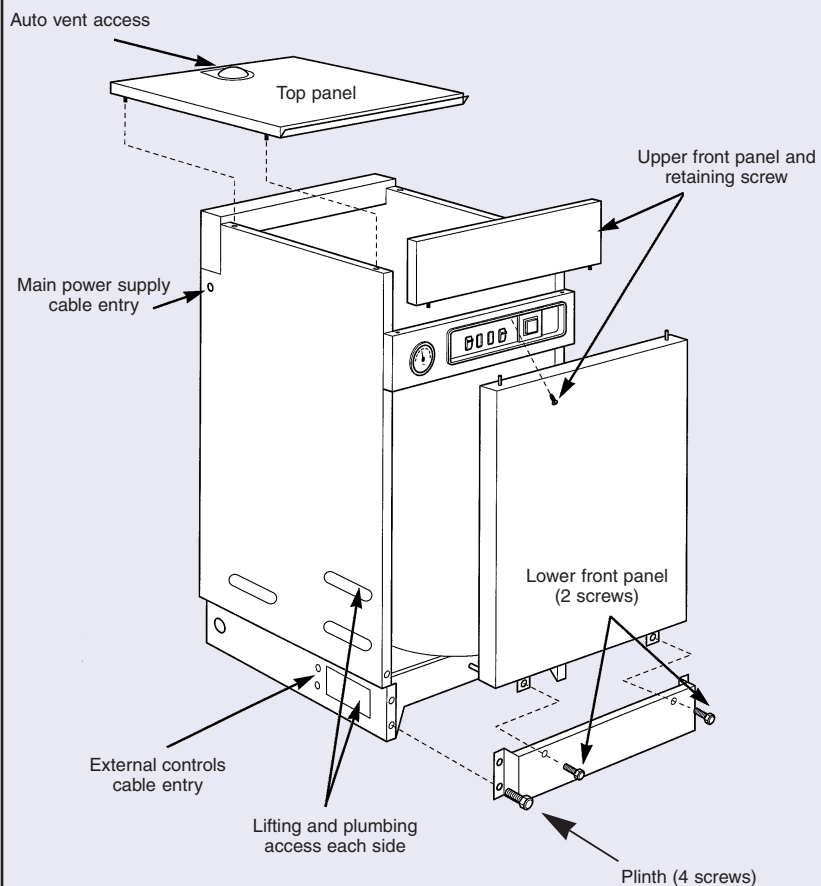


140

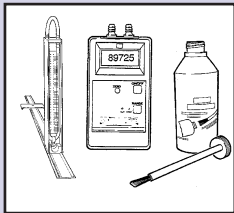
## Guide to panel removal

155x



BAXI POTTERTON  
 BROWNEGE ROAD  
 BAMBER BRIDGE  
 PRESTON PR5 6SN  
 (Technical Helpline) TEL 0870 606 0955  
 (Service) TEL 0870 606 0933 FAX 0870 606 0966  
 (Spares) TEL 0870 6060454

"Powermax" is a trademark of Baxi Group Ltd



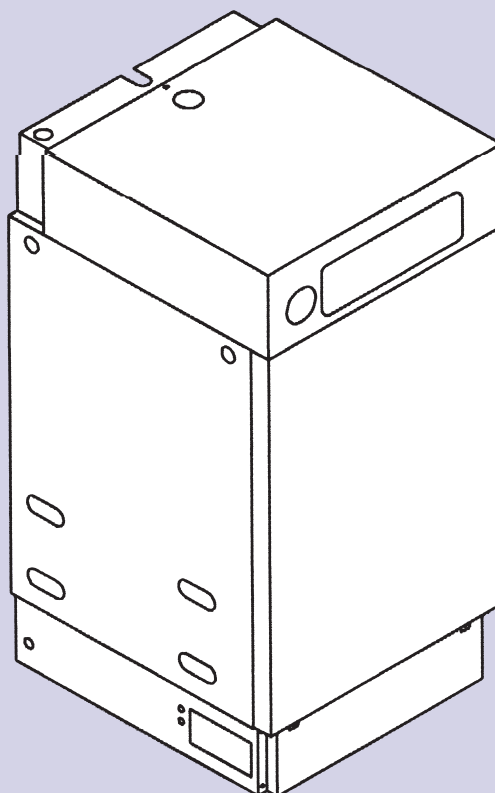
# INSTALLATION AND SERVICING INSTRUCTIONS

TO BE LEFT WITH BOILER - READ THESE INSTRUCTIONS BEFORE INSTALLING OR  
LIGHTING THE BOILER

## 140 and 155x

# RANGE POWERMAX

HIGH PERFORMANCE HOT WATER AND HEATING



CE

### POWERMAX OPEN VENT MODELS :

OV 140 P	OV 155x P	WITH FITTED PUMP
OV 140 CP	OV 155x CP	WITH FITTED PUMP & PROGRAMMER

### POWERMAX SEALED SYSTEM MODELS :

SS 140 P	SS 155x P	WITH FITTED PUMP
SS 140 CP	SS 155x CP	WITH FITTED PUMP & PROGRAMMER

### SAFETY NOTICE

In your own interest and that of safety, it is the law that all gas appliances are installed and serviced by competent persons in accordance with Gas Safety (Installation and Use) Regulations 1998. This appliance requires annual checking or servicing and this should be entrusted to a CORGI Registered Installer. All CORGI Registered Installers carry a CORGI ID card and have a registration number. Both should be recorded in your central heating log book. You can check your installer is CORGI registered by calling 01256 372300.

**benchmark**  
The code of practice for the installation, commissioning  
& servicing of central heating systems

**RANGE  
POWERMAX**

# POWERMAX – HIGH PERFORMANCE HOT WATER AND HEATING Installation and Servicing Instructions

**THIS APPLIANCE IS FOR USE WITH NATURAL GAS ONLY.**

## Contents

Section	Page
1. Safety Regulations	2
2. Description	2-3
3. Natural Gas Supply	3
4. Electric Supply	3
5. Siting the Appliance	3-4
6. Flueing Options	4-5
7. Ventilation Requirements	6
8. Technical Data	6
9. Installing the Appliance	6-7
10. Electrical Connection to the Appliance Wiring Diagrams	8 9
11. Water Supply / Primary System	10-11
12. Commissioning	14-15
13. Servicing Instructions	16-18
14. Fault Finding	12
15. Functional Flow Diagrams	13
16. Short List of Spare Parts	19
17. Installing an Extended Balanced Flue	20-21
18. List of Extended Flue Components	22
19. Optional Immersion Heater	23

## 1. SAFETY REGULATIONS

This appliance must be installed by a competent person in accordance with the Gas Safety Regulations and these instructions. Installers must be CORGI Registered. Failure to install appliances correctly could lead to prosecution.

This appliance must be installed in accordance with the relevant requirements of the current Gas Safety (Installation and Use) Regulations 1998, Local Building Regulations, Building Standards (Scotland) Regulations, Current IEE Wiring Regulations Health and Safety Document No. 635 "The Electricity at Work Regulations 1989" and the Byelaws of the Local Water Undertaking.

The installation must also comply with the relevant recommendations of the following British Standards:

### **BS6891:1988**

Specification for low pressure gas pipework in domestic premises

### **BS5440:Part 1:1999**

Specification for installation of flues

### **BS5440:Part 2:2000**

Specification for installation of ventilation for gas appliances (except that compartment ventilation is amended as in section 7 of these Instructions).

### **BS5546:1990**

Specification for installation of gas hot water supplies

### **BS5449:1990**

Specification for forced circulation hot water central heating systems

### **BS6798:1987**

Specification for installation of gas fired hot water boilers of rated input not exceeding 60kW



Baxi supports the Benchmark initiative and the aims of the programme. Benchmark has been introduced to improve the standards of installation and commissioning of central heating systems in the UK and to encourage the regular servicing of all central heating systems to ensure safety and efficiency.

## 2. DESCRIPTION

Powermax 140 and 155x are combination boilers in which the gas burner heats the contents of a built-in thermal store. This heated water is used as 'primary' water and circulated, as required, to the radiators. Domestic hot water ('secondary' water) is heated by a heat exchanger and delivered via a thermostatic blending valve which prevents the hot water exceeding 60°C. The flow rate is governed to a maximum of 12 litres per minute (140) and 18 litres per min (155x).

A fully pre-mixed burner is used to ensure that the gas is burned cleanly and efficiently. Ignition is fully automatic and the ignition controller incorporates a flame safety device.

A small diameter twin pipe flue system has been designed for a length of up to 9.0 metres (including a balanced flue terminal) through which to draw inlet air and expel exhaust gases. The standard terminal suits a wall thickness of 200mm to 500mm.

### Operation

The appliance thermostat maintains the thermal store at about 80°C and this stored water is circulated through radiators via a pump inside the casing.

A cold start thermostat prevents the pump from operating until working temperature (approx. 60°C) is attained.

For summer operation the central heating can be switched off by the user.

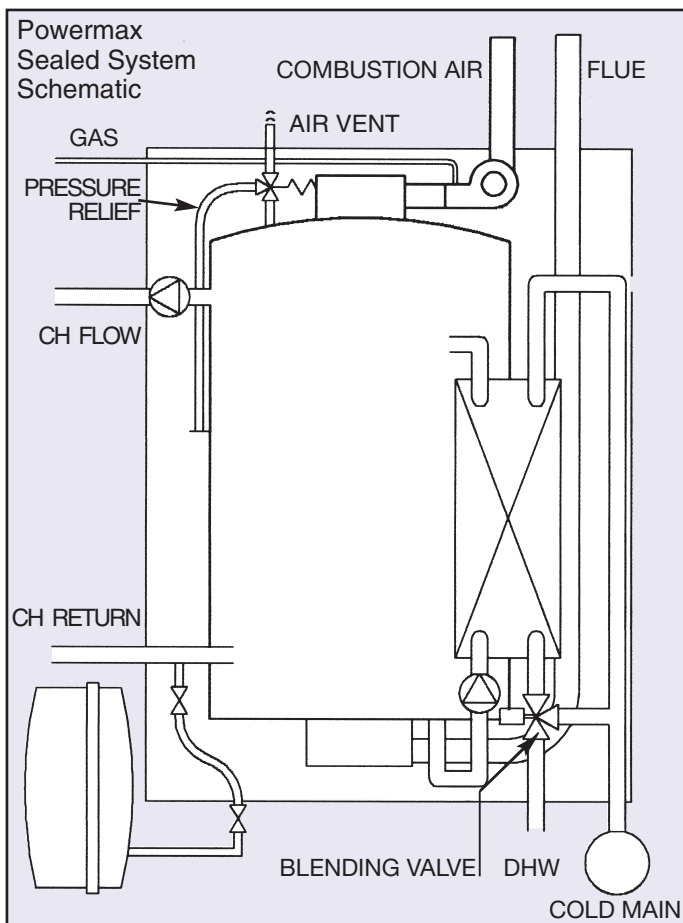
CP models come fitted with both CH pump and an electronic 7-day, 3-event programmer. Provision is made for fitting both room and frost thermostats if required.

Installation of Sealed System models only may fall within the scope of the Building Regulations 1992 (Part G). These require that installation of an 'unvented' system shall only be carried out by a competent person as defined in the Approved Document G3. The above requirements do not apply to a Powermax installed as part of an open vented system.

### Handling and Storage

Take particular care to avoid damaging outer panels, switches, programmer etc. Trucking must be done from the rear.

Store the appliance under cover in dry conditions.



### 3. NATURAL GAS SUPPLY

These boilers require a natural gas supply of 1.6 to 2.0 cubic metres per hour. Gas supply pipework of not less than 22mm diameter should be run to the appliance and to within 300mm of the gas valve (gascock) and should be installed in accordance with BS6891:1988. **(i.e. The pressure drop between meter and appliance not to exceed 1mbar).**

The gas connection to the appliance is  $Rp\frac{1}{2}$  ( $\frac{1}{2}$  in B.S.P.) Entry holes are provided through the controls chassis.

The complete installation must be tested for soundness and purged as described in the above standard and in accordance with Corgi recommendations.

### 4. ELECTRIC SUPPLY

The appliance requires a 230V ~ 50Hz single phase 3A fused electrical supply which must be installed in accordance with the current IEE Wiring Regulations and any Local Regulations which apply. Detailed wiring instructions are given in Section 10. Power consumption is approximately 140W for the appliance, with the Central heating pump rated at an additional 40W to 88W depending upon pump speed.

#### **WARNING : THIS APPLIANCE MUST BE EARTHED**

Note: This appliance may be installed in any room or internal space, although particular attention is drawn to the requirements of the current IEE Wiring Regulations, and in Scotland, the electrical provisions of the Building Regulations with respect to the installation of the appliance in a room or internal space containing a bath or shower. Where a room-sealed appliance is installed in a room containing a bath or shower, any electrical switch or appliance control, utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

## 5. SITING THE APPLIANCE

### General

The appliance must be installed on a flat floor capable of supporting the weight of the unit when full of water – up to 185kg. It should be sited to minimise the length of flue and to avoid long hot water pipe runs.

The extended flueing capability enables the appliance to be sited well away from an outside wall, thus installation in a first floor cupboard or compartment, basement, utility room or kitchen are all feasible locations. The appliance must not be sited outside or in any outhouse where it could be exposed to the weather.

The location chosen must permit the provision of a satisfactory external flue termination. The location must also provide adequate space for servicing and air circulation.

If floor settlement is likely due to the weight of the appliance, ensure that pipework design is able to accommodate this.

### Flue Protection

When using an extended flue system it is essential to fit protective ducting (such as that supplied in the extended flue kits) in order to prevent direct contact with the hot flue pipe.

### Compartment Installation

General requirements for cupboard/compartment installations, including airing cupboards, are given in BS6798. Specific requirements for Powermax installations are given below.

- The compartment must be ventilated at high and low level in accordance with BS5440:Part 2 and Section 7 of these instructions.
- The compartment shall be a fixed rigid structure large enough to allow it and the boiler to be inspected and serviced. A minimum width between the door jambs of 550mm (21in) must be provided.
- Internal surfaces should be non-combustible or lined with non-combustible material. Examples of non-combustible materials having a fire resistance of not less than 0.5 hour are plaster skimmed plasterboard, and fireproof boarding. The floor need not be lined. Doors or shelves made from combustible material, e.g. wood must be at least 75mm from the front or top of the boiler.
- The door of an understairs cupboard shall have a BS476:Part 8 fire resistance of not less than 0.5 hour; and air vents must be direct to outside air.
- The flue pipe must be protected by the ducting supplied by Baxi UK or by another no less suitable non-combustible enclosure.
- Householders should be discouraged from storing clothes etc on the boiler itself. A removable shelf at least 75mm above the boiler is acceptable.

### Requirements for horizontal balanced flue terminations

Detailed recommendations for flueing are given in BS5440:Part 1. The following notes are intended to give general guidance. The appliance must be installed so that the flue terminal is exposed to the external air, preferably on a clear expanse of wall. Acceptable positions are indicated in Fig.5.1. Avoid positions where the terminal is adjacent to projections; particularly immediately under a balcony, inside a re-entrant position, or immediately adjacent to a drain pipe.

If the appliance is fitted under a ventilator or opening window, the terminal must be at least 300mm (12in) from any part of the window or ventilator, and in accordance with BS5440:Part 1.

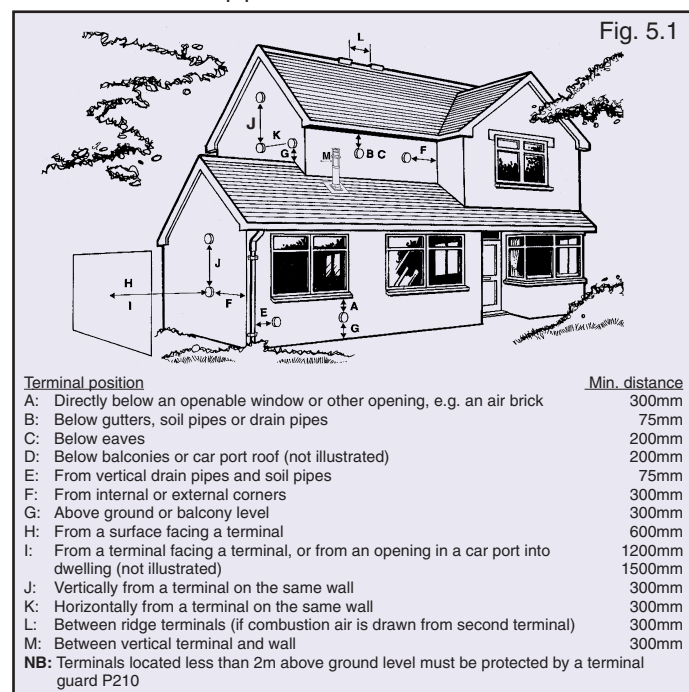
Where the lowest part of the terminal is less than 2m (6ft) above the level of any ground, balcony, flat roof or place to which people have access, the terminal must be protected by a guard of durable material. A Terminal Guard Kit is available as an optional extra Part No. P210 from Baxi UK. The guard requires a flat wall surface of approximately 450mm diameter, concentric with the terminal assembly.

The exhaust flue pipe of the terminal must not be closer than 25mm (1in) to combustible material. Additional clearance must be provided when passing the flue through timber walls.

Advice on gas installations in timber framed buildings is contained in an IGE technical publication available from the Institution of Gas Engineers, 21 Portland Place, London W1N 2AF.

## Flue Pipe Insulation

Lagging is recommended when the flue pipe exceeds 3m. The insulation used must be non-combustible and suitable for operating at temperatures up to 200°C. Class 'O' foil backed glass wool or mineral wool insulation wrapped tightly around the flue pipe will help to reduce pluming. It is not necessary to insulate the air inlet pipes.



## 6. FLUEING OPTIONS

Several flueing systems are available. ALL are 'room sealed' and a choice of terminals is offered:

1. Horizontal balanced flue terminal.
2. Vertical balanced flue terminal.
3. Ridge tile terminal (unbalanced)
4. Mini terminal balanced flue systems

All terminals can be sited up to 7.0m from the boiler. In some circumstances, a horizontal terminal can be sited 9.0m from the boiler – See below. Flue systems are supplied in kits, or components can be ordered individually-see list in section 17.

**Before starting an installation, check that the correct flue kit has been supplied with the boiler.**

**IMPORTANT** Any flue pipework in a horizontal plane **MUST** run downwards **AWAY** from the boiler by 5mm per metre. To prevent water accumulation there must be no sags or dips in the pipework.

## Visible Pluming

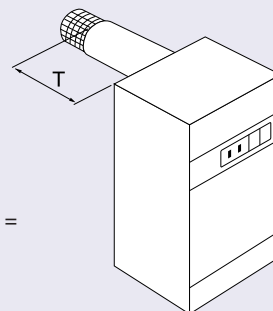
The efficient operation of Powermax will naturally give rise to condensation in the flue gases and pluming will be visible during adverse atmospheric conditions. In installations with long flue runs some condensate may be discharged from the terminal. The terminal must, therefore, be sited to avoid nuisance from either phenomenon.

## Balanced Flue Terminal

Use Kit P260 for installations where the flue passes through the wall immediately behind the appliance. The terminal is suitable for a thickness of 200mm to 500mm as shown in Fig.6.1.

An 800mm wall liner P337 can be ordered separately. Step-by-step instructions are given in Section 9.

**Fig. 6.1**



'T' WALL THICKNESS =  
200mm MIN  
500mm MAX

## Extended Balanced Flue Systems **Fig. 6.3**

Kits are supplied as follows with components also available separately.

	Kit No.
1m Sideways horizontal balanced flue	P261
3m Extended horizontal balanced flue	P263
5m Extended horizontal balanced flue	P265
7m Extended horizontal balanced flue	P267
9m Extended horizontal balanced flue	P269
Refer to Section 17 for step-by-step fixing instructions.	

The maximum length of each air/flue pipe must not exceed 5m (including a Horizontal BF Terminal) when the maximum of 4 air pipe bends and 3 flue pipe bends is used – see Fig 6.3.

The pipes can leave the boiler horizontally to right or left, or rearwards, or vertically upwards.

There is no minimum length.

If fewer bends are used between the appliance and the flue terminal, the maximum length of straight pipe can be increased if required – see table below.

MAX. No OF BENDS (90° OR 135°)			MAXIMUM PIPE LENGTH
Air Inlet	Exhaust Flue	Total	Air/Flue inc. Horizontal Trml.
4	3	7	5.0m each
3	2	5	7.0m each
2	1	3	9.0m each

## Ridge Tile Terminal **Fig. 6.5**

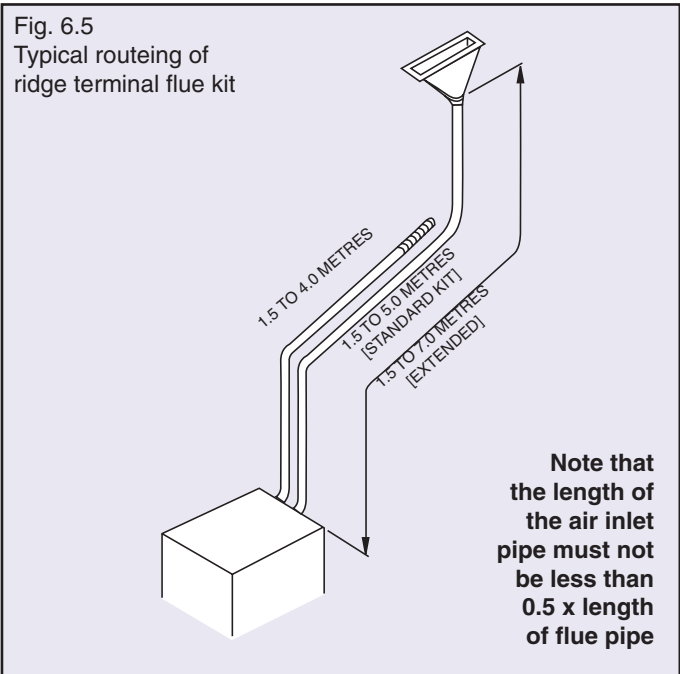
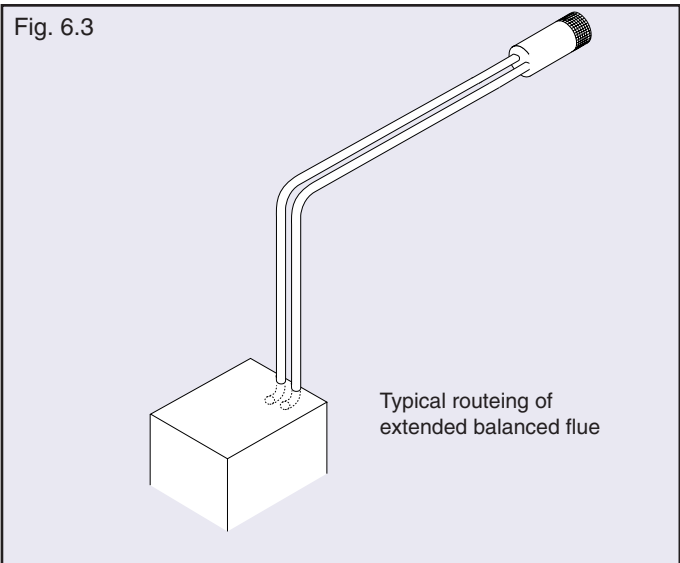
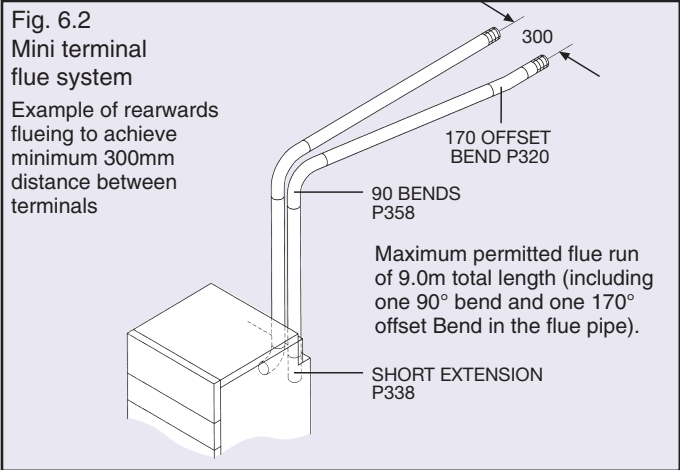
Kit P242 allows the flue to terminate at an approved (gas vent) Ridge Tile Terminal with combustion air being drawn from a ventilated loft space or from a second ridge terminal. The inlet terminal must be not less than 300mm above the top surface of the ceiling insulation. **The air inlet pipework must be at least 1.5m long and not less than half the flue length.** Full fixing instructions are supplied in each kit.

Additional components may be specified up to the maximum indicated in the diagram and the table opposite.

Combustion air may be drawn from a ventilated roof space or from a compartment or duct which is permanently ventilated direct to outside air. The effective open area of the vent must not be less than 160cm<sup>2</sup> (25in<sup>2</sup>).

When combustion air is drawn from a roof space or compartment or duct, that area must be effectively sealed from the remainder of the dwelling. A tight fitting trap door or similar is acceptable.





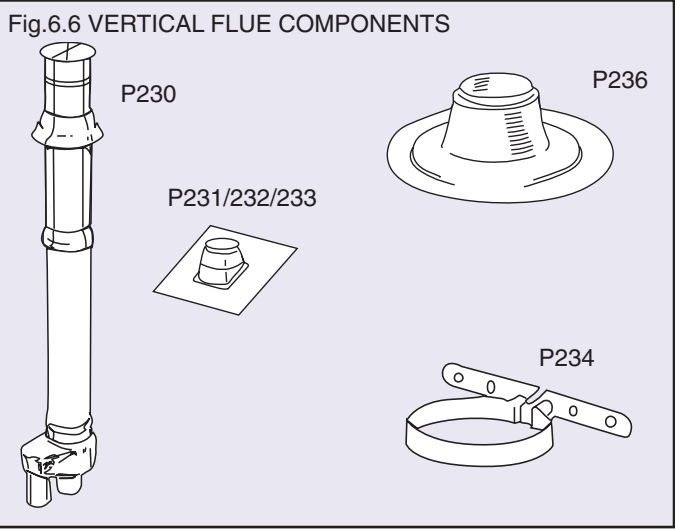
#### FLUEING RESTRICTIONS – RIDGE TILE TERMINAL

Application	Components	Number of Bends 90° or 135°	Pipe Length (metres)
Standard Kit	Air Inlet	2	1.5 minimum
	Flue	3	1.5 minimum
Extended Inlet & Flue	Air Inlet	2-3	1.5 to 4.0
	Flue	3 max	1.5 to 7.0

## Vertical RS Flue System

The Powermax Vertical RS flue system offers an unobtrusive balanced flue terminal as an option for both pitched and flat roofs. The vertical roof terminal Part No. P230 provides a combined air intake and combustion gas outlet in a concentric arrangement. Below the roof the terminal changes into a twin pipe system. Separate roof flashing units should be ordered (specified) for pitched or flat roofs. Roof pitches from 15° to 55° are catered for by selecting one of three pitched roof flashing units.

P231 for pitches 15° to 25°      P232 for pitches 25° to 45°  
P233 for pitches 35° to 55°      P236 for flat roofs



To connect the Powermax to the vertical terminal a kit Part No. P246 is required. This contains a range of extension air/flue pipes and bends to enable the terminal to be sited up to 2.5m from the appliance. The maximum overall length of the complete flue system must not exceed the limits indicated for extended balanced flue systems, however the length of the vertical terminal itself can be disregarded. Complete fixing instructions are provided in each kit.

## MINI TERMINAL FLUE

### Description

The Mini Terminal Flue system provides an alternative arrangement to the standard (140mm diameter) balanced flue terminal.

Separate 65mm diameter air inlet and flue terminal assemblies can be positioned in different locations on the same wall subject to similar wind conditions. See Fig. 6.2.

They are available in a small range of colours chosen for their compatibility with typical external building materials.

- Code.
- |  |             |
|--|-------------|
| A Matt Black (standard finish)                 | D Red Brick |
| B Stone (also suitable for yellow stock brick) | E Slate     |
| C Light Brick                                  | F White     |

Each terminal requires a hole of 65mm diameter to be core drilled through the external wall.

Flue kits are available as listed below. Each kit contains all the components needed for a complete system including full fixing instructions.

	Kit No.
1m Mini Terminal BF kit*	P271
3m Mini Terminal BF kit	P273
5m Mini Terminal BF kit	P275
7m Mini Terminal BF kit	P277
9m Mini Terminal BF kit	P279

\* For sideways flueing

**WARNING – The flue pipe becomes very hot when appliance is working. Householders should be warned not to touch exposed pipe e.g. beyond protective duct within loft. The flue pipe should be insulated or ducted if accidental contact is likely.**

## 7. VENTILATION REQUIREMENTS

- When the appliance is installed in a room or habitable internal space, there are no specific ventilation requirements.
- When the appliance is installed in a compartment it is essential that permanent high and low vents are provided for the circulation of cooling air. Purpose made vents must have a non-adjustable free area not less than the minimums specified in the table below.

MINIMUM EFFECTIVE AREA OF COMPARTMENT AIR VENTS		140	155x
Position of opening	Ventilated to	Area of each vent	
High and Low Level	Room	54cm <sup>2</sup>	60cm <sup>2</sup>
High and Low Level	Outside	27cm <sup>2</sup>	30cm <sup>2</sup>

## 8. TECHNICAL DATA

	140	155x
Nominal Output, kW gross	14.0	16.4
Nominal Input, kW gross	17.1	20.0
Category	I2H Gas G 20	
Supply Pressure, mbar	20	
Gas Rate m <sup>3</sup> /hr	1.6	2.0
Gas Connection	Rc 1/2	
Air sense/burner pressure differential -	- 0.13 ± 0.03mbar. This is factory set and no adjustment is intended	
NOx	< 40 ppm – Class 5	
CO	< 20 ppm	
Thermal store capacity (primary water) litres	80	100
DHW Temperature °C	55-60 maximum	
DHW Flow Rate, litres per minute (maximum)	12	18
Working Pressures, bar:		
Primary SS models	3 max (Design pressure 2.5 to comply with UK Water Regulations)	
Primary OV models	1.0 maximum	
DHW	6.0 maximum	
DHW	1.5 minimum	
Pressure Relief Valve, bar:	3.0	
Weight (empty) kg	75	85
Weight (full) kg	155	185
Connections:		
CH Flow/Return	22mm Compression	
DHW Inlet/Outlet	22mm Compression	
Gas	Rc 1/2	
Pressure Relief	15mm Tube (1/2 x 3/4 Tundish supplied loose)	
Electricity Supply:	230V ~ 3A fused supply	
Cable Entry	Top rear of LH panel	
Dimensions, mm		
Height	1100	1260
Width	540	
Depth	600	
Clearance requirements for installation and servicing:		
Top	400mm (16 inches)	
Sides	5mm (10mm (3/8") total)	
Base and back	Nil	
Front	450mm (18 in) unless behind an openable door	
Flueing:		
Flue Types	C13 C33 C53 (As flue kit specified)	
Bal. Flue Terminal	140mm Diameter	
Mini Flue	65mm Diameter	
Flue/Air Pipes	51mm Diameter	
Standard Flue Length	500mm	
Extended Flues	Refer to Section 6	

## 9. INSTALLING THE APPLIANCE

Guidance on where to locate the appliance is given in Sections 5, 6 and 7. In some instances it will be advantageous to pre-plumb pipework or to pre-fix terminal, air/flue pipes and duct.

- Move appliance to where it is accessible for flue preparation. For a guide to removing panels, see back page. Remove 2 screws at bottom of front cover, pull forward from bottom, gently ease downwards to free location studs.
- 140:** The lid is retained by 3 screws, 2 in the front edge under the timer control panel and a third transit screw in the back of the lid. The lid can be eased upwards from the rear and pulled gently forwards and away from the control panel. The transit screw can be discarded if access is restricted.
- 155x:** Remove recessed screw at top of switch panel and keep safe. Lift off upper front cover. The top panel is retained by 4 studs: gently ease upwards to remove. The plinth cover is retained with 4 screws and 2 screws retain the rear section.
- Carefully set aside the outer covers. Remove small press-out panel(s) either side of casing for plumbing connection (and flue/air pipes) as necessary. The hand hold cut outs in the side panels also provide convenient plumbing access. The cut out in the base allows pipework to be brought up from floor level, see Plumbing Guide on page 23, but the pipes **must not obstruct service access to the sump. See Fig. 11.1.**
- Connect one end of electricity supply cable to the user terminal in accordance with sections 4 and 10. The cable must be routed via the anchorage and through the bushing in LH side panel. See Fig. 9.6.
- Flueing  
If installing boiler with vertical RS balanced flue see separate instructions supplied with vertical flue kit.  
If installing boiler with an extended horizontal balanced flue go to Section 17 of these instructions.  
If installing boiler with a Ridge Tile Terminal or Mini Terminals, see separate instructions supplied with each kit. The standard flue kit P260 contains the following components, See Fig.9.2  
1 x flue terminal assembly. complete with sealing ring  
1 x wall liner  
1 x flexible duct AIR INLET ONLY  
2 x worm drive clips  
Note: The flue terminal assembly **MUST** be installed horizontally.  
The unit is floor standing and a vertical flat area of wall is required 1100mm or 1260mm high x 550mm wide. If unit is being raised above floor level, allow for this in marking position of flue liner.
- 4a** Mark off the centre of the 140mm (5½ in) diameter hole as shown in Fig.9.3 and core drill.  
If the wall is clad with a combustible material a 25mm (1in) wide area around the flue liner must be removed. Measure the wall thickness and cut the liner to this length.Cut opposite end to lugs.
- b** Fit the liner through the 140mm (5½ in) diameter hole (lugs inside) and cement into position, making good internal and external rendering. The latter may be done with arm extended through the liner.
- c** Insert 50mm diameter 90° elbow into flue socket (vertically rising pipe at the back of the appliance)

- d Measure and cut flue pipes with a hacksaw to a length as illustrated in fig 9.5. Measure the wall thickness and add 10mm to the flue pipe and 120mm to the air inlet pipe from datums 'AA'. Remove any burrs from cut ends of tubes.  
Note: If wall is not truly vertical or appliance is prevented from standing against wall, add stand off distance to wall thickness measurement.
- e Push fully home ensuring inlet air pipe enters flexible duct and exhaust flue pipe engages socket. Secure inlet pipe with worm drive clip (See Fig.9.4).
- f Carefully push appliance into position, entering terminal into wall liner. If necessary, fit terminal guard.
5. Make gas connection as described in Section 3.
6. Fix feed and expansion cistern or expansion vessel and make water connections as described in Section 11.
7. Test gas pipework for gas soundness in accordance with BS6891 and latest CORGI codes of practice.

## Optional immersion heater

Refer to page 23 for detailed wiring instructions.

## First Fix Plumbing

Refer to Guide diagram on page 23. This can be ordered as a full-size template Part No P3281.

Fig. 9.4

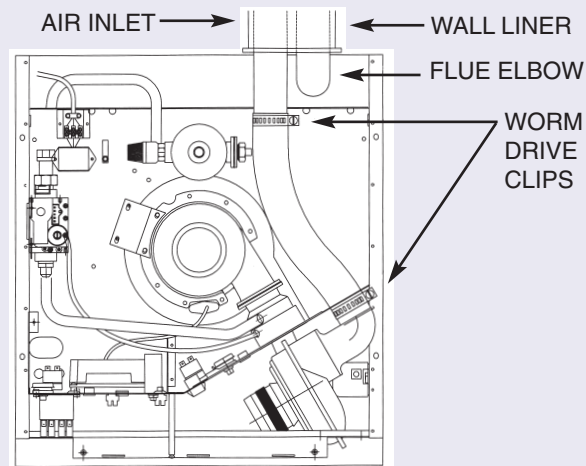


Fig. 9.5 Flue terminal assembly

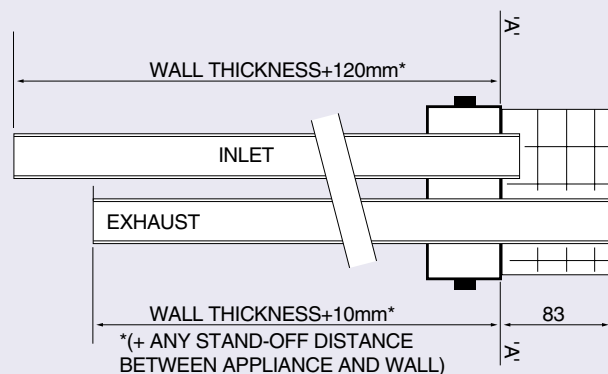


Fig. 9.6 Route for incoming electric cables

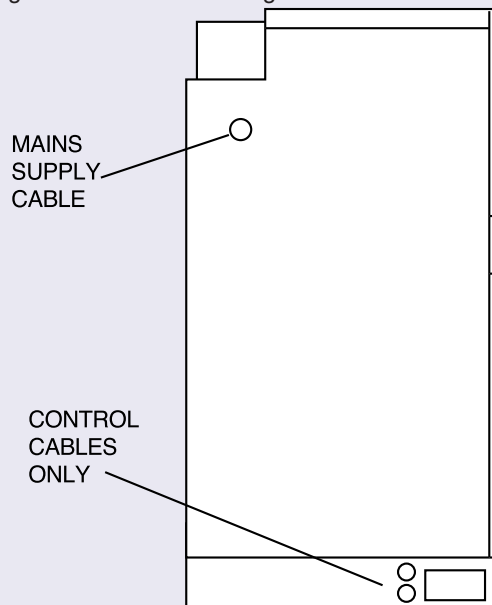


Fig. 9.1

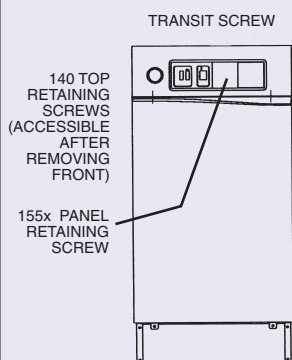


Fig. 9.2

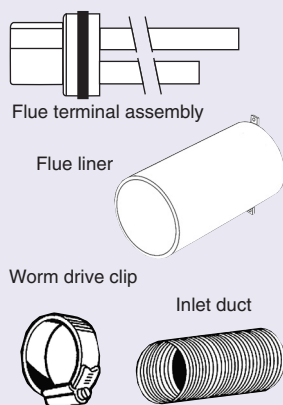
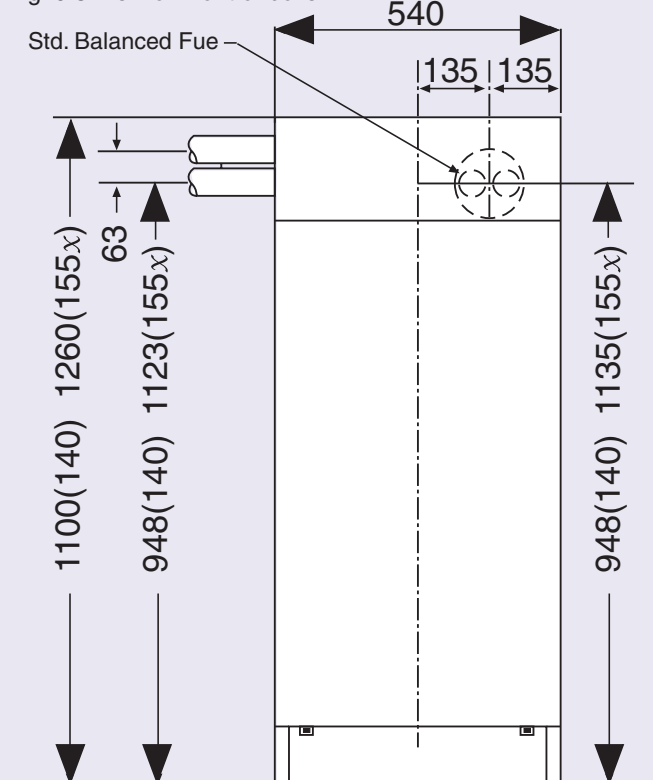


Fig. 9.3 View on front of boiler



\* Normal dimensions - check actual height on appliance.  
Allow also for floor unevenness.



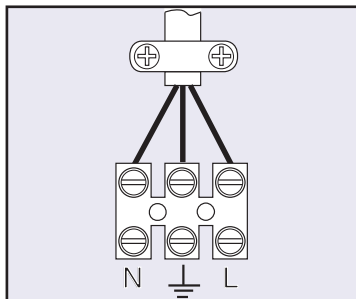
## 10. ELECTRICAL CONNECTION TO THE APPLIANCE

Wiring must comply with the current IEE Wiring Regulations. The supply cable must be 3-core 0.75sq.mm (24/0.2mm) to BS6500 Table 16.

The supply must be of 230V ~ 50Hz. A 3A fused double pole isolating switch may be used, having a minimum contact separation of 3mm in both poles, providing it serves only the boiler and its system controls. Alternatively a 3A 3 pin fused plug may be used.

Wiring diagrams are shown in Fig 10.1 for standard model and Fig 10.2 for model with built-in programmer. Note that the water level switch is omitted on open vented models.

1. Connect the incoming electricity supply cable to terminals  
L – brown  
N – blue  
⏏ – green-yellow  
of the user terminal block. Ensure that the cable is routed via the anchorage and through bushing in LH side panel. See Fig. 9.6. Trim all excess length from main supply cable.



2. Connect any external control cable to the terminal block as indicated and described below – See Fig 10.4 – and route via unused grommets on lower LH side of unit.

Note. The length of the conductors between the cord anchorage and the terminals must be such that the current carrying conductors become taut before the earth conductor if the cable is tugged, ie the earth wire must be longer than both the live and neutral when connecting into the terminal block.

3. To wire a room thermostat, remove orange link wire from terminals 27 and 28. Connect the feed wire to the stat to terminal 27, connect the switched wire to terminal 28 and the neutral to N3.

- 4a. To provide time to control for models without the built-in programmer, we recommend using the Powermax 'Diadem' analogue programmer kit P4230. To install remove the slave plug – see Fig 12.2 – and replace with the plug-and-lead supplied. Fixing instructions for the 'Diadem' programmer are supplied in the kit.

- 4b. Alternatively choose a twin channel programmer that has volt free contacts, as provided by programmers which use the British Gas standard wall plate configuration and a pumped/gravity option which should be set to "gravity". See Fig. 10.3. Power the programmer from terminal L2 and link to one side of the programmer's hot water relay contacts. Connect the switched hot water contact to terminal 24. To wire the central heating channel, remove link wire (terminals 27 and 28) and connect the programmer's CH relay contacts to terminals 27 and 28. NB The appliance switch must be kept in the OFF position otherwise the DHW remains permanently switched on. The central heating switch should be ON to obtain timed switching.

5. If a combined clock thermostat is being used to control the central heating, it should be of a type having voltage free contacts. Remove link wire (terminals 27 and 28) and connect the switched wire to terminal 28, feed wire to terminal 27.

A permanent live is available at terminal L2 and additional neutral at terminal N3 for supplying power to the clock.

6. If a frost 'stat is required, this should have voltage free contacts and provide a single pole double outlet. Connect as follows:  
Frost 'stat live to terminal L2  
Output 1 to terminal 24  
Output 2 to terminal 26  
The Sopac-Jaeger TA 547-04 (Double Outlet) is a suitable frost protection thermostat.
7. After completing the electrical connections, perform the following electrical system safety checks:  
A – EARTH CONTINUITY  
B – POLARITY  
C – RESISTANCE TO EARTH  
D – SHORT CIRCUIT  
WARNING – THIS APPLIANCE MUST BE EARTHED

Fig. 10.3

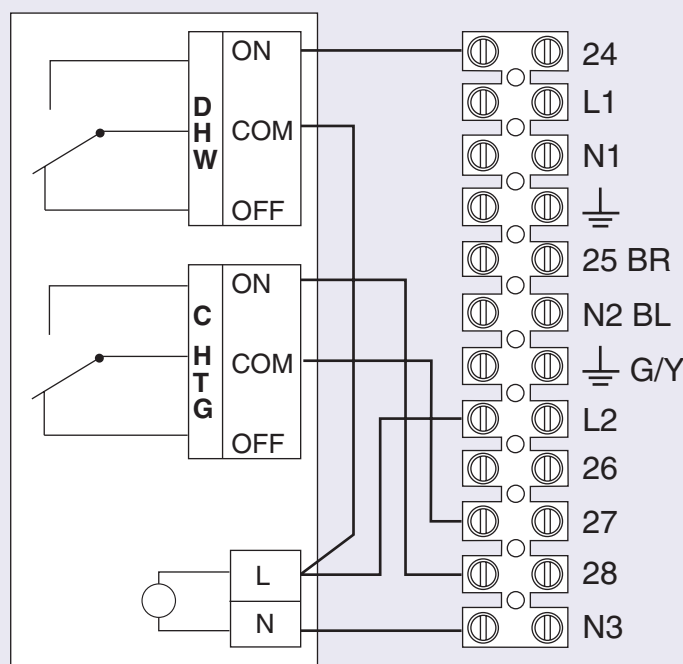


Fig. 10.4 Terminal block

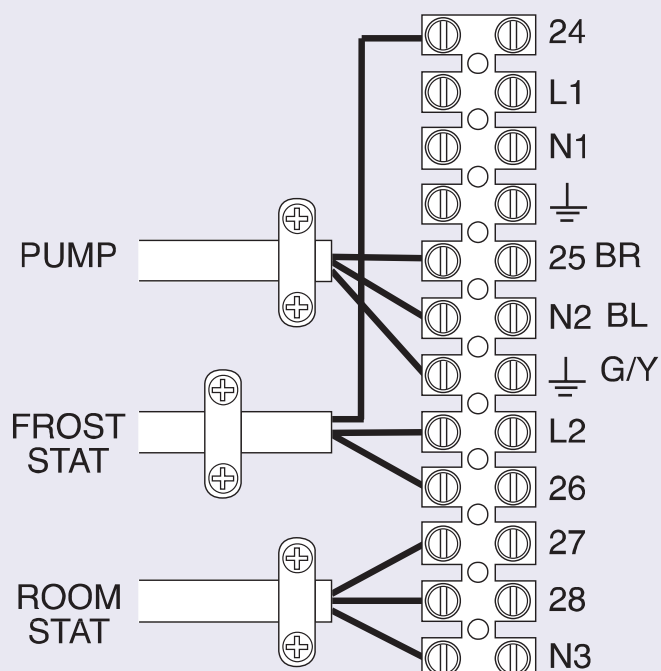


Fig. 10 Powermax 140 / 155x wiring diagram

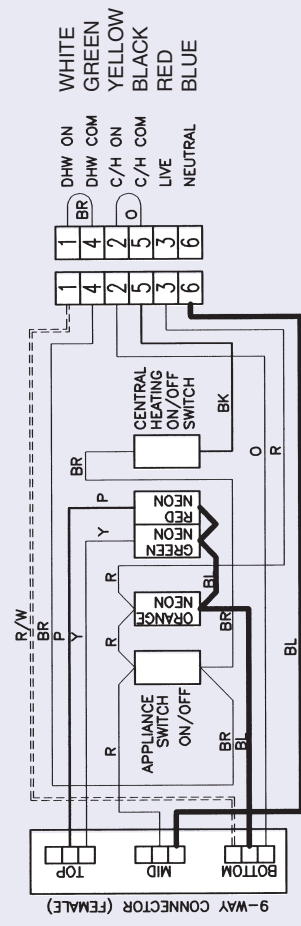


Fig. 10.1

REMOTE PROGRAMMER MODELS

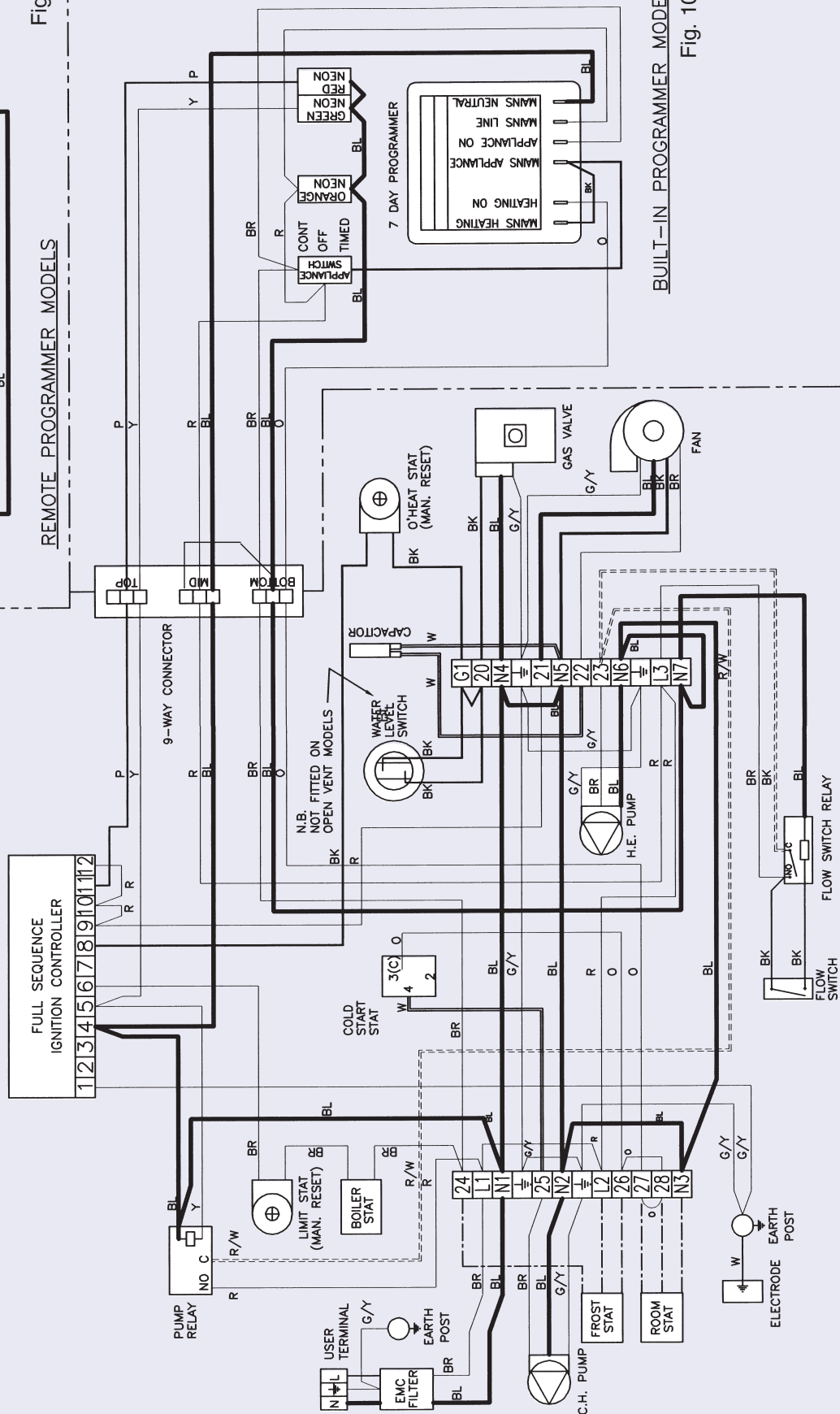


Fig. 10.2

BUILT-IN PROGRAMMER MODELS

# 11 WATER SUPPLY

## Mains Supply Requirements

It is essential that the mains water supply pressure and flow availability are capable of meeting both the hot and cold water services demand. The unit is capable of delivering up to 12 litres/min (140) or 18 litres/min (155x) of hot water. Where the mains pressure is in excess of 6 bar, pressure reduction to between 2 to 3 bar is recommended for splash free tap operation.

Unless consistently high mains pressures are available, it is unlikely that a mains service pipe of less than 22mm OD (copper) or 25mm OD (Blue MDPE) will provide an adequate flow rate to the system. Powermax is not recommended for use where the prevailing mains pressure is below 1.0 bar.

A full way isolating valve (e.g. gate valve or quarter-turn valve) should be fitted in the supply before, but adjacent to, the unit. It is recommended that a 22mm draw-off is provided from which 15mm or smaller pipes can then be used to supply hot water services to individual terminations to give a balanced distribution system.

## Terminal Water Fittings

**Taps:** Ensure that all terminal fittings will withstand mains pressure.

**Showers:** Because of the draw-off profile, thermostatic shower mixers are recommended to optimise performance; these must be suitable for use at mains pressure. The Range 'Showermax' thermostatic shower kit is recommended for use with this boiler. Where it is possible for a flexible shower handset to reach below the bath spillover level, compliance with the Water Byelaws is essential.

## Use in Hard Water Areas

In areas where temporary hardness exceeds 200mg/L, treatment of the mains water supplied to the appliance is recommended to maintain its performance. The Powermax electronic water conditioner P3237 is available factory fitted or can be retro-fitted. Any scale reducer, or ion-exchange softener, will be most effective when installed immediately upstream of the boiler i.e. in the inlet pipework.

Good quality polyphosphate dosing devices can also inhibit scaling but generally should not be fitted where heat could impair their performance. Always follow the manufacturer's instructions.

Record the type of conditioner being used in *(benchmark)* log book.

# PRIMARY SYSTEM

## FLOW AND RETURN CONNECTIONS

These are on the LH side of the unit; the flow is taken from below the pump. Pipework can be run inside the casing but **must not prevent the removal of the flue collector sump** – see **NO GO area** in Fig. 11.1. See also the plumbing layout Guide on page 23.

## PIPEWORK ABOVE BOILER

Where the boiler has pipework rising above it, a non-return valve **should be fitted**, preferably in the flow where it will not obstruct filling.

Air vents must be fitted at the highest positions on flow and return pipes and at any point where air is likely to collect.

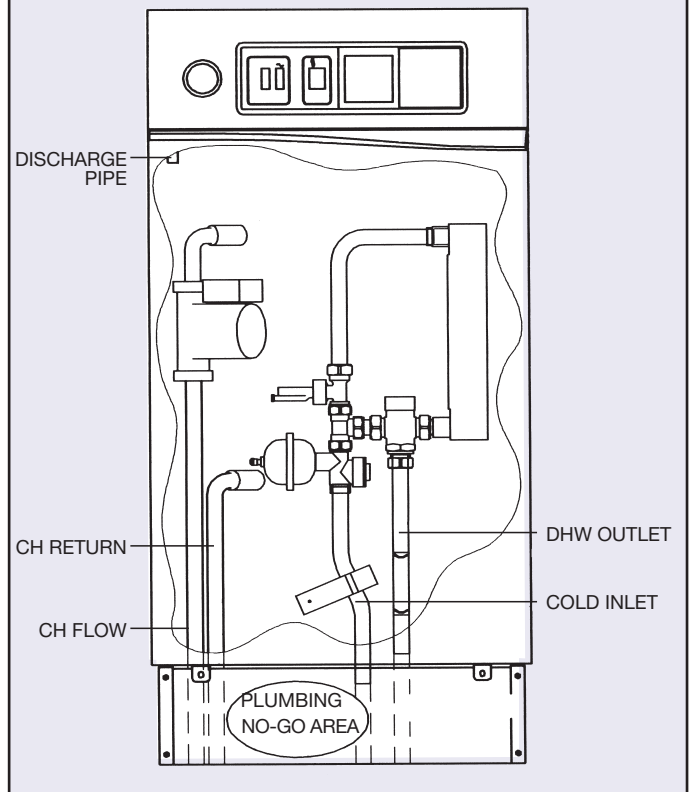
## TRVs IN SYSTEM

When all radiators are fitted with Thermostatic Radiator Valves, a **bypass loop** (manual or automatic) must be provided.

## SOLDER FLUX

Use water soluble flux for making soldered capillary joints in the primary circuit. Traditional grease-based flux must not be used.

Fig. 11.1 Water connections



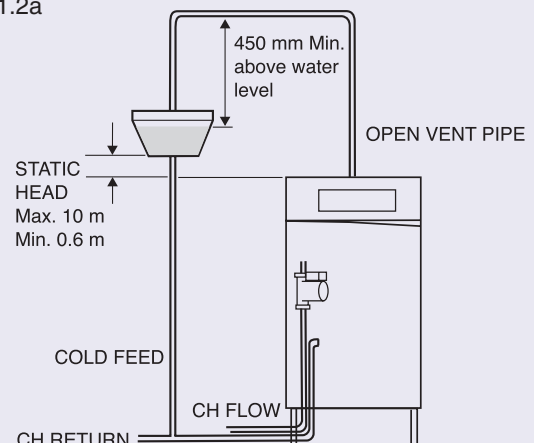
## Open Vented Systems

When installing 'OV' variants of Powermax the thermal store within the appliance must be supplied with primary water from a low pressure source e.g. a feed and expansion (F&E) cistern. The unit is suitable for a maximum working head of 10 metres (33ft head). The minimum static head is 600mm.

The vent pipe connection is situated at the top of the unit. A 22mm open vent pipe must rise continuously, unimpeded, to above the feed and expansion cistern. The top rear panel is cut away to enable the vent pipe to run on the wall behind the appliance.

Note also that the F & E water level must be at least 1metre above the highest point of the primary circulation system. An unvalved feed and expansion pipe must be provided from the F & E cistern and teed into the C.H. return near the boiler. Use 22mm if plastics pipe is used or if head is less than 1m.

Fig. 11.2a



## Sealed Primary Systems

Only 'SS' variants can be installed with a sealed primary system. The 'SS' prefix is recorded on the Data Badge and external packaging.

'Sealed System' models have an air separation fitting at the back of the boiler. This also houses the water level safety switch and connects the pressure relief valve and automatic air vent. The installer must fit an external expansion vessel of adequate expansion capacity. As a general guide systems of up to 7-9 radiators will need an 18 litre vessel; a 12 litre vessel may be satisfactory for 5 radiator systems. The table below indicates the size of vessel required for systems of different water capacities.

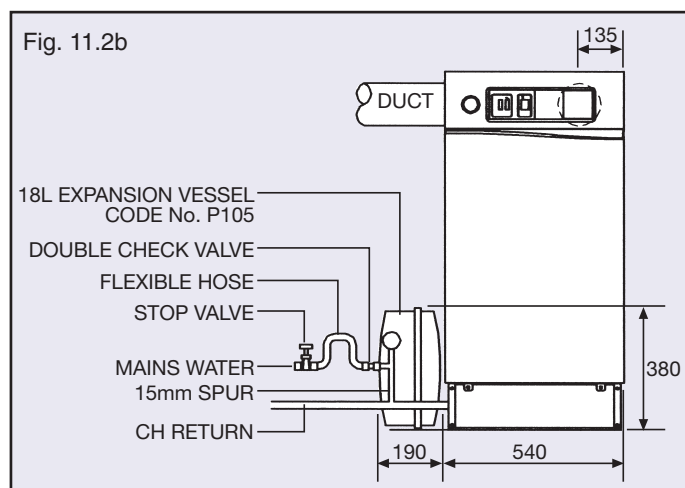
Volumes in litres					
Expansion Vessel	Powermax 140 155x		Radiators Pipework 140 155x		Total System Volume
12	80	100	117	97 max	197 max
16	80	100	182	162 max	262 max
18	80	100	215	195 max	295 max

An 18 litre expansion vessel part No P105 and wall bracket P116 are normally supplied with sealed system boilers. Connect the expansion vessel to the boiler central heating return using a 15mm pipework spur, see Fig.11.2b. This spur can also be used to connect a WRC approved filling loop. Observe this sequence when installing loop: mains – stopvalve – flexible hose – double check valve – boiler primary circuit. NB: If the stopvalve is not in sight of the pressure gauge on the Powermax, fit an additional gauge adjacent to the filling loop. On 'SS' variants a pressure relief valve set at 3.0 bar is fitted at the top of the thermal store. A 15mm pipe from the relief valve is accessible at the front of the boiler. The tundish (supplied loose) may be fitted within the casing or externally. The discharge pipe from the tundish should be not less than 22mm diameter, and must have a continuous fall to a visible and safe position.

See Fig 11.3.

Pipework from the tundish should fall vertically for 300mm and then continue by continuous fall to a visible safe termination – preferably below a fixed grating and above the water seal of a trapped gulley. The tundish must be kept clear of electrical devices.

Under normal working conditions no discharge will occur. A multiple fault condition could cause a short discharge of scalding water and steam. Adequate precautions should be taken to prevent obstruction of the outlet and to minimise the danger to persons (especially children) and property. Section G3 of the Building Regulations Approved Document should be consulted for full information.



## System Flushing

For optimum performance after installation, Powermax and its associated central heating system should be flushed in accordance with the guidelines given in BS7593: 1992 – Treatment of water in domestic hot water systems. Full instructions are supplied with proprietary cleansers sold for this purpose.

To help prevent both radiator corrosion and the possibility of noise inside the boiler, it is recommended that Inhibitor is used. To ensure that the correct amount of inhibitor is used add the volume of the Powermax thermal store to your radiator and pipework calculations as shown. It should be used in accordance with the guidelines in the above standard and the inhibitor manufacturer's instructions.

Suitable inhibitors and flushing agents are available from BetzDearborn and Fernox. Instructions for use are supplied with these products.

Once the system has been fully flushed, complete the relevant section in *(benchmark)* log book.

Fig. 11.3 Typical Discharge Pipe Arrangement

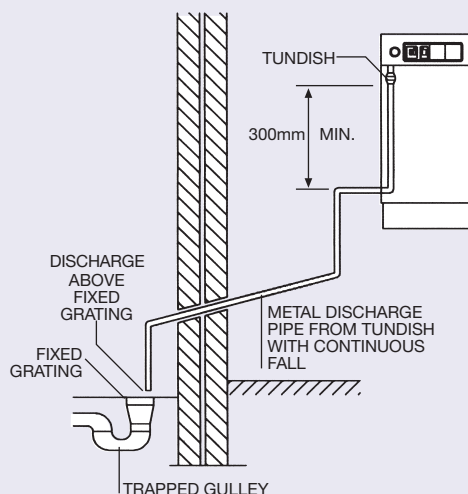


Fig. 11.4

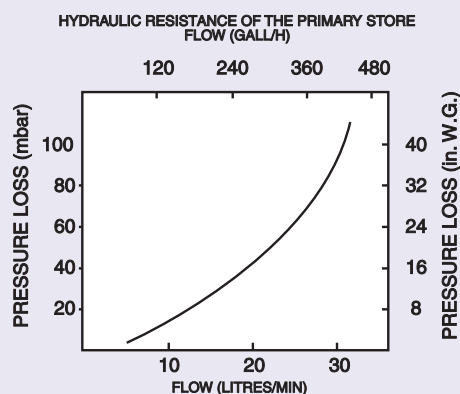
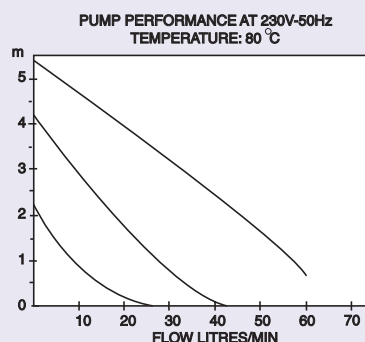
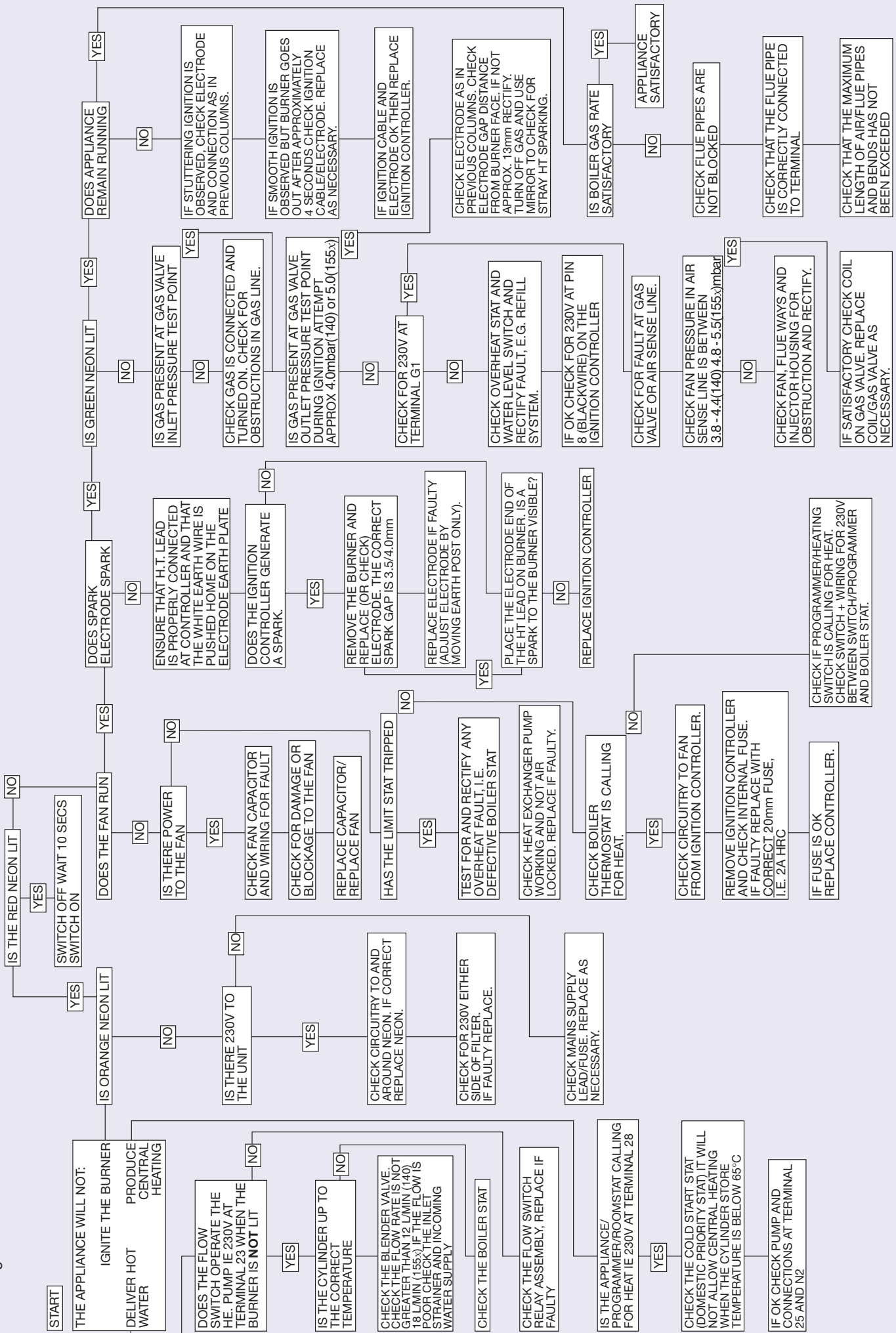


Fig. 11.5

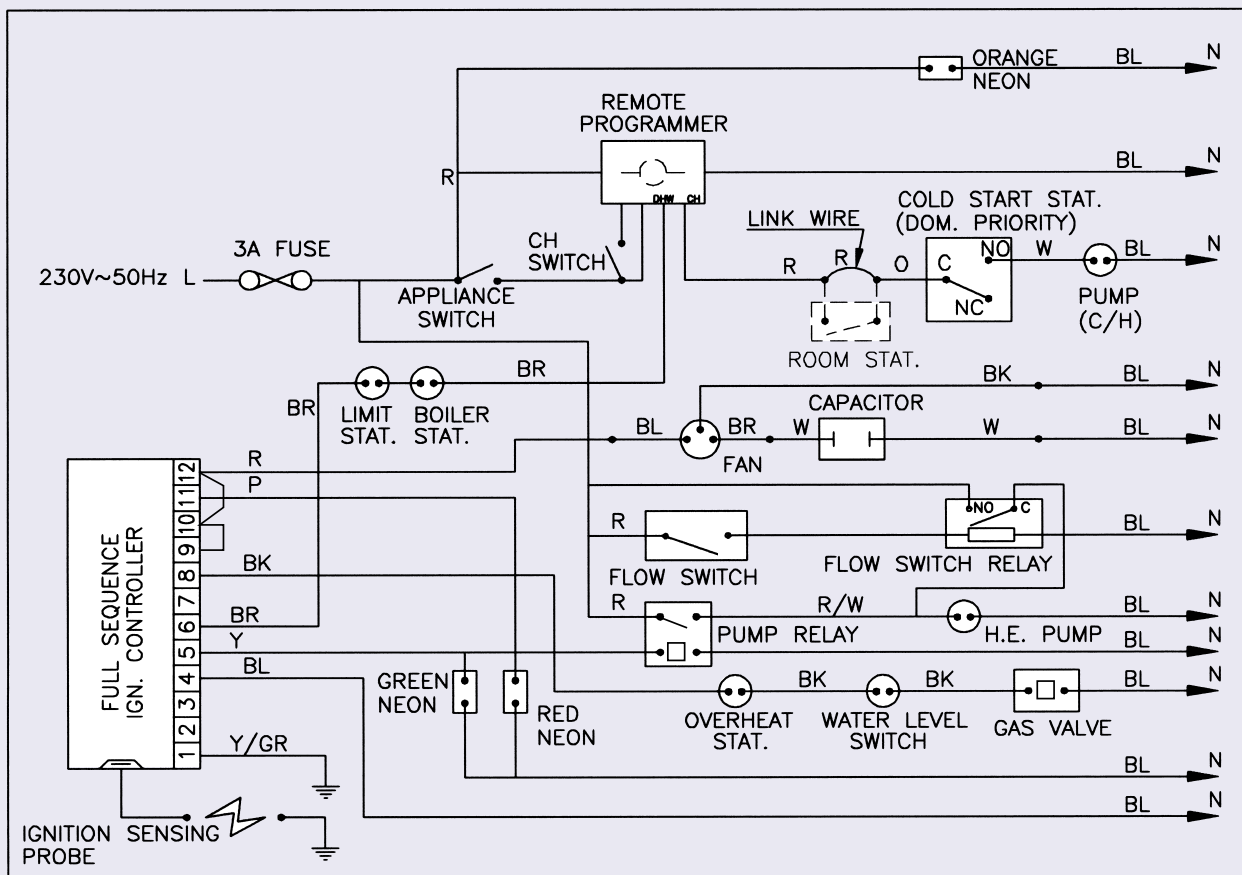


# Fault finding chart



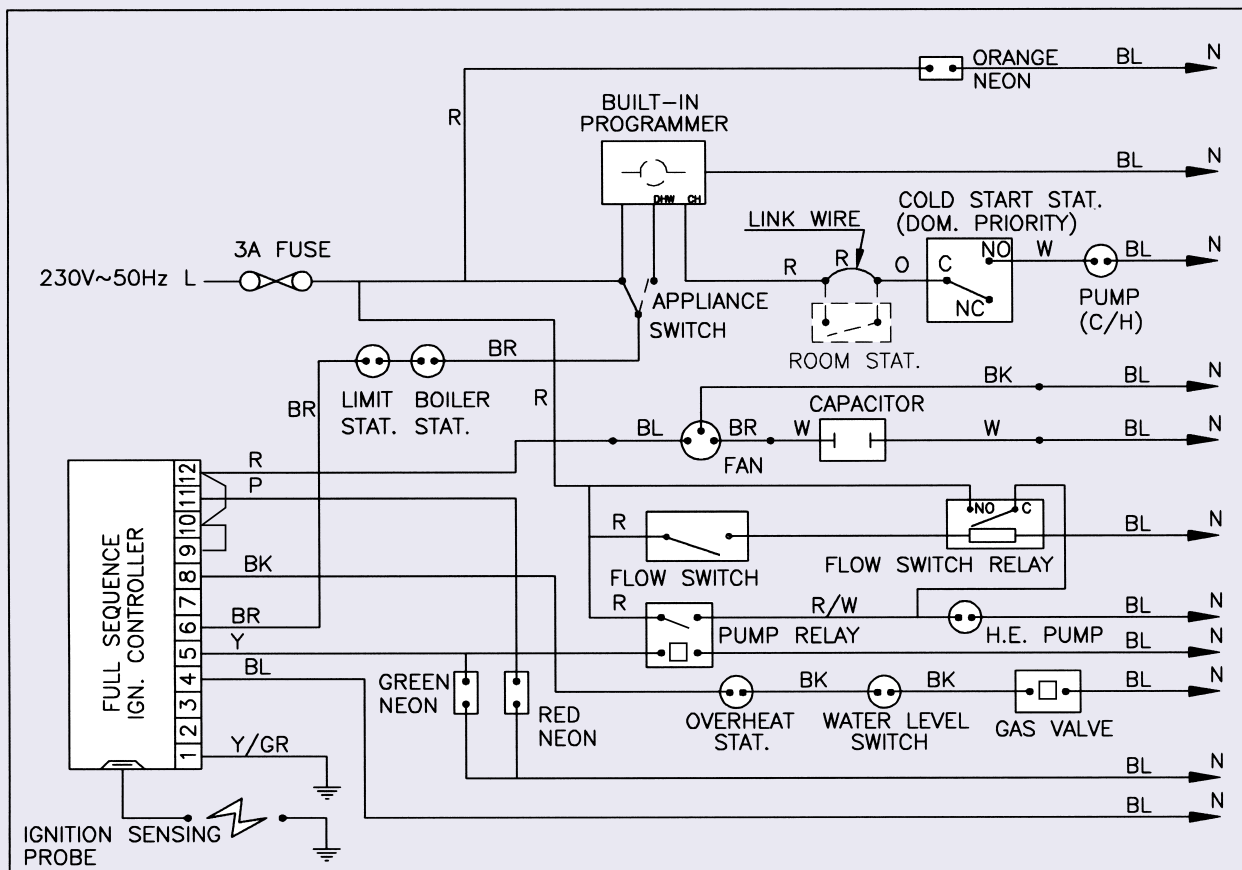


140 / 155x Functional Flow Diagram 1  
P Model with remote programmer connected



NB: Water level switch is omitted on Open Vent models.

140 / 155x Functional Flow Diagram 2  
CP model with built-in programmer



## 12. COMMISSIONING

**WARNING: DO NOT ATTEMPT TO START THIS APPLIANCE UNLESS THE THERMAL STORE (PRIMARY CIRCUIT) HAS BEEN FILLED WITH WATER**

### Sealed Primary System

- a With no water pressure on the system, check and if necessary adjust expansion vessel pressure to 0.6 to 0.7 bar (8 to 10 psi) **N.B.** Vessel pressure cannot be accurately set with water pressure in system.
- b Loosen cap on automatic air vent, check draincock is closed and open isolating valves on CH pump.
- c Open stopvalve(s) and fill system with water to approx. 0.9 bar. Release air from radiators and pipework and run cylinder up to temperature with CH off.  
Bleed both heat exchanger and CH pumps.
- d Thoroughly check radiator valve connections, glands and unions for leaks.
- e Set CH pump to speed 3, bleed every radiator and pipework high points until all air or air/water mix is removed.
- f Allow system to reach full temperature (boiler 'stat switches off) and note HOT system pressure. Check that relief valve is not "passing" by observing tundish over several minutes. ("Passing" is usually due to debris on valve seat. Snapping valve shut several times will normally cure this). After firing and checking, drain and flush the system, refill as above adding inhibitor, and check for leaks.
- g Again bleed every radiator etc. until all air or air/water mix is removed and re check relief valve.
- h Check system final pressure equals HOT pressure noted in f above. Top up pressure if necessary.
- i Adjust CH pump to correct speed for system. Remove flexible hose and leave in a secure position for householder. Protect hose union threads with end caps.

### Open Vented Primary System

- a Ensure Draincock is closed.
- b Open valves either side of central heating pump.
- c Admit water to the F&E cistern and thence to the thermal store and the remainder of the central heating system. Bleed both heat exchanger and CH pumps.
- d Open any radiator valves and air bleed valves so as to ensure that the store and radiators are full.  
Note: Drain and flush the system. Refill as above adding inhibitor, and check for leaks.

### Domestic Hot Water System

- a Open one or more hot water taps.
- b Turn on mains water supply and observe air free water issuing from tap(s).
- c Close tap(s) and check mains water pipework for leaks.
- d **Check that all factory-made plumbing connections are tight (and have not loosened in transit).**
- e The blending valve is pre-set to supply water at approximately 57°C and does not require adjustment.

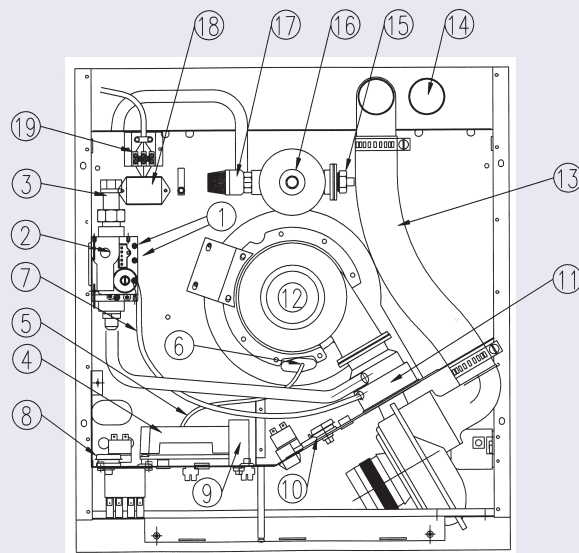
### Starting (Lighting) The Appliance

CHECK POLARITY OF ELECTRICAL SUPPLY IS CORRECT.  
CHECK THERMOSTAT WIRING, ie 'SWITCHED' WIRE IS CONNECTED TO TERMINAL 28.

Remove screw from solenoid valve inlet pressure test point Fig.13.4 and attach a suitable gauge.

- a Turn any in-line gascock 'on' and turn the service gascock 'on'. (Indicated by the screwdriver slot being in line with the direction of gas flow.) See Fig.12.3.

Fig. 12.1

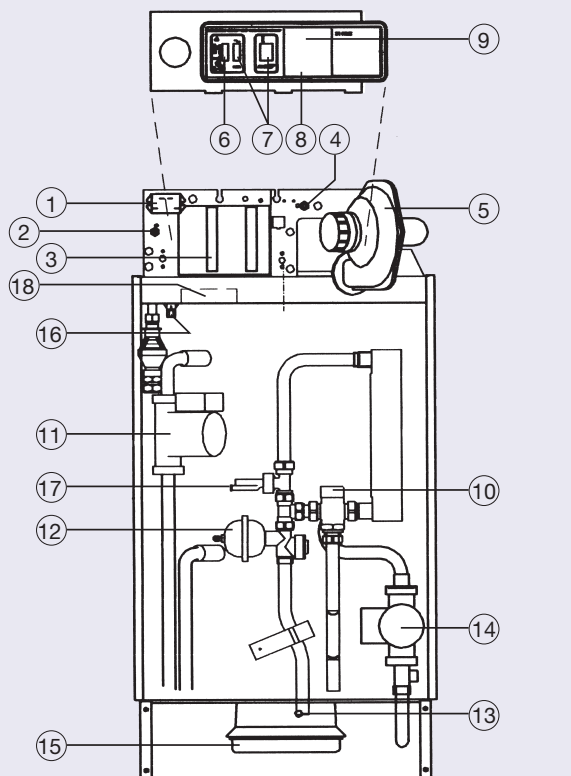


- |                           |                         |
|---------------------------|-------------------------|
| 1. Pressure Test Screws   | 11. Injector            |
| 2. Air-gas Ratio Valve    | 12. Burner              |
| 3. Union Gascock          | 13. Air Inlet Pipe      |
| 4. Ignition Controller    | 14. Flue Pipe           |
| 5. H.T. Lead              | 15. Water Level Switch  |
| 6. Ignition Electrode     | 16. Auto. Air Vent      |
| 7. Air Sense Tube         | 17. Safety Relief Valve |
| 8. Boiler Thermostat      | 18. EMC Filter          |
| 9. Capacitor              | 19. User Terminal       |
| 10. Cold Start Thermostat |                         |

- b Switch electricity supply on at the isolating switch and observe orange neon on control panel indicating the mains supply is live.  
**Note:** Switch panel layouts are shown in Fig.12.4 for standard model and Fig.12.5 for model with built-in programmer.
- c Move the appliance on-off switch to the 'I' (on) position (standard model) or 'CONT' (programmer model). Fan starts to rotate **after a slight delay**. After a few seconds the automatic ignition sequence will be initiated and the burner will light.
- d Green neon indicates the burner is operating.  
**Note:** If the burner fails to light, the ignition sequence will be automatically repeated until either the burner lights or a safety **LOCK-OUT** condition is signalled by the red neon. If red neon glows, switch to 'O' (OFF) at the appliance on/off switch, **WAIT TEN SECONDS BEFORE SWITCHING ON AGAIN**.
- e With the appliance operating check the green neon is stable.  
Note: After first filling with cold water some noise may occur within the combustion chamber as the flame settles on the burner. This is normal and will disappear after approximately one minute. It does not occur in normal use.
- f Run boiler for 15-20 mins and transfer manometer tube to outlet test nipple. Check burner pressure is approximately 3.8 to 4.4 mbar (140) or 4.8 to 5.5 mbar (155x). NB The longer the flue system the lower will be the expected pressure. Record operating pressure in (benchmark) log book. Very low values e.g. 3.0 mbar, indicate an obstruction in the air supply; a high pressure e.g. >6.0 mbar indicates a blockage in the flue pipe or sump - see fault finder chart on page 12. Note that the gas valve is factory pre-set and the burner pressure is not directly adjustable. In case of difficulty consult The Technical Helpline 0870 606 0955
- g Record the "working" inlet gas pressure at inlet pressure test nipple - Fig. 13.4 - in (benchmark) log book.
- h Turn appliance off, remove gauge, replace test screws and test for gas soundness.

## The Central Heating System

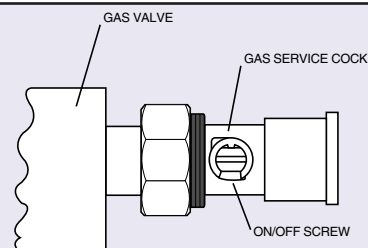
Fig. 12.2



- |   |                                  |
|---|----------------------------------|
| 1. Relay  | 10. Blending Valve               |
| 2. Limit Thermostat                                 | 11. CH Pump                      |
| 3. Terminal Block                                   | 12. DHW Expansion Vessel         |
| 4. Overheat Thermostat                              | 13. Combustion Test Point        |
| 5. Fan  | 14. Heat Ex. Pump                |
| 6. Appliance ON-OFF Switch                          | 15. Sump                         |
| 7. Neons  | 16. Remote Programmer Slave Plug |
| 8. Programmer                                       | 17. Flow Switch                  |
| 9. Programmer ON-OFF Switch (At back of programmer) | 18. Flow Switch Relay            |

- On programmer model, set the 3-way-switch to **TIMED** and commission the programmer by moving the slider switch (accessible behind the switch panel) to the **right**. Press **SELECT HW** and **SELECT CH** buttons (repeat if necessary) until the indicators align with either **ALL DAY** or **24HR**, Fig 12.5, and press **SET** button to align left hand indicator with **RUN**. On standard model move central heating switch to the 'I' (on) position, Fig 12.4.
- Check that any connected room thermostat is calling for heat.
- Note that the central heating pump will not operate until the storage cylinder contents have reached a temperature of approximately 60°C. After filling with cold water, this will normally take between 20 to 25 minutes.
- Wait until the thermal store has reached its normal temperature of approx 82°C (by temporarily switching the central heating off again) before balancing the radiators in the usual way to achieve a temperature drop of 10° to 15°C.
- Set the room thermostat or programmer according to the manufacturer's instructions. On programmer model press **SELECT CH** button to align CH indicator with **AUTO** and press **SELECT HW** button to align indicator with **ALL DAY**.
- With the thermal store fully heated, check DHW output temperature is approximately 55-60°C using nearest tap and a flowrate of approximately 5 l/min. Record inlet and outlet temperatures in **(benchmark)** log book.
- Measure hot water flow rate at bath tap (fully open) and record in **(benchmark)** log book.
- Refit outer covers and plinth front in reverse order.

Fig. 12.3



## Handing Over to the User

- Explain the appliance controls.
- Give guidance if the system is to be shut down for long periods when freezing is possible.
- Advise that the appliance should be serviced regularly.
- Explain that the correct operating position for the 3-way switch is the down **TIMED** position which enables **HOT WATER** and **HEATING** to be obtained when required. The up **HOT WATER** position will provide 24 hour hot water availability in the unlikely event of the programmer failing.
- Explain how to re-start appliance if red neon indicates lock-out.
- Hand over the User's Instructions, Installation Instructions and completed **(benchmark)** log book to the user.

Fig. 12.4 Standard Switch Panel

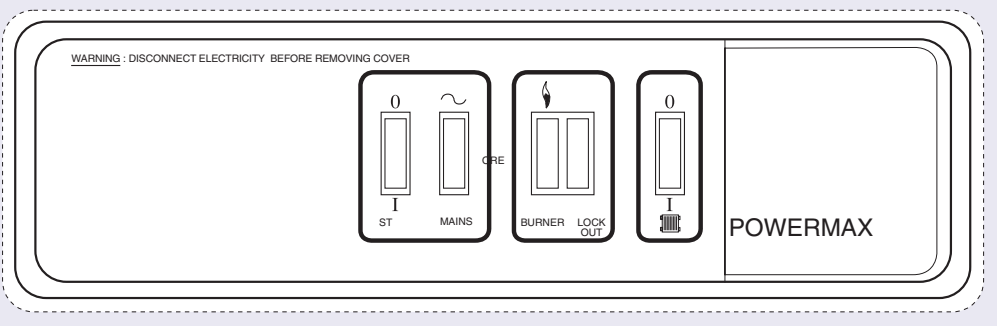
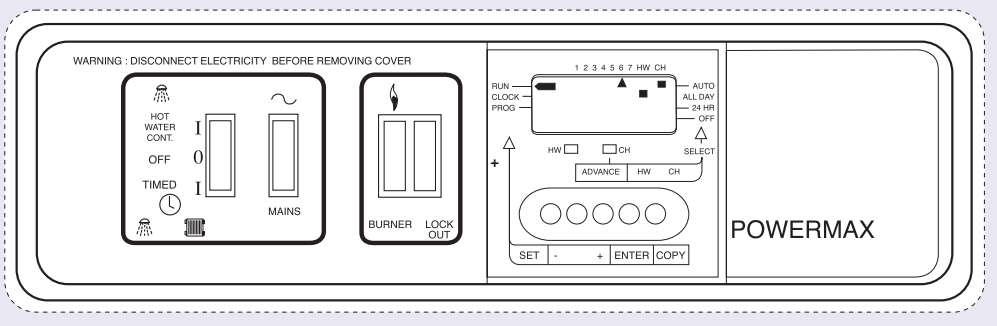


Fig. 12.5 Programmer Switch Panel



## 13. SERVICING INSTRUCTIONS

### Routine Annual Servicing

To ensure safe, efficient operation of the appliance, it is necessary to carry out routine servicing at regular intervals. The frequency of servicing will depend upon the particular installation conditions and the use to which the boiler is put.

**IMPORTANT: Before commencing any servicing or exchange of components, always turn off the gas supply and isolate the electricity supply.**

An annual inspection is recommended with servicing every other year.

After completing any service work always test for gas soundness.

To gain access to the boiler for servicing, remove front panel and top cover as described in section 9 and fig 9.1.

**Note before removing any of the burner parts for servicing ensure you have a new burner gasket P507 available.**

### Annually

- a Remove two M4 screws holding fan to burner, also air inlet elbow retaining screws. Pull fan away from burner and rest on ledge formed by cross brace. Disconnect air sense tube and check that it remains supple and free from splits etc. Release both union nuts on gas pipe.  
**Note: Hold injector with second 19mm AF spanner to prevent injector being disturbed. Swing pipe clear of burner.**
- b Loosen 8 screws around burner flange. Lift burner gently upwards until ring clears the controls chassis. Keep screws safe.  
Gently remove deposits from burner face and inspect.  
**Renew burner flange gasket.**
- c Disconnect the HT lead at the electrode and check that the connection is clean and tight. Inspect the electrode condition and check gap which should be 3.5 to 4.0mm.
- d Sealed system models only – release system pressure via relief valve and check expansion vessel pre-charge pressure is between 0.6 to 0.7 bar. Adjust if required and top up system to same pressure. Remove air from boiler via automatic air vent.
- e Reassemble in reverse order ensuring all 8 burner/fan screws are tight. Check that fan lead remains clear of motor after re-assembly.  
**NB: Check tightness of burner screws again after boiler has operated for several minutes.**

### Every Second Year

- f Additionally to the above.  
Use pliers to remove turbulators from heat exchanger pipes. Visually inspect combustion chamber and pipes for excess deposits (a small torch will be useful). If cleaning is required, first remove sump – see step g.
- g Remove M6 screw that secures the retaining strap and withdraw strap. Allow sump to drop vertically to floor level but leave underneath boiler to collect deposits.
- h Heat exchanger tubes can now be cleaned using a 28mm (1 1/8") diameter brush. Remove sump ensuring it is clear of gauze in flue collector. Vacuum away deposits and clean sump prior to replacing.  
Note: Apply similar care when replacing sump, ensuring it is evenly retained. Check sump joint for soundness using an electronic 'sniffer' whilst boiler is operating.
- i Check that boiler and its controls are functioning correctly.
- j Remove HW mini expansion vessel and probe bladder using a blunt instrument. Replace if deflated, Part No. P527.

Fig. 13.1

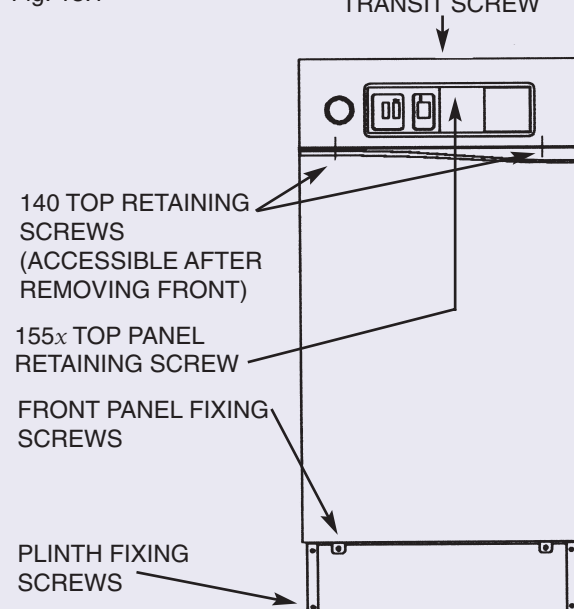
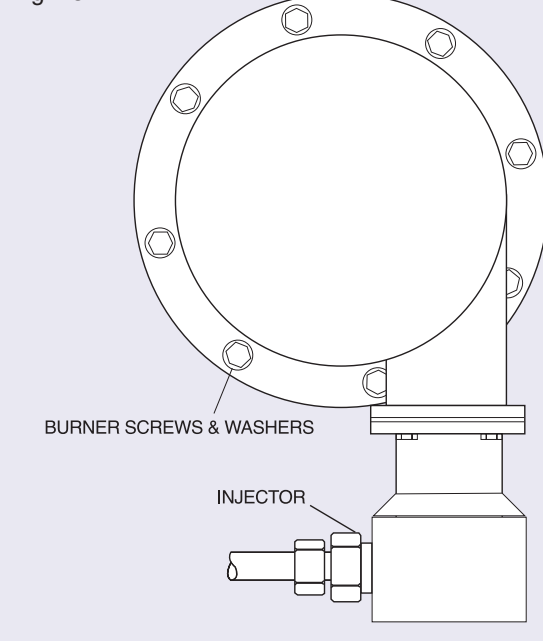


Fig. 13.2



### Combustion testing

A combustion analysis test point is provided on the flue collector (just above sump joint). The test point is a tapped hole and is sealed by a special screw/washer assembly. Insert the sampling probe by approximately 25 to 30mm until it touches the inner gauze. This will enable an accurate reading to be taken. For a correctly installed appliance typical values to be expected are:-

CO < 20ppm  
CO<sub>2</sub> 8.8 - 9.6%

Levels significantly outside these limits should be investigated and may indicate a defective component or faulty installation. Ensure the test point is FULLY GASTIGHT. Do not substitute any other screw for the special Powermax screw (Part No. P690).

### Electrical safety testing

It may be necessary to carry out electrical test work to ensure the safety of the appliance circuits after overhaul or as part of an inspection programme. This should be carried out to latest edition IEE regulations for Class 1 appliances with the flash test set at 1500 volts.



## Component Exchange Procedures Fig. 13.1

### General Notes

Isolate gas and electricity supplies. To gain access remove front panel and top cover as described in section 9 and fig 9.1.

Components are replaced in reverse order unless otherwise stated.

To remove switch panel undo the single fixing screw noting how lower edge of panel locates for reassembly. Taking care not to damage the wiring, the panel can be attached for servicing through the 2 holes in its corners to the lid fixing nuts using the lid fixing screws.

**Note that any damaged gasket or seal must always be renewed.**

### Full Sequence Ignition Controller Fig.12.1

- Refer to General above.
- Pull off H/T lead from connection at top of controller.
- Pull out the 'Molex' connector plug.
- Remove top screws, and remove controller.

### HT Lead Fig.12.1.

- Refer to General above.
- Disconnect lead at electrode and at ignition controller.

### Burner Fig.13.2

- Refer to General above.
- Remove two M4 screws holding fan to burner, also air inlet elbow retaining screws. Pull fan away from burner and rest on ledge formed by cross brace. Disconnect air sense tube and check that it remains supple and free from splits etc. Release both union nuts on gas pipe. **Note:** Hold injector with second 19mm AF spanner to prevent injector being disturbed. Swing pipe clear of burner.
- Remove 8 screws from burner flange and lift burner out. **Note:** When re-tightening union nut on gas feed pipe hold injector securely with second spanner to prevent it being disturbed. **Always fit new flange gasket P507.**
- Check for soundness at gas supply pipe unions.

### Injector

- Refer to General above.
- Release union nuts on gas feed pipe.
- Unscrew injector anti-clockwise. Re-seal new injector with a sealant complying with BS 5952.
- Check joints for soundness.

### Spark Electrode Fig.13.3.

- Refer to General and Burner above.
- Remove burner/fan.
- Disconnect the H/T lead. Remove the screws and washers. Gently pull the electrode away from the combustion chamber. Fit new electrode and gasket and check that the spark gap is as shown.
- Replace burner using new gasket**, and check operation of appliance.
- Check for soundness at gas supply pipe unions.

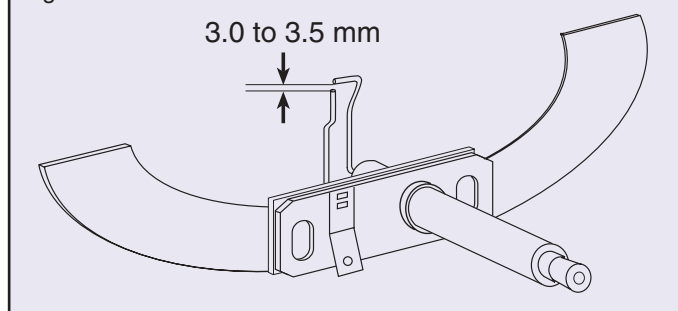
### Fan Fig.12.1 & 12.2

- Refer to General above.
- Disconnect fan leads from small terminal block.
- Remove screws retaining air inlet elbow. NB 2mm A/F hexagon key required.
- Remove two M4 screws and pull the fan gently forward.
- Ensure fan is fitted with new O-ring supplied. Reassemble and check for soundness, especially air inlet elbow.

### Neon Lights and Switches Fig.12.2

- Refer to General above.
- Push the neon light or switch from the back through the switch panel and replace in reverse order making sure the leads are correctly replaced – See wiring diagrams Fig.10.

Fig. 13.3 ELECTRODE GAP



### Air/Gas (Solenoid) Valve Fig.12.1 & 13.4

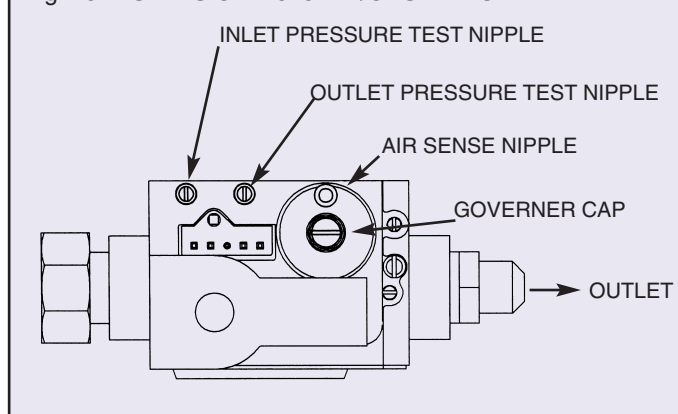
- Refer to General above.
- Disconnect gas service cock at the union and disconnect the outlet pipe at the union nut on flared fitting.
- Remove screw holding bracket. Disconnect the wiring leads and remove valve. Remove bracket.
- Remove the flared fitting from valve outlet and transfer to new valve. **Note:** Threads on valve outlet must be resealed with a sealant complying to BS5952.
- Fit new valve in reverse order. Ensure that inlet and outlet connections are fully gas tight.

### Procedure for checking/setting S.I.T. Sigma 848 Air/Gas Ratio Valve

**Do not attempt these adjustments unless you have both the use of a correct specification of digital manometer and the relevant training.**

- Using a differential manometer connect the positive side of the manometer to the gas valve outlet pressure tapping and the negative side to the air pressure sense line using a tee piece.
- Start the boiler, ensure that the inlet pressure is adequate, i.e. ~20 mbar and bring thermal store up to working temperature (above 60°C). Read the differential pressure across the micromanometer ( $\Delta P$ ).
- If reading is outside the range – 0.13 to – 0.16 mbar, carefully remove the servo governor cap and adjust the value of  $\Delta P$  to – 0.13 ( $\pm 0.03$ ) mbar (i.e. the gas pressure is 0.13mbar less than the air sense pressure).
- Replace cap and tighten.
- Re-connect sense line tubing to valve.
- Check burner pressure is approximately 3.8 to 4.4 mbar (140) or 4.8 to 5.5 mbar (155x). NB The longer the flue system the lower will be the expected pressure. Very low values e.g. 3.0 mbar, indicate an obstruction in the air supply; a high pressure e.g. >6.0 mbar indicates a blockage in the flue pipe or sump - see fault finder chart on page 12. In case of difficulty, consult The Technical Helpline 08706 049049.

Fig. 13.4 S.I.T. SIGMA 848 AIR/GAS RATIO VALVE

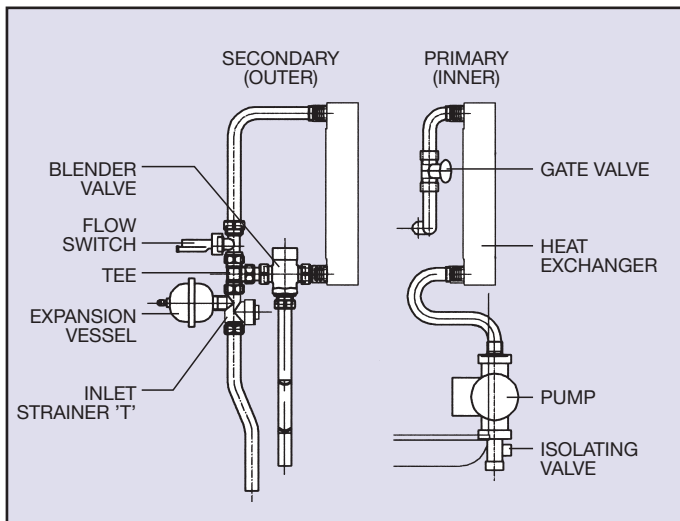




## DHW heat exchanger (H/E)

The H/E, blending valve, flow-switch tee and the strainer fitting can be removed from the boiler as a sub-assembly for ease of working.

- 1 Refer to General above.
- 2 Turn off mains water supply (remove strainer cap to drain if necessary).
- 3 Isolate primary side of H/E by closing the gate valve near the top of the H/E, and closing isolation valve below pump. Drain via pump bleed screw if necessary.
- 4 Disengage flow-switch from the tee fitting by loosening union nut.
- 5 Loosen the compression nuts **below** the strainer and blending valve and **above** the gate valve and pump. Lift H/E sub-assembly away from the boiler.
- 6 Separate the pipework from the H/E by removing the M5 nuts and the retaining plates. **NB** Top and bottom plates differ slightly.
- 8 The H/E and/or blending valve can now be replaced. **NB** Ensure that the O-ring joints on the H/E connections are kept clean. Do not allow oil to come into contact with the O-rings.
- 9 Check and adjust mini-expansion pre-charge pressure to 4.0 to 5.0 bar and clean strainer element before reassembling in reverse order. **NB** Ensure that the flow switch is replaced and the arrow pointing upwards and the 'flats' in line with the pipework.
- 10 When replacing expansion vessel, ensure it seals on washer within socket. Any sealant must be approved for use with potable water.



### Thermostats – Control & Cold Start Fig.12.1

- a Refer to General above.
- b Disconnect the two thermostat leads.
- c Remove the clip and phial from the pocket.
- d Remove the two retaining screws holding the thermostat housing, note the routing of the capillary tubing and remove.
- e Carefully replace the new capillary tubing and phial ensuring that the phial is secured with the spring clip. Note: Do not bend capillary tubing to a radius of less than 20mm.
- f Hold thermostat housing in position and replace retaining screws. Turn spindle fully clockwise (Control 'stat only)
- g Reconnect electrical leads.

### Overheat and Limit Thermostat Fig.12.2

- a Refer to General above.
- b Disconnect the two leads.
- c Remove clip and phial from the pocket.
- d Remove the retaining nut holding thermostat housing, note the routing of the capillary tubing and remove.

- e Carefully replace the new capillary tubing and phial, ensuring the latter is retained with the spring clip.
- f Hold thermostat in position and replace retaining nut. Reconnect leads.

### Programmer Fig.12.2

- a Refer to General. Remove switch panel.
- b Disconnect leads from programmer noting relative position of colour coded wires.
- c Working from rear of switch panel, remove two 4BA screws and washers and remove programmer.
- d Replace in reverse order ensuring the leads are correctly connected – see wiring diagram Fig 10.2 – and re-fit switch panel.
- e Before restarting the appliance, switch on the programmer battery by moving the slider switch on rear of programmer body to the right (when facing appliance).  
Note: The programmer is fitted with a long-life lithium battery, which should only be replaced by suitably qualified personnel. A discharged battery should be disposed of through a registered professional agency for waste material.
- f Set new programmer to customer's requirements.

### Relay Fig.12.2

- a Refer to General above
- b Remove one M4 screw and loosen the other. Relay can now be removed and leads transferred.

### EMC Filter Fig.12.1

- a Refer to General above
- b Remove both fixing screws. Release wiring between filter and both terminal blocks.
- c Replace filter. Reconnect wiring (including earth lead) and **MAINTAIN CORRECT LINE/NEUTRAL POLARITY** See Fig. 10.1

## Sealed system models only

### Safety Relief Valve Fig.12.1

- a Refer to General above
- b Loosen cap on automatic air vent and drain approx. 0.5 litre out of thermal store. Unscrew nut on discharge pipe and nut on pressure gauge fitting.
- c Loosen both M4 grub screw (2mm Hex-Key) in socket and pull valve clear of socket.
- d Refill system – see Section 12.

### Automatic Air Vent Fig.12.1

- a Refer to General above
- b Release pressure within primary system and drain approx. 0.5 litre out of thermal store. Body of vent can now be unscrewed.
- c Replace and refill system – see Section 12.

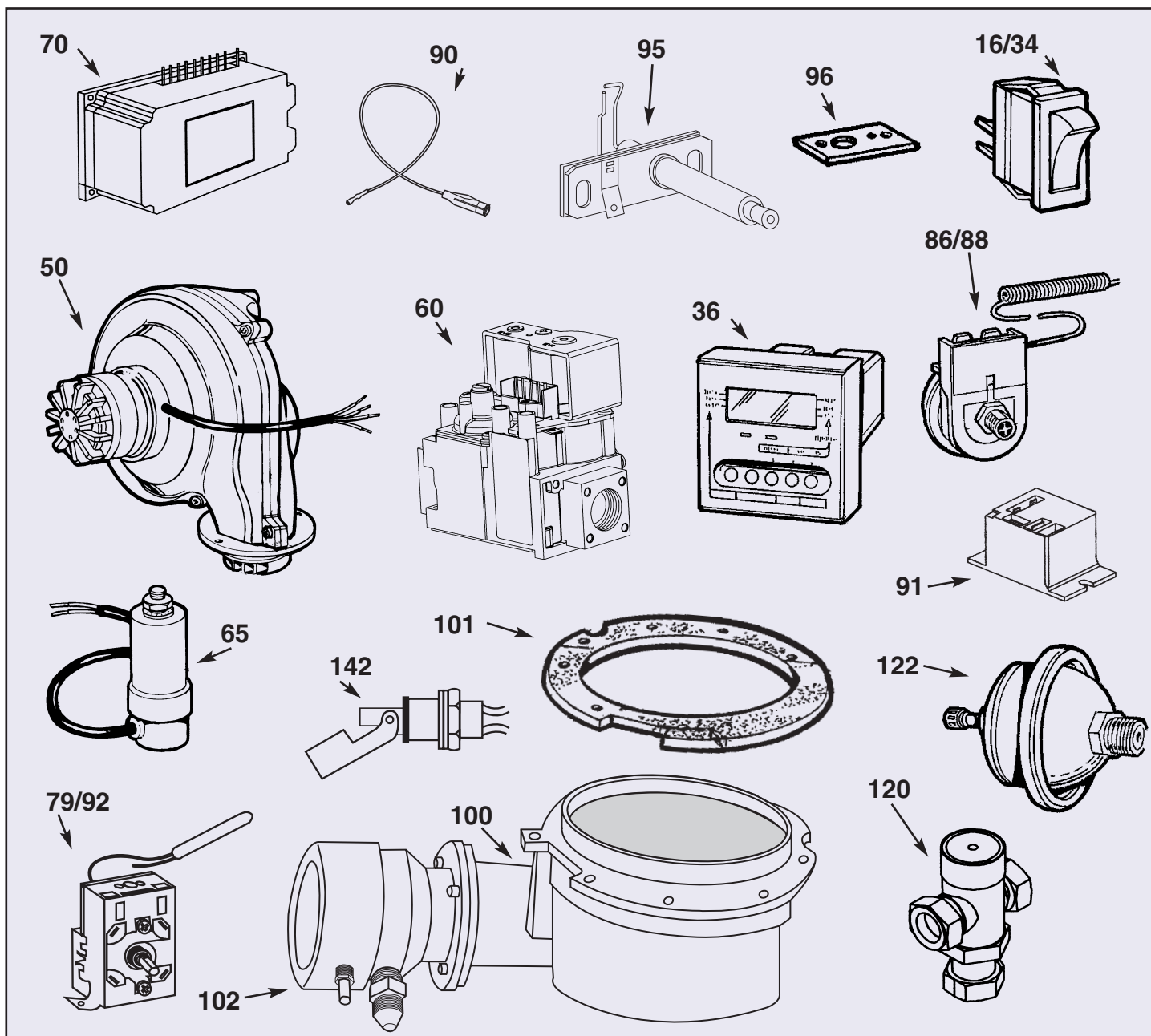
### Low Water Switch Fig.12.1

- a Refer to General Above
- b Release wires at RH terminal block
- c Reduce pressure and drain approx 0.5 litre out of thermal store and remove outer flange (6 screws).
- d Unscrew large plastic nut and remove switch.
- e **IMPORTANT** – When fitting new switch it is essential to keep 'crocodile' float hinge horizontal so that float can drop. Use a small adjustable spanner to hold flats on body in a vertical plane whilst nut and grommet are being re-tightened. **DO NOT OVER-TIGHTEN LARGE NUT – HAND TIGHT + 1 FLAT IS RECOMMENDED.**
- f Re-connect wires, refill system – see Section 12 – and test for operation and leak tightness.

### Pressure Gauge

- a Refer to General above
- b Release pressure within primary system.
- c Unscrew nut retaining capillary tube to safety relief valve.
- d Remove gauge from panel by squeezing lugs on gauge body
- e Fit new gauge ensuring that capillary tube is routed well away from electrical connections.
- f Refill system – see Section 12.

## SHORT LIST OF SPARE PARTS



Key Number	Part Number	Old Part Number	Description	GC Number
40/96/101	P656		Service Gasket Set	E39 647
16	P512		Rocker Switch (on-off position) Arco C1400 AB	387 154
34	P513		Rocker Switch (3 position) Arco-electric C1420 AB	387 155
36	P4231		Programmer – 7 Day Electronic – dark grey	E39 668
40	P765	P378	Flue Collector/Sump Seal	E39 670
50	P719	P504	Blower (c/w O-ring) G2E- 120	387 145
60	P742	P179	Gas Valve Sigma 848	E71 131
65	P503		Capacitor – Ducati 16.15.67 1.5mfd	387 144
70	P769	P678	Ignition controller ASS 0569G04D	E11 – 861
79	P784	P638	Thermostat Ranco P1338	378 976
86	P481		Thermostat Overheat Ranco LM7 – P5040	371 529
88	P753	P639	Thermostat Limit Ranco LM7 – P5060	378 797
90	P747	P625	HT Ignition Lead and Sleeving	298 238
91	P759	P693	Relay 691-21242-240	E71 134
92	P783	P616	Thermostat, Cold Start – Ranco K36	378 937
95	P774		Ignition Electrode c/w Gasket	298 240
96	P510		Ignition Electrode Gasket	298 030
100	P089		Burner Head (c/w gasket)	298 243
101	P507		Burner Gasket	298 027
102	P701		Injector Module Assembly	298 262
120	P757	P665	Thermostatic Blending Valve	E11 883
122	P732	P527	Mini Expansion Vessel	298 035
123	P746	P3246	Flow Switch Assembly c/w Relay	E39 690
136	P532		C.H. Pump WSP Gold	298 107
137	P785	P646	Heat Exchanger Pump CP51	378 962
142	P110		Water Level Switch	298 260

# 17. INSTALLATION INSTRUCTIONS FOR EXTENDED BALANCED FLUE SYSTEMS

## Installing Terminal Assembly

**Note: The flue terminal must be installed horizontally.**

- Mark the centre of the 140mm (5½ inch) diameter hole and core drill.  
Note: If the wall is clad with a combustible material an additional 25mm wide area must be removed around liner.  
Measure the wall thickness and cut the liner to this length. Cut opposite end to lugs.
- Fit the liner through the 140mm diameter hole, lugs inside, and make good internal and external rendering. The latter may be done with arm extended through liner.  
Note: Ensure lugs are either vertical or horizontal and avoid filling threads in lugs with mortar.
- Mark wall thickness measurement on terminal air/flue pipes using datum 'A' 'A' shown in Fig. 17.1. Fix liner closure plate on to the pipes at this length using the clamp attached. Avoid crushing pipes with clamp. If either pipe requires cutting to length (eg to allow bends to be fitted) do this now.
- Push flue terminal assembly into liner. Secure terminal by fixing plate to liner using the screws supplied.

## Routeing of Air/Flue Pipes

For flue and air pipes leaving the boiler vertically, refer to the plan view in Fig. 17.7 (especially when planning to first fix the extended pipes).

- Measure distances of flue pipe runs and note as a guide to cutting pipes. The maximum length of each air/flue pipe run must not exceed 5.0m (including a Horizontal BF Terminal) if the maximum of 4 air pipe bends and 3 flue pipe bends is used – see Fig.17.2. There is no minimum length.  
If fewer bends are used between the appliance and the flue terminal, then the maximum length of straight pipe can be increased if required – see table below.  
Any exhaust flue pipe accessible to occupants of the dwelling must be covered with protective ducts – Part No. P360 is suitable.  
The flue terminal assembly and the (hot) exhaust products flue pipe must not be closer than 25mm (1") to combustible material. If the flue pipes are run through a timber wall or cupboard, or via a roof space with wooden rafters; ENSURE A 25mm GAP IS LEFT AROUND THE EXHAUST FLUE PIPE; OR EXTEND THE PROTECTIVE DUCT.

## Preparing Appliance & Protective Duct

- See Fig. 17.3. Slip a worm drive clip over both ends of flexible inlet duct. Push one end of the duct over the spigot on fan inlet and secure with clip.  
If flue pipework leaves appliance vertically, remove 90° elbow from flue pipe and engage plain end with flexible duct. Secure with worm drive clip.  
Insert flue pipe extension adaptor P338 into flue pipe socket on boiler. Re-fit rear box (This can not be fitted after vertical flue pipe has been fixed).

MAX. No OF BENDS (90° or 135°)			MAX. PIPE LENGTH
Air Inlet	Flue	Total	Air/Flue inc. Terminal.
4	3	7	5.0m each
3	2	5	7.0m each
2	1	3	9.0m each

Note: If air/flue pipes run horizontally leftwards, align bends and fit the first pipe length to the left, before securing clamp with 70mm long screw.

- Move appliance to its final position. Note: Fixing the first stage of the open vent pipe and F & E pipe is recommended next (See section 11 of main instructions).
- With appliance in position, determine length of protective duct required and if necessary adjust standard length to suit – See Fig 17.5. Fix duct to wall with screws and plugs provided. Temporarily set aside duct cover.

Fig. 17.1 Extended flue terminal assembly

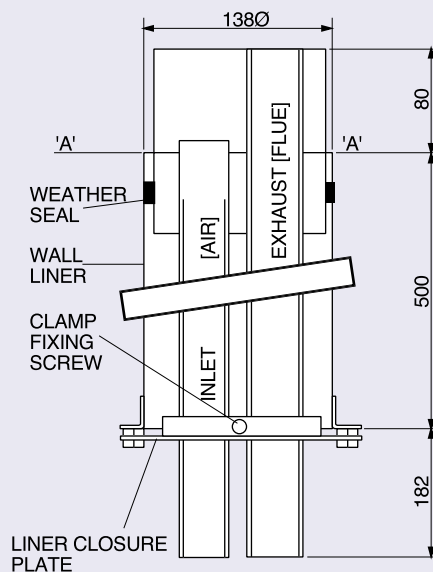
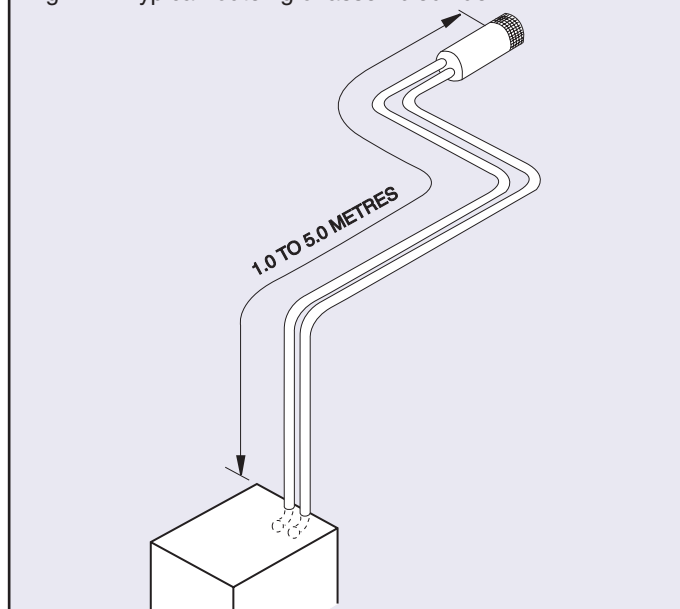


Fig. 17.2 Typical routeing of assembled flue



## Flue Pipe Insulation

When the flue pipe length exceeds 3m, the flue should be lagged. The insulation used must be non-combustible and suitable for operating at temperatures up to 200°C. Class 'O' foil backed glass wool or mineral wool duct/pipe insulation wrapped tightly around the flue pipe only will be satisfactory.

## Assembling Air/Flue Pipes

Any route can be taken by the air/flue pipes

Note: THE FLUE PIPES MUST BE ASSEMBLED WITH THE PLAIN END OF PIPE (OR BEND) NEAREST THE APPLIANCE AND THE FEMALE SOCKET END FURTHEST FROM APPLIANCE.

ALWAYS ADJUST LENGTH OF PIPES BY CUTTING PLAIN END. REMOVE BURRS INSIDE AND OUTSIDE.

KEEP THE OUTSIDE OF FLUE PIPES CLEAN AND FREE OF OIL OR GREASE.

THE PIPE SUPPORTS AND CLIPS MAINTAIN A SPACING OF 63mm BETWEEN THE PIPE CENTRES – SEE FIG. 17.6. THUS INNER PIPE(S) OF STACKED RUNS ARE 63mm OR 126mm SHORTER THAN OTHER PIPE DEPENDING ON THE NEXT CHANGE OF DIRECTION.

Fig. 17.3

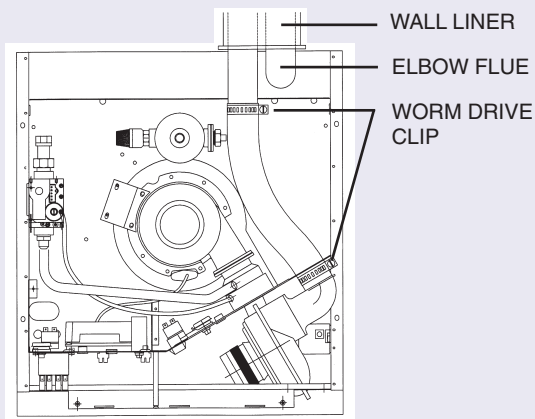
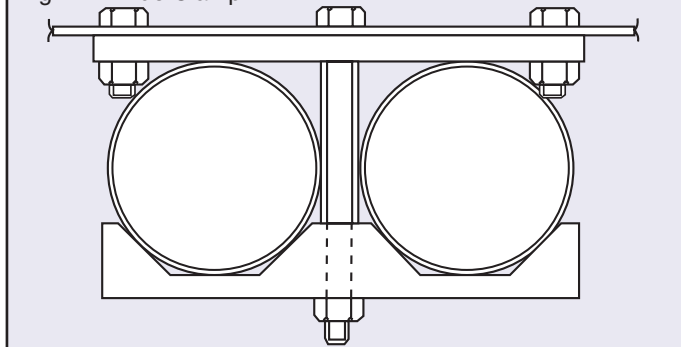


Fig. 17.4 Flue Clamp



- Measure and cut the first pair of flue pipes away from the appliance (within duct). Smear a film of silicone sealant (approx. 0.5mm thick) around mating surface of pipes. Push pipes firmly into the sockets using a twisting motion to spread sealant.
  - Measure and cut next pair of air/flue pipes. Slip pipe supports along pipes as required before engaging pipes with socket of preceding pipes or bends.
  - Smear a film of sealant (approx 0.5mm thick) around the male pipe surfaces before pushing pipes firmly together. Select the duct bend (if required) and insert pipe bends. Push plain end of pipe bends into pipe sockets. Repeat above procedure to reach terminal. Ensure that air inlet and flue gas connections are correctly made as indicated in Fig 17.1.
  - Fix pipe supports to masonry or woodwork so that flue pipes are held securely in position.
  - Check especially that every joint within the duct is thoroughly sealed before fitting the duct cover.
- NOW REFER BACK TO MAIN INSTALLATION INSTRUCTIONS ON PAGE 7.

Fig. 17.5  
Protective outer duct

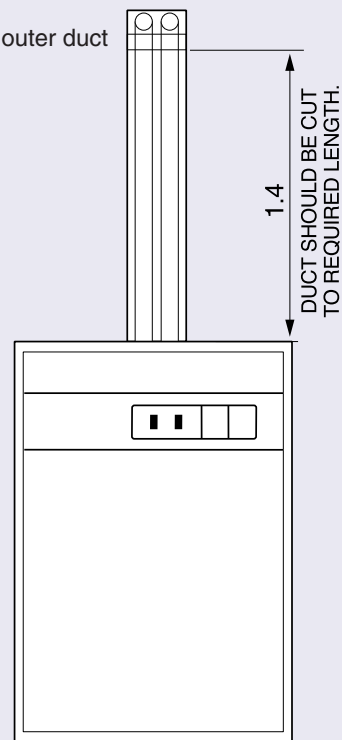


Fig. 17.6

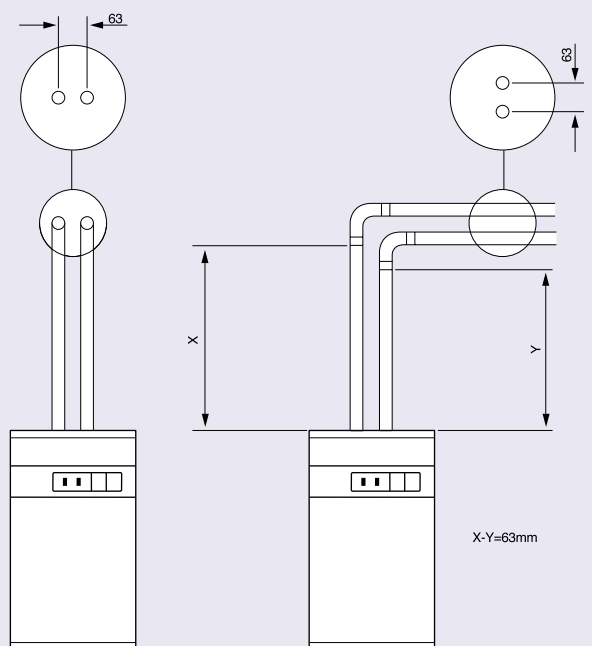
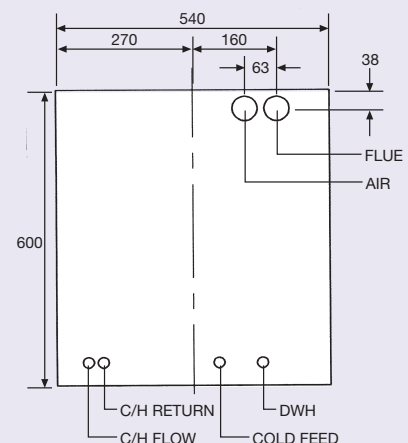
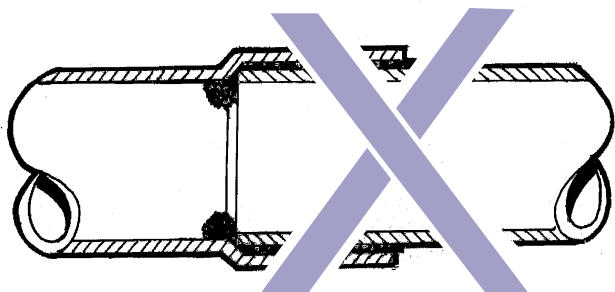


Fig. 17.7

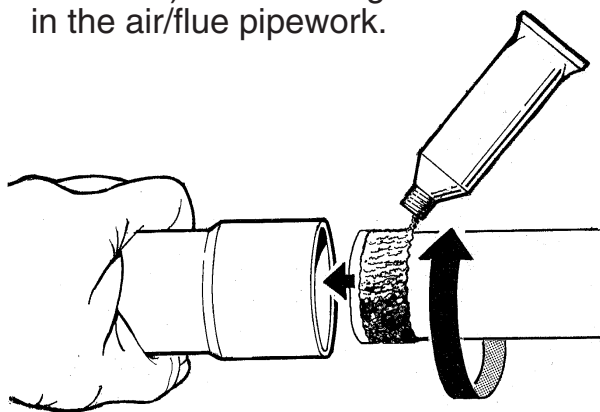


# IMPORTANT – NOTICE TO INSTALLERS

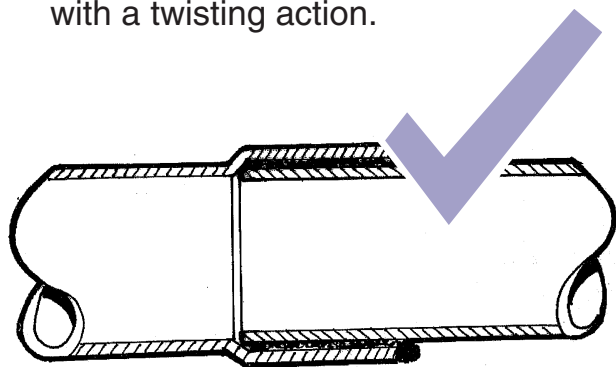
The sockets in Powermax Air/Flue pipes are manufactured to close tolerances to enable secure joints to be made with minimum use of sealant.



- Use of excessive sealant within the socket must be avoided. Otherwise sealant may be pushed in front of the pipe (especially one that is not deburred) thus causing a restriction in the air/flue pipework.



- Experience has shown that an effective technique is to smear silicone sealant around the **OUTSIDE** of a **DEBURRED** pipe end which is then inserted into the socket with a twisting action.



Restricting the flue or air supply can impair the operation of the Powermax appliance and invalidate the manufacturer's warranty.

**Refer to Section 17 of Installation Instructions before assembling extended flues.**

## EXTENDED FLUE COMPONENTS

Part No:		Description
P300		Air/Flue pipe 3.0m socketed one end
P354		Air/Flue pipe 2.0m socketed one end
P355		Air/Flue pipe 1.5m socketed one end
P356		Air/Flue pipe 1.0m socketed one end
P357		Air/Flue pipe 0.5m socketed one end
P369		Air/Flue Offset 400 x 42 crs.
P382		Slip Coupling (Kit)
P338		Flue Outlet Adaptor (155 Only)
P385		Bend 125°
P358		Bend 90°
P359		Bend 135°
P320		Bend 170°
P360		Flue duct assembly c/w clips and fasteners
P361		Pipe support, horizontal
P362		Pipe support, vertical
P363		Clamp Assembly
P366		Liner Closure Plate Assembly
P337		Long Wall Liner 800mm
P372		Front/Back Duct Bend Assembly Kit
P373		Left/Right Duct Bend Assembly Kit
P370		Duct termination assembly
P389		Wall Plate
P390		Flue Brackets (Set of 6)
P386		Mini Terminal
P209		Mini Terminal Guard
P388		Mini Liner
P315		Silicone Sealant - tube



## OPTIONAL IMMERSION HEATER

This heater is rated 3kW at 240V~ only and must be wired to a totally separate, suitably rated mains supply. THERE MUST BE NO INTERCONNECTION WITH THE WIRING TO THE BOILER.

**Warning:** THIS HEATER MUST BE EARTHED. IT SHOULD BE INSTALLED IN ACCORDANCE WITH THE CURRENT IEE WIRING REGULATIONS AND BE WIRED THROUGH A DOUBLE POLE ISOLATING SWITCH OR A SUITABLE CONTROLLER. THE HEATER MUST BE FULLY IMMERSSED AND NOT BE SWITCHED ON DRY. SECURE CABLE GRIP USING ONLY SCREWS PROVIDED.

THIS IMMERSION HEATER HAS A SPECIAL 1<sup>3</sup>/<sub>4</sub>" BSP THREAD. **IT IS NOT** INTERCHANGEABLE WITH STANDARD IMMERSION HEATERS. USE ONLY THE 'O' RING SEAL PROVIDED. THE USE OF ANY SEALANT ON THE 'O' RING IS NOT RECOMMENDED.

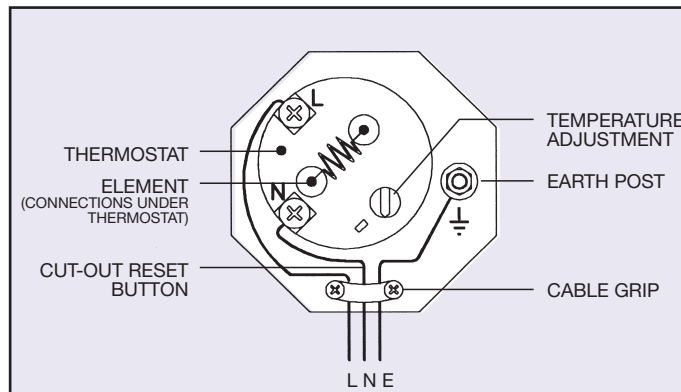
THE HEATER MUST BE WIRED WITH 85°C RUBBER INSULATED HOFR SHEATHED FLEXIBLE CABLE 1.5 mm<sup>2</sup> COMPLYING WITH BS 6141 TABLE 8. THE OUTER SHEATHING SHOULD BE SECURED USING THE CABLE GRIP FITTED AND ROUTED AWAY FROM THE BOILER THROUGH ONE OF THE GROMMETS PROVIDED.

The heater is controlled by the rod type thermostat fitted. A temperature setting of 65°C is recommended and is factory pre-set.

The thermostat incorporates a thermal cut-out which cuts the power to the immersion heater in an overheat situation. Should this operate it can be manually reset by pressing the black button to the side of the temperature adjustment dial.

NOTE: Investigate the cause of the overheating prior to resetting.

Should the immersion heater require replacement use only the Powermax spare part P3223.



## FIRST FIX PLUMBING GUIDE

