GENERAL GUIDANCE ONLY. POTTERTON COMMERCIAL DIVISION CANNOT ACCEPT RESPONSIBILITY FOR FLUE SYSTEM DESIGNS BASED ON THE ABOVE RECOMMENDATIONS.

WATER CIRCULATION SYSTEMS

The water circulation system should be indirect and installed in accordance with the relevant parts of British Standards Codes of Practice CP342.2 and BS 6644: 1991.

The maximum and minimum design temperature differential across the boiler should be 20°C and 10°C and the boiler should be prevented from operating with flow rates giving a temperature difference across the boiler greater than 25°C based on the full boiler output.

Boilers operating under constant flow conditions can be more accurately controlled and are not subject to excessive temperature stresses.

The boilers **MUST NOT** be fired under any circumstances with less than the minimum water flow.

On systems with variable flow rates due to flow reducing devices, ie. TRVs, zone valves, etc, or where the minimum heat demand, ie. summer domestic hot water load, does not achieve the

minimum boiler flow rate then consideration shall be given to incorporating a primary loop system.

It is recommended that the system is designed to give a constant boiler flow rate. For further information on water circulation systems see Potterton Technical Bulletin No. 1 current issue.

BOILER PROTECTION

The provision of pump overrun by a time delay relay or a thermostat situated in the flow pipe close to the boiler is essential to remove residual heat from the boiler, see Fig.15, section 6.

Unions and isolating valves should be fitted to the flow and return manifolds so that the boiler can be isolated from the system if the need arises. Your legal obligations must be adhered to. (i.e. appropriate safety valves must be fitted).

IMPORTANT: The water level in the cistern or expansion tank should be minimal on cold charge to allow expansion without discharge from the overflow between cold and hot operating conditions.

SYSTEM WATER QUALITY

High efficiency boiler systems require the water quality of the system water to be controlled by the use of inhibitors to maintain a neutral Ph and inhibit corrosion. Additionally the water system should be free of leaks to prevent raw water make up which will dilute any inhibitors, promote corrosion and form lime scale.

Existing Systems

On existing systems where boilers are being replaced due to failure then the cause should be investigated before installing new boilers. This can normally be achieved by cutting open a failed boiler section and examination for system debris or contamination.

Lime scale is a positive indicator of continuous system water make up due to water loss. Evidence of magnetite (black sludge) in the system and the formation of gas in radiators causing air locking is a positive indicator of corrosion.

Where an old system shows evidence of contamination then system cleaning should be carried out before installation of new boilers. The heating system should be chemically flushed to remove any lime scale or corrosion and a corrosion and lime scale inhibitor added. Lime scale descalers if incorrectly used could cause any remaining system debris to continue to breakdown and contaminate the new boiler causing boiler failure.

Advice on system cleaning and suitable products should be sought from specialist suppliers of system cleaners such as Fernox or Sentinel.

It is important to note that corrosion inhibitor can only be used in an attempt to prevent corrosion from occurring, where a system has an existing corrosion problem, inhibitors will be ineffective and the system requires cleaning.

On existing systems where comprehensive descaling and desludging cannot be carried out then consideration should be given to separating the new boiler system from the existing system pipe work by the use of plate heat exchangers.

New Systems

New pipe work systems should be thoroughly flushed with a suitable cleaning agent to remove debris and flux residues before filling. The system water should be dosed with a suitable corrosion and lime scale inhibitor.

System Water Monitoring

The system water should be monitored as part of a maintenance programme to ensure the following.
Raw water make up is not occurring.
Corrosion and lime scale Inhibitors are still active
Water Ph is below Ph 8.5 other wise on systems with aluminium content, component failures may occur.

SYSTEM WATER CONNECTIONS

It is essential that all pipework connections to the boiler are self supporting, correctly aligned and allow for free expansion of both boiler and pipework.

Care should be taken in the pipework design to prevent strain on the connections. Excessive strain can lead to premature failure of the boiler, which is obviously outside the terms of our warranty.

The use of expansion bellows to take up both axial and lateral movement is recommended.

SEALED SYSTEMS

General

Potterton Commercial boilers are suitable for use on sealed systems designed in accordance with BS 6644: 1991 and BS 6880 Part 2. In addition, reference should be made to the Health & Safety Executive guidance note PM5 "Automatically Controlled Steam & Hot Water Boilers".

BOILER ERECTION

A lifetime guarantee is available on this boiler when commissioning is carried out by the Potterton Commercial service department and the system meets with our recommendations. Please refer to our standard terms and conditions for further details.

Risk Assessment

Before starting work a risk assessment should be carried out on the boiler house and its access to determine and ensure a safe installation and working environment.

Regardless of the type of activity being assessed, the principles of risk assessments are the same. The basic steps are: -

- Classify Activity
- Identify Hazards
- Identify Existing Control Measures
- Determine Risk
- Assess Acceptability of Risk
- Prepare a Control Plan
- Implement Plan
- Review Plan
- Record Results

Manual Handling

Any person or persons moving or lifting the boiler or any part of the boiler, should be trained in manual handling techniques and if necessary use suitable lifting equipment to reduce the risk of injury to themselves and other people.

Personal Protective Equipment

When undertaking any work you must comply with the Personal Protective Equipment Regulations 1992.

Confined Spaces

A "confined space" as defined in the Health & Safety Confined Spaces Regulations 1997 ' means any place, including any chamber, tank, vat, silo, pit, trench, pipe, sewer, flue, well or other similar space in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk.

Precautions should be taken in all areas where by virtue of its even partially enclosed nature, pose a reasonably foreseeable specified risk.

Electrical Safety

Working on appliances can be broken down into two main systems of work.

- 1) Safe systems of work are adapted for all boiler maintenance and repair work undertaken on site.
- 2) The work undertaken does not affect the electrical safety of the appliance. In particular the earth connected to the buildings fixed electrical installation.

In the case of (1) above electrical work should only be undertaken once the boiler has been isolated from the electricity supply and confirmed electrically dead. If this is impractical then suitable precautions must be undertaken to prevent injury.

In the case of (2) above checks are specified to identify any abnormality in the electricity supply to the boiler as well as to confirm that the boiler electrical connections are reinstated correctly where it is necessary to disconnect or reconnect any internal wiring within the boiler.

If it is necessary to disconnect and reconnect the appliance from the site electrical installation other than means of a plug and socket then additional checks shall be undertaken by an approved engineer to check the earth loop impedance in accordance with IEE regulations.

Always carry out preliminary electrical safety checks.

All appliances and central heating systems must be provided with their own means of isolation for safety purposes especially during installation and maintenance.

Preparation

Preparatory to installation of the boiler a check must be made to ensure that suitable facilities are available for off-loading of the individual waterway sections and conveying them to the boiler room. Each waterway section weighs approximately 92 kg and measures 613mm x 130mm x 750mm. Ensure all manual handling techniques are followed.

Particular attention must be paid to ensuring cleanliness of the boiler room and waterway sections, dust or moisture may result in imperfect adhesion of the sealants which are applied during the erection of the waterways. All tapped holes should be degreased before making connections.

C.O.S.H.H

During the erection procedure there are a number of items which are subject to the Control Of Substances Hazardous to Health (C.O.S.H.H) Regulations, and may require specialist personal protective equipment (P.P.E) beyond what is normally required. Listed below are the items subject to the C.O.S.H.H regulations and the recommended precautions that should be taken. For a full breakdown of any substances listed below, please contact the Commercial Technical Department.

- 1) **Refractory Ceramic Fibre Insulation Block** – Wear gloves, overalls and safety glasses. In the case of an irritation rinse the affected area with water and wash gently. In the case of eye contact, flush abundantly with water. If irritation persists seek medical advice.
- 2) **Refractory Ceramic Fibre Insulation Blanket** – Wear gloves, overalls and safety glasses. In the case of an irritation rinse the affected area with water and wash gently. In the case of eye contact, flush abundantly with water. If irritation persists seek medical advice.
- 3) **Nipple Sealing Paste** – Wear gloves and overalls. In the case of an irritation rinse the affected area with water and wash gently. In the case of eye contact, flush abundantly with water. If irritation persists seek medical advice.
- 4) **Sealing Rope** - Wear gloves and overalls. In the case of an irritation rinse the affected area with water and wash gently. In the case of eye contact, flush abundantly with water. If irritation persists seek medical advice.

**Potterton Commercial Customer
Erection/Assembly Check List**

The items listed below have been put together as a guide to what actions should be completed before the erection/assembly of a boiler takes place.

- I. Site access available for persons carrying out the proposed work.
- II. Site managers/personnel aware that work will be taking place.
- III. Risk assessments carried out on possible risks that may effect the persons carrying out the proposed work.

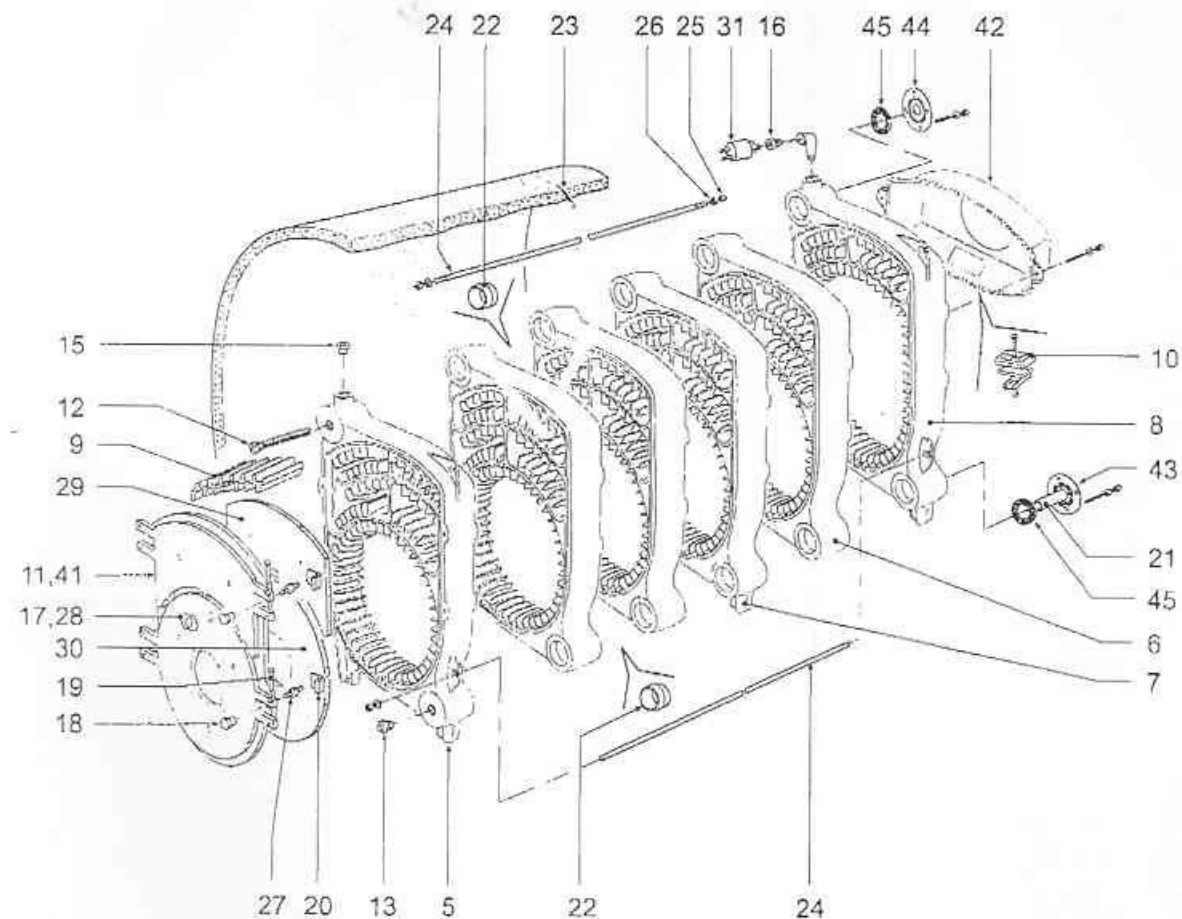
- IV. Sections and fittings boxes should be positioned adjacent to the plinth(s) within the boiler house prior to persons carrying out the proposed work attending site. If this is unable to be done notice prior to attending site should be given.
- V. When boilers are to be stripped and rebuilt, labour and transport should be provided for moving the sections from the delivery point to the final erection point. If this is unable to be provided notice prior to attending site should be given.
- VI. Sections/casing, etc, should be kept in a clean and dry area prior to erection/assembly.
- VII. Water should be available.
- VIII. A drain off area should be available.
- IX. Power should be available.
- X. A site representative should be available at all times.
- XI. Clear instructions supplied to the persons carrying out the proposed work regarding positioning the boiler.
- XII. Fire evacuation procedures, facilities availability, specific health and safety information, etc, should be provided.

Items VII to X are essential if boilers require pressure testing.

The F220 is delivered with the waterways fully assembled.

Fig 3

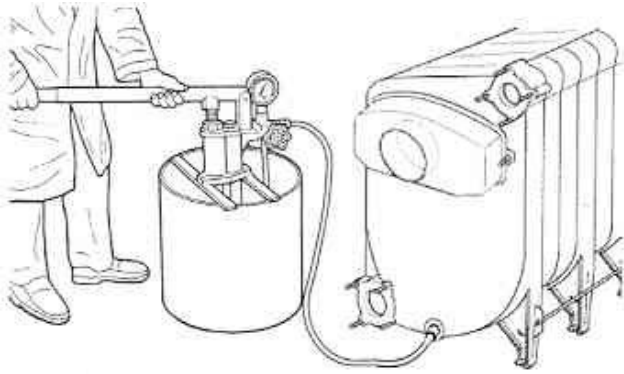
Assembly of the waterways if dismantling and re-erection needs to take place.



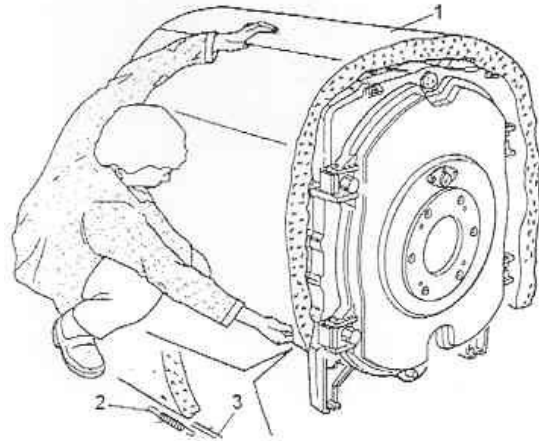
No.	Description	No.	Description
5	Front Section	23	Fastening Clip for Insulation
6	Inter Section (Without Feet)	24	Tie Rod M12 x 925
7	Inter Section (With Feet)	25	Nut M12
8	Rear Section	26	Spring
9	Baffle	27	Stud M16 x 85
10	Flue Clean-out Cover	28	Inspection Glass
11	Burner Door	29	Insulation, burner door, top
12	Thermostat Pocket	30	Insulation, burner door, bottom
13	Plug 1 1/4"	31	Water pressure switch
15	Plug 1/2"	41	Burner Door Complete
16	Reducing fitting 1/2" to 1/4"	42	Flue hood
17	Inspection flange	43	Return Flow Flange
18	Grooved Nut	44	Flow Flange
19	Door Hinge Pin	45	Flow Flange
20	Door Hinge		
21	Sparge Pipe 1" x 420		
22	Boiler Nipple		

Installation

1. Blank off boiler connections, and fill the boiler heat-exchanger with water and test with a pressure of 8 bar. Wait a few minutes and check the boiler for any leakage between sections and seals.

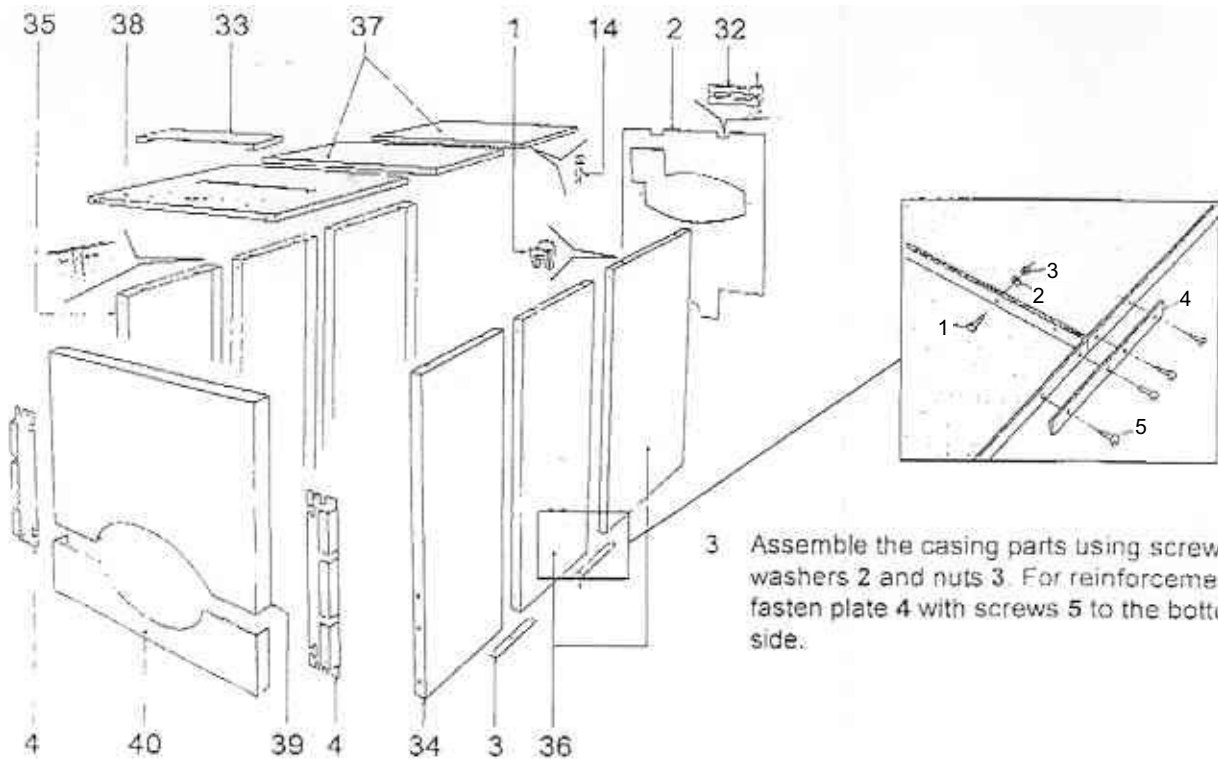


2. After pressure test is completed, wrap the insulation blanket (1) around the heat-exchanger and fasten it with the tension springs (2) to the tie rods (3).

**Assembling the Boiler Casing**

Prepare the left and right hand side casing panels using table 4.1 and the diagrams shown below and next page.

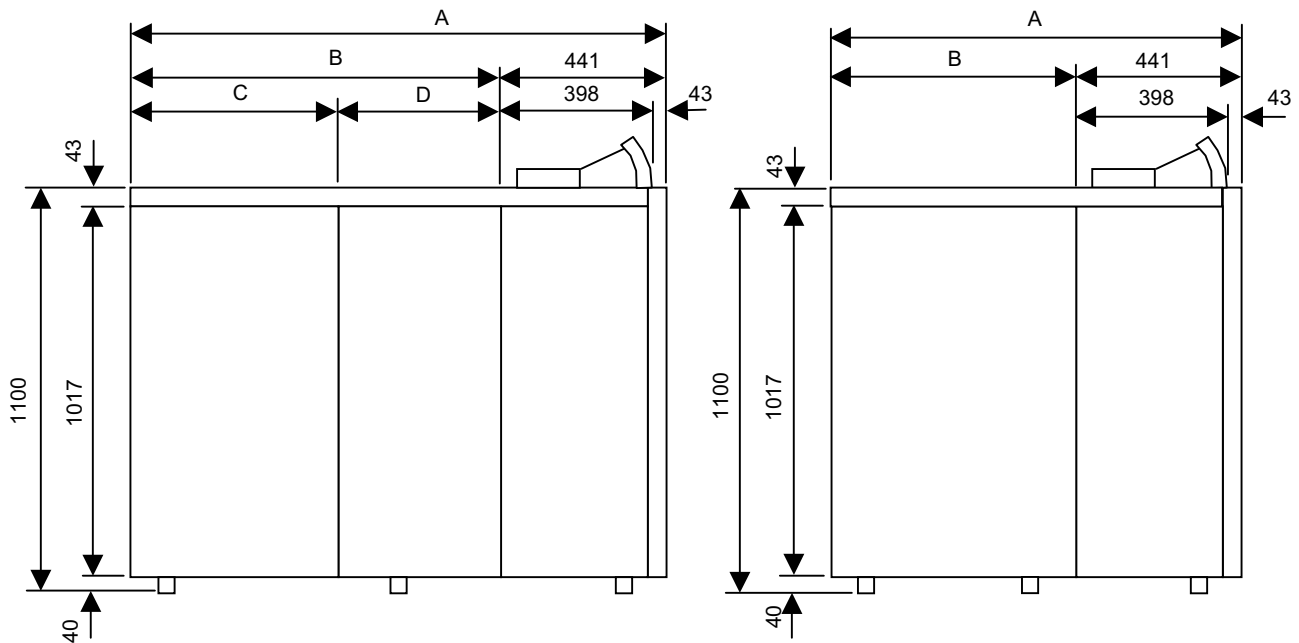
Fig 4



- 3 Assemble the casing parts using screws 1, washers 2 and nuts 3. For reinforcement fasten plate 4 with screws 5 to the bottom side.

No.	Description	No.	Description	No.	Description	No.	Description
1	Plug Cap	14	Plug Cap	35	Front Left	39	Front Top
2	Rear Casing	32	Strain Relief	36	Rear	40	Front Bottom
3	Fastening Plate	33	Cover Plate	37	Top Rear		
4	Support	34	Front Right	38	Top Front		

Fig 5 Casing Dimensions for Location of Panels

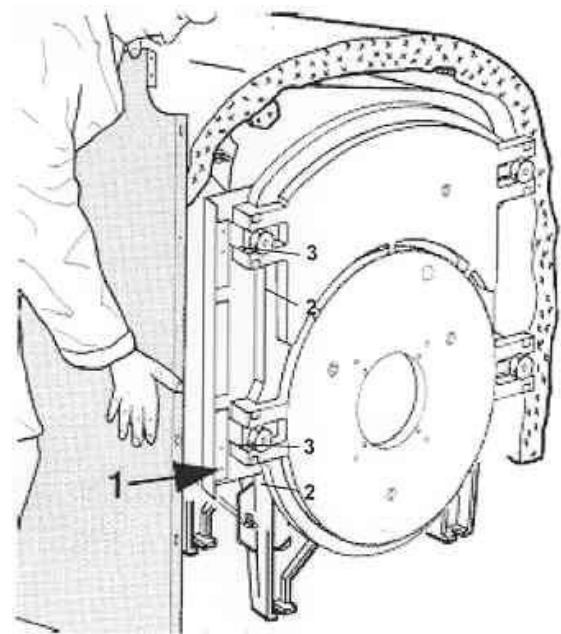


	7	8	9	10	11	12	13
A	838	948	1058	1168	1278	1388	1498
B	440	550	660	770	880	990	1100
C	-	-	-	-	440	440	550
D	-	-	-	-	550	550	550

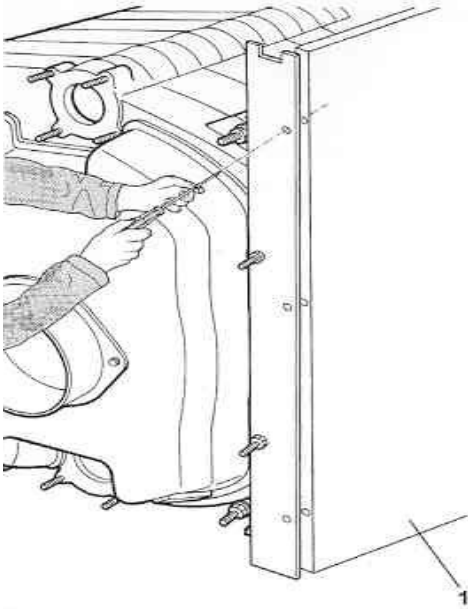
1. Mount the rear wall plate to the studs (1) of the flue hood. Do not tighten the nuts yet to enable later adjustment of the side casing.



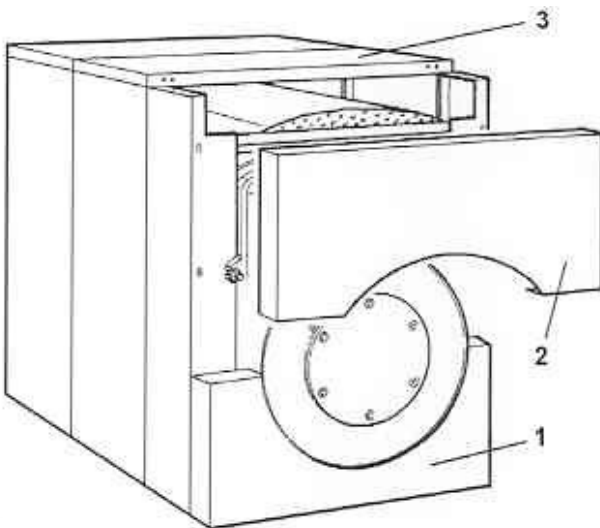
2. Slightly slacken the hinge screws. Assemble the lateral supports (1) between the hinge supports (2) for the door and boiler block so that the slots (3) click correctly into place. Tighten the hinge screws. Fasten the assembled side casing panels to the supports.



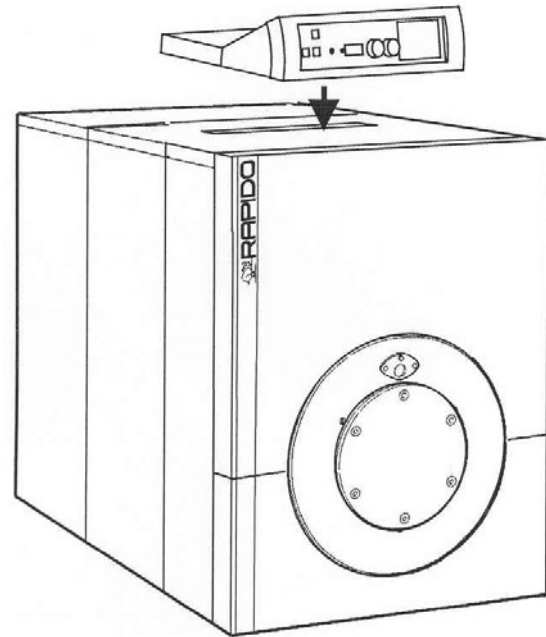
3. Fasten the side casing panels (1) with self tapping screws to the rear support brackets, align the casing and tighten the nuts.



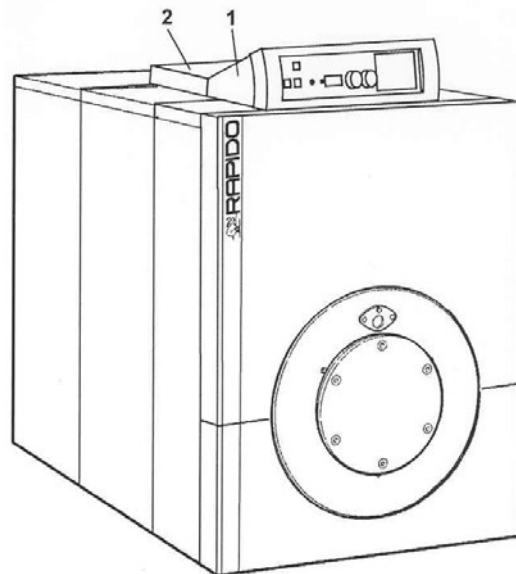
4. Insert lower front casing (1), upper front casing (2) and the upper casing panel (3) with index bolts into the side casing



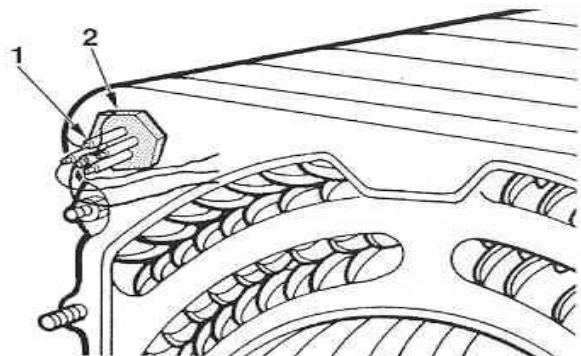
5. After assembling the casing correctly the control panel should be fitted as follows. The control panel is supplied separately in a brown box, depending on operation you will have either a SP1.1 for On/Off operation or a SP2.2 for High/Low operation.
6. Remove the control panel from the box and uncoil the capillary phials and cables and guide them through the upper boiler-casing panel. Route the burner cable with seven and four pin plugs behind the front plate up to the burner level.



7. Click the control Panel (1) and cover plate (2) into the boiler casing.



8. Insert the thermostat phials (1) into the thermostat pocket (2).



Connection of the Flue.

The flue must be connected to the flue spigot of the boiler according to DIN 1298. Make sure that it is sealed around the flue socket. The flue connection must be in accordance with the relevant regulations. Always ensure the flue is sized correctly for optimum performance it is recommended that the services of a Flue Specialist be used.

Burner Fitting

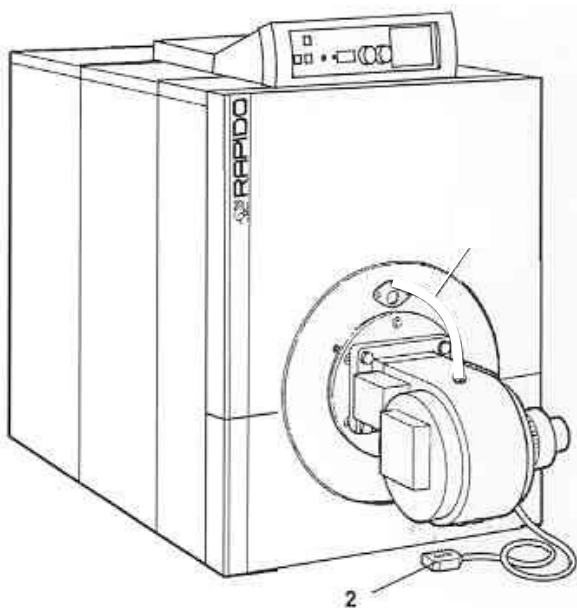
The Potterton Rapido F220 can be operated with either Oil or Gas pressure jet burners. All burners have been pre-matched to ensure trouble free operation.

The burner manufacturer will provide the appropriate adapter plate for fitting to the boiler. As the boiler is of the pressure jet type, the gap between burner flame tube and the door insulation must be carefully sealed with a strip of insulating material after the burner installation. This is included with the boiler. Not fitting this may lead to damage to the burner door and its insulation.

Prior to commissioning of the boiler, ensure the tightness of the burner and the flue.

For 2-stage burner operation the 1st stage must be at least 50% of the maximum boiler capacity. Please refer to the burner manufacturers instructions for commissioning details.

For 2 stage operation with a high/low burner the 7-pin and 4-pin Weiland plugs should be connected. For On/Off operation just the 7-pin plug needs to be connected.



CONNECTIONS**Boiler & Burner Power Supply**

The F220 is supplied with either single phase or three phase burners. The electrical supply to the boiler installation should be connected via a fused isolator.

Single Phase Installation

Install a 230V 50Hz single-phase electrical supply (min cable rating – 6.3A) to the boiler instrument panel. No separate electrical supply for the burner is normally required. The burner is normally powered from the instrument panel lead provided.

Note: the following single-phase burners must have a separate mains supply for the burner motor as Fig. 12.

**Nu-Way NGN15, NGN25 & NOL20
EOGB – BG500, B50 & B55, B45, B450**

Fig.6 – Boiler & Burner Power Supply

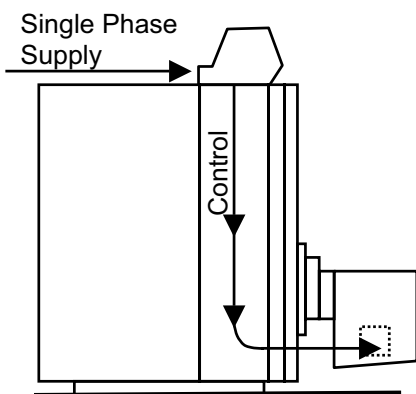
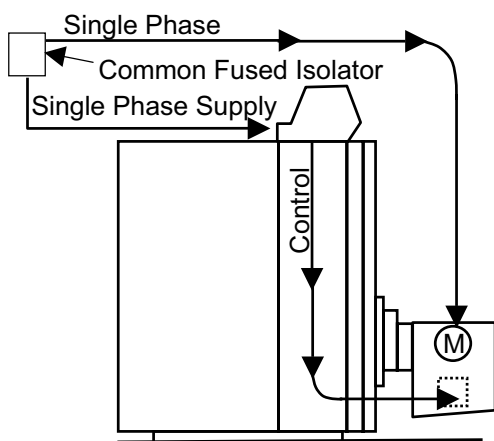
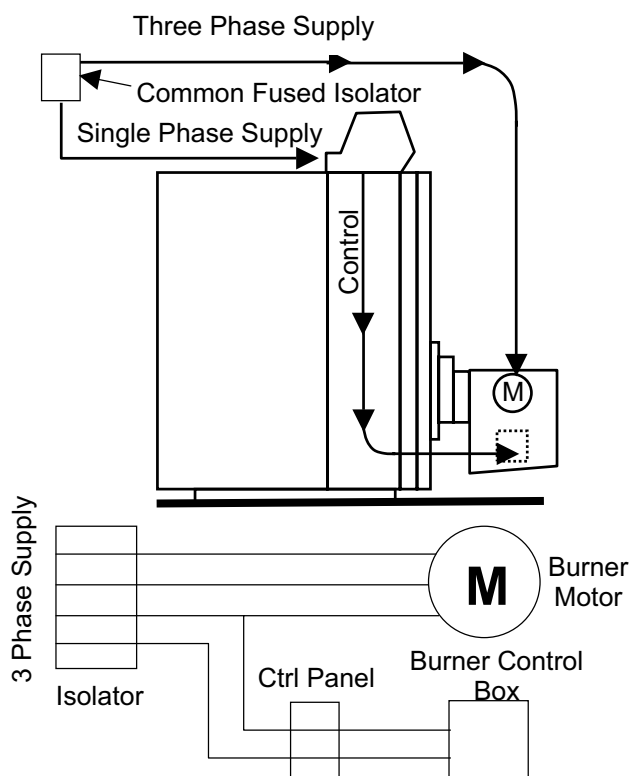


Fig. 7 – Boiler and Burner Single Phase Supply

**Three Phase Installation**

CAUTION: If the burner motor is supplied with three-phase power, control panel single-phase supply must be taken from one of the phases supplying the burner motor.

Install a three-phase supply direct to the burner via a fused isolator (sized to the burner manufacturers specification), see Fig.11. Install a separate 220 – 240V 50Hz single-phase electrical supply derived from the three-phase supply to the boiler instrument panel. This is fused 6.3A in the instrument panel.

**BOILER MAINTENANCE**

It is essential for efficient and trouble free operation that the boiler plant is regularly maintained. This must be carried out by qualified and experienced engineers and in the case of gas fired appliances attention is drawn to the mandatory requirement of CORGI (Confederation of Registered Gas Installers) registration of personnel undertaking work on these appliances. This facility is available from Potterton Commercial Division, details are available from regional offices listed on the back page back of this manual.

Boilers should be serviced and re-commissioned as a minimum on an annual basis.

It is strongly advised that a maintenance contract be entered into with Potterton Commercial Division to ensure that the boiler/burner unit is correctly and properly maintained.

WARNING: Isolate the electrical and fuel supplies before attempting any maintenance work.

Cleaning of Flue Surfaces

The boilers are supplied with a flueway brush for routine cleaning procedures. Boilers may require periodic cleaning with specialist mechanical equipment dependent on boiler conditions, fuel type, etc. After cleaning the boiler must be re-commissioned and combustion checks made to ensure functional safety and efficiency.

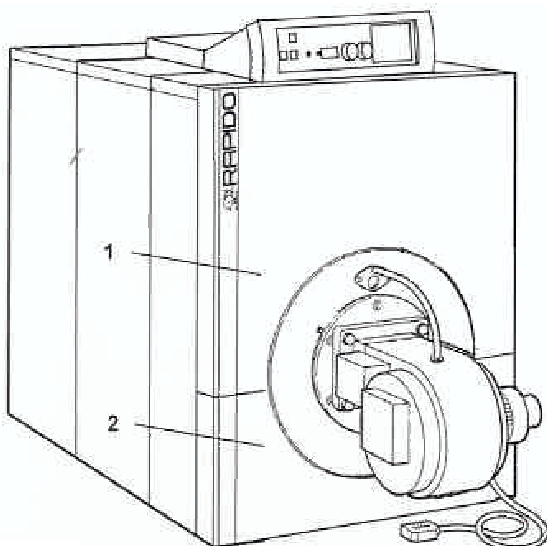
Frequency of boiler cleaning varies and is dependent on site conditions, fuel type, heat load, design of controls and running conditions.

For the maximum efficiency and economy in running it is essential that the combustion chamber and flueway surfaces should be kept clean and free from deposits.

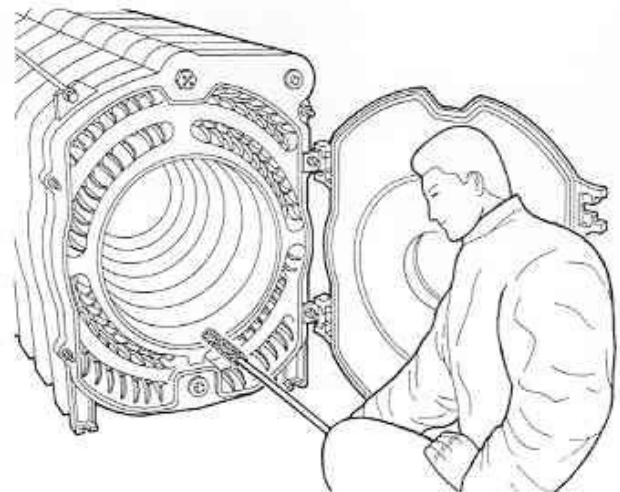
A layer of deposit 1/16" thick will reduce the heat transfer through the tube wall by up to 10%.

Not only does this waste fuel but the higher flue gas temperatures that result will increase the thermal stress within the boiler and may lead to joint leakage or in extreme cases section failure.

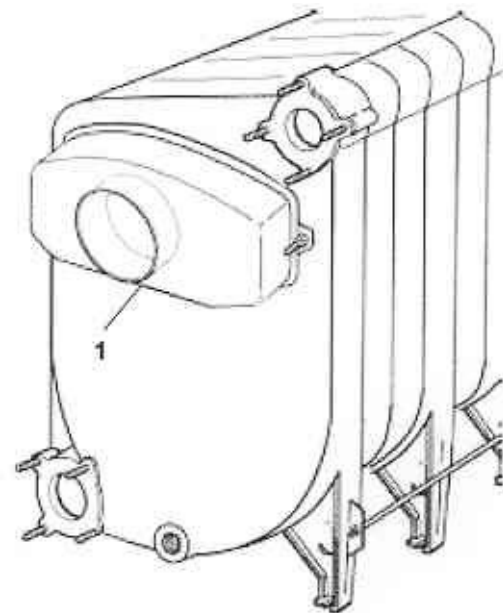
1. Cleaning of the boiler requires opening of the door, this is achieved by removing casing parts (1) & (2) as shown below.



2. Unscrew the four brass nuts and open the boiler door and clean through the flueways to remove any residue.



3. Remove the combustion residue through the cleaning opening on the fluehood.



4. Close the burner door and the cleaning openings and re-assemble the front casing.

5. Clean and service the blast tube as specified by the burner manufacturer.

Natural Gas & LPG Fired Boilers

We recommend brushing out of the combustion chamber and flueways and the removal of the rear clean out cover to check for deposits in the flue box once a year.

Class 'D' Fuel Oil

The boilers should be brushed out thoroughly at least twice a year for Class D (35 second) and Class 2, (28 second). During the heating season more frequent

attention may be necessary dependent on the operating conditions to prevent the formation of hard adherent scale on the flueway surfaces.

It is essential to ensure that cleaning is carried out throughout the full length of the boiler passes and that the rear clean out cover is taken off to allow for the removal of deposits brushed through into the flue box.

Should a heavy or tough adherent deposit become formed, which is too hard for the standard brush to remove, it may be necessary to wash out the tubes with water followed by a thorough brushing - this may have to be repeated several times.

Sludge Gas

Maintenance for boilers running on these fuels will be required at more frequent intervals, possibly on a weekly basis or even a daily basis dependent on fuel type and quality.

Boiler Ancillaries

Check the sealing of the boiler door against the front section. There should be a uniform depression about 3/32" (2mm) deep from the sealing grooves of the front section in the braiding. If this is not uniform, the sealing may be adjusted by the locknuts on the hinge pins. Make sure the locknuts are fully tightened after adjustment is complete.

Keep a regular check on the condition of the door refractory. If there is any deterioration this must be made good immediately to prevent damage to the boiler and burner.

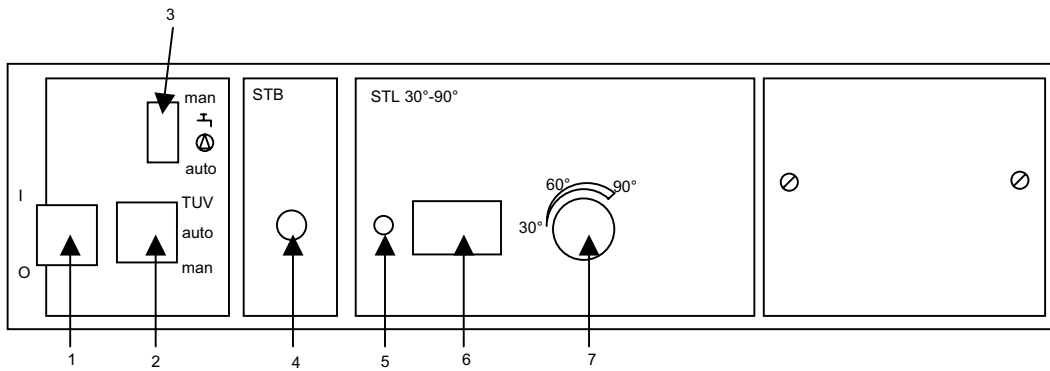
Boiler Controls

The operation of boiler controls including control thermostat, high/low thermostat and overheat thermostat should be checked on an annual basis and the burner recommissioned as detailed below.

Safety Interlocks

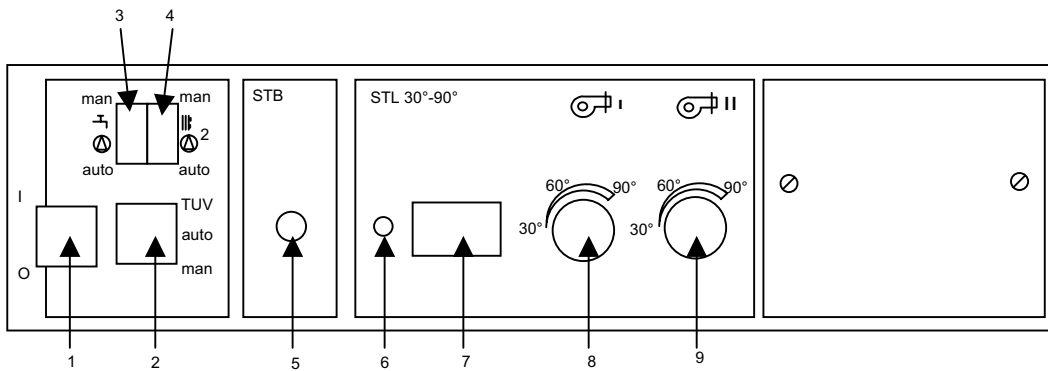
The operation of safety interlocks such as flow proving on mechanical flue/ventilation systems should be checked to ensure that operation of the boiler is prevented on a fault.

Fig. 8 – Boiler Control Panel Layout (Model SP.1.1).



- | | |
|-----------------------------------|-----------------------|
| 1. Boiler on/off switch | 5. Overheat LED |
| 2. Manual/auto/test switch | 6. Temperature gauge |
| 3. Auto/manual charge pump switch | 7. Control thermostat |
| 4. Overheat button | |

Fig .9 – Boiler Control Panel Layout (Model SP 2.2)



- | | | |
|--|------------------------|------------------------|
| 1. Boiler on off switch | 5. Overheat button | 9. High/low thermostat |
| 2. Manual/auto/test switch | 6. Overheat LED | |
| 3. Auto/manual charge pump switch | 7. Temperature gauge | |
| 4. Auto.manual/circulation pump switch | 8. Control thermostat. | |

COMMISSIONING

IMPORTANT: The boiler must be commissioned following completion of installation. Operation of an uncommissioned appliance may cause injury to personnel and damage to the boiler/burner unit and could invalidate the manufacturers warranties.

Commissioning should only be carried out by personnel approved and competent to do so. This facility is available from Potterton Commercial Service Offices at the addresses as listed on the back page of this manual.

Commissioning of the burner unit should be carried out in accordance with the burner manufacturers handbook provided with combustion adjustments in accordance with the Potterton burner data sheet also provided.

Before commencing to commission the burner check the following.

1. Electrical supply is of correct voltage and polarity and earthing is available.
2. Fuel supply is tested for leakage and purged of air. Ensure the burner is suitable for the connected fuel supply and pressure.
3. Boiler and system are fully flooded with water and the operating pressure is within the appliance range.
4. Pumps are operational and any flow proving interlocks are functional. The operation of the pump should be checked, particularly on sealed systems, to ensure that operation does not cause a reduction in pressure within the system below the minimum operating pressure. See Section 3 for further details on water circulation systems.
5. Ventilation is adequate and, in the case of mechanical ventilation systems, operation of the boiler is inhibited unless the ventilation fan is proved.
6. On mechanically assisted flue systems the operation of the boiler plant should be inhibited unless the mechanical flue system is operational and flow proved.
7. The safety valve should be checked to ensure that it is of the correct size and pressure. See Section 3 for further details.
8. The cold feed and open vent sizes should be checked. See Section 3 for further details.

9. Ensure the burner fitted to the boiler is of the correct specification and size for the boiler and suitable for the fuel supply available.

Following completion of the above checks the burner should be commissioned in accordance with the burner manufacturers handbook provided with the burner. Typical combustion figures for relevant burners are detailed below. The combustion figures, etc. should be completed on the commissioning form provided with this manual and returned to Potterton Commercial at the address on the back page.

<u>OIL</u>	CO ₂	- 11 - 12%
	Smoke	- 0 - 1 Bacharach
	Flue Gas Temp	- 220°C (428°F)
	Draught	- 1 mm negative

<u>GAS</u>	CO ₂	- 8.5 – 9.5%
	O ₂	- 4 - 5%
	CO	- Nil
	Flue Gas Temp	- 220°C (428°F)
	Draught	- 1 mm negative

IMPORTANT: The boiler/burner units are supplied in accordance with Potterton Commercial Quality Assurance plan registered to meet the requirements of BS 5750 Part 2. A condition of the supply of the appliance for compliance with this Quality Assurance plan is the return of the appliance commissioning report.

Following/during commissioning of the burner unit the following additional checks should be carried out.

14. Operation of the control, high/low and high limit thermostats should be checked for correct operation.
15. The flue draught available at the appliance flue outlet should be checked under all operating conditions (hot and cold) and should be within the boiler operating parameters, see Table 3.
16. The fuel supply to the appliance should be isolated and the burner operated to ensure safety shut down and lockout of the burner on flame failure.
17. Shut down of the boiler plant by external controls does not cause a hazardous condition and pump overrun is provided to remove residual heat from the boiler.

18. Following commissioning the boiler overheat and control thermostats should be set to the required operating setting. See Section 3 for maximum operating temperature.

19. Following completion of commissioning the soundness of all automatic fuel valves should be checked for leakage.

Additional Checks

Where possible the system should be checked to ensure that following purging of air there is no raw water make-up. In particular, when the system is operated in the hot condition, there should be no discharge of water from the safety valve, open vent or cold feed tank overflow that would otherwise lead to unregulated raw water make-up when the system cools down.

FAULT FINDING

General fault finding for burner failure should be in accordance with the burner manufacturers handbook. Set out below are general guidance notes on system fault finding.

Overheat Operation

Operation of the boiler overheat thermostat is associated with a reduction in boiler water flow. Where overheat operation is reported the following should be checked.

- a) The boiler/system pump is adequate for the duty.
- b) Operation of flow reducing devices, i.e., TRVs, compensated mixing valves, etc., do not reduce the water flow rate through the boiler below the minimum flow rate. See Water Circulation Systems in Section 3 for boiler flow rates.
- c) Pump overrun is incorporated to dissipate residual heat from the boiler on system shut down.
- d) The operation of boiler back end valves incorporate a time delay to allow for removal of residual heat from the boiler.
- e) The boiler is operating at the correct rate and is not overfired.
- f) Check sparge pipe for blockage.

To reset the overheat thermostat allow the boiler to cool down, remove the overheat thermostat knob and press the reset button.

The use of a primary loop system is highly recommended to provide a constant boiler flow rate

under all operating conditions. For further information refer to Potterton Publication Technical Bulletin No.1 Issue 2.

Burner Lockout

The package burners supplied with the boiler unit have an integral safety system to allow the safe and reliable operation of the burner. Failure of the burner to operate correctly will cause the burner control box to "lockout" and the lockout button on the burner will illuminate to indicate this.

The lockout condition can be manually reset by pushing the reset button and the control box should restart its control sequence in an attempt to light the burner. If the control box lockout will not reset or goes to lockout after being reset then the services of a boiler repair/maintenance company should be sought. This service is available from Potterton Commercial Division service offices at the addresses on the back page of this manual.

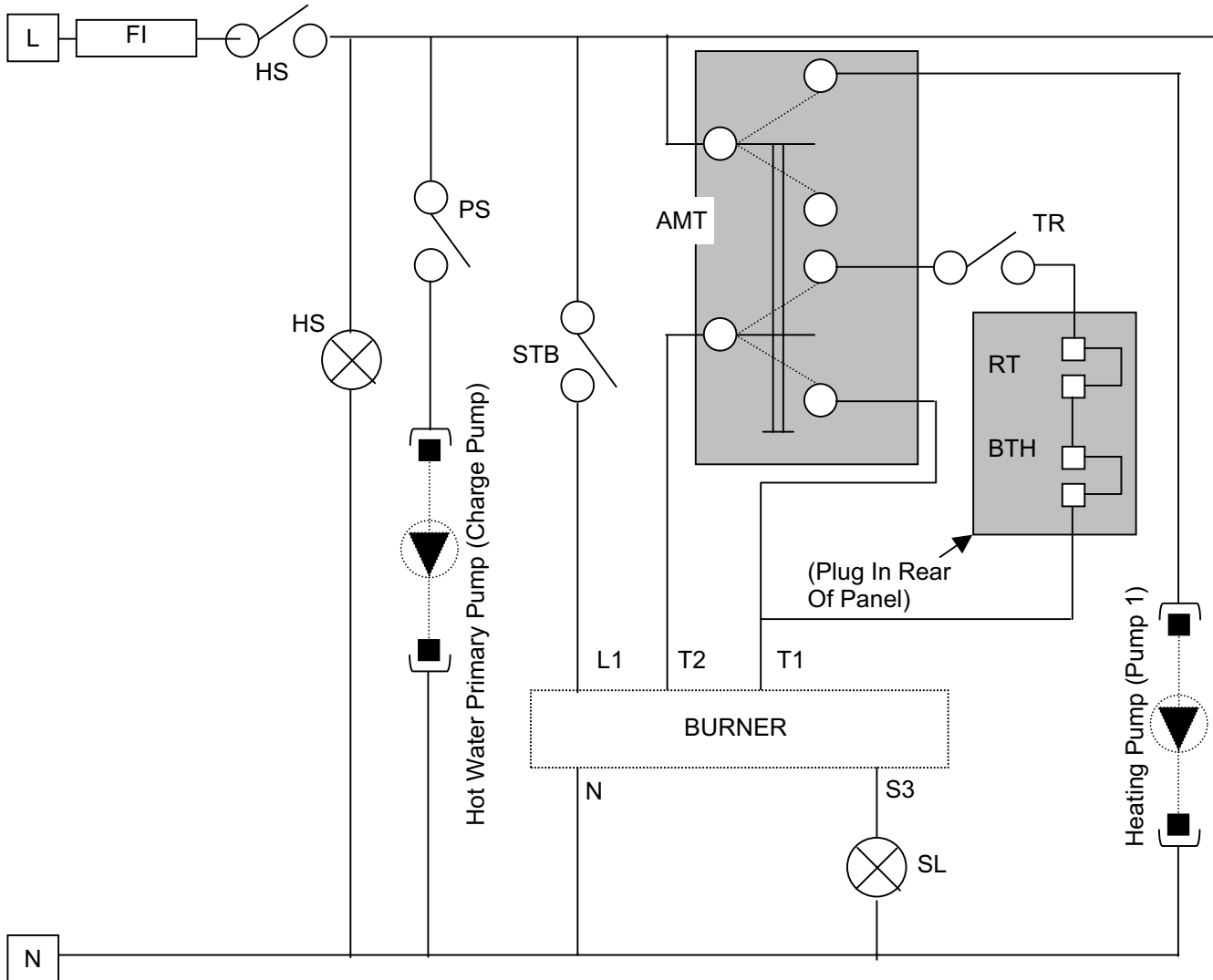
WARNING: The lockout reset button should not be repeatedly operated otherwise a hazardous situation may occur.

Should the boiler go to lockout, check the following before attempting to relight the burner.

1. Fuel is available at the burner.
2. The electrical supply to the appliance is of the correct voltage and polarity.

The boiler control boxes in some instances have indicator dials as an aid to fault finding on boiler lockout. In these instances refer to the control box manufacturers data sheet for fault finding details.

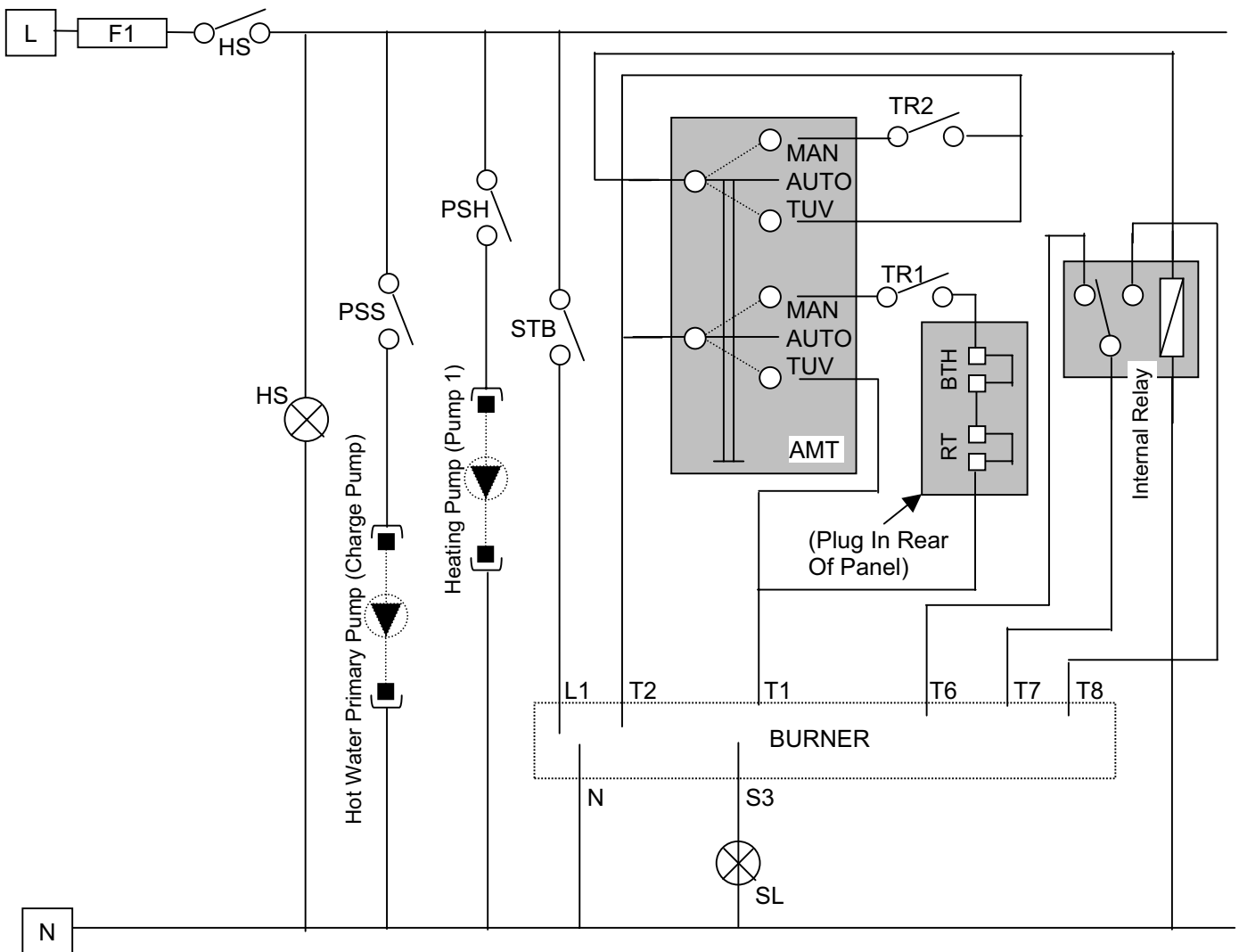
Fig. 10 - Schematic Wiring Diagram Model SP 1.1

**LEGEND**

F1	- Delayed Action 6.3A Fuse	HS	- Mains Switch & Lamp
PS	- Manual/Auto/TUV Switch for Storage Hot Water Pump	STB	- High Limit Thermostat
TR	- Control Thermostat	AMT	- Manual/Auto/TUV Switch
SL	- Fault Warning Light	BTH	-) External Interlocks for Time
		RT	-) Switch, Room Stat, etc

Auto/Manual/TUV Switch: In the MANUAL position the boiler will work normally in conjunction with any other external controls (ie. thermostats, control systems). The AUTO position should not be used on this boiler as it is only to be used with special controls which are not available in the UK. The TUV (test) position by-passes the control and high/low thermostats and fires the boiler on full rate, this can be used to check the operation of the overheat thermostat

Fig. 11 - Schematic Wiring Diagram Model SP 2.2



LEGEND	F1	-	Delayed Action 6.3A Fuse	HS	-	Mains Switch & Lamp
	PSS	-	Auto/Manual Switch for Hot Water Circuit Pump	PSH	-	Auto/Manual Switch for Heating Circuit Pump
	AMT	-	Manual/Auto/TUV Switch	SL	-	Fault Warning Light
	TR1	-	Control Thermostat	BTH	-) External Interlocks for Time
	TR2	-	High/Low Thermostat	RT	-) Switch, Room Stat, etc
	STB	-	High Limit Thermostat			

Auto/Manual/TUV Switch: In the MANUAL position the boiler will work normally in conjunction with any other external controls (ie. thermostats, control systems). The AUTO position should not be used on this boiler as it is only to be used with special controls which are not available in the UK. The TUV (test) position by-passes the control and high/low thermostats and fires the boiler on full rate, this can be used to check the operation of the overheat thermostat

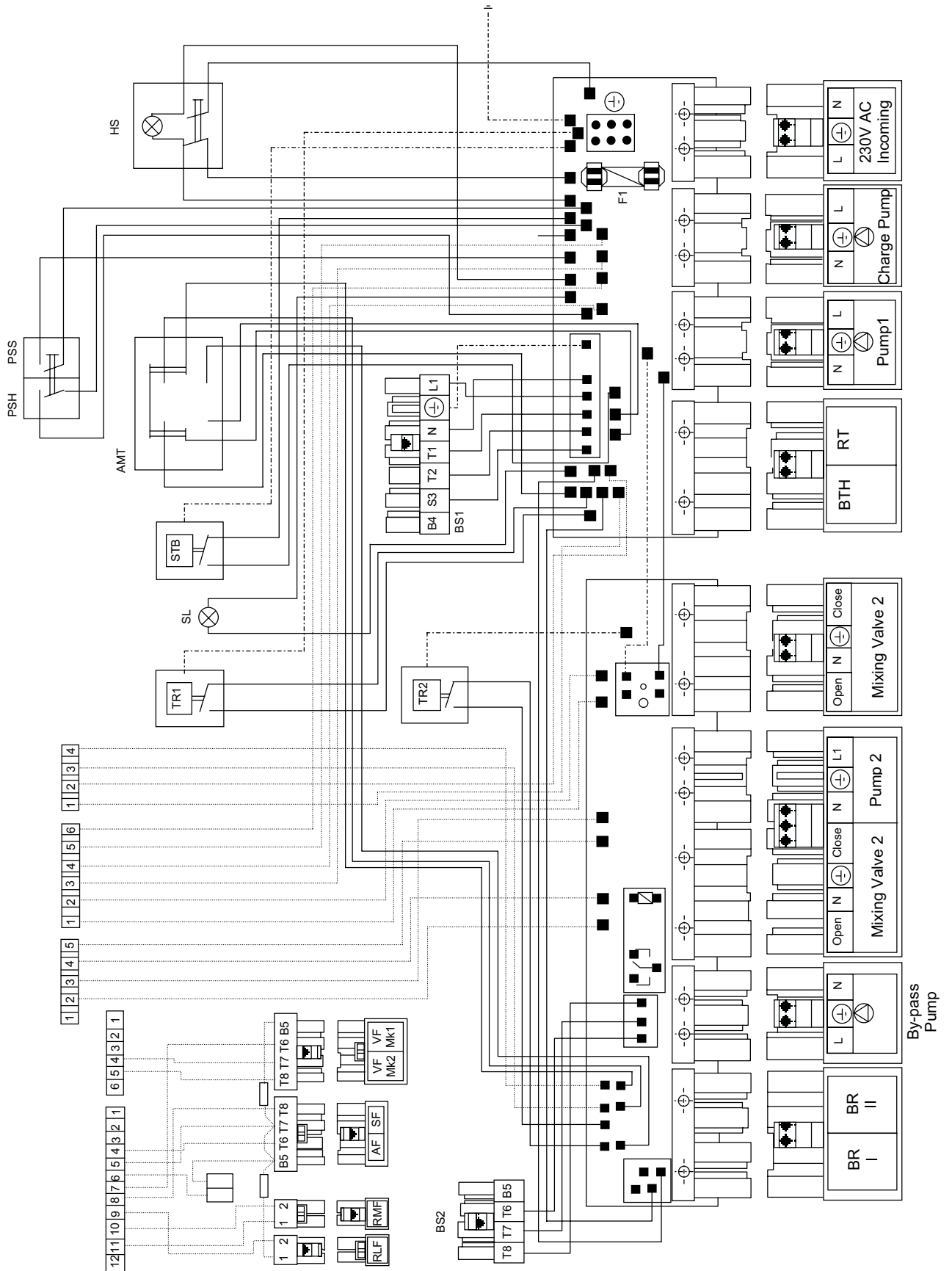


Fig. 12 - Wiring Diagram Model SP 2.2

----- Denotes wiring supplied in the control panel but not required in the UK

Legend for Wiring Diagram (page 22)

AF	-	[NOT REQUIRED FOR UK]
AMT	-	Automatic/Manual/TUV Switch
BR1	-	Burner stage 1 (external)
BR2	-	Burner Stage 2 (external)
BS1	-	Burner Plug Stage 1
BS2	-	Burner Plug Stage 2
BTH	-	[NOT REQUIRED IN UK]
F1	-	Delayed Action 6.3A Fuse
HS	-	Mains switch
KF	-	[NOT REQUIRED FOR UK]
Mixing Valve 1	-	Mixing Valve Motor – Heating Circuit No.1 (green)
Mixing Valve 2	-	Mixing Valve Motor – Heating Circuit No.2 (red)
PSH	-	Auto/ Manual Switch – Circuit No.1 Heat Circulating Pump (red)
PSS	-	Auto/ Manual Switch – Storage Charging Pump
P1,P2, etc	-	[NOT REQUIRED FOR UK]
Pump 1	-	Heating Circuit No.1 Heating Circulation Pump (green)
Pump 2	-	Heating Circuit No.2 Heating Circulation Pump (red)
RT	-	Connection for Room Thermostat/Interlock
RMF	-	[NOT REQUIRED FOR UK]
RLF	-	[NOT REQUIRED FOR UK]
SF	-	[NOT REQUIRED FOR UK]
STB	-	Safety Temperature Limiter
TR	-	Temperature Control
VF-MK1	-	[NOT REQUIRED FOR UK]
VF-MK2	-	[NOT REQUIRED FOR UK]

Fig.13 – Pump Overrun Using Changeover Pipe Thermostat

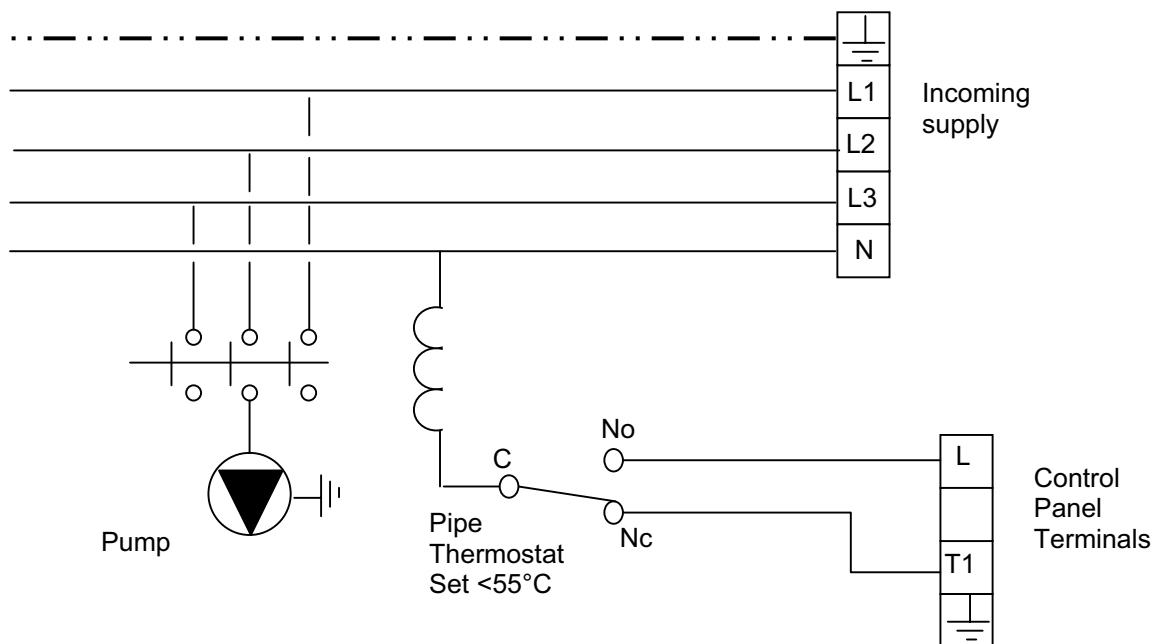
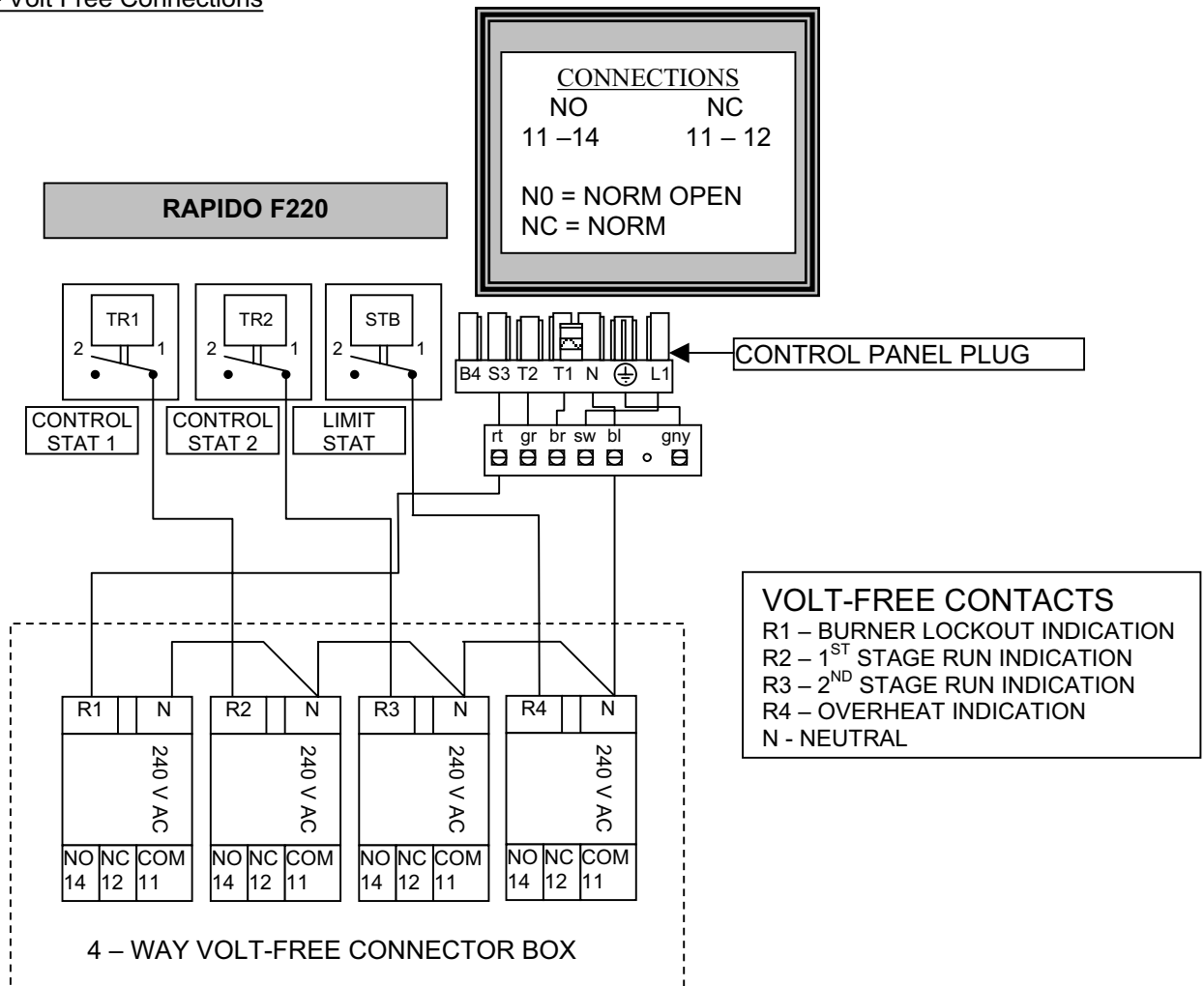
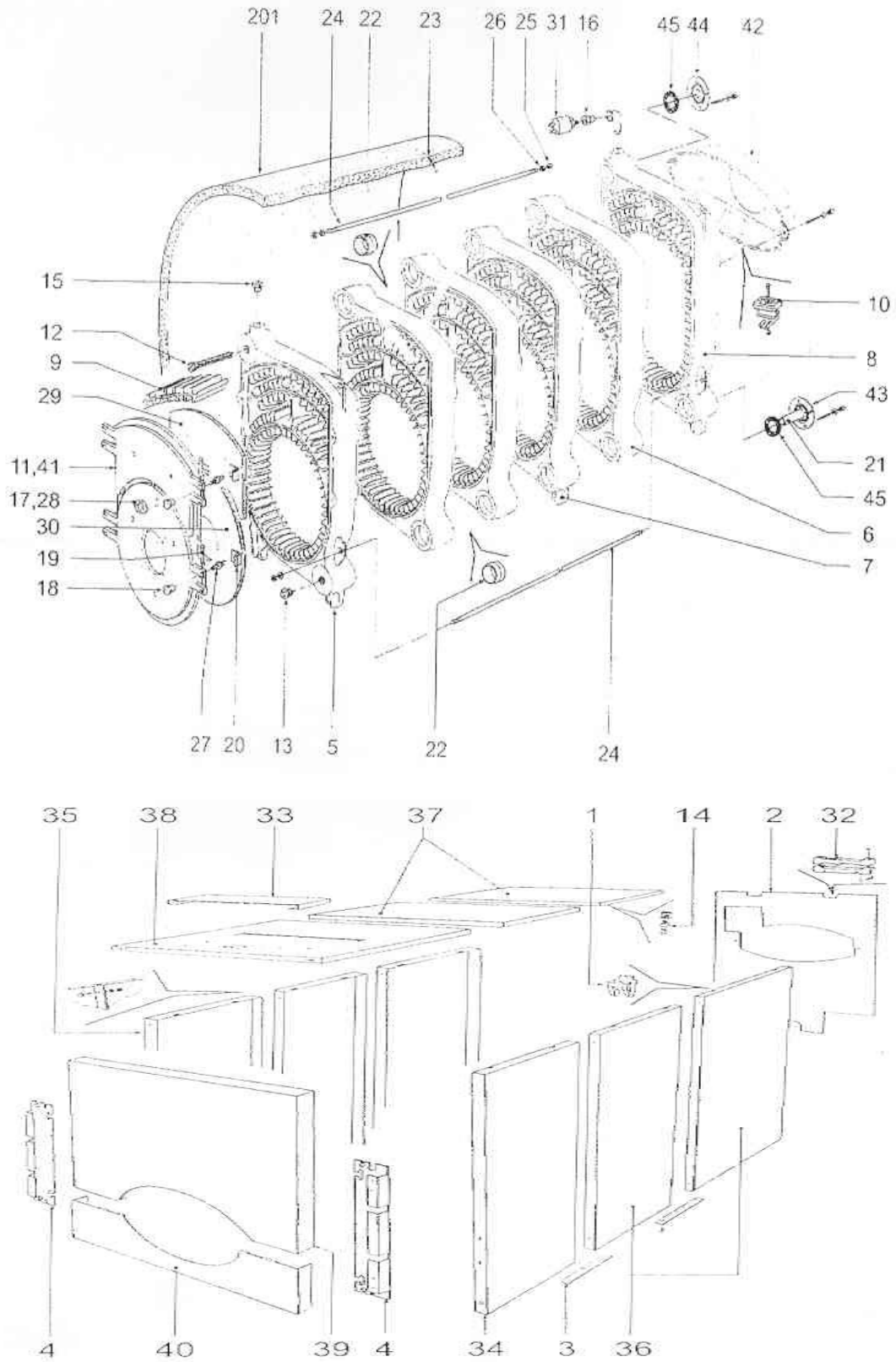


Fig. 14 – Volt Free Connections



RAPIDO F220 SPARE PARTS



F220 Spare Parts List

Description	Part No.
1 Casing Pin securing Clip	551184
2 Rear casing Panel	551508
3 Side Panel securing strips	551181
4 Support bracket for side panels	551509
5 Front Section	551510
6 Intermediate Section without Feet	551511
7 Intermediate Section with Feet- 9,10,11,12 & 13 section	551512
8 Rear Boiler Section	551513
9 Flueway Baffles	551514
10 Fluehood Cleanout cover	551507
11 Burner Door	551515
12 Thermostat Pocket	551168
13 Front Section end Plug 1¼	551137
14 Casing securing Pin	551186
15 Front Section End Plug ½	551456
16 Reducer ½ x ¼	551310
17 Sight Glass Flange	551516
18 Burner Door Nut	551133
19 Door Hinge Pin	551517
20 Door Hinge	551518
21 Sparge Pipe 7,8 & 9 section 1" x 420mm	551519
21 Sparge Pipe 10 & 11section 1" x 600mm	551520
21 Sparge Pipe 12 & 13 section 1" x 720mm	551521
22 Boiler Nipple	551522
23 Insulation Blanket	551167
24 Tie Rod M12 x 925mm 9 section	551381
24 Tie Rod M12 x 1255mm 12 section	551523
24 Tie Rod M12 x 1140mm 11 section	551524
24 Tie Rod M12 x 1375mm 13 section	551525
24 Tie Rod M12 x 720mm 7 section	551526
24 Tie Rod M12 x 830mm 8 section	551380
24 Tie Rod M12 x 1050mm 10 section	551527
25 Nut M12	551384
26 Washer	551320
27 Tie Bolt M16 x 85mm	551528
28 Sight Glass	551549
29 Burner Door Insulation - TOP	551529
30 Burner Door Insulation - Bottom	551530
31 Flow Switch	550999
32 Cable Clamp	551187
33 Top Control Panel Cover	551160
34 Front R/H Case Side Panel	551531
35 Front L/H Case Side Panel	551532
36 Rear Case Panel 440mm 7,11 & 12 section	551533
36 Rear Case Panel 550mm 8,12 & 13 section	551534
36 Rear Case Panel 660mm 9 section	551535
36 Rear Case Panel 770mm 10 section	551536
37 Rear Case Top Panel 440mm - 7,11 & 12 section	551537
37 Rear Case Top Panel 550mm - 8,12 & 13 section	551538
37 Rear Case Top Panel 660mm - 9 section	551539
37 Rear Case Top Panel 770mm - 10 section	551540

F220 Spare Parts List Cont...

38 Front Top Case Panel	551541
39 Front Door Upper Panel	551542
40 Front Door Lower Panel	551543
41 Burner Door (Complete)	551544
42 Rear FlueHood	551545
43 Return Flange (Rear Section)	551546
44 Flow Flange (Rear Section)	551547
45 Flange gasket	551548

Control Panel SP1.1

Part No.	Description
5103183	Control Panel Complete (ON/OFF)
358850	Blanking Plate
358847	Charge Pump Switch
358848	Control Thermostat Knob
358849	Temperature Gauge
358852	Main Control Board
358853	Clips
358855	Control Panel Cover
358854	Control Panel Front
358856	Base Panel
358857	Overheat Thermostat
358858	Overheat LED
358859	Control Thermostat
500115	ON/OFF switch
358861	Test Switch

Control Panel SP2.2

Part No.	Description
5103192	Control Panel Complete (HIGH/LOW
358847	Charge Pump Switch
358850	Blanking Plate
358848	Control Thermostat Knob
358851	Control Board
358849	Temperature Gauge
358852	Main Control Board
358853	Clips
358854	Control Panel Front
358855	Control Panel Cover
358856	Base Panel
358857	Overheat Thermostat
358858	Overheat LED
358859	Control & High/Low Thermostats
500115	ON/OFF Switch
358861	Test Switch

CONVERSION TABLE

IMPERIAL TO METRIC		METRIC TO IMPERIAL	
HEAT		1 Therm = 100,000 Btu/hr	
1 Btu/hr	= 0.2931 W	1 kW	= 3412 Btu/hr
1 Btu/hr	= 1055 J	1 J	= 0.0009478 Btu/hr
1 Btu/hr	= 0.252 kcal	1 kcal	= 3.968 Btu/hr
VOLUME		1 dm³ = 1 litre	1,000 dm³ = 1m³
1 ft ³	= 28.317 dm ³	1 m ³	= 35.3147 ft ³
1 ft ³	= 0.02832 m ³	1 litre	= 0.2199 Imp. Gallon
1 Imp Gall	= 4.546 litre	1 litre	= 0.03531 ft ³
1 Imp Gall	= 1.2 U.S. Gallon		
PRESSURE		1 k Pa = 1000 Pa	1 bar = 1000 mbar = 100 Kpa
1 lb ²	= 6895 Pa	1 bar	= 33.45 ft. w.g
1 lb ²	= 68.95 mbar	1 kPa	= 0.3345 ft.w.g
1 in. w.g.	= 249.1 Pa	1 bar	= 14.5 ib/in ²
1 in. w.g.	= 2.491 mbar	1 Pa	= 0.3858 in. w.g.
1 in. w.g.	= 25.4 mm.w.g.	1 mm w.g.	= 0.0394 in. w.g.
		1 mm w.g.	= 9.8 Pa w.g.
LENGTH		1m = 1000mm	
1 inch	= 25.4mm	1 mm	= 0.03937 in
1 ft	= 0.3048 m	1 m	= 3.281 ft
1 yard	= 0.9144 m	1 m	= 1.094 yard
1 mile	= 1.609 km	1 km	= 0.6214 mile
FLOW RATE		0°C reference temperature	
1 kg/sec = 1 lit/sec @		1 lit/sec	= 13.2 gall/min
1 gal/min	= 0.07577 lit/sec	1 lit/sec	= 2.119 ft ³ /min
1 ft ³ /min	= 0.4719 lit/sec	1 m ³ /sec	= 2119 ft ³ /min
1 ft ³ /min	= 0.02832 m ³ /sec		
TEMPERATURE			
°F to °C	= ("X" °F - 32) x 0.5556	°C to °F	= ("X" °C x 1.8) + 32
TEMPERATURE DIFFERENCE		1°C = 1°K	
"X" °F x 0.5556	= °C	"X" °C x 1.8	= °F
WEIGHT			
1 lb	= 0.4536 kg	1 kg	= 2.205 lbs
1 cwt	= 50.8 kg	1 tonne	= 0.9842 ton
1 ton	= 1016 kg	1 tonne	= 2204.6 lbs

Commercial Sales Technical and Service Enquiries

Potterton Commercial

Brooks House
Coventry Road
Warwick CV34 4LL

Tel: 08706 050607
Fax: 08706 001516
Sales Hotline: 08706 001991

Technical Helpline: 08706 002322

Service Hotline: 08702 412759
Service Fax: 08701 653000

e-mail: commercial@potterton.co.uk
web site: www.pottertoncommercial.co.uk

Spares

Potterton Commercial spares are available nationwide through the **interpart** network of approved stockists. Alternatively please contact:-

interpart
Brooks House
Coventry Road
Warwick
CV34 4LL

Tel: 08706 000454
Fax: 08706 000545

Applications and Installations

Our experienced technical and applications team are available to offer advice on any aspect of heating system design and boiler installation.

Please contact:

Tel: 08706 002322

Commercial Service

Our service organisation covers the whole of the UK to look after your needs for all Potterton Commercial products. We are also able to offer our services for other manufacturers products.

Our service department offers a wide range of specialised services including:-

- Boiler site assembly
- Burner commissioning for all fuels
- Boiler maintenance and maintenance contracts
- Breakdown and repair services
- Boiler dismantling and re-jointing
- Burner and boiler replacement
- Oil/gas conversions
- Systems conditioning
- Water treatment and descaling
- Packaged unit

The logo for Potterton Commercial, featuring the word "POTTERTON" in a bold, blue, sans-serif font. The letter "O" has a red dot above it. Below the word "POTTERTON" are two horizontal lines, one red and one blue.The word "COMMERCIAL" in a red, sans-serif font, with each letter inside a white rectangular box. The boxes are arranged in a single row.

heating specialists

A Baxi Group Company

"All descriptions and illustrations contained in this leaflet have been carefully prepared but we reserve the right to make changes and improvements in our product which may affect the accuracy of the information contained in this leaflet"

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