Guide to panel removal

Transit screw

Auto vent access

Main power supply cable entry

Front panel (2 screws)

Lifting and plumbing access each side

External controls (and immersion heater cable entry)

Plumbing access each side

Plinth (4 screws)

Top panel

Upper front panel and retaining screw

Main power supply cable entry

External controls cable entry

Lifting and plumbing access each side

Lower front panel (2 screws)

Plinth (4 screws)
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.

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

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.
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 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.
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 Rp1½ (½ 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 cupoard 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.

- a The compartment must be ventilated at high and low level in accordance with BS5440:Part 2 and Section 7 of these instructions.
- b 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.
- c 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.
- d 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.
- e The flue pipe must be protected by the ducting supplied by Baxi UK or by another no less suitable non-combustible enclosure.
- f 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.

### 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**

![Balanced Flue Terminal](image)

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

### Extended Balanced Flue Systems

**Fig. 6.3**

Kits are supplied as follows with components also available separately:

<table>
<thead>
<tr>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P261</td>
<td>1m Sideways horizontal balanced flue</td>
</tr>
<tr>
<td>P263</td>
<td>3m Extended horizontal balanced flue</td>
</tr>
<tr>
<td>P265</td>
<td>5m Extended horizontal balanced flue</td>
</tr>
<tr>
<td>P267</td>
<td>7m Extended horizontal balanced flue</td>
</tr>
<tr>
<td>P269</td>
<td>9m Extended horizontal balanced flue</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>MAX. No OF BENDS (90° OR 135°)</th>
<th>MAXIMUM PIPE LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Inlet</td>
<td>Exhaust Flue</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### 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 160cm² (25in²).

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.

### 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.

---

**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.

**Fig. 5.1**

![Flue Pipe Insulation](image)

**NB:**

- **M:** Between vertical terminal and wall 300mm
- **L:** Between ridge terminals (if combustion air is drawn from second terminal) 300mm
- **K:** Horizontally from a terminal on the same wall 300mm
- **J:** Vertically from a terminal on the same wall 300mm
- **H:** From a surface facing a terminal 600mm
- **I:** From a terminal facing a terminal, or from an opening in a car port into dwelling (not illustrated) 1200mm
- **G:** Above ground or balcony level 300mm
- **F:** From internal or external corners 300mm
- **E:** From above ground or balcony level 300mm
- **D:** Below balconies or car port roof (not illustrated) 200mm
- **C:** Below eaves 200mm
- **B:** Below gutters, soil pipes or drain pipes 75mm
- **A:** Directly below an openable window or other opening, e.g. an air brick 300mm

### Step-by-step instructions are given in Section 9.

---

**Terminal position**

- **Air Inlet**
- **Exhaust Flue**
- **Total**
- **Air/Flue inc. Horizontal Trmnl.**

<table>
<thead>
<tr>
<th>MAX</th>
<th>No OF BENDS</th>
<th>MAXIMUM PIPE LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
**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

**Vertical RS Flue System**

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

**FLUEING RESTRICTIONS – RIDGE TILE TERMINAL**

<table>
<thead>
<tr>
<th>Application</th>
<th>Components</th>
<th>Number of Bends 90° or 135°</th>
<th>Pipe Length (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Kit</td>
<td>Air Inlet</td>
<td>2</td>
<td>1.5 minimum</td>
</tr>
<tr>
<td></td>
<td>Flue</td>
<td>3</td>
<td>1.5 minimum</td>
</tr>
<tr>
<td>Extended Inlet &amp; Flue</td>
<td>Air Inlet</td>
<td>2-3</td>
<td>1.5 to 4.0</td>
</tr>
<tr>
<td></td>
<td>Flue</td>
<td>3 max</td>
<td>1.5 to 7.0</td>
</tr>
</tbody>
</table>

* 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.

**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.

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

<table>
<thead>
<tr>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P271</td>
<td>1m Mini Terminal BF kit*</td>
</tr>
<tr>
<td>P273</td>
<td>3m Mini Terminal BF kit</td>
</tr>
<tr>
<td>P275</td>
<td>5m Mini Terminal BF kit</td>
</tr>
<tr>
<td>P277</td>
<td>7m Mini Terminal BF kit</td>
</tr>
<tr>
<td>P279</td>
<td>9m Mini Terminal BF kit</td>
</tr>
</tbody>
</table>

* 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

a. When the appliance is installed in a room or habitable internal space, there are no specific ventilation requirements.

b. 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

<table>
<thead>
<tr>
<th>Position of opening</th>
<th>Ventilated to</th>
<th>Area of each vent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High and Low Level</td>
<td>Room</td>
<td>54cm² 60cm²</td>
</tr>
<tr>
<td>High and Low Level</td>
<td>Outside</td>
<td>27cm² 30cm²</td>
</tr>
</tbody>
</table>

8. TECHNICAL DATA

<table>
<thead>
<tr>
<th>Category</th>
<th>140</th>
<th>155x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Output, kW gross</td>
<td>14.0</td>
<td>16.4</td>
</tr>
<tr>
<td>Nominal Input, kW gross</td>
<td>17.1</td>
<td>20.0</td>
</tr>
<tr>
<td>Thermal store capacity (primary water) litres</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>DHW Temperature °C</td>
<td>55-60 maximum</td>
<td>18</td>
</tr>
<tr>
<td>DHW Flow Rate, litres per minute (maximum)</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Working Pressures, bar:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary SS models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary OV models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Relief Valve, bar:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (empty) kg</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>Weight (full) kg</td>
<td>155</td>
<td>185</td>
</tr>
<tr>
<td>Connections:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH Flow/Return</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHW Inlet/Outlet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Relief</td>
<td></td>
<td></td>
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<tr>
<td>Electricity Supply:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable Entry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions, mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>1100</td>
<td>1260</td>
</tr>
<tr>
<td>Width</td>
<td>540</td>
<td>600</td>
</tr>
<tr>
<td>Depth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearances for installation and servicing:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sides</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base and back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flueing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flue Types</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bal. Flue Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini Flue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flue/Air Pipes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Flue Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended Flues</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

1. 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.

2. 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.

3. 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.

4. 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 rings
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.
10. ELECTRICAL CONNECTION TO THE APPLIANCE

Wiring must comply with the current IEE Wiring Regulations. The supply cable must be 3-core 0.75 sq.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. 10.1 Powermax 140 / 155x wiring diagram

Fig. 10.2 Wiring diagram for remote programmer models.

Fig. 10.3 Wiring diagram for 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 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.
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.

<table>
<thead>
<tr>
<th>Expansion Vessel</th>
<th>Powermax</th>
<th>Radiators</th>
<th>Pipework</th>
<th>Total System Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>80</td>
<td>100</td>
<td>97</td>
<td>197 max</td>
</tr>
<tr>
<td>16</td>
<td>80</td>
<td>100</td>
<td>162</td>
<td>262 max</td>
</tr>
<tr>
<td>18</td>
<td>80</td>
<td>100</td>
<td>195</td>
<td>295 max</td>
</tr>
</tbody>
</table>

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 – stop valve – flexible hose – double check valve – boiler primary circuit.

NB: If the stop valve 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 BetzDearbom and Fernox. Instructions for use are supplied with these products.

Once the system has been fully flushed, complete the relevant section in the log book.
NB: Water level switch is omitted on Open Vent models.
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.

b. Switch supply electricity on at the isolating switch and observe orange neon on control panel indicating the mains supply is live.

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.

c. 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.

d. Green neon indicates the burner is operating.

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

Handing Over to the User

a. Explain the appliance controls.
b. Give guidance if the system is to be shut down for long periods when freezing is possible.
c. Advise that the appliance should be serviced regularly.
d. 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.
e. Explain how to re-start appliance if red neon indicates lock-out.
f. Hand over the User’s Instructions, Installation Instructions and completed log book to the user.

Fig. 12.2

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

Fig. 12.3

GAS VALVE  
GAS SERVICE COCK  
ON/OFF SCREW

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.

b. Check that any connected room thermostat is calling for heat.
c. 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.
d. 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.
e. 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.
f. 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 log book.
g. Measure hot water flow rate at bath tap (fully open) and record in log book.
h. Refit outer covers and plinth front in reverse order.

Fig. 12.4 Standard Switch Panel

WARNING: DISCONNECT ELECTRICITY BEFORE REMOVING COVERS

POWERMAX

Fig. 12.5 Programmer Switch Panel

WARNING: DISCONNECT ELECTRICITY BEFORE REMOVING COVER

POWERMAX
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.

Anually

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>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. <strong>Note:</strong> Hold injector with second 19mm AF spanner to prevent injector being disturbed. Swing pipe clear of burner.</td>
</tr>
<tr>
<td>b</td>
<td>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. <strong>Renew burner flange gasket.</strong></td>
</tr>
<tr>
<td>c</td>
<td>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.</td>
</tr>
<tr>
<td>d</td>
<td>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.</td>
</tr>
<tr>
<td>e</td>
<td>Reassemble in reverse order ensuring all 8 burner/fan screws are tight. Check that fan lead remains clear of motor after re-assembly. <strong>NB:</strong> Check tightness of burner screws again after boiler has operated for several minutes.</td>
</tr>
</tbody>
</table>

Every Second Year

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>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.</td>
</tr>
<tr>
<td>g</td>
<td>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.</td>
</tr>
<tr>
<td>h</td>
<td>Heat exchanger tubes can now be cleaned using a 28mm (11/8”) diameter brush. Remove sump ensuring it is clear of gauze in flue collector. Vacuum away deposits and clean sump prior to replacing. <strong>Note:</strong> Apply similar care when replacing sump, ensuring it is evenly retained. Check sump joint for soundness using an electronic ‘sniffer’ whilst boiler is operating.</td>
</tr>
<tr>
<td>i</td>
<td>Check that boiler and its controls are functioning correctly.</td>
</tr>
<tr>
<td>j</td>
<td>Remove HW mini expansion vessel and probe bladder using a blunt instrument. Replace if deflated, Part No. P527.</td>
</tr>
</tbody>
</table>

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:** 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 nutserts using the lid fixing screws.

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

Full Sequence Ignition Controller Fig. 12.1
a Refer to General above.
b Pull off H/T lead from connection at top of controller.
c Pull out the ‘Molex’ connector plug.
d Remove top screws, and remove controller.

HT Lead Fig. 12.1.
a Refer to General above.
b Disconnect lead at electrode and at ignition controller.

Burner Fig. 13.2
a Refer to General above.
b 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.
c 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.
d Check for soundness at gas supply pipe unions.

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

Spark Electrode Fig. 13.3.
a Refer to General and Burner above.
b. Remove burner/fan.
c 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.
d Replace burner using new gasket, and check operation of appliance.
e Check for soundness at gas supply pipe unions.

Fan Fig. 12.1 & 12.2
a Refer to General above.
b Disconnect fan leads from small terminal block.
c Remove screws retaining air inlet elbow. NB 2mm A/F hexagon key required.
d Remove two M4 screws and pull the fan gently forward.
e 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
a Refer to General above.
b 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.

Air/Gas (Solenoid) Valve Fig. 12.1 & 13.4
a Refer to General above.
b Disconnect gas service cock at the union and disconnect the outlet pipe at the union nut on flared fitting.
c Remove screw holding bracket. Disconnect the wiring leads and remove valve. Remove bracket.
d 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.
e 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.

i 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.

ii 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 (ΔP).

iii If reading is outside the range – 0.13 to – 0.16 mbar, carefully remove the servo governor cap and adjust the value of ΔP to – 0.13 (±.03) mbar (i.e. the gas pressure is 0.13mbar less than the air sense pressure).

iv Replace cap and tighten.
v Re-connect sense line tubing to valve.
vi Check burner pressure is approximately 3.8 to 4.4 mbar (140) or 4.8 to 5.5 mbar (155). 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.
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.
6. Lift H/E sub-assembly away from the boiler.
7. 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

- Refer to General above.
- Disconnect the two thermostat leads.
- Remove the clip and phial from the pocket.
- Remove the two retaining screws holding the thermostat housing, note the routing of the capillary tubing and remove.
- Carefully replace the new capillary tubing and phial, ensuring the latter is retained with the spring clip.
- Hold thermostat in position and replace retaining nut. Reconnect leads.

Programmer Fig.12.2

- Refer to General. Remove switch panel.
- Disconnect leads from programmer noting relative position of colour coded wires.
- Working from rear of switch panel, remove two 4BA screws and washers and remove programmer.
- Replace in reverse order ensuring the leads are correctly connected – see wiring diagram Fig 10.2 – and re-fit switch panel.
- 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.
- Set new programmer to customer’s requirements.

Relay Fig.12.2

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

EMC Filter Fig.12.1

- Refer to General above
- Remove both fixing screws. Release wiring between filter and both terminal blocks.
- 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

- Refer to General above
- 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.
- Loosen both M4 grub screw (2mm Hex-Key) in socket and pull valve clear of socket.
- Release pressure within primary system and drain approx. 0.5 litre out of thermal store. Body of vent can now be unscrewed.
- Replace and refill system – see Section 12.

Automatic Air Vent Fig.12.1

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

Low Water Switch Fig.12.1

- Refer to General Above
- Release wires at RH terminal block
- Reduce pressure and drain approx 0.5 litre out of thermal store and remove outer flange (6 screws).
- Unscrew large plastic nut and remove switch.
- IMPORTANT – When fitting new switch it is essential to keep ‘crocrode’ 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.
- Re-connect wires, refill system – see Section 12 – and test for operation and leak tightness.

Pressure Gauge

- Refer to General above
- Release pressure within primary system.
- Unscrew nut retaining capillary tube to safety relief valve.
- Remove gauge from panel by squeezing lugs on gauge body.
- Fit new gauge ensuring that capillary tube is routed well away from electrical connections.
- Reconnect electrical leads. Reconnect leads.
<table>
<thead>
<tr>
<th>Key Number</th>
<th>Part Number</th>
<th>Old Part Number</th>
<th>Description</th>
<th>GC Number</th>
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</thead>
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<tr>
<td>40/96/101</td>
<td>P656</td>
<td></td>
<td>Service Gasket Set</td>
<td>E39 647</td>
</tr>
<tr>
<td>16</td>
<td>P512</td>
<td></td>
<td>Rocker Switch (on-off position) Arco C1400 AB</td>
<td>387 154</td>
</tr>
<tr>
<td>34</td>
<td>P513</td>
<td></td>
<td>Rocker Switch (3 position) Arco-electric C1420 AB</td>
<td>387 155</td>
</tr>
<tr>
<td>36</td>
<td>P4231</td>
<td></td>
<td>Programmer – 7 Day Electronic – dark grey</td>
<td>E39 668</td>
</tr>
<tr>
<td>40</td>
<td>P765</td>
<td>P378</td>
<td>Flue Collector/Sump Seal</td>
<td>E39 670</td>
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<tr>
<td>50</td>
<td>P719</td>
<td>P504</td>
<td>Blower (c/w O-ring) G2E- 120</td>
<td>387 145</td>
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<td>60</td>
<td>P742</td>
<td>P179</td>
<td>Gas Valve Sigma 848</td>
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<td>65</td>
<td>P503</td>
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<td>Capacitor – Ducati 16.15.67 1.5mfd</td>
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<td>70</td>
<td>P769</td>
<td>P678</td>
<td>Ignition controller ASS 0569G04D</td>
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<td>P794</td>
<td>P638</td>
<td>Thermostat Ranco P1338</td>
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<td>Thermostat Overheat Ranco LM7 – P5040</td>
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<td>Thermostat Limit Ranco LM7 – P5060</td>
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<td>P747</td>
<td>P625</td>
<td>HT Ignition Lead and Sleevings</td>
<td>298 238</td>
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<tr>
<td>91</td>
<td>P759</td>
<td>P693</td>
<td>Relay 691-21242-240</td>
<td>E71 134</td>
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<td>92</td>
<td>P783</td>
<td>P616</td>
<td>Thermostat, Cold Start – Ranco K36</td>
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<td>95</td>
<td>P774</td>
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<td>Ignition Electrode c/w Gasket</td>
<td>298 240</td>
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<td>96</td>
<td>P510</td>
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<td>Ignition Electrode Gasket</td>
<td>298 030</td>
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<tr>
<td>100</td>
<td>P089</td>
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<td>Burner Head (c/w gasket)</td>
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<td>101</td>
<td>P507</td>
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<td>Burner Gasket</td>
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<td>102</td>
<td>P701</td>
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<td>Injector Module Assembly</td>
<td>298 262</td>
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<td>120</td>
<td>P757</td>
<td>P665</td>
<td>Thermostatic Blending Valve</td>
<td>E11 883</td>
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<td>122</td>
<td>P732</td>
<td>P527</td>
<td>Mini Expansion Vessel</td>
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<td>123</td>
<td>P746</td>
<td>P3246</td>
<td>Flow Switch Assembly c/w Relay</td>
<td>E39 690</td>
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<td>136</td>
<td>P532</td>
<td></td>
<td>C.H. Pump WSP Gold</td>
<td>298 107</td>
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<tr>
<td>137</td>
<td>P785</td>
<td>P646</td>
<td>Heat Exchanger Pump CP51</td>
<td>378 962</td>
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<tr>
<td>142</td>
<td>P110</td>
<td></td>
<td>Water Level Switch</td>
<td>298 260</td>
</tr>
</tbody>
</table>
17. INSTALLATION INSTRUCTIONS FOR EXTENDED BALANCED FLUE SYSTEMS

Installing Terminal Assembly

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

a. Mark the centre of the 140mm (5 1/2 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.

b. 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.

c. Mark wall thickness measurement on terminal air/flue pipes using datum ‘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.

d. 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 occupiers 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).

<table>
<thead>
<tr>
<th>MAX. No OF BENDS (90° or 135°)</th>
<th>MAX. PIPE LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Inlet</td>
<td>Flue</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

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 FURTHER 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.

a 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.
b 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.
c 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.
d Fix pipe supports to masonry or woodwork so that flue pipes are held securely in position.
e 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.
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

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P300</td>
<td>Air/Flue pipe 3.0m socketed one end</td>
</tr>
<tr>
<td>P354</td>
<td>Air/Flue pipe 2.0m socketed one end</td>
</tr>
<tr>
<td>P355</td>
<td>Air/Flue pipe 1.5m socketed one end</td>
</tr>
<tr>
<td>P356</td>
<td>Air/Flue pipe 1.0m socketed one end</td>
</tr>
<tr>
<td>P357</td>
<td>Air/Flue pipe 0.5m socketed one end</td>
</tr>
<tr>
<td>P369</td>
<td>Air/Flue Offset 400 x 42 crs.</td>
</tr>
<tr>
<td>P382</td>
<td>Slip Coupling (Kit)</td>
</tr>
<tr>
<td>P338</td>
<td>Flue Outlet Adaptor (155 Only)</td>
</tr>
<tr>
<td>P385</td>
<td>Bend 125°</td>
</tr>
<tr>
<td>P358</td>
<td>Bend 90°</td>
</tr>
<tr>
<td>P359</td>
<td>Bend 135°</td>
</tr>
<tr>
<td>P320</td>
<td>Bend 170°</td>
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<tr>
<td>P360</td>
<td>Flue duct assembly c/w clips and fasteners</td>
</tr>
<tr>
<td>P361</td>
<td>Pipe support, horizontal</td>
</tr>
<tr>
<td>P362</td>
<td>Pipe support, vertical</td>
</tr>
<tr>
<td>P363</td>
<td>Clamp Assembly</td>
</tr>
<tr>
<td>P366</td>
<td>Liner Closure Plate Assembly</td>
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<tr>
<td>P337</td>
<td>Long Wall Liner 800mm</td>
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<td>P372</td>
<td>Front/Back Duct Bend Assembly Kit</td>
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<td>P373</td>
<td>Left/Right Duct Bend Assembly Kit</td>
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<td>P370</td>
<td>Duct termination assembly</td>
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<td>P389</td>
<td>Wall Plate</td>
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<td>P390</td>
<td>Flue Brackets (Set of 6)</td>
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<td>P386</td>
<td>Mini Terminal</td>
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<td>P209</td>
<td>Mini Terminal Guard</td>
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<tr>
<td>P388</td>
<td>Mini Liner</td>
</tr>
<tr>
<td>P315</td>
<td>Silicone Sealant - tube</td>
</tr>
</tbody>
</table>
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 IMMERSED AND NOT BE SWITCHED ON DRY. SECURE CABLE GRIP USING ONLY SCREWS PROVIDED.

THIS IMMERSION HEATER HAS A SPECIAL 1¾" 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 H0FR SHEATHED FLEXIBLE CABLE 1.5 mm² 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.

FIRST FIX PLUMBING GUIDE

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.