

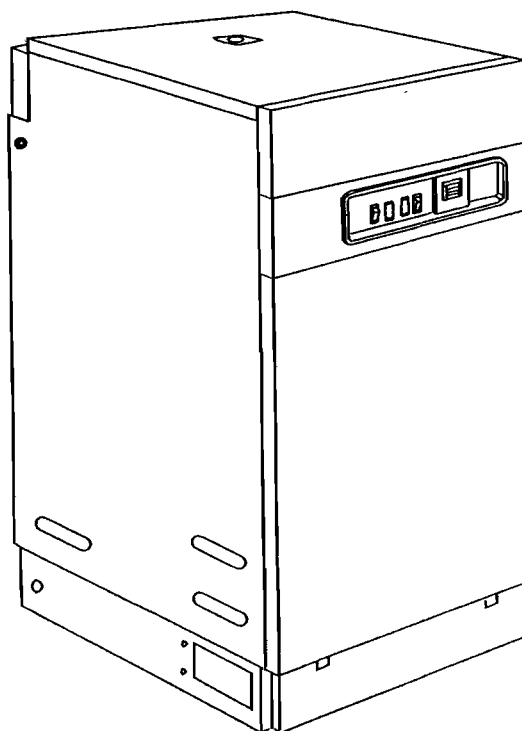
INSTALLATION AND SERVICING INSTRUCTIONS

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

155

RANGE POWERMAX

HIGH PERFORMANCE HOT WATER AND HEATING



CE

POWERMAX 155 OPEN VENT MODELS :

		GC No.
OV 155	STANDARD MODEL	41 389 06
OV 155 P	WITH FITTED PUMP	41 389 07
OV 155 CP	WITH FITTED PUMP & PROGRAMMER	41 389 08

POWERMAX 155 SEALED SYSTEM MODELS :

		GC No.
SS 155	STANDARD MODEL	41 389 03
SS 155 P	WITH FITTED PUMP	41 389 04
SS 155 CP	WITH FITTED PUMP & PROGRAMMER	41 389 05

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

RANGE
POWERMAX

is a Division of RSA Waterheating Limited.

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 & USE) REGULATIONS 1998. THIS APPLIANCE REQUIRES ANNUAL CHECKING OR SERVICING AND THIS SHOULD BE ENTRUSTED TO A CORGI REGISTERED INSTALLER.

POWERMAX - THE ULTIMATE COMBINATION

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	8
Wiring Diagrams	9
11. Water Supply	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 Balance Flue	20-21
18. List of Extended Flue Components	22

1. SAFETY REGULATIONS

This appliance must be installed by a competent person in accordance with the Gas Safety Regulations. 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 1994, 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 1:1990

Specification for installation of flues

BS5440:Part 2:1989

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



RSA Waterheating Limited is a member of the Benchmark initiative and fully supports 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' is a combination boiler 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 within the store.

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. There is no pilot flame.

A small diameter twin pipe flue system has been designed for a length of up to 7.0 metres (including a balanced flue terminal) through which to draw inlet air and expel exhaust gases. The terminal suits a wall thickness of 200mm to 500mm.

This boiler can be used in any of three ways:

- Combined central heating boiler and domestic waterheater.
- As a stand-alone high pressure, high-flow waterheater.
- As a Central Heating Boiler
Appliance Output : 15.5kW
(53.000Btu/h).

Domestic Hot Water

Hot water is delivered via a blending valve which is preset to 55°C - 60°C for domestic use.

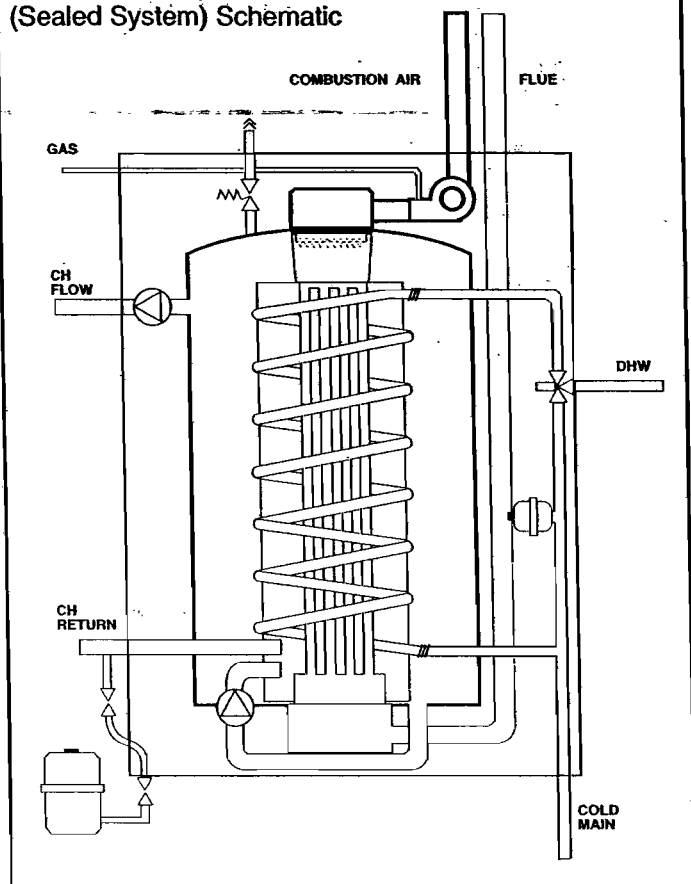
Operation

The appliance thermostat maintains the thermal store at 82°C and this stored water is circulated through radiators via a normal domestic pump which can be fitted within the casing. Provision is made in the terminal block for connecting the pump and room thermostat. 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 of Powermax 155 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.



3. NATURAL GAS SUPPLY

The Powermax 155 requires a natural gas supply of 1.85 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.

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 standard appliance or 220W with the CH pump fitted.

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 Powermax when full of water - ie 190kg. 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.

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 RSA Waterheating or by another no less suitable non-combustible enclosure.
- When sited in a cupboard, 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:Part1. 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.

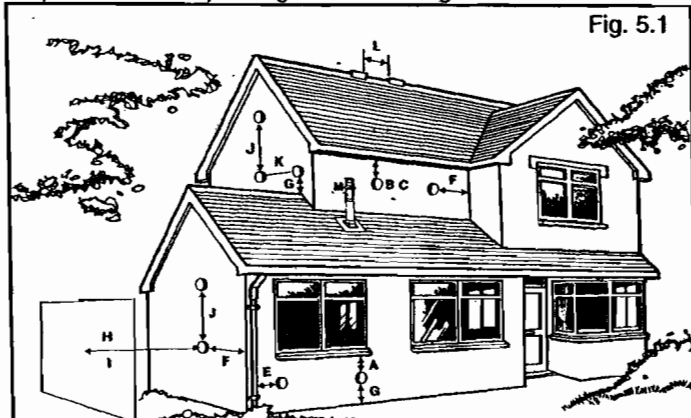
If the appliance is fitted under a ventilator or opening window, the terminal must be at least 300mm (12in) from any part of the window or ventilator, and in accordance with BS5440:Part 1.

Note: If this appliance is to be fitted into a timber framed building - consult British Gas publication Guide for Gas Installations in Timber Framed Housing (DM2) 2nd edition, or your local Gas Region.

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 IMI Waterheating Limited. 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.

Fig. 5.1



Terminal position

	Min. distance
A: Directly below an openable window or other opening, e.g. an air brick	300mm
B: Below gutters, soil pipes or drain pipes	75mm
C: Below eaves	200mm
D: Below balconies or car port roof (not illustrated)	200mm
E: From vertical drain pipes and soil pipes	75mm
F: From internal or external corners	300mm
G: Above ground or balcony level	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)	1500mm
J: Vertically from a terminal on the same wall	300mm
K: Horizontally from a terminal on the same wall	300mm
L: Between ridge terminals (if combustion air is drawn from second terminal)	300mm
M: Between vertical terminal and wall	300mm

NB: Terminals located less than 2m above ground level must be protected by a terminal guard P210

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)

All can be sited up to 5.0m or 7.0m from the appliance, and components for extended flues are supplied either in kits or 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.

Kit Number :

P260: Rearwards horizontal balanced flue

Refer to Section 9 for step-by-step fixing instructions.

P261: 1m Sideways horizontal balanced flue

P263: 3m Extended horizontal balanced flue

P265: 5m Extended horizontal balanced flue

P267: 7m Extended horizontal balanced flue

Refer to Section 17 for step-by-step fixing instructions.

P242: 5m Ridge tile flue kit.

Complete fixing instructions supplied with each kit.

P246: 2.5m Vertical RS balanced flue.

Complete fixing instructions supplied with each kit.

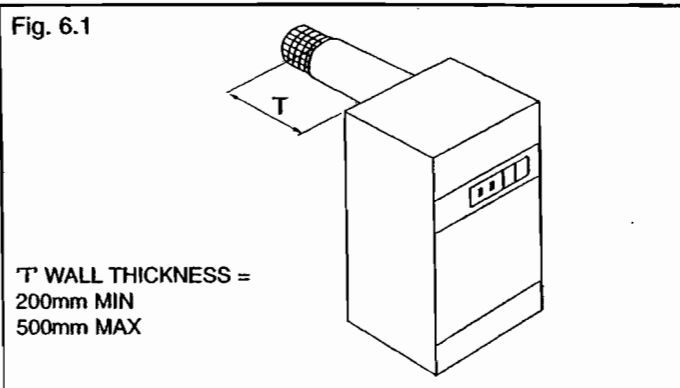
Visible Plumbing

The efficient operation of Powermax will naturally give rise to condensation in the flue gases and plumbing 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.

Fig. 6.1



Extended Balanced Flue Systems Figs.6.2 & 6.3

Extended Flue Components can be ordered as required for installations where the appliance is sited some distance from the balanced flue terminal.

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 - see Fig 6.2

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 + Horizontal Terminal
4	3	7	5.0m each
3	2	5	7.0m each

Ridge Tile Terminal Fig. 6.5

With this system, combustion air can be 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.

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

Air for combustion must effectively be taken from outside.

Typically, combustion air will 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 180cm² (28in²).

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

Fig. 6.2

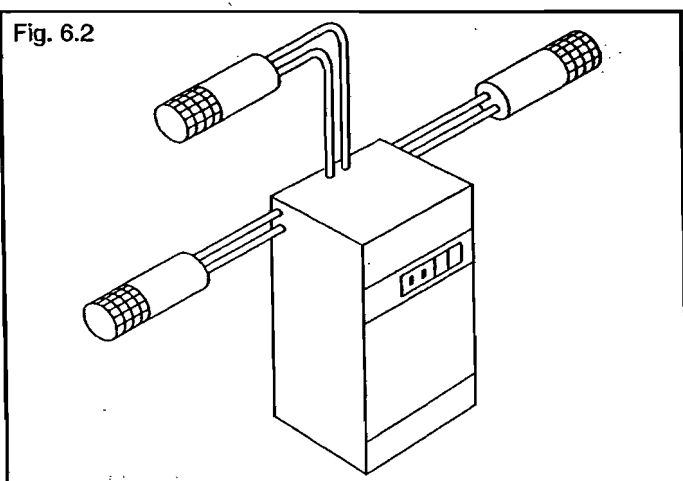
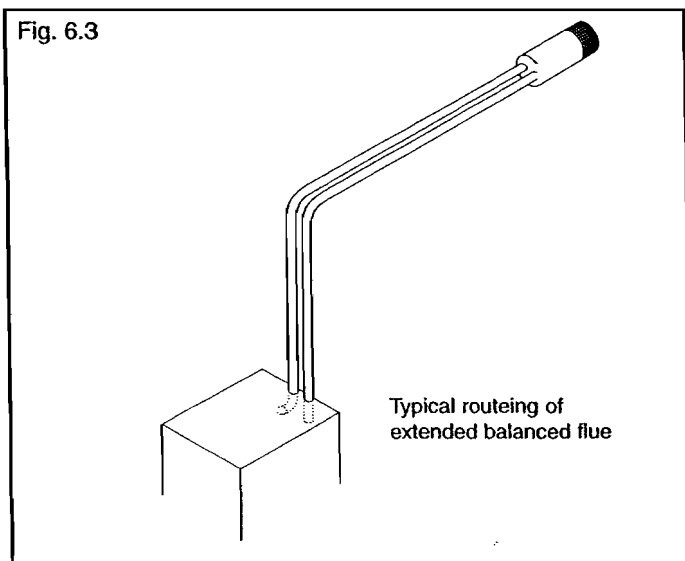
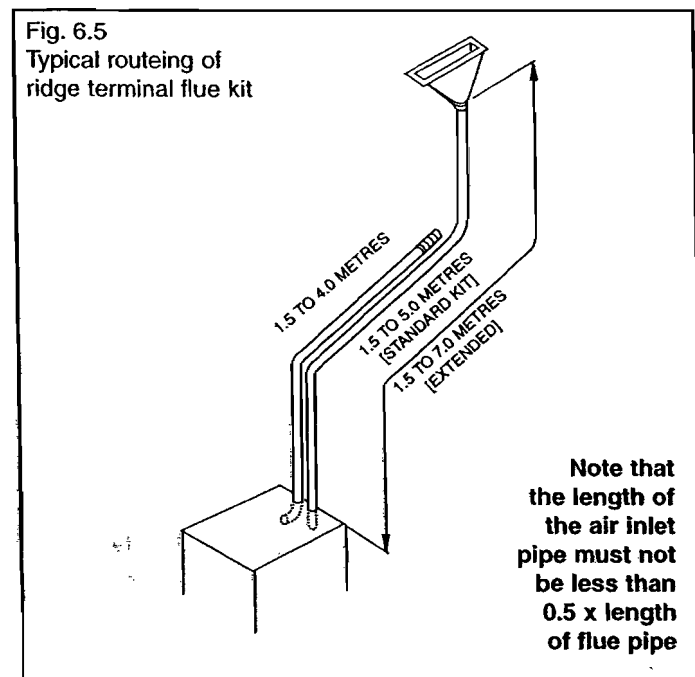


Fig. 6.3

Fig. 6.5
Typical routing of ridge terminal flue kit

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 easy to fit option for both pitched and flat roofs. Where using the horizontal BF terminal is not practical, the Vertical RS system offers a more cost effective alternative to the Ridge Tile Terminal and retains all the advantages of a truly balanced flue system.

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.

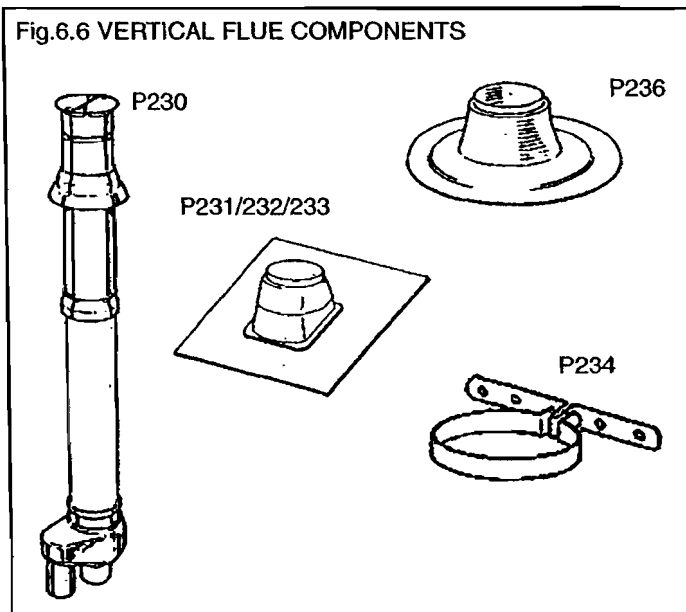
P231 for pitches 15° to 25°

P232 for pitches 25° to 45°

P233 for pitches 35° to 55°

P236 for flat roofs

Fig.6.6 VERTICAL FLUE COMPONENTS



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.

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.

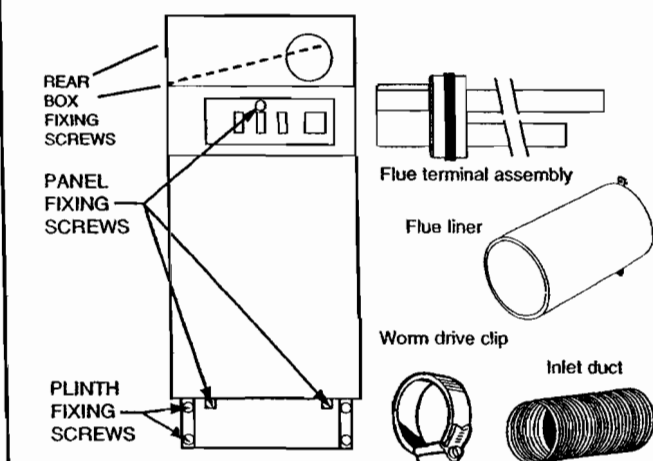
7. VENTILATION REQUIREMENTS

- 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		
Position of opening	Ventilated to	Area of each vent
High and Low Level	Room	60cm ²
High and Low Level	Outside	30cm ²

Fig. 9.1

Fig. 9.2



8. TECHNICAL DATA

Nominal Output	15.5kW
Nominal Input	18.9kW
Category	I _{2H} Gas G 20
Supply Pressure	20mbar
Flue Types	C ₁₃ -C ₃₃ -C ₅₃ (As flue kit supplied)
Gas Connection	Rc1/2
Air Sense/Burner Pressure differential - 0.13 ± 0.03mbar.	
This is factory set and no adjustment is intended	
NO _x	<40ppm
CO	<20ppm

Working Pressures:

Primary*	3 bar max FSS Models
Primary	1 bar max FOV Models
DHW	6 bar max
DHW	1 bar min

Pressure Relief Valve	3 bar
Thermal Store Capacity	100L
DHW Temperature	55-60°C
Weight (empty)	90kg
Weight (full)	190kg

Connections:

CH Flow/Return	22mm Compression
DHW Inlet	22mm Compression
DHW Outlet	22mm Compression

Safety Valve / Tundish

15mm tube / G 3/4

Flueing:

Balanced Flue	140mm dia
Standard Flue Length	500mm
Maximum Flue Length	5m (+3 bends in each pipe)
Maximum Flue Length	7m (+2 bends in each pipe)

Options: Programmer	7 day, 3 period, digital
Expansion Vessel	18L 400mm dia
Sealed System Filling Loop	

Clearance Requirements for Installation and Servicing:

Top	400mm (16 inches)
Sides	5mm [10mm (3/8") total]
Base and Back	Nil
Front	450mm (18in) Unless behind an openable door

Electricity Supply 230V-3A

Dimensions:

Height	1260mm
Width	540mm
Depth	600mm

*NB Primary design pressure 2.5 bar to comply with UK Water Byelaws

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. To gain access after unpacking, see Fig. 9.1, remove two screws at bottom of front cover, pull forward from bottom, gently ease downwards to free location studs. 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. Lift off rear box section after unfastening a screw at the back of each side panel.

2. Carefully set aside the outer covers. Remove small panel(s) either side of casing for plumbing connection (and flue/air pipes) as necessary. The cut-away base allows pipework to be brought up from below floor level but must not obstruct service access to the sump.
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 clip on rear panel 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, see separate instructions supplied with ridge terminal flue 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 1260mm high x 550mm wide. If unit is being raised above floor level, eg in a wet floor area, 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'. Remember to add also any stand-off. 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 soundness in accordance with BS6891.

Fig. 9.4

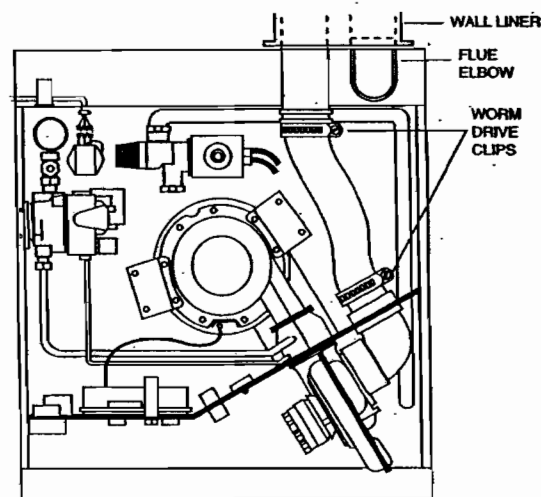


Fig. 9.5 Flue terminal assembly

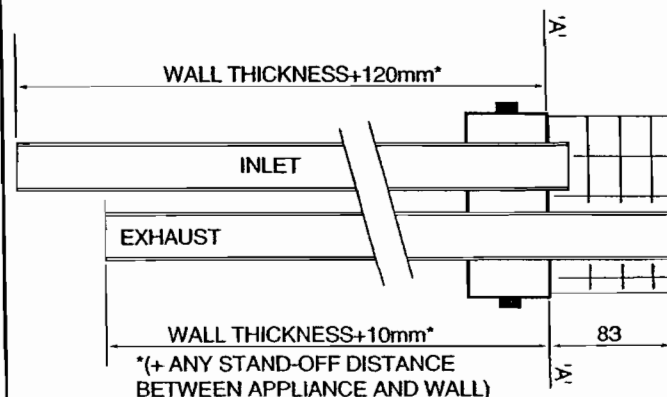
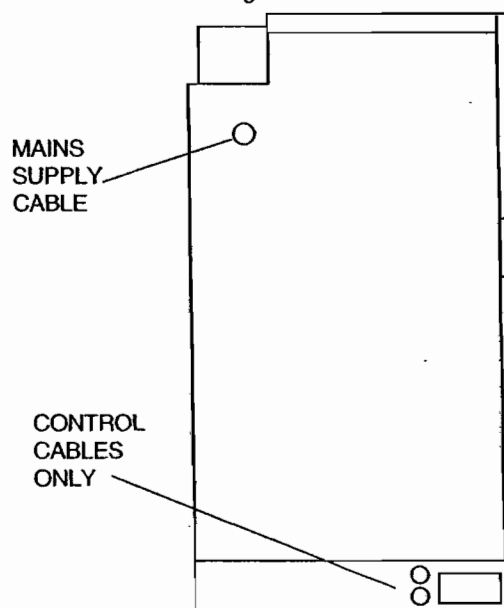


Fig. 9.6 Route for incoming electric cables



10. ELECTRICAL CONNECTION TO THE APPLIANCE

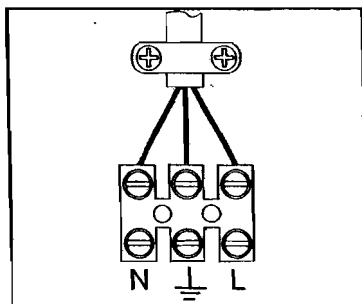
Wiring must comply with the current IEE Wiring Regulations. The supply cable must be 3-core 0.75sq.mm (24/0.2mm) to BS6500 Table 16.

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 the pump cable and any external control cable to the terminal block as indicated and described below - See Fig 10.4 - and route via clips on inside of LH side panel.

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. If not factory fitted the central heating pump must be connected to the terminal block at terminal 25 (pump live), N2 (pump neutral) and E2 (pump earth) to allow the cold start thermostat to be operative. All wiring for the pump etc must be suitable for 230V.

4. To provide timed control for non-programmer models, a twin channel programmer having voltage free contacts should be used. 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 or the programmer will be by-passed and hence inoperative.

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

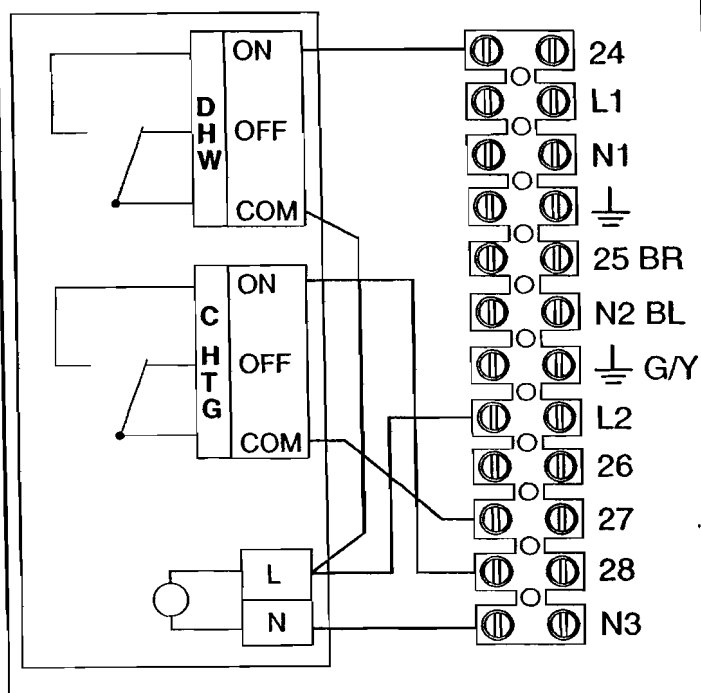


Fig. 10.4 Terminal block

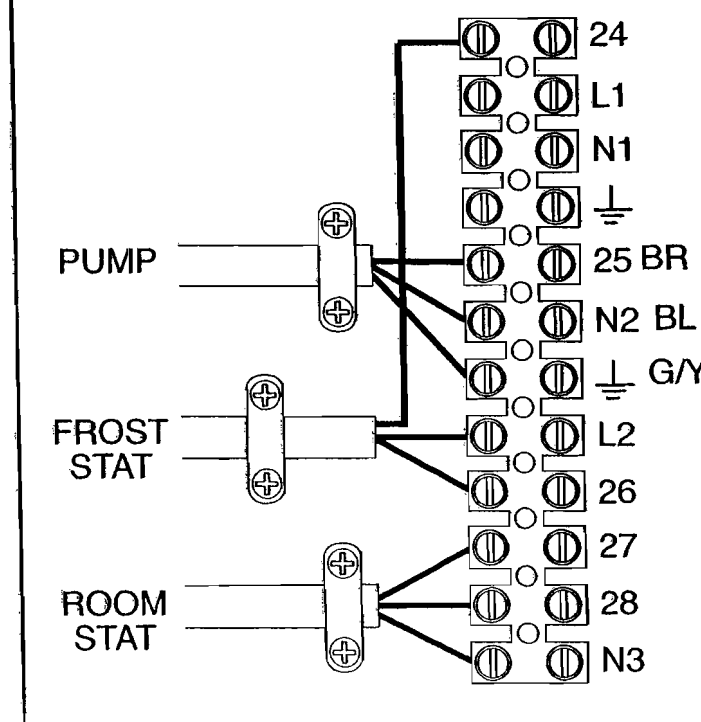


Fig. 10

Powermax 155 / 157 wiring diagram
 From Serial Nos. 155 Open Vent - V114001
 155 Sealed System - S209001
 157 Open Vent - V40100
 157 Sealed System - S30100

KEY	
GREEN / YELLOW (G/Y)	
WHITE (W)	
PURPLE (P)	
BLUE (B)	
BLACK (BK)	
BROWN (BR)	
RED (R)	
ORANGE (O)	
YELLOW (Y)	
RED / WHITE (R/W)	

FULL SEQUENCE
 IGNITION CONTROLLER

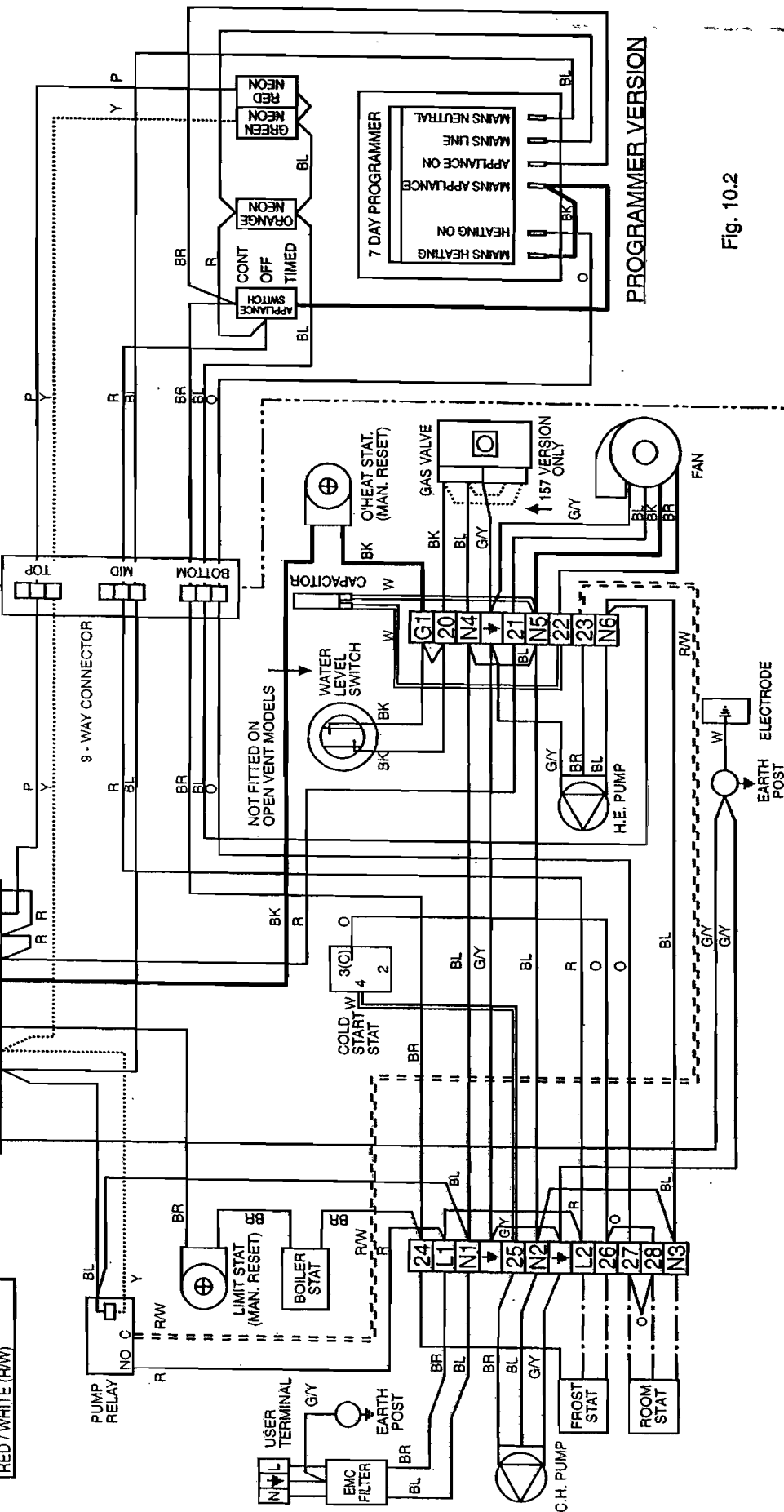
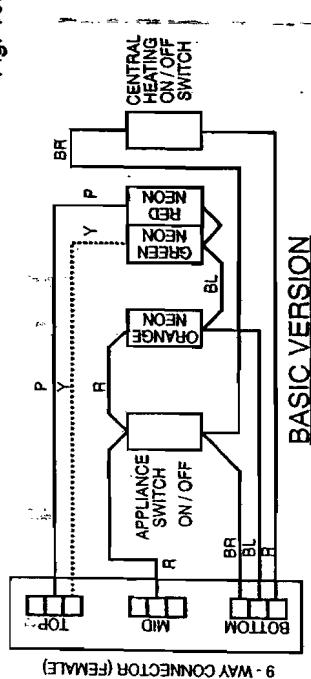


Fig. 10.2

Fig. 10.1



11. WATER SUPPLY

Mains Supply Requirement See Fig. 11.1

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 18 litres/min of hot water at 2 bar. 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.

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. An in-line scale reducer (conditioner) or ion-exchange softener will be most effective when fitted immediately before the unit.

Good quality polyphosphate dosing devices can inhibit scaling but generally should not be fitted where heat could impair their performance e.g. in the same compartment as the boiler. Always follow the manufacturer's instructions.

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

Primary Pipework

Water soluble flux should be used for making soldered capillary joints in the primary (radiator) circuit. Traditional grease-based flux must not be used.

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

Open Vented Primary System

When installing 'OV' variants of Powermax 155 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. 11.1 Water connections.

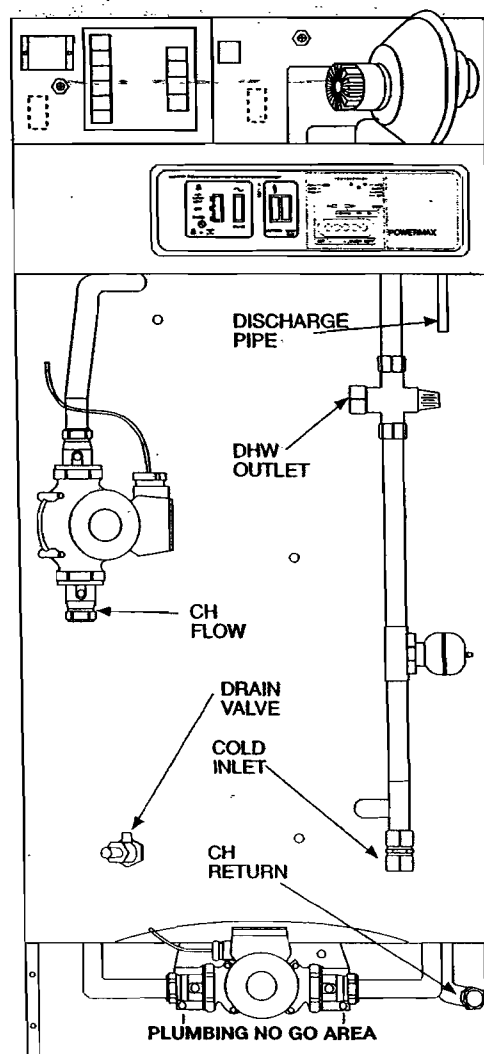
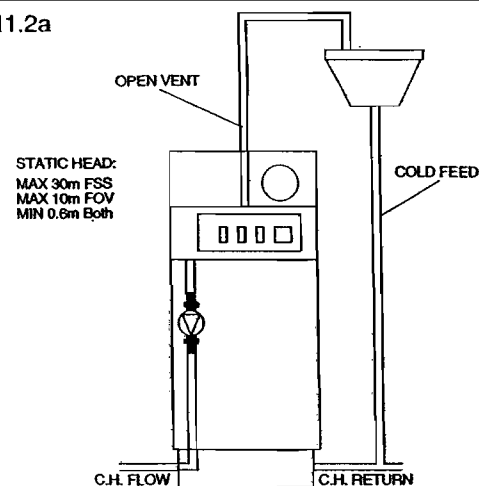


Fig. 11.2a



Sealed Primary System

Only 'SS' variants of Powermax 155 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 155	Radiators & Pipework	Total System Volume
12	100	97 max	197 max
16	100	152 max	262 max
18	100	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 gully. 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.

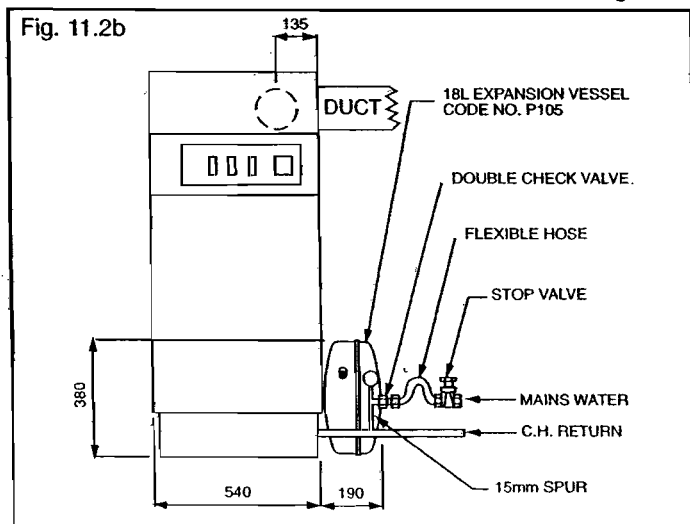
Flow and Return Connections

The CH connection are positioned above left with the return is positioned just below it to the right.

There is space to run flow and return pipework between the front cover and the storage cylinder but **the pipes must not prevent the removal of the flue collector sump** – see **NO GO** area in Fig. 11.1.

Special requirements for thermostatic radiator valves (TRV's) and installations where radiators are sited above the boiler

Note that in installations where all radiators are fitted with TRV's, a by-pass loop (manual or automatic) must be provided. Where the boiler is on a ground floor and/or has radiators above it, the non-return valve remains fitted in the central heating flow.



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.

If an inhibitor is to be used after flushing, 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.

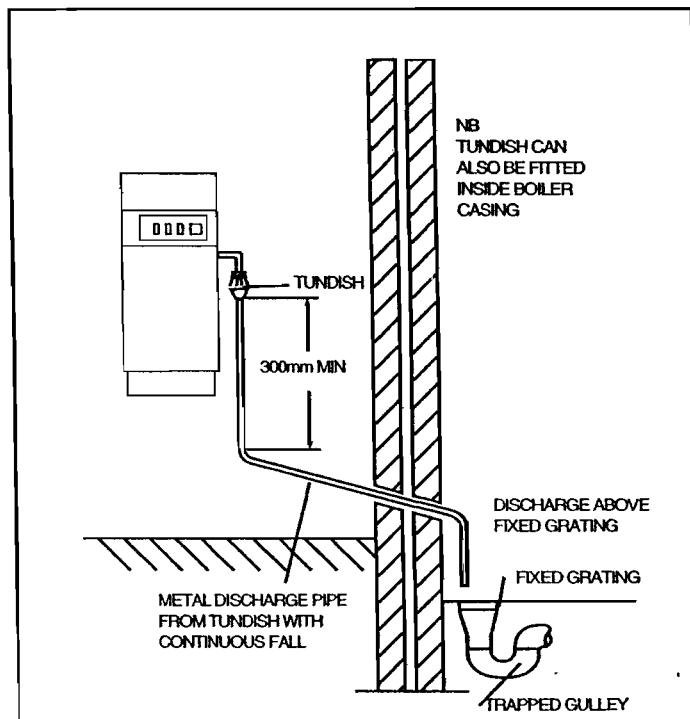


Fig. 11.4 HYDRAULIC RESISTANCE OF THE PRIMARY STORE FLOW (GALL/H)

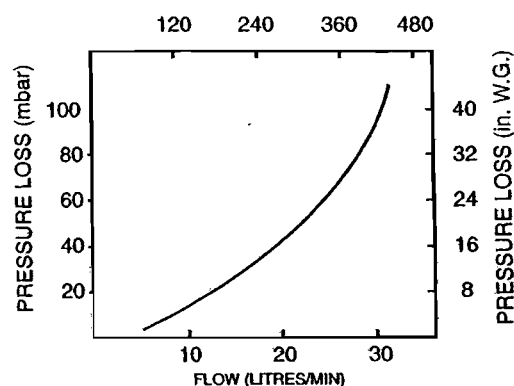
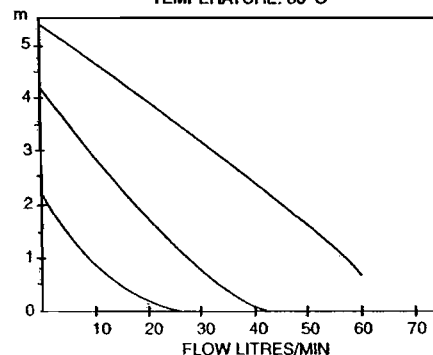
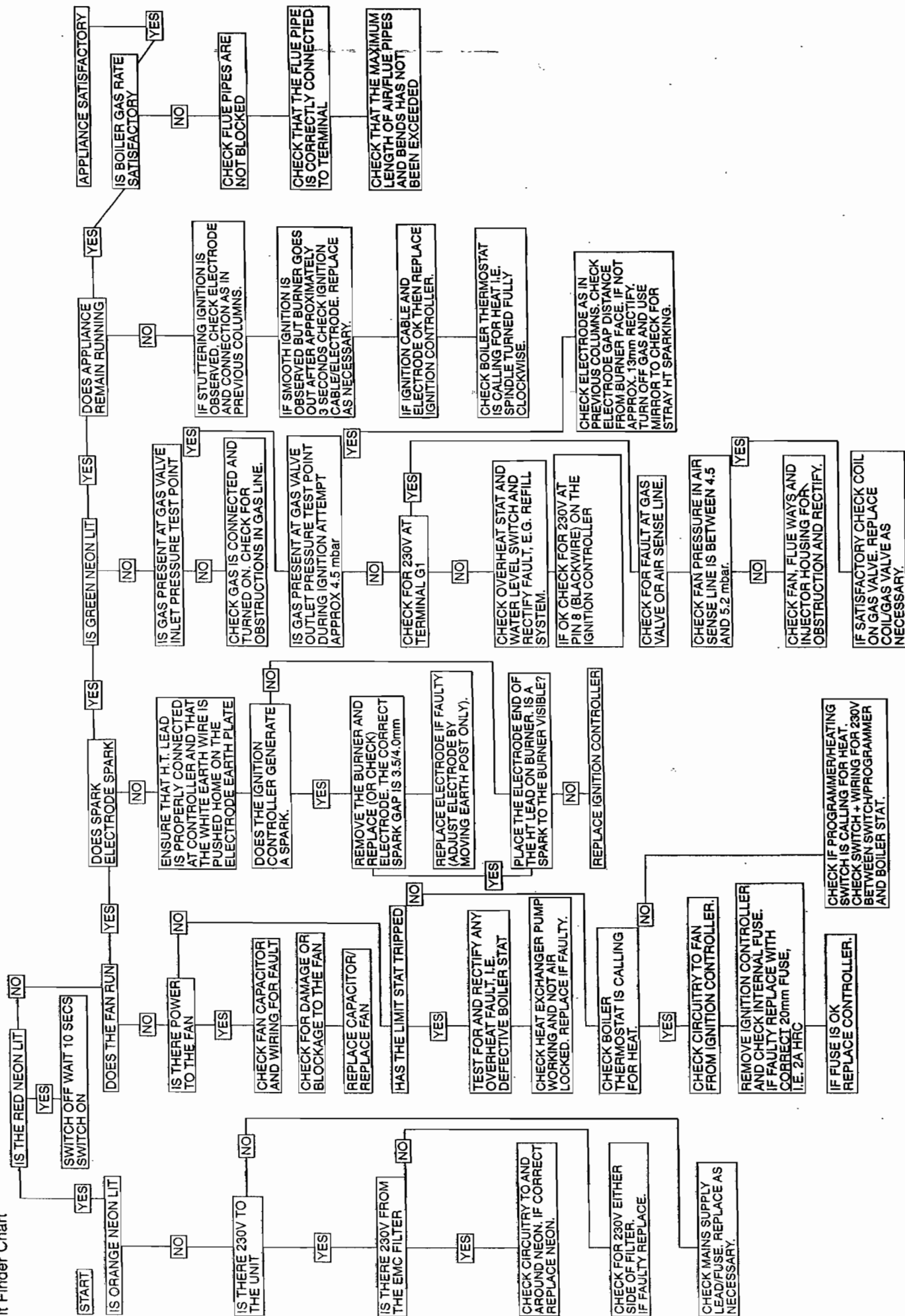


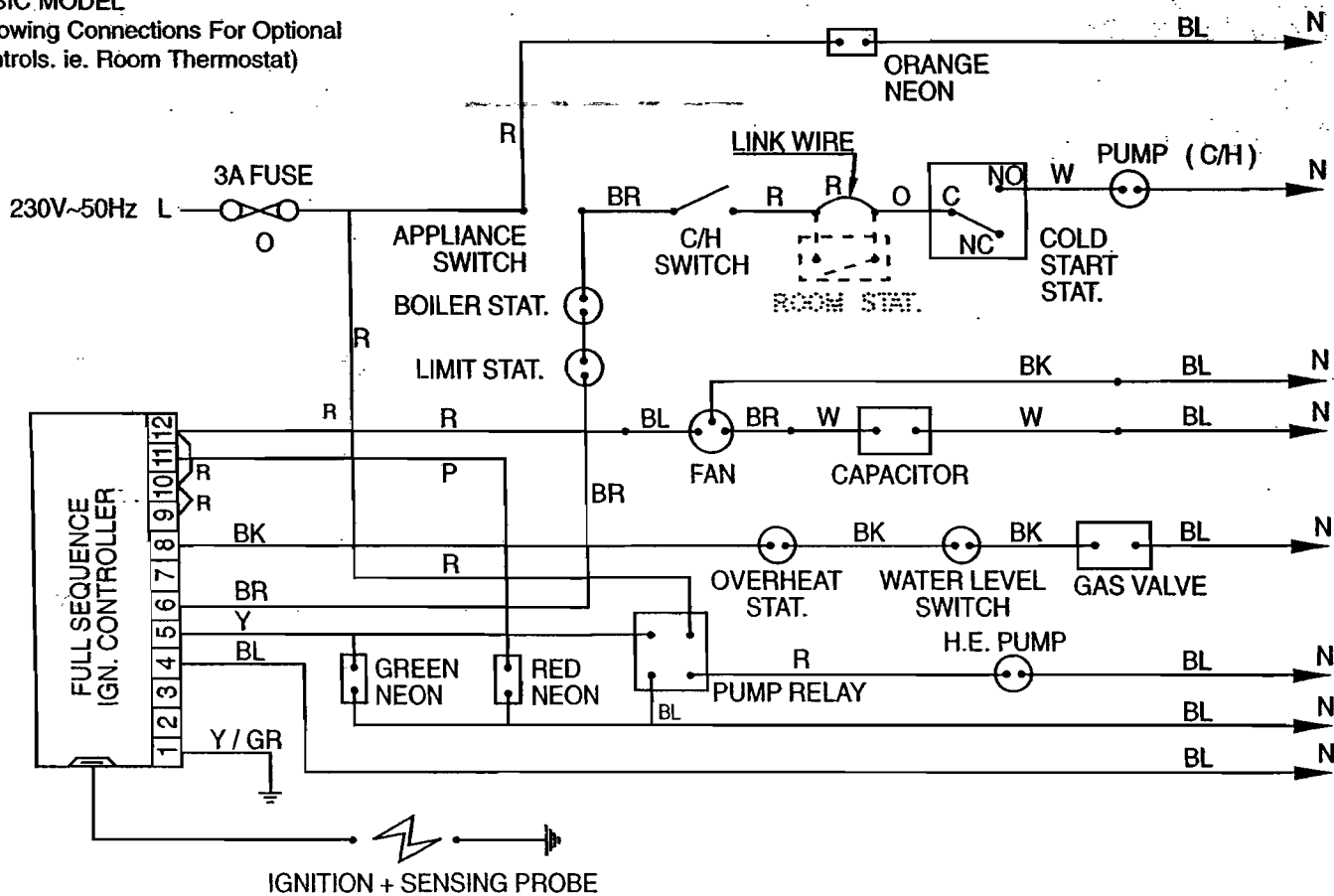
Fig. 11.5 PUMP PERFORMANCE AT 230V-50Hz TEMPERATURE: 80°C



Fault Finder Chart

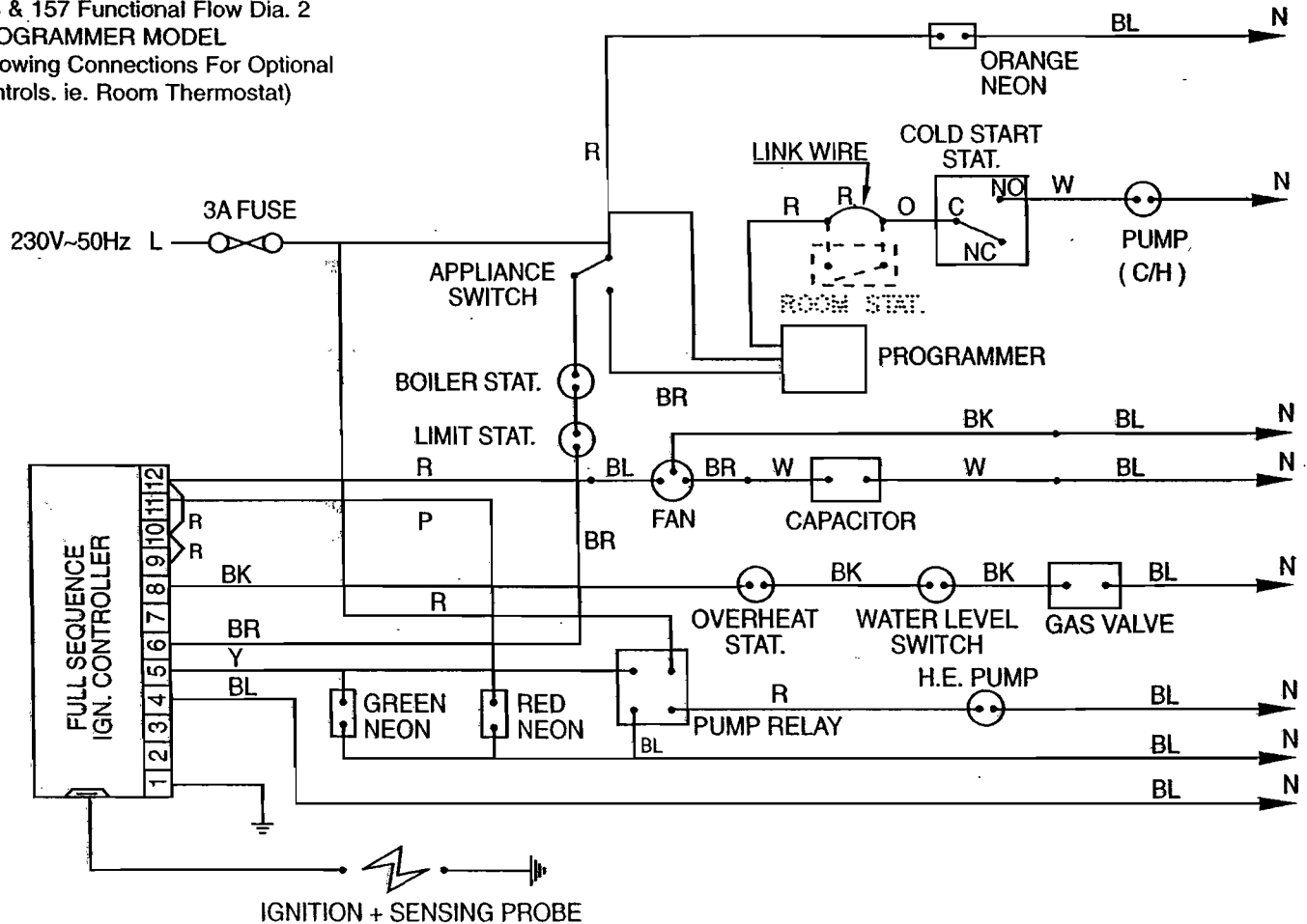


155 & 157 Functional Flow Dia. 1
BASIC MODEL
(Showing Connections For Optional
Controls. ie. Room Thermostat)



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

155 & 157 Functional Flow Dia. 2
PROGRAMMER MODEL
(Showing Connections For Optional
Controls. ie. Room Thermostat)



12. COMMISSIONING

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

Sealed Primary System

- 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.
- Loosen cap on automatic air vent, check draincock is closed and open isolating valves on CH pump.
- 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.
- Thoroughly check radiator valve connections, glands and unions for leaks.
- Set CH pump to speed 3, bleed every radiator and pipework high points until all air or air/water mix is removed.
- 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.
- Again bleed every radiator etc. until all air or air/water mix is removed and re check relief valve.
- Check system final pressure equals HOT pressure noted in f above. Top up pressure if necessary.
- 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 Ventd Primary System

- Ensure Draincock is closed.
- Open valves either side of central heating pump.
- 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.
- 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 and check for leaks.

Domestic Hot Water System

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

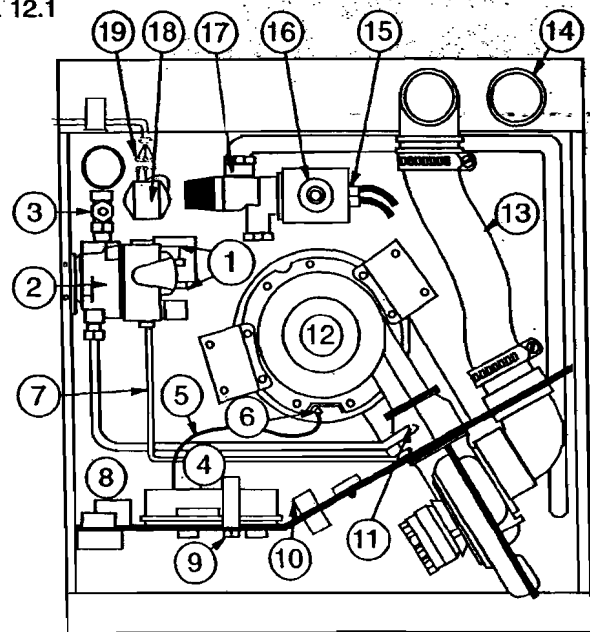
Starting (Lighting) The Appliance

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.

- 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 | |

- 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.

- Move the appliance on-off switch to the 'I' (on) position (standard model) or 'CONT' (programmer model). Fan starts to rotate almost immediately. The automatic ignition sequence has been initiated and the burner will light after approximately 10 seconds.

- Green neon indicates the burner is operating.

Note: If the burner fails to light at the first attempt, the controller will repeat the ignition sequence four more times before going to "lock-out" (indicated by the red neon). To re-set, switch to 'O' (off) at the appliance on-off switch, wait ten seconds and switch to 'I' (on) or ('CONT') again.

- 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.

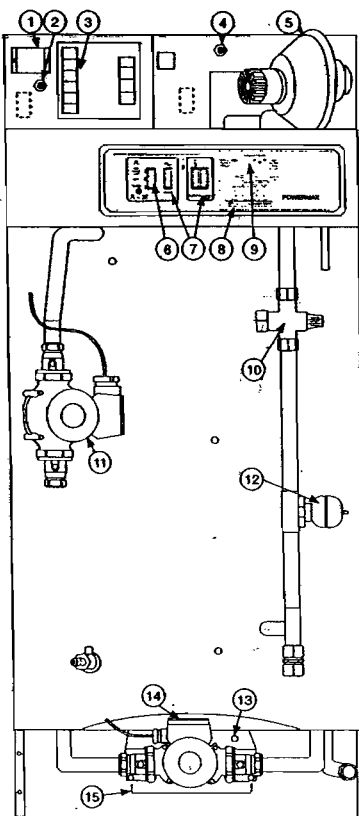
- Run boiler for 15-20 mins and transfer manometer tube to outlet test nipple. Check burner pressure is approx. 4.8 mbar (flue systems < 3m) or approx. 4.5 mbar (flue systems > 3m). Record operating pressure in (benchmark) log book. If pressure is very low, e.g. 3.0 mbar, this indicates a fault condition - possibly a partially obstructed flue - see fault finding chart page 12. Note that the gas valve is factory pre-set and the burner pressure is not adjustable. In case of difficulty consult RSA Waterheating Limited.

- Record the "working" inlet gas pressure at inlet pressure test nipple - Fig. 13.4 - in (benchmark) log book.

- Turn appliance off, remove gauge and test for gas soundness.

The Central Heating System

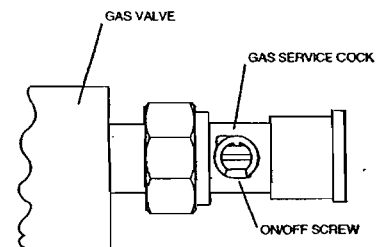
Fig. 12.2



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

- On programmer model, set the 3-way-switch is **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.
 - Hand over the User's Instructions and leave these Instructions either at the gas meter or with the user.
 - Explain that the appliance ON-OFF switch must be winter "TIMED" position in order to obtain central heating.
 - 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.
- Note** that Central Heating is NOT AVAILABLE when appliance ON-OFF switch is in "CONT" position. This refer to hot water only, eg. for use during summer months.

Fig. 12.4 Standard Switch Panel

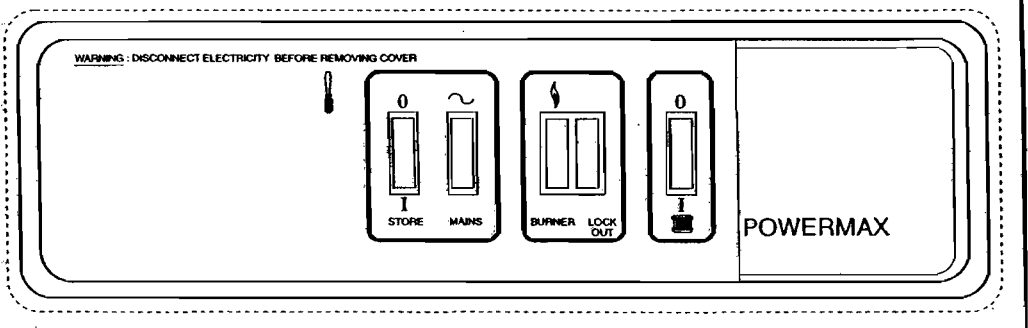
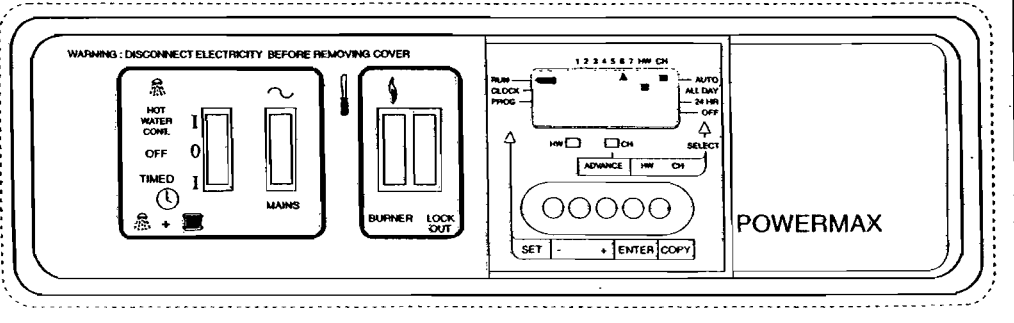


Fig. 12.5 Programmer Switch Panel



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 remove two screws at bottom of front cover, pull forward from bottom and gently ease downwards to free location studs. Remove recessed screw at top of switch panel and keep safe, lift off upper front cover. The top panel is retained by four studs; gently ease upwards to remove.

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 switch panel housing. 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 as 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 Close isolating valves either side of heat exchanger pump. Release pump at large union nuts or remove pump head from body and move to one side. 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.

Check that boiler and its controls are functioning correctly.

Note: The DHW expansion vessel will not normally require attention during routine servicing.

Fig. 13.1

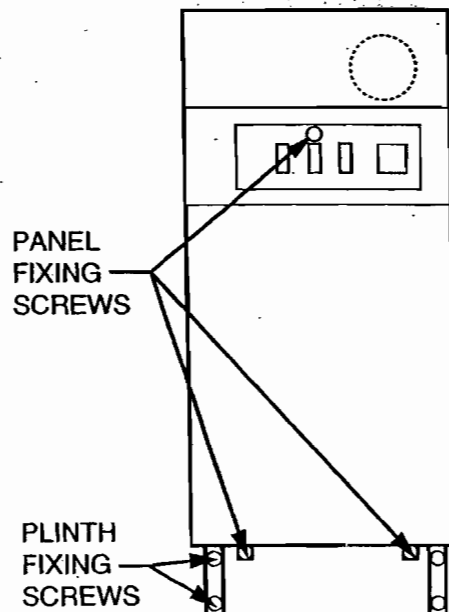
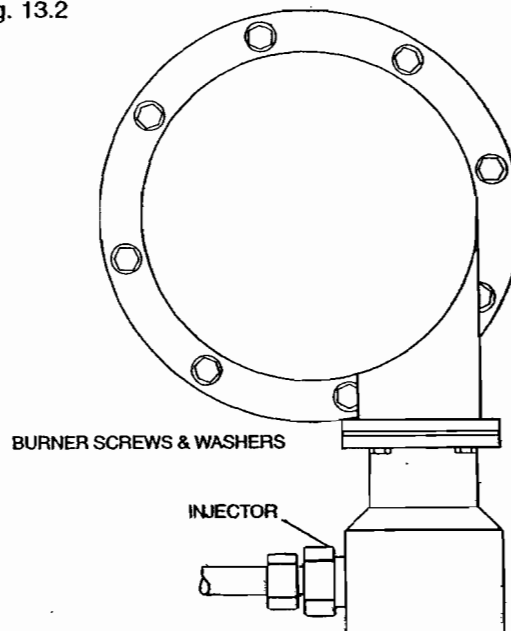


Fig. 13.2



Combustion testing

A combustion analysis test point is provided on the flue collector (just above sump joint). The test point is tapped M6 and is sealed by a special screw/washer assembly. For a correctly installed appliance typical values to be expected are:

CO <20ppm
CO₂ <9.5%

Levels significantly above these 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. P610).

General Notes

Isolate gas and electricity supplies. To gain access remove two screws at bottom of front cover, pull forward from bottom and gently ease downwards to free location studs. Remove recessed screw at top of switch panel and keep safe, lift off upper front cover. The top panel is retained by four studs; gently ease upwards to remove.

Components are replaced in reverse order unless otherwise stated.

To remove switch panel unplug the 9-way plug and remove the 4 fastenings securing the complete panel which may now be withdrawn.

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

Microgas Full Sequence Ignition Controller

- Refer to General above.
- Pull off H/T lead from connection at top of controller.
- Pull out the "Molex" connector plugs.
- Remove the top and bottom 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 switch panel housing. 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 pipes 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.
- 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.

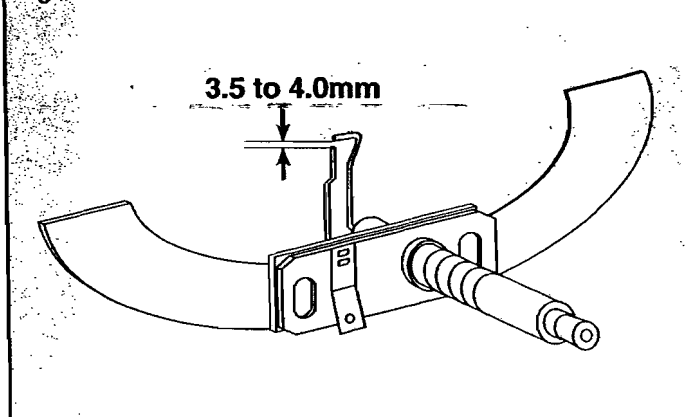
Spark Electrode Fig.13.3.

- 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.

Capacitor Fig.12.1.

- Refer to General on previous page.
- Disconnect the two leads from the capacitor at small terminal block.
- Unscrew the nut and washer holding the capacitor.
- When replacing, ensure that the leads are correctly connected. (Refer to wiring diagram Fig.10.)

Fig. 13.3 ELECTRODE GAP



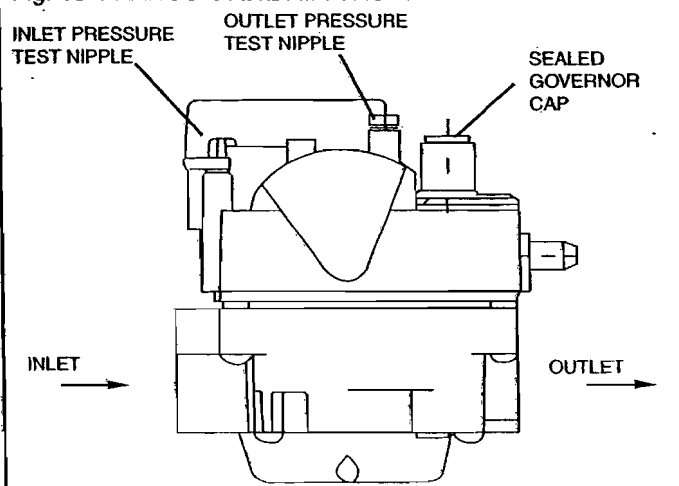
Air/Gas (Solenoid) Valve Fig.12.1 & 13.4

- Refer to General above.
- Disconnect gas service cock at the union and disconnect the outlet pipe at the union nut on flared fitting.
- Remove two screws 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 RANCO U7212 Air/Gas Ratio Valve

- 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 (ΔP).
- If reading is outside the range - 0.10 to - 0.16 mbar, carefully remove the servo governor cap and adjust the value of ΔP to - 0.10 (± 0.03) mbar (i.e. the gas pressure is 0.10mbar less than the air sense pressure).
- Replace cap and tighten.
- Re-connect sense line tubing to valve.
- Check burner pressure is approximately 4.8 mbar (flue syst <3m) or approximately 4.5 mbar (flue systems >3m). NB A very low pressure eg. 3 mbar indicates a fault in the air supply; a high pressure indicates a fault in the flue - see fault finder chart on page. In case of difficulty, consult RSA Waterheating (Tel: 01904 464300).

Fig. 13.4 RANCO U7212 AIR/GAS RATIO VALVE



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.
- 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

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.

DHW Expansion Vessel Fig.12.2

- a Isolate mains water supply and connect water in a suitable container.
- b Unscrew vessel from branch connection.
- c Replace ensuring vessel seals on washer within socket. Sealant should be approved for use with potable water.

Blending Valve Fig.12.2

- a Refer to General.
- b Isolate mains water supply.
- c Release compression nut on valve outlet and ease pipework away from socket.
- d Release large union nut just above inlet fitting, release remaining two compression nuts on blender and remove valve.
Note: The blender valve is pre-set to supply mixed water at approximately 55 - 60°C and does not require adjustment.

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 4BA 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.

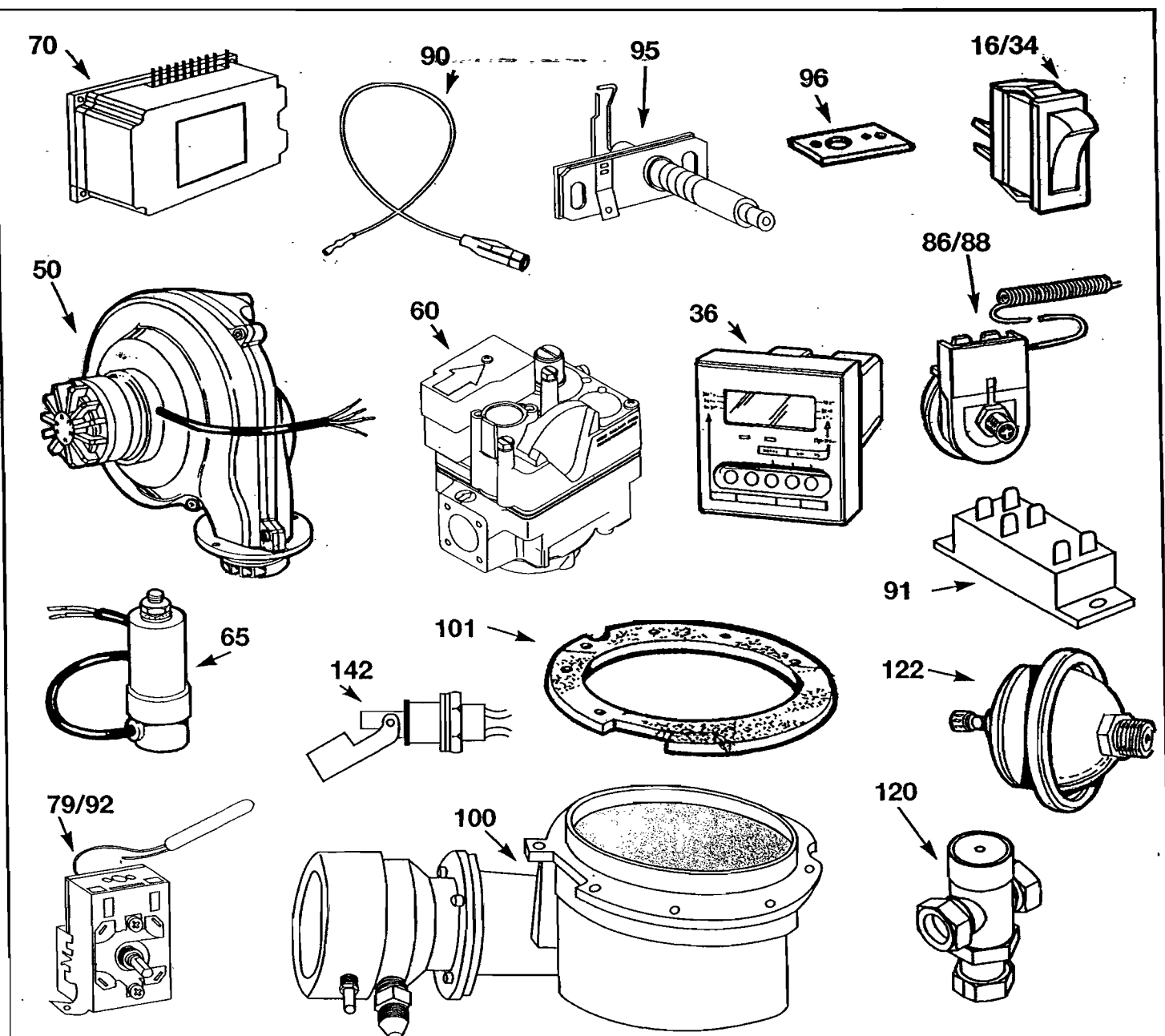
Low Water Switch Fig.12.1

- 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 (remove outer flange if fitted).
- 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	Description	GC Number
40/96/101	P656	Service Gasket Set	
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	
40	P378	Flue Collector/Sump Seal	
50	P504	Blower (c/w O-ring) G2E- 120	387 145
60	P618	Gas Valve U7212	378 964
65	P503	Capacitor – Ducati 16.15.67 1.5mfd	387 144
70	P678	Ignition controller ASS 0569G01A	E11 – 861
79	P638	Thermostat Ranco P1338	378 976
86	P481	Thermostat Overheat Ranco LM7 – P5040	371 529
88	P639	Thermostat Limit Ranco LM7 – P5060	378 797
90	P625	HT Ignition Lead and Sleeving	298 238
91	P634	Relay P&B T12	298 241
92	P616	Thermostat, Cold Start – Ranco K36	378 937
95	P624	Ignition Electrode c/w Gasket	298 240
96	P510	Ignition Electrode Gasket	298 030
100	P620	Burner (c/w gasket)	298 243
101	P507	Burner Gasket	298 027
102	P621	Injector	298 262
120	P665	Thermostatic Blending Valve	298 137
122	P527	Mini Expansion Vessel	298 035
136	P532	C.H. Pump WSP Gold	298 107
137	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.

Routing of Air/Flue 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).
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

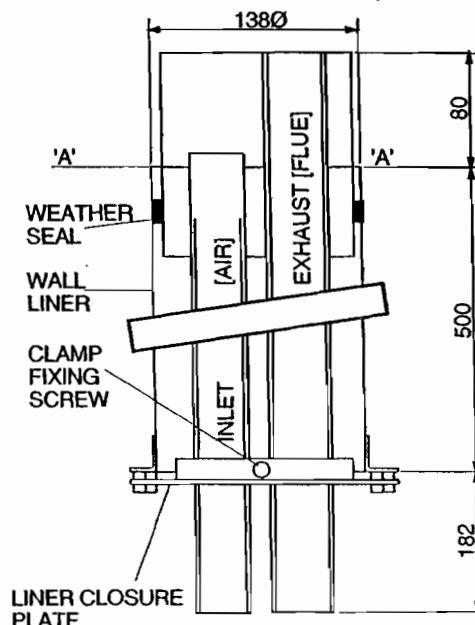
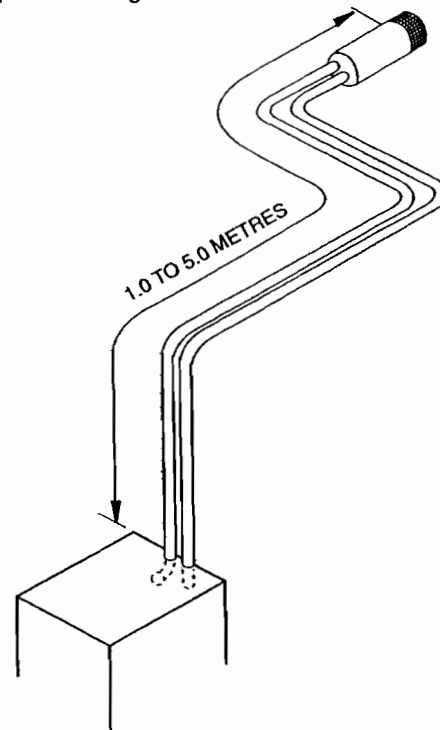


Fig. 17.2 Typical routing of assembled flue



MAXIMUM NUMBER OF 90° or 135° BENDS			MAXIMUM PIPE LENGTH
Air Inlet	Exhaust Flue	Total	Air/Flue & Terminal
4	3	7	5.0m each
3	2	5	7.0m each

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

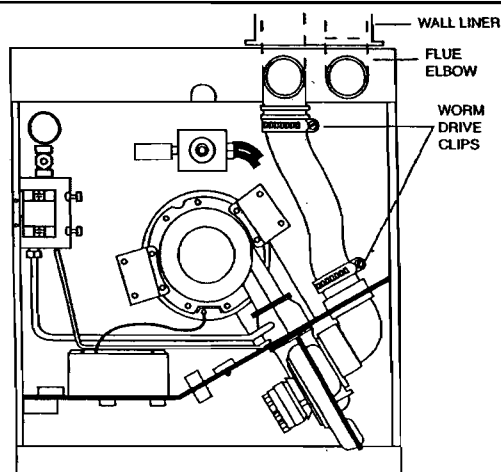
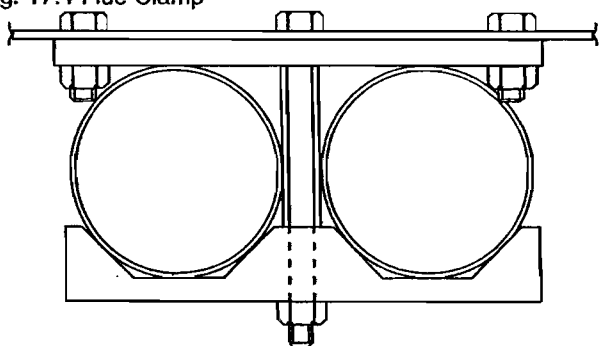


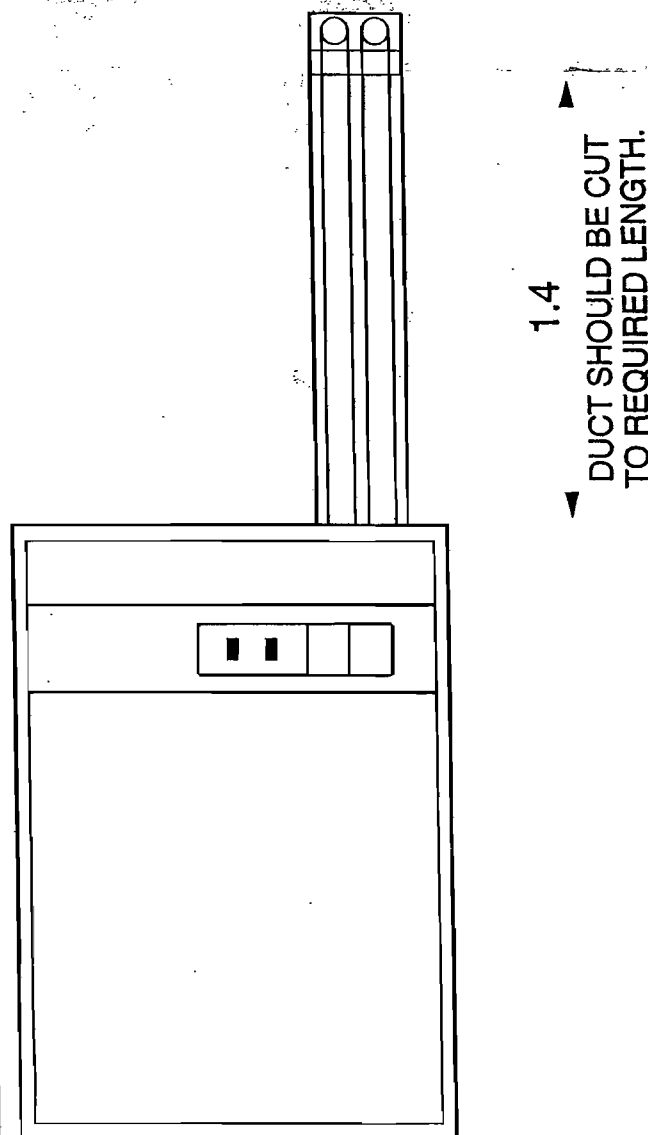
Fig. 17.4 Flue Clamp



- 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.

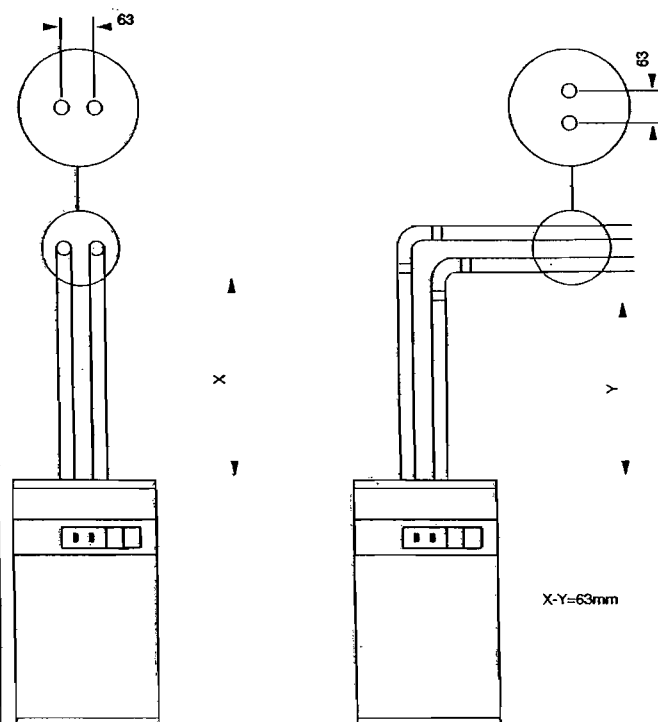
Fig. 17.5

Protective outer duct.



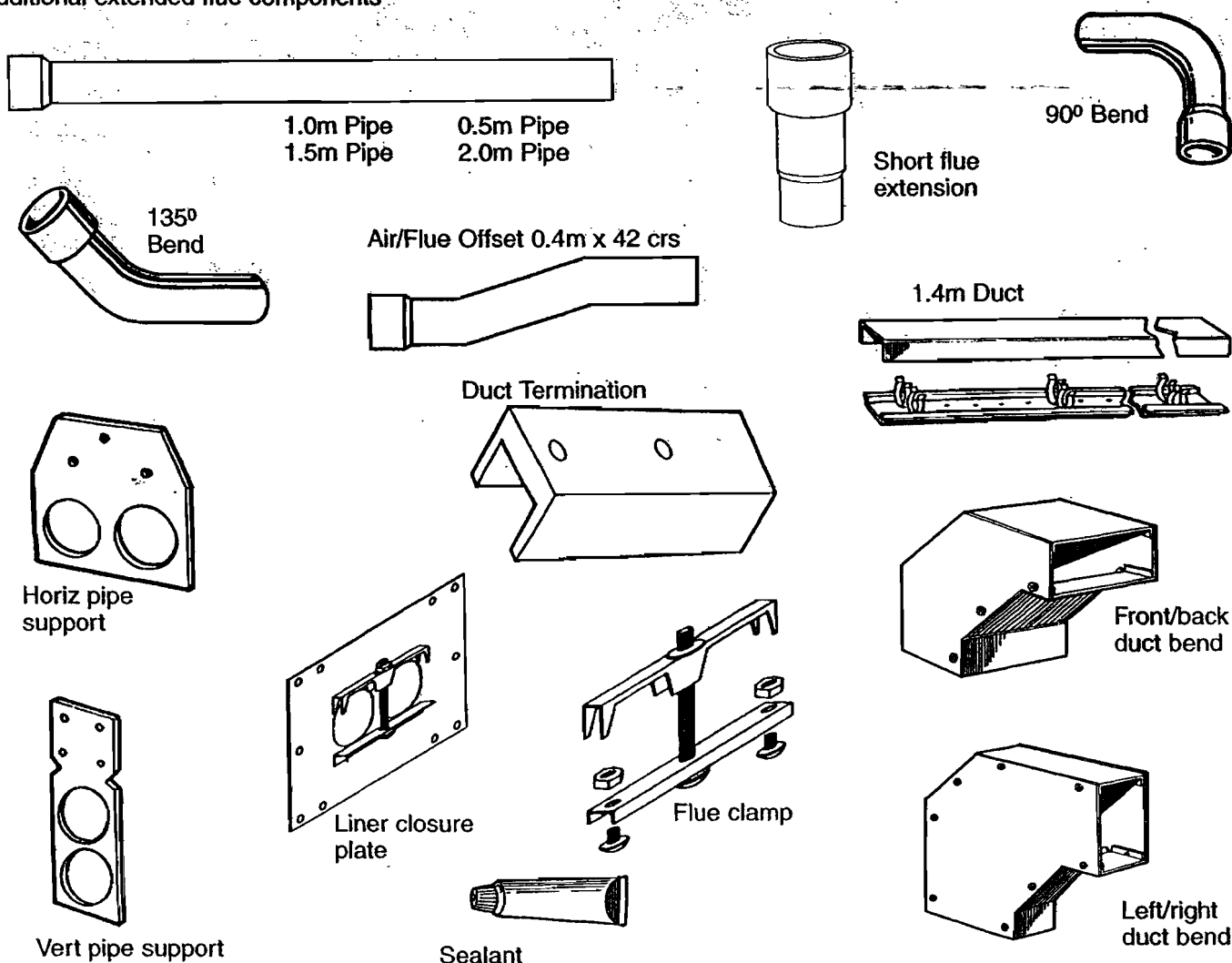
1.4
DUCT SHOULD BE CUT TO REQUIRED LENGTH.

Fig. 17.6



X-Y=63mm

Additional extended flue components

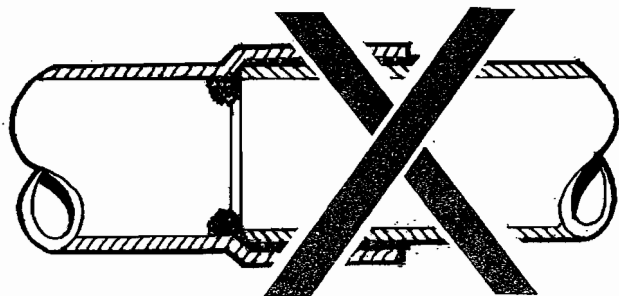


List of Extended Flue Components

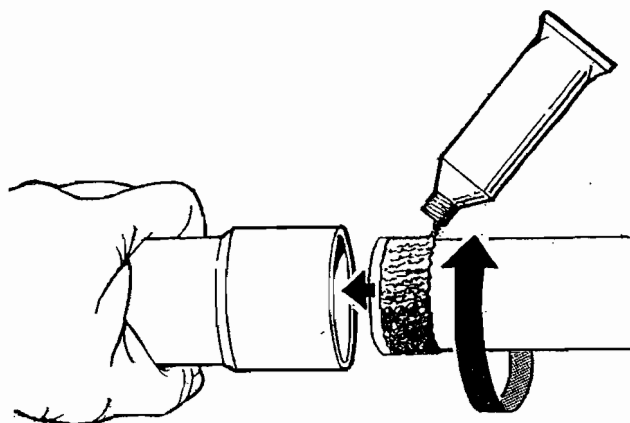
	Part No.	GC No.
Air/flue pipe, socketed at one end 2.0m long	P354	298 176
1.5m long	P355	298 177
1.0m long	P356	298 178
0.5m long	P357	298 179
Pipe Offset	P369	298 189
90° bend	P358	298 181
125° bend	P385	
135° bend	P359	298 182
170° bend	P320	
1.4m protective duct c/w clips and fixings	P360	298 183
Short Flue Pipe Extension FITS 155 ONLY	P338	298 266
90° Elbow Air/flue FITS 155 ONLY	P339	298 256
Horizontal pipe support, 63mm pipe centres	P361	298 184
Vertical pipe support, 63mm pipe centres	P362	298 185
Flue clamp assembly	P363	298 174
Liner closure plate	P366	298 186
FB duct bend (allows vertical duct to be extended to front or rear to maintain protection of air/flue bends)	P372	298 195
LR duct bend (allows vertical duct to be extended to left or right to maintain protection of air/flue bends)	P373	298 196
Worm drive clip	P314	298 021
40 ml tube 'Hylasil' RTV silicone sealant	P315	298 022
Ridge Terminal Adaptor	P367	298 187
Gasket for Ridge Terminal Adaptor	P353	
Air Inlet Guard	P368	298 188
Duct Termination	P370	298 190
Slip Coupling	P382	

IMPORTANT - NOTICE TO INSTALLERS

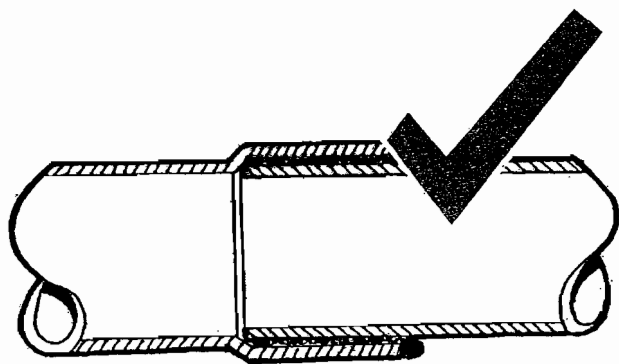
The sockets in Powermax Air/Flue pipes are manufactured to close tolerances to enable secure joints to be made with minimum use of sealant.



- 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.



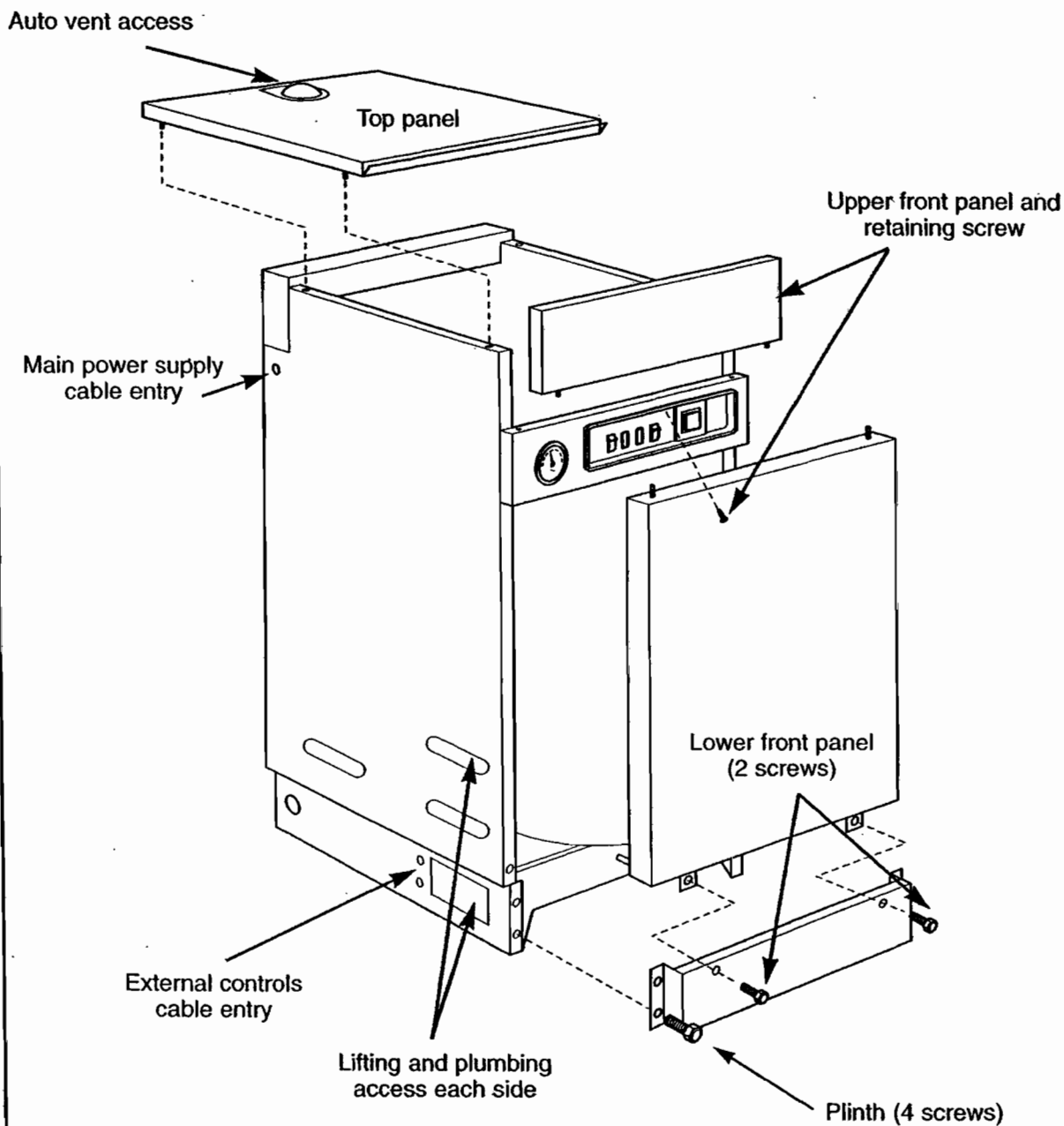
- Experience has shown that an effective technique is to smear silicone sealant around the **OUTSIDE** of a **DEBURRED** pipe end which is then inserted into the socket with a twisting action.



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.

Guide to Panel Removal



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

RANGE
POWERMAX

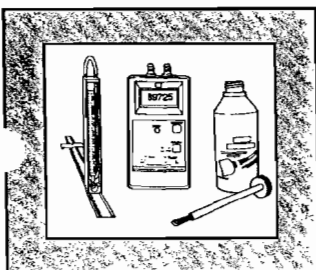
is a Division of RSA Waterheating Limited.

PMX 1017
P.436 - m
9/99

RSA WATERHEATING LIMITED
JAMES NICOLSON LINK
CLIFTON MOOR
YORK YO30 4WG

TEL 01904 464300 FAX 01904 690775 (Gen. Enquiries)
TEL 01904 464343 FAX 01904 691934 (Service)

RSA Waterheating Limited has a policy of continuous improvement
and the right to change a specification at any time without notice is reserved.



INSTALLATION AND SERVICING INSTRUCTIONS

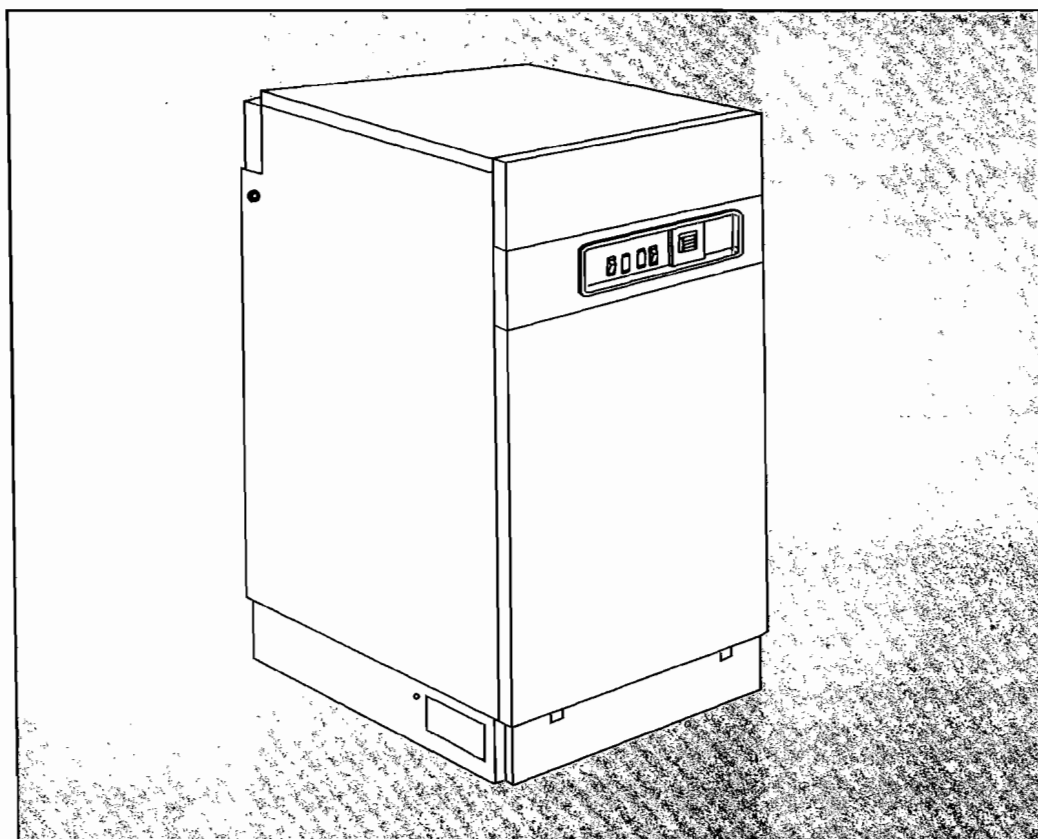
TO BE LEFT WITH BOILER - READ THESE INSTRUCTIONS BEFORE INSTALLING OR LIGHTING THE BOILER

185

RANGE

POWERMAX

HIGH PERFORMANCE HOT WATER AND HEATING



CE

POWERMAX 185 OPEN VENT MODELS :

185	STANDARD MODEL
185 P	WITH FITTED PUMP
185 CP	WITH FITTED PUMP & PROGRAMMER

FROM SERIAL No. 074001 ONWARDS

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

RANGE
POWERMAX

a Division of RSA Waterheating Limited.

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.

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	8
Wiring Diagrams	9
11. Water Supply	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	22
18. List of Extended Flue Components	23

1. SAFETY REGULATIONS

In your own interest and that of safety, it is the law that all gas appliances are installed by competent persons in accordance with the Gas Safety Regulations. 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 1:1990

Specification for installation of flues

BS5440:Part 2:1989

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



RSA Waterheating Limited is a member of the Benchmark initiative and fully supports 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' is a combination boiler 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 within the store.

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. There is no pilot flame.

A small diameter twin pipe flue system has been designed for a length of up to 7.0 metres (including a balanced flue terminal) through which to draw inlet air and expel exhaust gases. The terminal suits a wall thickness of 200mm to 500mm.

This boiler can be used in any of three ways:

- Combined central heating boiler and domestic waterheater.
- As a stand-alone high pressure, high-flow waterheater.
- As a Central Heating Boiler
Appliance Output : 18.3kW
(62,500Btu/h).

This appliance **must** be installed as part of an open vented primary system. It is not suitable for sealed primary systems.

Domestic Hot Water

Hot water is delivered via a blending valve which is preset to 55°C - 60°C for domestic use.

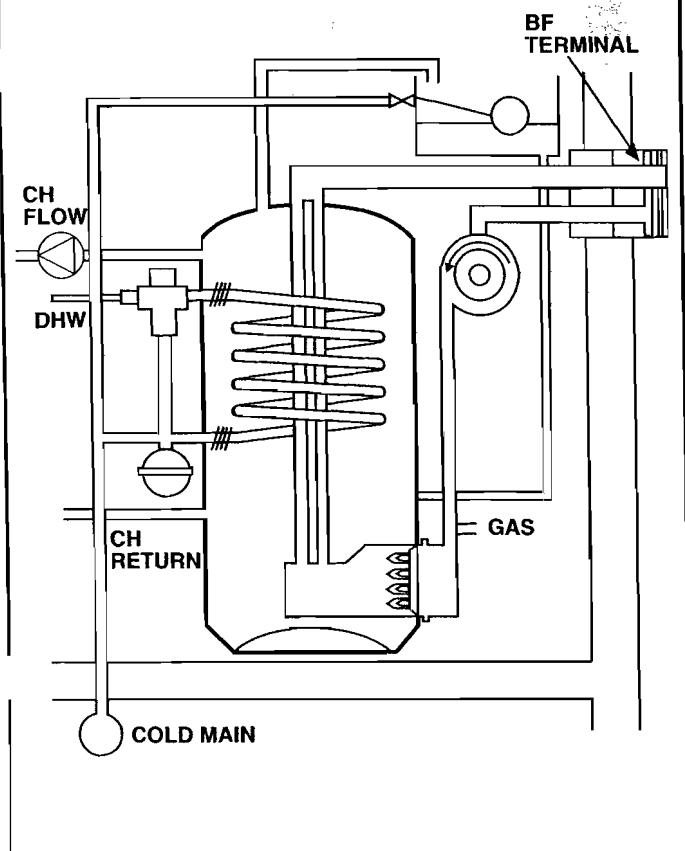
Operation

Operation is fully automatic and the boiler control thermostat will try to maintain the thermal store at 82°C. This stored water is circulated through the radiators via a normal domestic pump which is usually fitted within the casing. Provision is made in the terminal block for connecting the pump and room thermostat. A cold start thermostat prevents the pump from operating until working temperature (approx. 60°C) is attained.

Timed operation of the central heating is essential and the built-in Powermax programmer (CP model) is recommended. CP models come fitted with both CH pump and an electronic 7-day, 3-event programmer. For summer operation the central heating can be switched off by the user.

The central heating system should also include temperature controls and provision is made for fitting both room and frost thermostats.

Powermax 185 Schematic



3. NATURAL GAS SUPPLY

The Powermax 185 requires a natural gas supply of 2.2 cubic metres per hour. Gas supply pipework of 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.

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 40W for the standard appliance or 170W with the CH pump fitted.

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 Powermax when full of water - ie 220kg. 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.

Flue Protection

When using an extended flue system it is essential to fit the protective ducting supplied with the flue system kit in order to prevent direct contact with the hot exhaust 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 RSA Waterheating or by another no less suitable non-combustible enclosure.
- When sited in a cupboard, 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:Part1. 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.

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. Acceptable positions are indicated in Fig.5.1.

Note: If this appliance is to be fitted into a timber framed building - consult British Gas publication Guide for Gas

Installations in Timber Framed Housing (DM2) 2nd edition, or your local Gas Region.

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.

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.

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)

All can be sited up to 5.0m or 7.0m from the appliance, and components for extended flues are supplied either in kits or 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.

Kit Number.

P250: Rearwards horizontal balanced flue

Refer to Section 9 for step-by-step instructions.

P251: 1m Extended horizontal balanced flue

P253: 3m Extended horizontal balanced flue

P255: 5m Extended horizontal balanced flue

P257: 7m Extended horizontal balanced flue

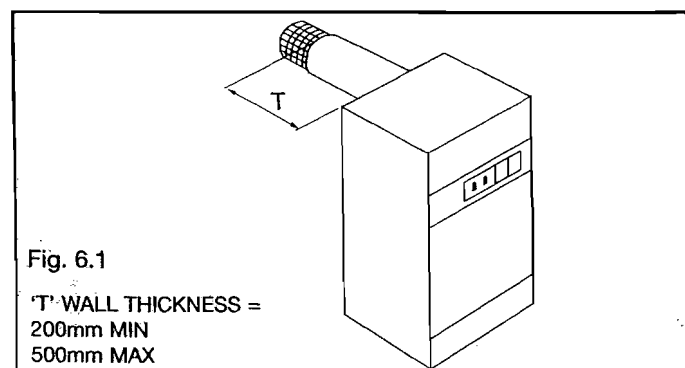
Refer to Section 17 for step-by-step fixing instructions.

P240: 5m Ridge tile flue kit. Complete fixing instructions supplied with each kit.

P245: 2.5m Vertical RS balanced flue. Complete fixing instructions supplied with each kit.

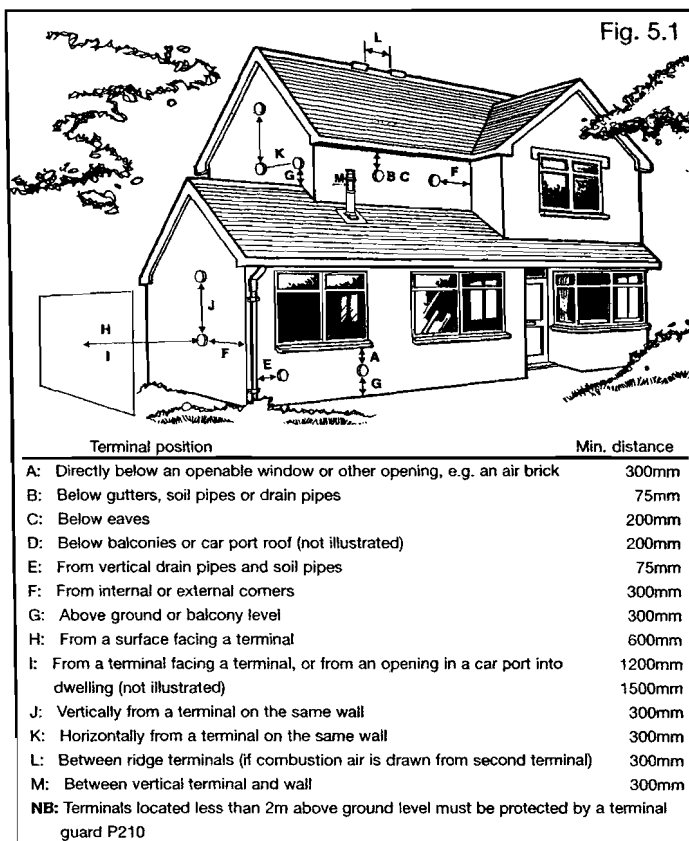
Balanced Flue Terminal

For installations where the flue passes through the wall immediately behind the appliance. The terminal is suitable for a thickness of 200mm to 500mm (8 to 20in) as shown in Fig.6.1. An 800mm wall liner P337 can be ordered separately.



Visible Plumbing

The efficient operation of Powermax will naturally give rise to condensation in the flue gases and plumbing 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.



Extended Balanced Flue Systems Figs.6.2 & 6.3

Extended Flue Components can be ordered as required for installations where the appliance is sited some distance from the balanced flue terminal.

The air/flue pipes can be run to an external wall face up to 5.0m away from the appliance, and can leave the appliance horizontally to right or left, rearwards or vertically upwards - See Fig. 6.2

The maximum length of each air/flue pipe run must not exceed 5.0m including the BF terminal if the maximum of 4 bends in each pipe is used - see Fig 6.3. There is no minimum length.

If fewer than 4 pairs of bends are used between the appliance and the flue terminal assembly, then the maximum length of straight pipe can be increased if required - see table below.

MAX. NO OF BENDS- (90° OR 135°)			MAX. PIPE LENGTH
Air Inlet	Exhaust Flue	Total	Air/Flue + Term.
4	4	8	5.0m each
3	3	6	7.0m each

Ridge Tile Terminal Fig. 6.5

With this system, combustion air can be 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 and the air inlet pipework must be at least 1.5m long and not less than half the length of the flue. Additional components may be specified up to the maximum indicated in the diagram and the table below.

Air for combustion must effectively be taken from outside.

Typically, combustion air will 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 203cm² (32in²).

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

Fig. 6.2

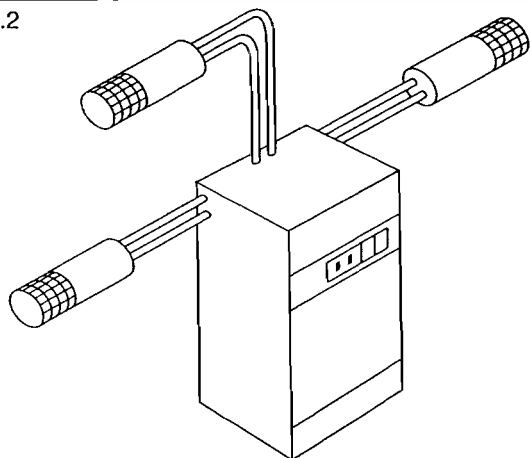
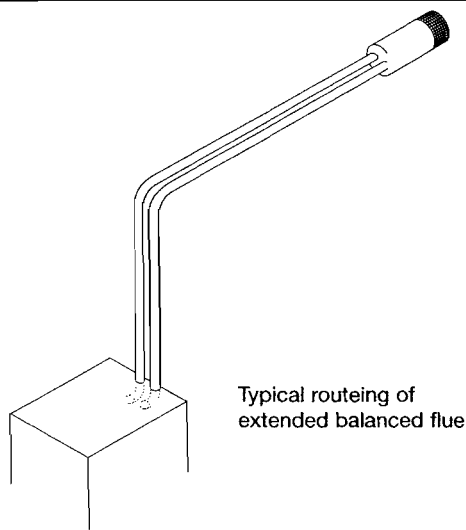
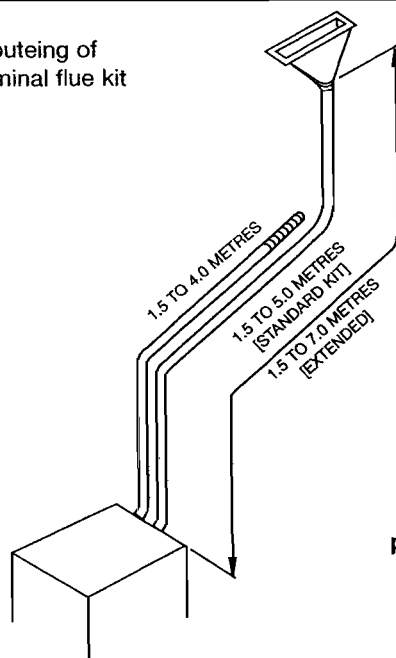


Fig. 6.3

Fig. 6.5
Typical routing of ridge terminal flue kit

Note that the length of the air inlet pipe must not be less than 0.5 x length of flue pipe

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

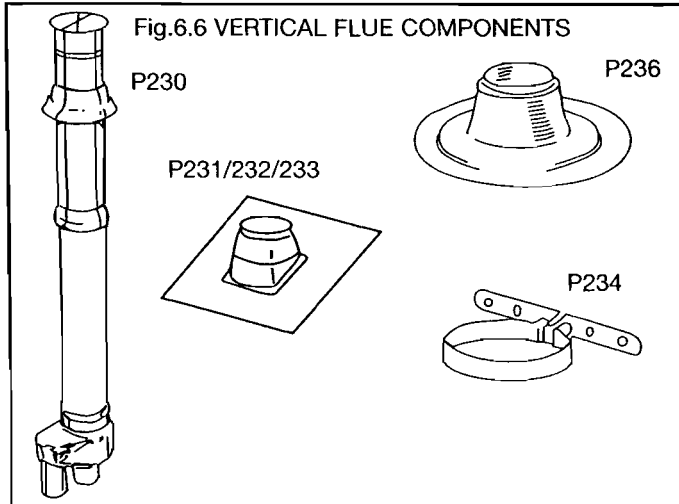
Vertical RS Flue System

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

Fig.6.6 VERTICAL FLUE COMPONENTS



To connect the Powermax to the vertical terminal a kit Part No. P245 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.

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.

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.

3m Mini Terminal BF kit	P283
5m Mini Terminal BF kit	P285
7m Mini Terminal BF kit	P287

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		
Position of opening	Ventilated to	Area of each vent
High and Low Level	Room	71cm ²
High and Low Level	Outside	36cm ²

Fig. 9.0

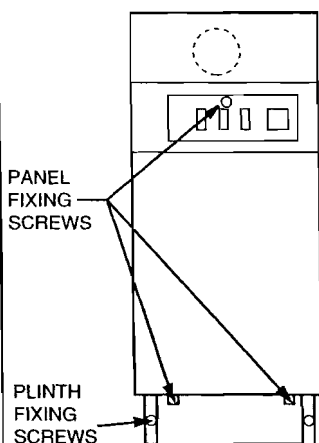


Fig. 9.1

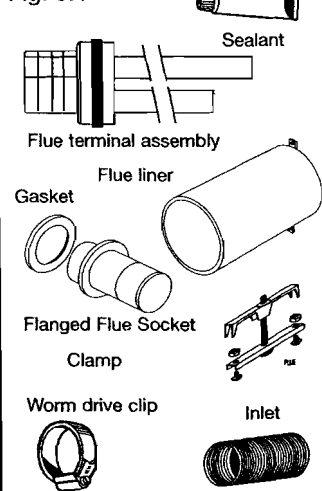
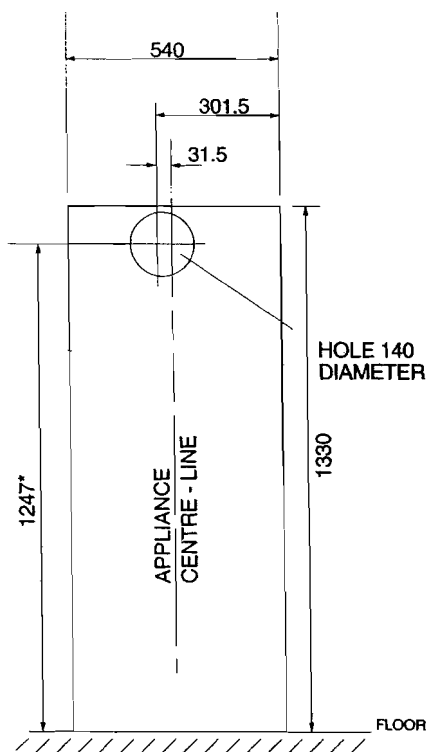


Fig. 9.2



* Nominal dimension - check actual height on appliance. Allow also for floor unevenness

8. TECHNICAL DATA

Nominal Output	18.31kW (62,500 Btu/h)
Nominal Input	22.55kW (76,940Btu/h)
Category	I _{2H} Gas G 20
Supply Pressure	20mbar
Flue Types	C ₁₃ -C ₃₃ -C ₅₃ (As flue kit supplied)
Gas Connection	Rc1/2
Burner Pressure	11.5 ± 0.5mbar. (4.5 ± 0.2 in w.g.)
This is factory set and no adjustment is intended	
Gas rate	2.15m ³ /h (75.9ft ³ /h)
Injector	No. 215
NO _x	<50ppm
CO	<20ppm

Working Pressures:

Primary	1 bar max
DHW	6 bar max
DHW	1 bar min

Thermal Store Capacity

150L

DHW Temperature

55-60°C

Weight (empty)

80kg

Weight (full)

235kg (inc. C.H. Pump)

Connections:

CH Flow/Return	22mm Compression
DHW Inlet	22mm Compression
DHW Outlet	22mm Compression
Open vent	22mm Compression

Flueing:

Balanced Flue	140mm dia
Standard Flue Length	500mm
Maximum Flue Length	5m (+4 bends in each pipe)
Maximum Flue Length	7m (+3 bends in each pipe)

Options: Programmer 7 day, 3 period, digital

Clearance Requirements for Installation and Servicing:

Top	400mm (16 inches)
Sides	5mm [10mm (3/8") total]
Base and Back	Nil
Front	450mm (18in) Unless behind an openable door

Electricity Supply 230V-3A

Dimensions:

Height	1330mm
Width	540mm
Depth	600mm

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. To gain access after unpacking, see fig 9.0, remove two screws at bottom of front cover, pull forward from bottom, gently ease downwards to free location studs. 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 two screws.

2. Carefully set aside the outer covers. Remove small panel(s) either side of casing for plumbing connection (and flue/air pipes) as necessary. The cut-away base allows pipework to be brought up from below floor level.
3. Connect one end of electricity supply cable to the user terminal in accordance with sections 4 and 10. The cable must be routed through the bushings in LH side panel and controls chassis.
4. Flueing

Note: The inlet baffle (in separate poly bag with appliance) should be fitted when the flue length is 1.49m or less. Remove fan inlet cone Fig 9.5, place baffle inside fan spigot and reassemble inlet cone.

If installing boiler with vertical RS balanced flue see separate instructions supplied with vertical flue kit.

If installing boiler with an extended balanced flue go to Section 17 of these instructions.

If installing boiler with a Ridge Tile Terminal, see separate instructions supplied with ridge terminal flue kit.

The boiler is supplied as standard with the following flue components, See Fig. 9.1

- 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
- 1 x tube RTV silicone sealant
- 1 x flanged flue socket/gasket
- 1 x flue clamp

Note: The flue terminal assembly MUST be installed horizontally.

The unit is floor standing and a vertical flat area of wall is required 1330mm high x 550mm wide. If unit is being raised above floor level, eg in a wet floor area, 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. 9.2 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 Place gasket on spigot of flanged socket. Fit socket assembly into the outlet of flue collector and secure using the backing flange and two M6 set screws. Slip a worm drive clip over both ends of flexible inlet duct. Push one end of the duct over the fan inlet extension and secure with clip. (See Fig 9.3).
 - d Measure and cut flue pipe with a hacksaw to a length as illustrated in fig 9.4. Measure the wall thickness and add 105mm to the flue pipe from datums 'AA'. Remember to add also any stand-off. Remove any burrs from cut ends of pipes.
- Note:** If wall is not truly vertical or appliance is prevented from standing against wall, add stand off distance to wall thickness measurement.
- e Smear a film of silicone sealant (approximately 0.5mm thick) on to the first 40mm of the exhaust flue pipe of the terminal assembly. Push fully home ensuring inlet air pipe enters flexible duct and flue pipe engages socket. Secure inlet pipe with worm drive clip (see Fig 9.3). Fit clamp assembly hard against rear panel of appliance.

- 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 and make water connections as described in Section 11.
DO NOT OBSTRUCT BURNER OR GAS PIPE TO BURNER.
7. Complete electrical connections to appliance strictly in accordance with sections 4 and 10.
8. Test gas pipework for soundness in accordance with BS6891.

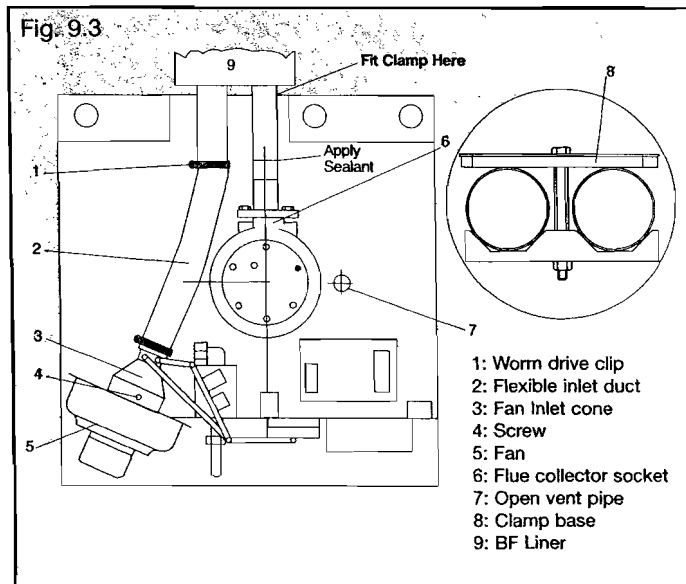
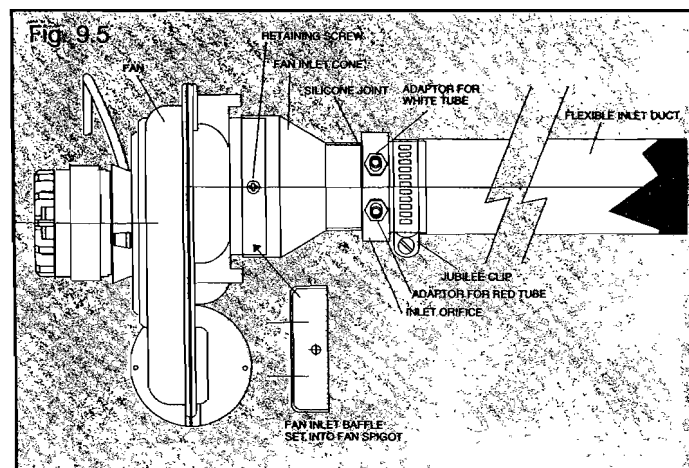
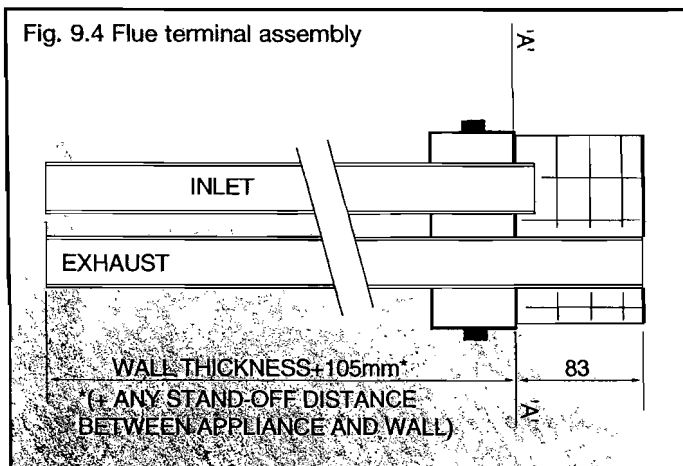


Fig. 9.4 Flue terminal assembly



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.

1. Connect the incoming electricity supply cable to terminals

L - brown
N - blue

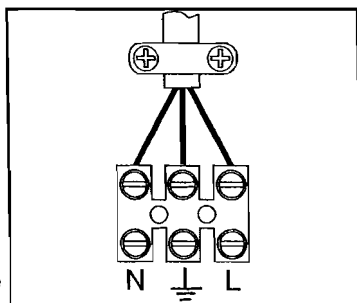
⏏ - green-yellow
of the user terminal block. Ensure that the cable is routed via the anchorage and

through bushing in LH side panel. See Fig 10.3. Trim all excess length from main supply cable.

2. Connect the pump cable and any external control cable to the terminal block as indicated and described below - See Fig 10.4 - and route via clips on inside of RH side panel.

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. If not factory fitted, the central heating pump must be connected to the terminal block at terminal 6 (pump live), 7 (pump neutral) and 8 (pump earth) to allow the cold start thermostat to be operative. All wiring for the pump etc must be suitable for 230V.
4. To provide timed control for non-programmer models, a twin channel programmer having voltage free contacts should be used. Power the programmer from terminal 11 (L) and link to one side of the programmer's hot water relay contacts. Connect the switched hot water contact to terminal 14. To wire the central heating channel, remove link wire (terminals 9 and 10) and connect the programmer's CH relay contacts to terminals 9 and 10. NOTE THAT THE APPLIANCE ON-OFF SWITCH IS NOW INOPERATIVE.
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 9 and 10) and connect the switched wire to terminal 9, feed wire to terminal 10. A permanent live is available at terminal 11 and additional neutral at terminal 12 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 11
Output 1 to terminal 14
Output 2 to terminal 13
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. ENSURE THE GAS SUPPLY IS EARTH BONDED.

Fig. 10.3 Route for incoming electric cables

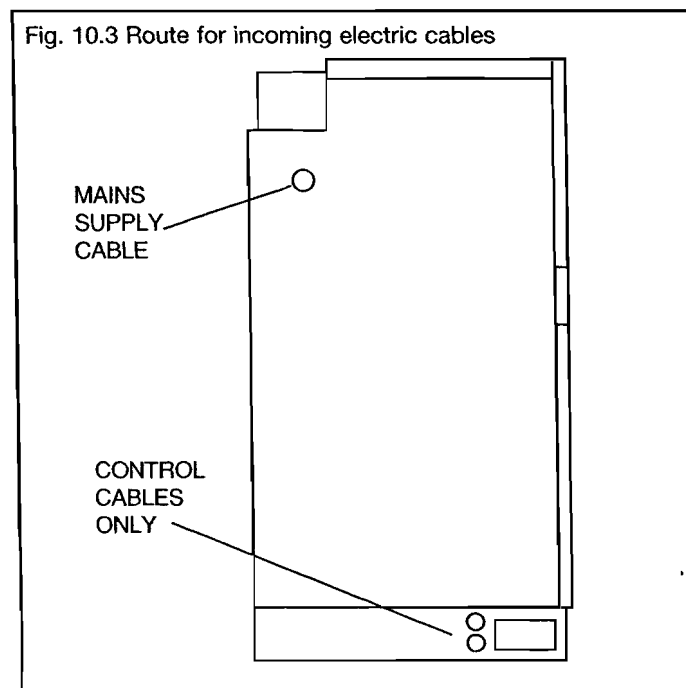


Fig. 10.4 Terminal block

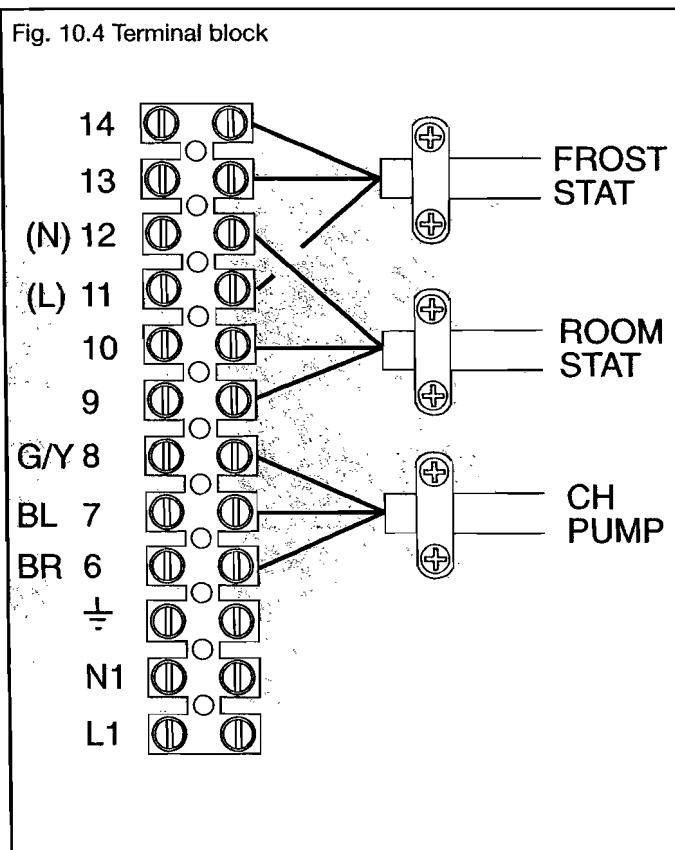


Fig. 10 Powermax 185 wiring diagram

MAIN WIRING HARNESS

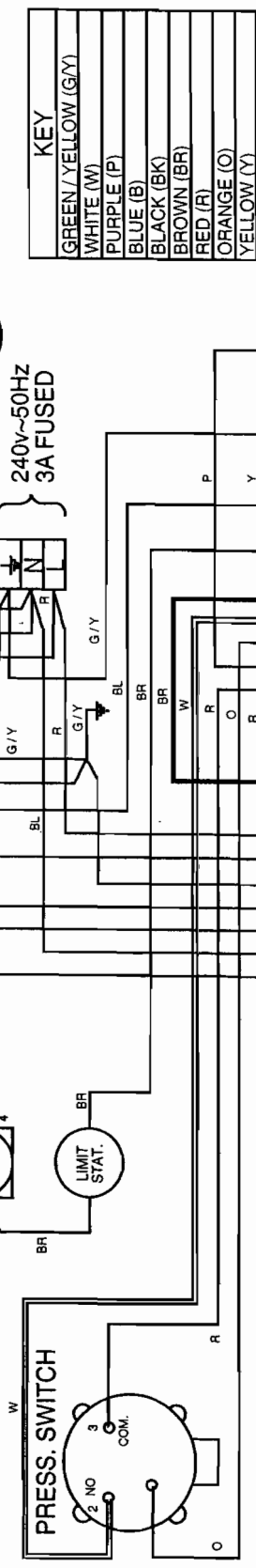
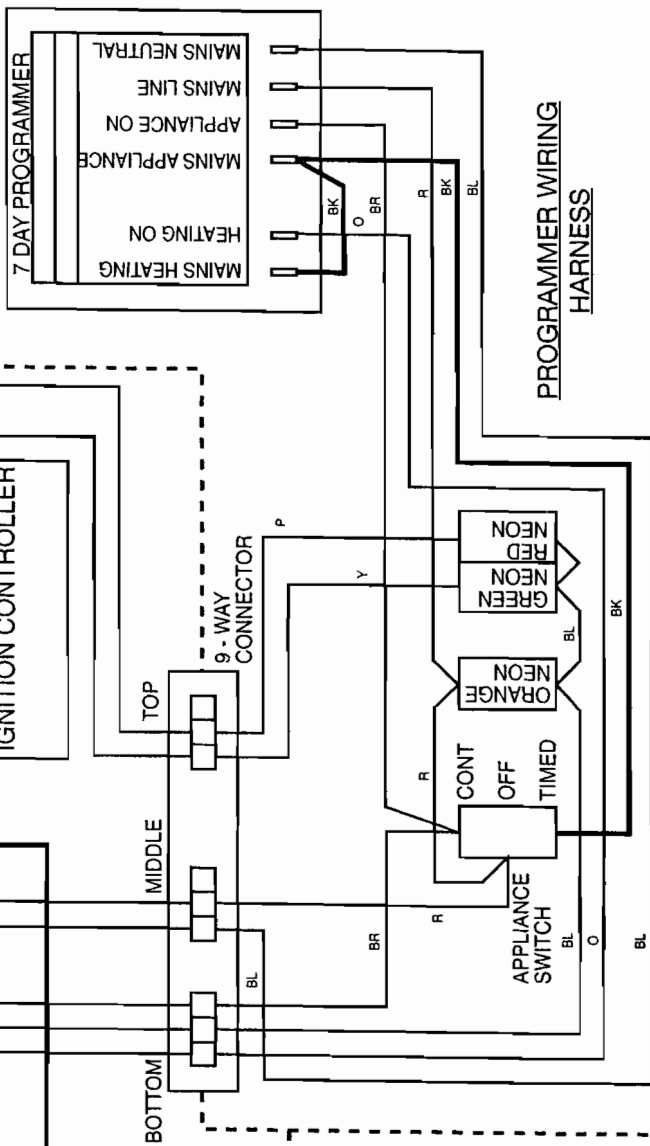


Fig. 10.2



STANDARD SWITCH PANEL
WIRING HARNESS

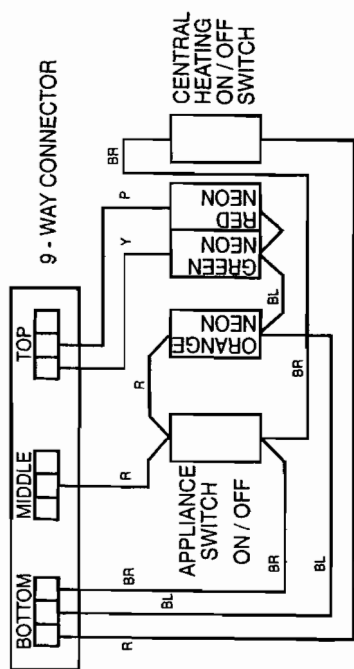


Fig. 10.1

11. WATER SUPPLY

Mains Supply Requirement

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 20 litres/min of hot water. Where the mains pressure exceeds 4.5 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 (14.5 psi; 33ft head).

A full way isolating valve (e.g. gate valve or quarter-turn valve) should be fitted in the supply pipe before, but adjacent to, the unit.

Distribution Pipe Sizing

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.

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. An in-line scale reducer (conditioner) or ion-exchange softener will be most effective when fitted immediately before the unit.

Good quality polyphosphate dosing devices can inhibit scaling but generally should not be fitted where heat could impair their performance. They also need regular replenishment to remain effective.

Conditioners such as those using electric or magnetic fields can, in most waters, be effective at reducing or modifying limescale formation. We offer, as a factory fitted extra, an electric water conditioner and recommend this as a 'no maintenance' option.

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

Primary Pipework

Water soluble flux should be used for making soldered capillary joints in the primary (radiator) circuit. **Traditional grease-based flux must not be used.**

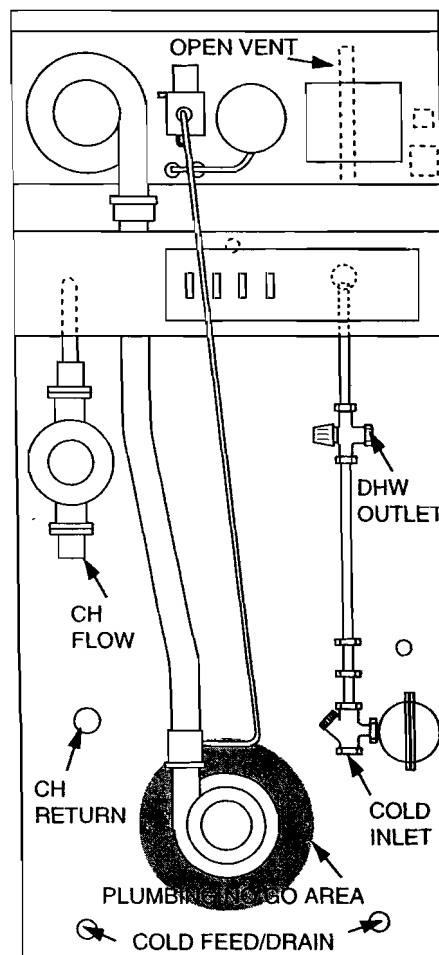
Open Vented Primary System See Fig. 11.1

When installing Powermax 185 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 and behind the controls chassis (See Fig 9.3). 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. When Powermax is used as the boiler of a central heating system, the F & E cistern should be positioned such that the

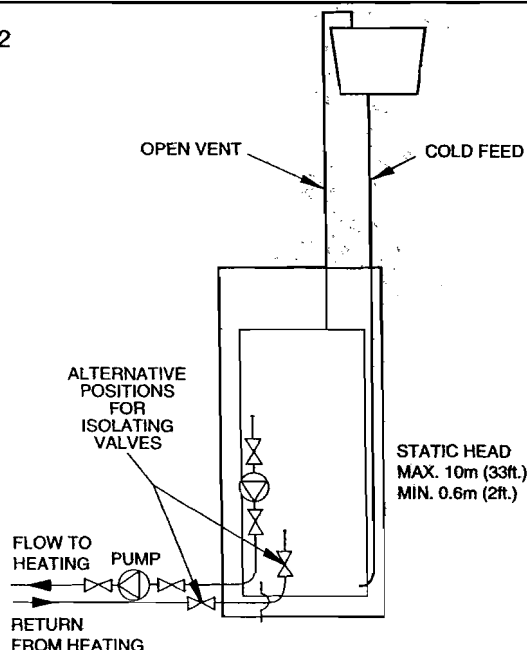
water level is at least 1metre above the highest point of the primary/circulation system. The cistern should not be positioned at a height greater than 10 metres above the unit. An unvalved 15mm feed and expansion pipe must be provided from the F&E cistern to the unit. Two connections are provided near the base of the boiler. A drain cock is fitted to one connection the other connection being provided with a 15mm compression fitting for the cold feed and expansion pipe. These may be reversed if more convenient, see Fig 11.1. The top rear panel is cut away to enable the cold feed pipe to be conveniently run down on either side of the thermal store.

Fig. 11.1 Water connections



Note: CHECK THAT FACTORY FITTED CONNECTIONS HAVE NOT BECOME LOOSE IN TRANSIT.

Fig. 11.2



Flow & Return Connections

Two 22mm compression connections are accessible with the front and plinth covers removed. The central heating flow is positioned above left and the return is located below left. See Fig.11.1.

There is space to run flow and return pipework between the front cover and the thermal store but **the pipes must not obstruct the burner or prevent the removal of the burner or ignition electrode. Observe "No Go" area indicated in Fig 11.1.**

Special requirements for Thermostatic radiator valves (TRV's) and installations where radiators are sited above the boiler

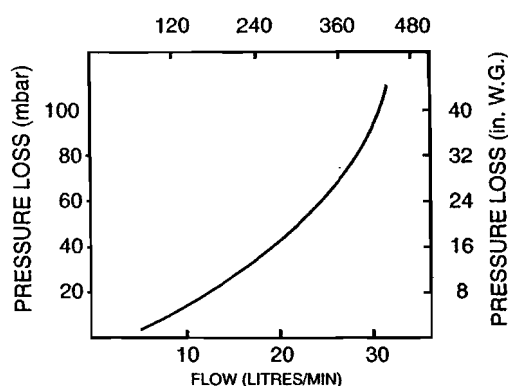
Note that in installations where all radiators are fitted with TRV's, a by-pass loop (manual or automatic) must be provided. Where the boiler is on a ground floor and/or has radiators above it, a non-return valve must be fitted in the central heating flow.

Central Heating Pump

If the central heating pump is not factory-fitted it should be sited in the flow (as Fig. 11.2) and isolating valves incorporated as close to the pump as possible. Alternatively the pump may be fitted within the appliance casing. When selecting pump consult head loss graph Fig.11.3. The circulating pressure and flowrate available from the factory-fitted pump is shown in Fig.11.4.

Fig. 11.3

HYDRAULIC RESISTANCE OF THE PRIMARY STORE



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.

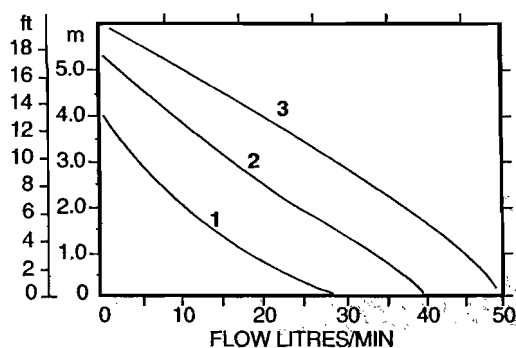
If an inhibitor is to be used after flushing, it should be used in accordance with the guidelines in the above standard and the inhibitor manufacturer's instructions.

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

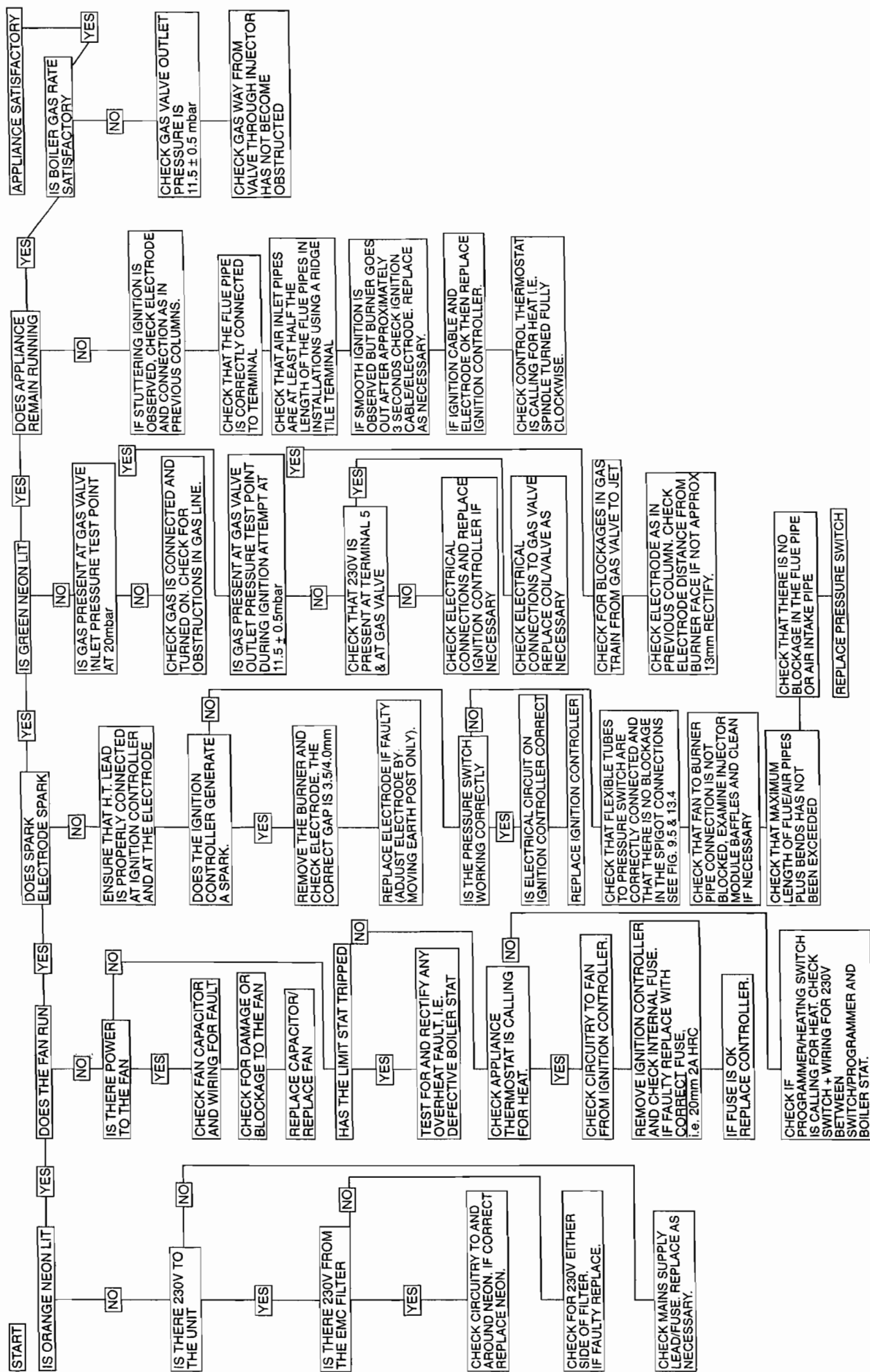
Once the system has been fully flushed, complete the relevant section in **(benchmark)** log book.

NOTE: When refilling after flushing or draining down for maintenance purposes check that the central heating circuit has not air locked: Before recommissioning the system, crack open the 22mm expansion connection at the top of the unit to see that it is full of water. If difficulty is experienced with refilling, contact the Powermax Service Department for advice.

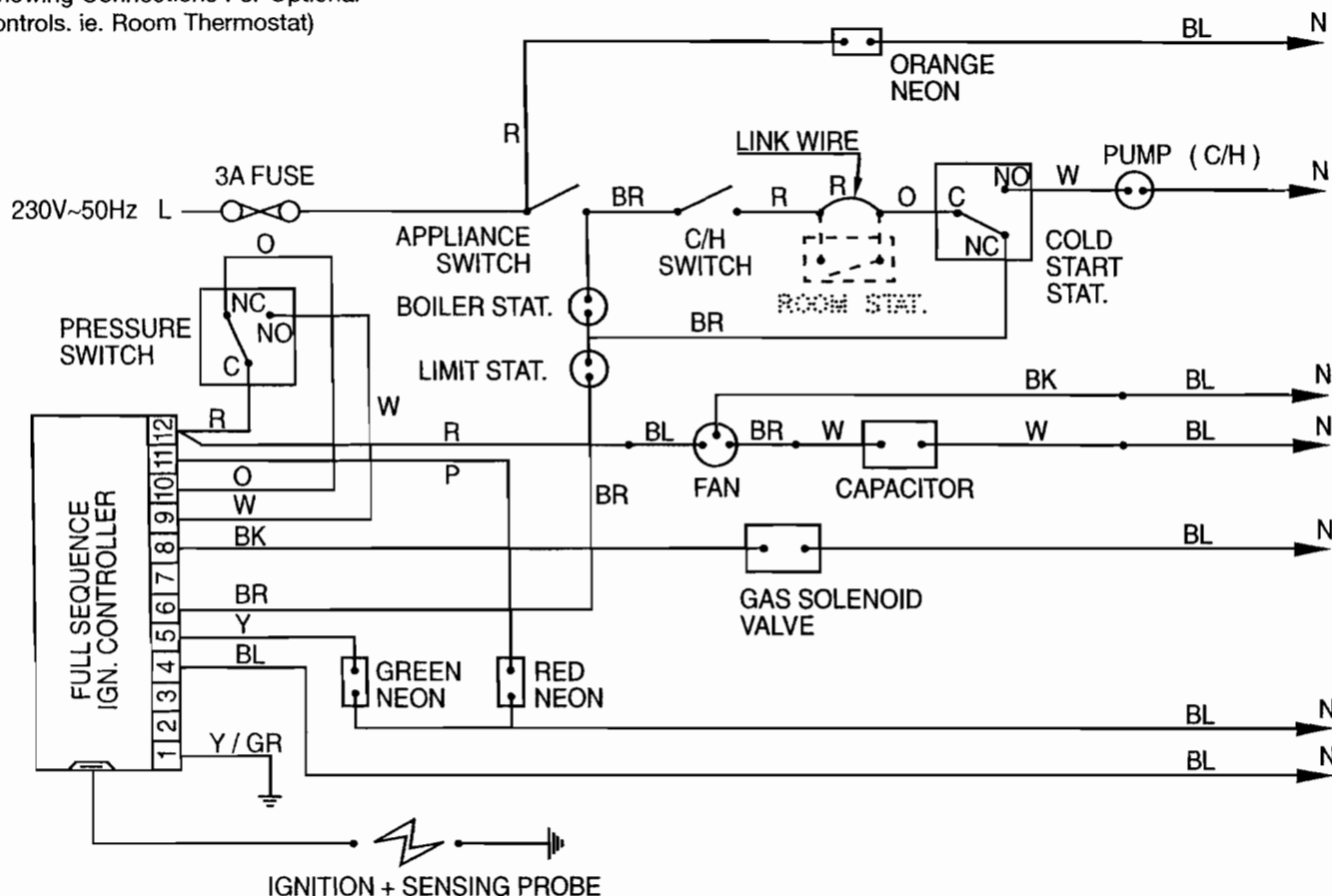
Fig. 11.4 PUMP PERFORMANCE AT 230V~50Hz
TEMPERATURE 80°C



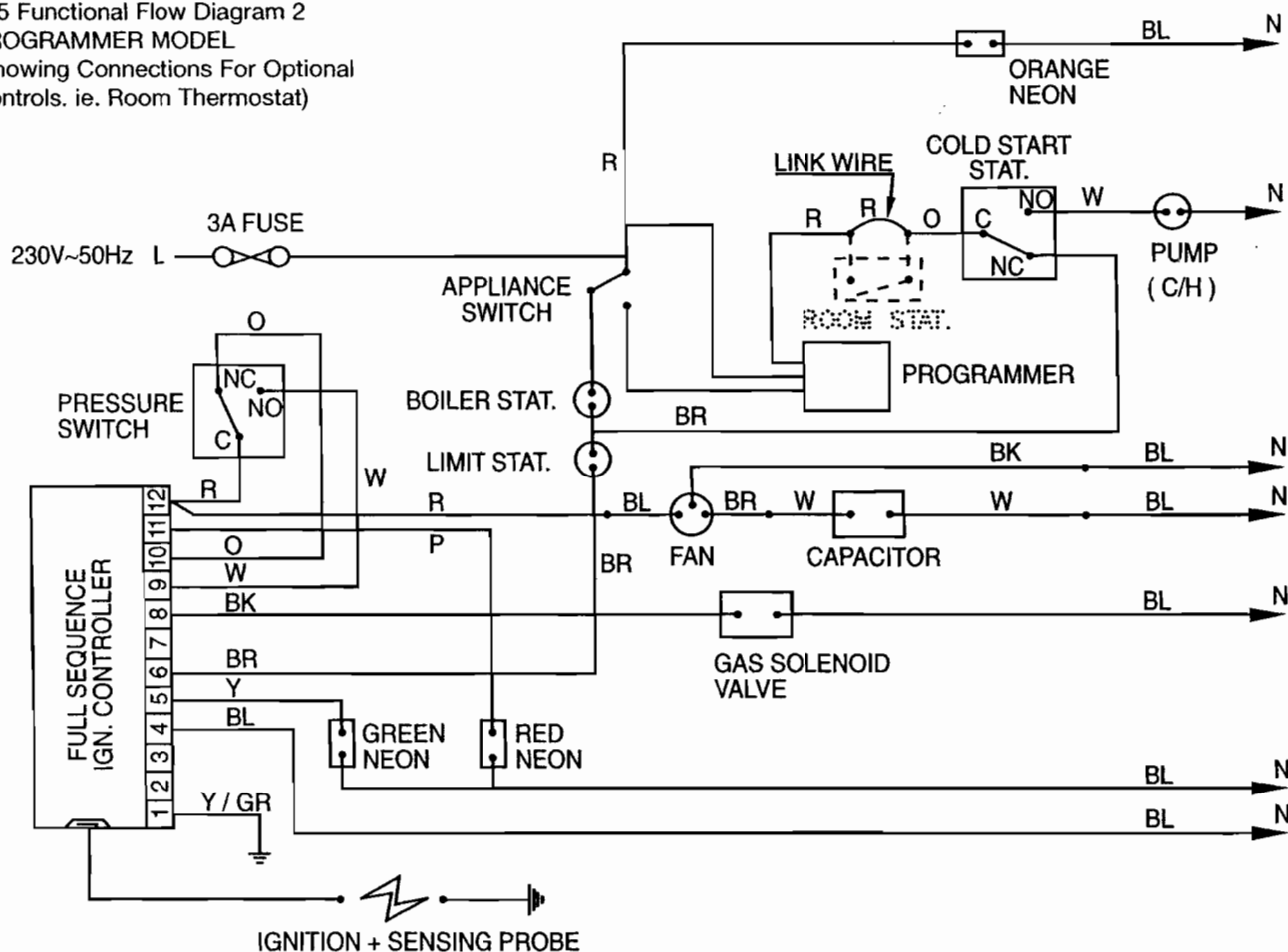
Fault Finder Chart



185 Functional Flow Diagram 1
STANDARD MODEL
(Showing Connections For Optional
Controls. ie. Room Thermostat)



185 Functional Flow Diagram 2
PROGRAMMER MODEL
(Showing Connections For Optional
Controls, ie. Room Thermostat)



12. COMMISSIONING

WARNING: DO NOT ATTEMPT TO START THIS APPLIANCE UNLESS THE THERMAL STORE (PRIMARY CIRCUIT) HAS BEEN FILLED WITH WATER.
IF IN DOUBT CRACK OPEN THE 22mm FITTING AT THE TOP OF THE UNIT, WATER WILL WEEP OUT OF THE JOINT WHEN THE UNIT IS FULL.

Open Vented Primary System

- Ensure Draincock is closed.
 - Open isolating valves either side of central heating pump (if fitted).
 - Admit water to the F&E cistern and thence to the thermal store and the remainder of the central heating system.
 - 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 and check for leaks.

Domestic Hot Water System

- Open one or more hot water taps.
- Turn on mains water supply and observe air free water issuing from tap(s).
- Close tap(s) and check mains water pipework for leaks.
- Check that all factory-made plumbing connections are tight (and have not loosened in transit).**
- 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 9.

Remove screw from solenoid valve inlet pressure test point Fig.13.5 and attach a suitable gauge.

- 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.
- Remove the sealing screw from the cold start drain at the base of the combustion chamber (below burner Fig. 12.1) and place a small receptacle underneath to catch any condensate that is discharged.
- 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.

- Move the appliance on-off switch to the 'I' (on) position (standard model) or 'CONT' (programmer model). Fan starts to rotate **almost immediately**. After about ten seconds the automatic ignition sequence will be initiated and the burner will light after approximately 10 seconds.

- Green neon indicates the burner is operating.

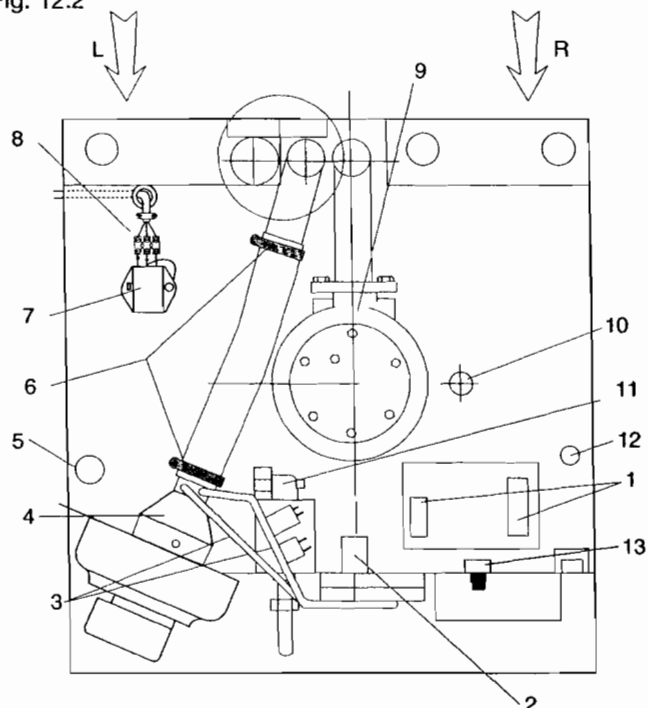
Note: If the burner fails to light at the first attempt, the controller will repeat the ignition sequence four times before going to "lock-out" (indicated by the red neon). NB. The fan runs continuously at lock-out.

To re-set, switch to 'O' (off) at the appliance on-off switch, wait ten seconds and switch to 'I' (on) or 'CONT' again.

- 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.

- Run boiler for 15-20 mins and transfer manometer tube to outlet test nipple. Check that the burner pressure is within the limits given in section 8 Technical Data. If outside these

Fig. 12.2



- | | |
|--------------------------|------------------------------|
| 1. Terminal Blocks | 7. EMC Filter |
| 2. Capacitor | 8. User Terminal Block |
| 3. Pressure Switch Tubes | 9. Flue Collector Hood |
| 4. Inlet Extension Cone | 10. Open Vent Pipe |
| 5. Route For Gas Pipe | 11. Union Gas Cock |
| 6. Worm Drive Clips | 12. Route For Cold Feed Pipe |
| | 13. Limit Thermostat |

limits check meter governor pressure setting and ensure that the gas supply pipework is correctly sized and free from obstruction. Record operating pressure in **(benchmark)** log book. Replace sealing screw after checking - no sealant is required. Note that the gas valve is factory pre-set and the burner pressure should not need adjusting. If unable to obtain correct burner pressure contact RSA Waterheating Limited.

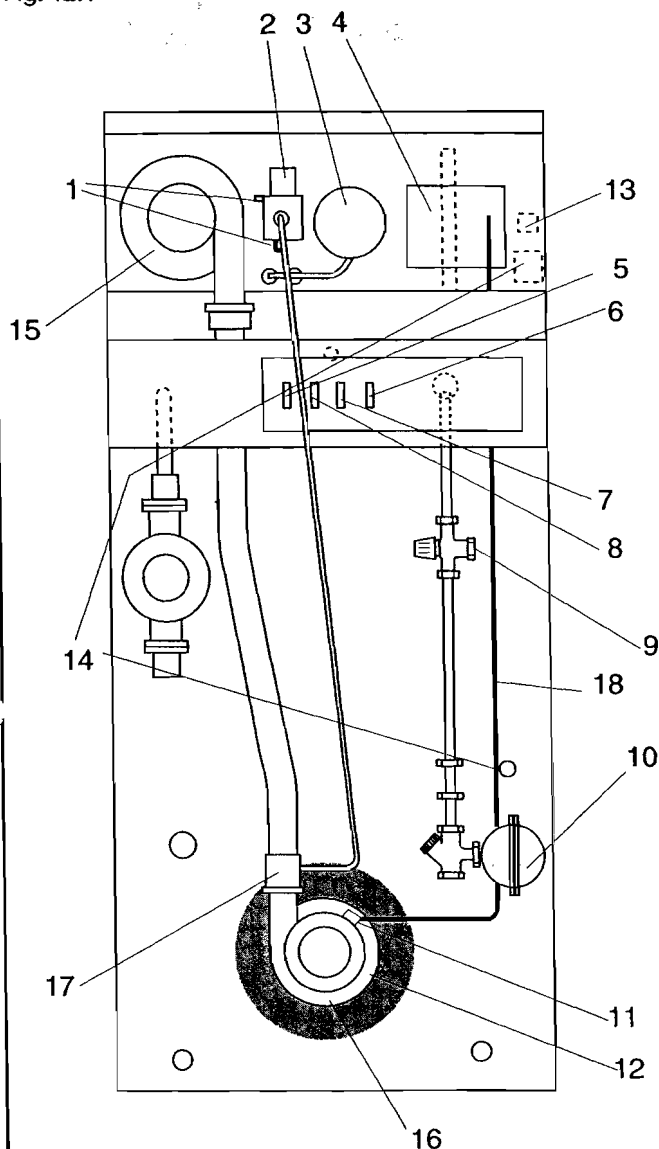
Record the "working" inlet gas pressure at inlet pressure test point - Fig. 13.5 - in **(benchmark)** log book.

- Turn appliance off, remove gauge and test for gas soundness.
- After approximately twenty minutes (or when there is no further wet discharge) replace the sealing screw in the cold start drain - Fig. 12.1.

Commissioning The Central Heating System

- On programmer model, 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.

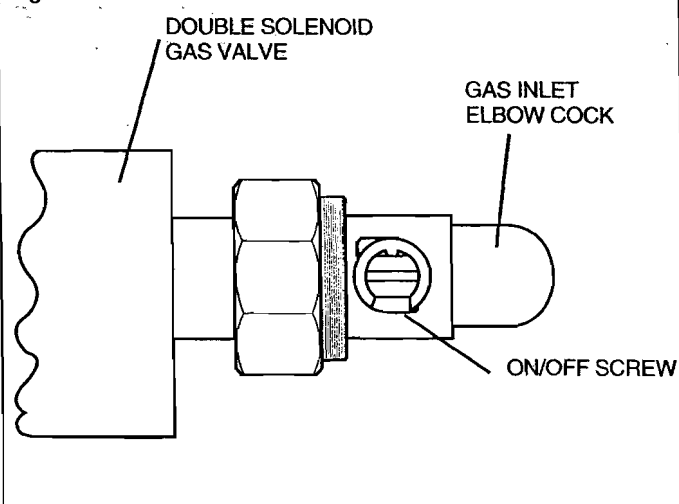
Fig. 12.1



- | | |
|---------------------------------------|---------------------------|
| 1. Pressure Test Points | 9. Blending Valve |
| 2. Double Solenoid Gas Valve | 10. Mini Expansion Vessel |
| 3. Pressure Switch | 11. Electrode |
| 4. Full Sequence Ignition Controller | 12. Burner |
| 5. Appliance ON-Off Switch | 13. Cold Start Thermostat |
| 6. Central Heating Control Switch | 14. Control Thermostat |
| 7. Green Neon (Burner On) | 15. Fan |
| 8. Orange Neon (Electrical Supply On) | 16. Cold Start Drain |
| | 17. Injector Module |
| | 18. HT Lead |

- 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 **(benchmark)** log book.
- g Measure hot water flow rate at bath tap (fully open) and record in **(benchmark)** log book.
- h Refit outer covers and plinth front in reverse order.

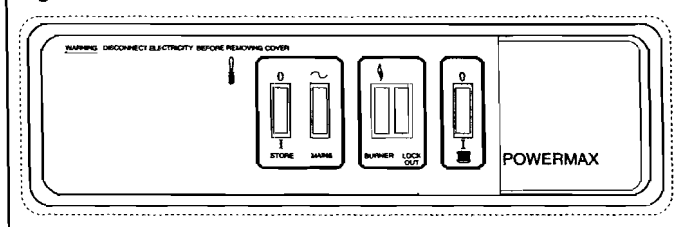
Fig. 12.3



Handing Over to the User

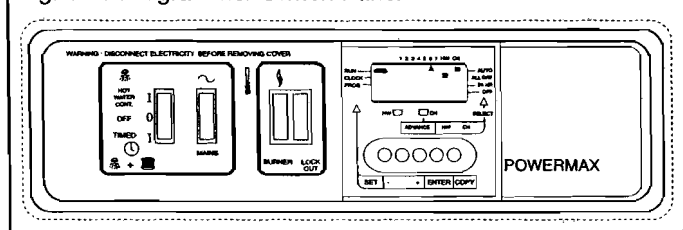
- Explain the appliance controls.
- Give guidance if the system is to be shut down for long periods when freezing is possible.
- Advise that the appliance should be serviced regularly.
- Explain that the correct operating position for the 3-way switch is the down TIMED position which enables HOT WATER 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



Note that Central Heating is NOT AVAILABLE when appliance ON - OFF switch is in "CONT" position. This refers to hot water only, eg. for use during summer months.

Fig. 12.5 Programmer Switch Panel



13. SERVICING INSTRUCTIONS

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 appliance is put, but in general, once a year is adequate.

IMPORTANT:

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

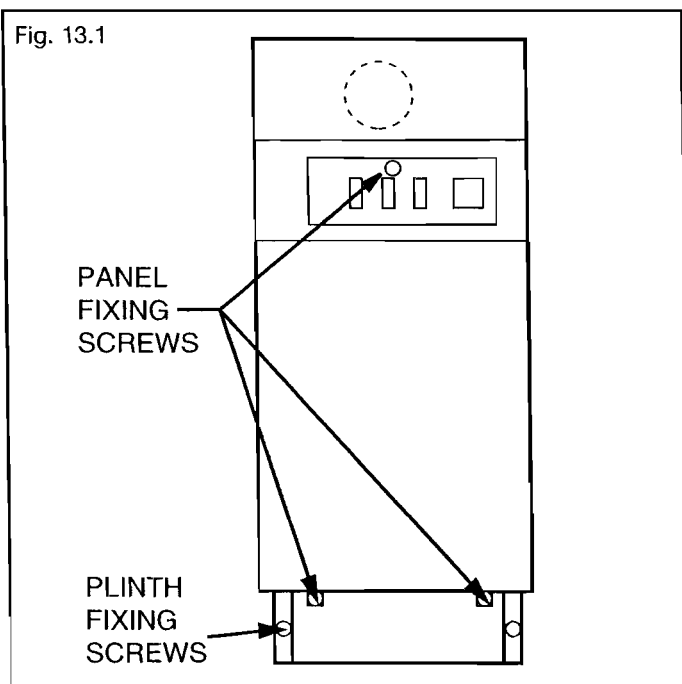
Replace any damaged gasket/seal in burner/flue system.

NB. A service gasket set P493 is available, see page 19

After completing any service work always test for gas soundness.

To gain access remove two screws at bottom of front cover, pull forward from bottom and gently ease downwards to free location studs. Remove recessed screw at top of switch panel and keep safe, lift off upper front cover. The top panel is retained by four studs; gently ease upwards to remove.

Fig. 13.1



Routine Annual Servicing

- Remove screws from flue collector and remove top cover. See Fig. 12.2. Use a pair of pliers to remove the baffles from the heat exchanger pipes. Clean baffles with a brush to remove any deposits. Set aside. Clean and check the collector hood (check and replace gasket if necessary).
- Release union nut on gas supply to burner.
Note: Hold injector with second spanner to prevent it being disturbed.
Remove 8 screws and washers from the burner flange. Pull the burner gently forwards until the burner ring clears the combustion chamber front. Gently pull the burner downwards with a twisting motion to enable the pipe to disengage from the O ring seal. See Fig. 13.2. Inspect and gently remove any deposits from the burner face. Check and replace gasket if necessary.
- Check electrode gap is 3.5 to 4.0mm - Fig. 13.3. (Note: Adjustment not normally needed; replace electrode and gasket if outside these limits). Check electrode securing screws are tight.
- Using a flue cleaning brush, insert the brush from above into each heat exchanger tube in turn. Brush up and down cleaning the tube.

- Using a vacuum or brush, clean out the combustion chamber taking care not to damage electrode.
- After cleaning, replace all components/assemblies in reverse order using new gaskets/joints as necessary.
Note: Before replacing the burner check that the spark gap is as shown in Fig. 13.3.
- Check that the appliance and controls are functioning correctly. Check for air leakage at O-ring seal between air delivery pipe and injector module.
Note: The DHW expansion vessel will not normally require attention during routine servicing.

Component Exchange Procedures Fig. 13.1

General

Isolate gas and electricity supplies.

To gain access remove two screws at bottom of front cover, pull forward from bottom and gently ease downwards to free location studs. Remove recessed screw at top of switch panel and keep safe, lift off upper front cover. The top panel is retained by four studs; gently ease upwards to remove.

To remove switch panel unplug the 9-way plug and remove the 4 fasteners securing the complete panel.

Note: That any damaged gasket **must** always be renewed. Components are replaced in reverse order unless otherwise stated.

Full Sequence Ignition Controller

Fig. 12.1

- Refer to General above.
- Pull off H/T lead from connection at top of controller.
- Pull off the 12-way connector plug.
- Unscrew 2 screws and nuts and remove controller.

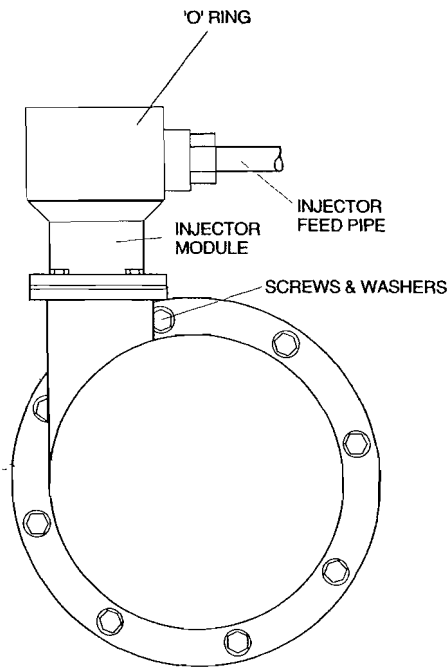
HT Lead Fig. 12.1

- Refer to General above.
- Disconnect lead at electrode and at ignition controller.
- Push short lower sleeve over electrode after re-connecting HT lead at controller.

Burner Fig. 13.2

- Refer to General above.
- Remove 2 screws securing plinth Fig. 13.1. Release union nut on gas supply to injector module.
Note: Hold injector with second spanner to prevent it being disturbed.
- Remove 8 screws and washers holding the burner to the combustion chamber.
- Pull the burner gently forward until the burner ring clears the combustion chamber front. Holding the fan to burner air pipe, pull the burner gently downwards with a twisting motion until the burner disengages from the O ring seal.
- Fit new burner using new gasket making sure all screws and washers are secured.
Note: When re-tightening union nut on gas feed pipe hold injector securely with second spanner to prevent it being disturbed.
- Check for soundness at gas supply pipe union.

Fig. 13.2



Injector Module Fig. 13.2

- Refer to General on previous page and remove switch panel.
 - Release union nut on gas feed pipe to burner.
 - Remove 3 nuts and washers securing fan. Remove screws securing fan inlet cone extension (1) and outlet adaptor (2). Gently manoeuvre fan forwards until inlet cone and studs disengage, lift fan approximately 10mm to disengage outlet adaptor; now swivel fan to burner air pipe anti-clockwise and lift clear of module. Temporarily replace fan in mounting bracket.
 - Remove 4 screws securing module to burner and lift module clear.
 - Fit new module and gasket. Reassemble in reverse order.
- Note:** When re-tightening union nut on gas feed pipe hold injector securely with second spanner to prevent it being disturbed.
- Check joints for soundness.

Spark Electrode Fig. 13.3

- Refer to General and Burner on previous page. Remove burner.
- Disconnect the HT 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. Adjust if necessary by moving earth wire only.
- Replace burner using new gasket, and check operation of appliance.
- Check for gas soundness at gas supply pipe union.

Fig. 13.3

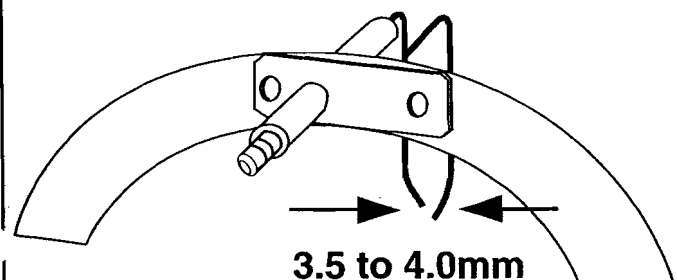
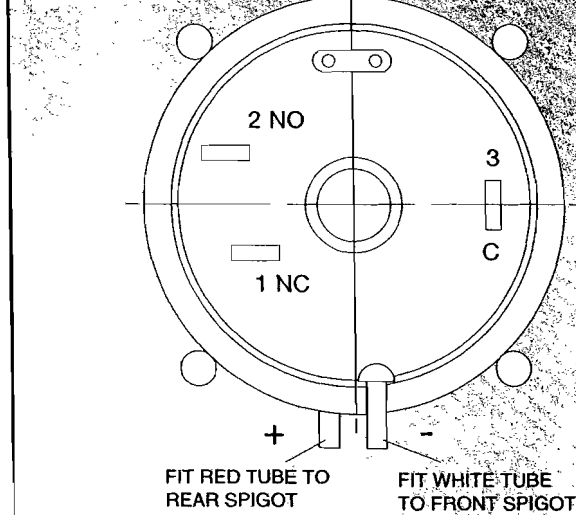


Fig. 13.4



Pressure Switch Fig. 13.4

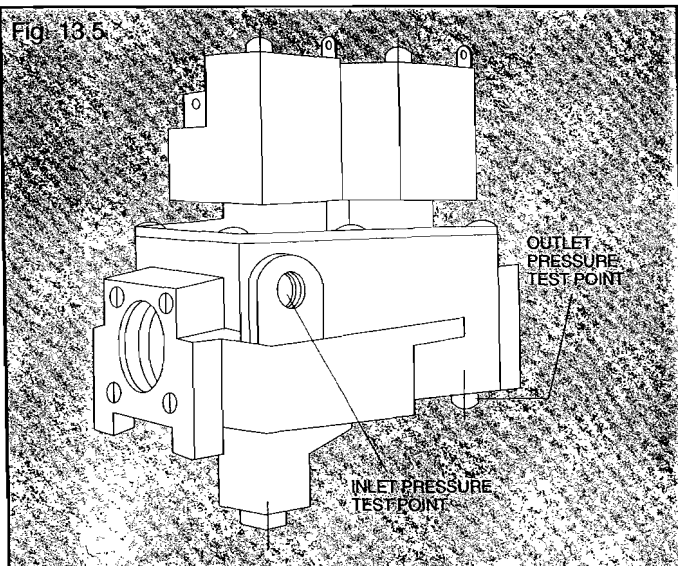
- Refer to General on previous page.
- Pull both tubes off the spigots noting relative positions of red and white tubing.
- Release wiring clamp at top of switch and remove leads.
- Unscrew 2 screws and nuts to remove switch. When replacing make sure leads are correctly connected (Refer to wiring diagram Fig. 10) and connect tubes to spigots as before.

Capacitor Fig. 12.2

- Refer to General on previous page.
- Disconnect the two leads from the capacitor at small terminal block.
- Unscrew the nut and washer holding the capacitor.
- Remove capacitor and replace ensuring that the leads are correctly replaced.

Fan Fig. 12.1 & 12.2

- Refer to General and remove switch panel.
- Disconnect fan leads from small terminal block.
- Remove the 3 nuts and washers from the fan mounting studs. Remove screws securing fan inlet cone extension and outlet adaptor.
- Pull the fan gently forwards until extension disengages and the studs clear the mounting bracket. Hold the air delivery pipe, disengage the fan from the pipe.
- Ensure fan is fitted with new O-ring supplied. Reassemble and check for soundness.



Gas Solenoid Valve Fig. 12.2 & 13.5

- a Refer to General.
- b Disconnect gas service cock at the union and disconnect the outlet pipe at the union nut on flared fitting.
- c Remove two screws retaining front of valve and two screws holding bracket. Disconnect the wiring leads and remove valve. Remove bracket.
- d Remove the flared fitting from the 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.
- f Check operation of gas solenoid valve at pressure test points. After burner has been operating for at least 10 minutes check that the burner pressure is within the limits given in the section on TECHNICAL DATA. If outside these limits check meter governor pressure setting and ensure that the gas supply pipework to the appliance is correctly sized and free from obstruction. Refer to Section 12 for lighting procedure and instructions to check burner pressure.

Neon Lights and Switches Fig. 12.1

- a Refer to General.
- 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 diagram Figs. 10.1 (standard model) and 10.2 (model with built-in programmer).

Control and Cold Start Thermostat Fig. 12.1

- a Refer to General.
- b Disconnect the leads after noting relative positions.
- c Remove the clip, spacer 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 and spacer.

Note: Do not bend capillary tube to a radius of less than 20mm.

- f Hold thermostat housing in position and replace retaining screws. Turn spindle of control thermostat fully clockwise.
- g Reconnect electrical leads - see wiring diagram Fig. 10.

Limit Thermostat Figs. 12.2

- a Refer to General.
- b Disconnect the leads.
- c Remove the clip, spacer 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 and spacer.
- f Hold thermostat housing in position and replace retaining nut. Reconnect leads.

DHW Expansion Vessel Fig. 12.1

- a Refer to General and drain down as necessary.
- b Isolate mains water supply.
- c Unscrew vessel from branch connection.
- d Replace using sealant suitable for use with potable water.

Blending Valve Fig. 12.1

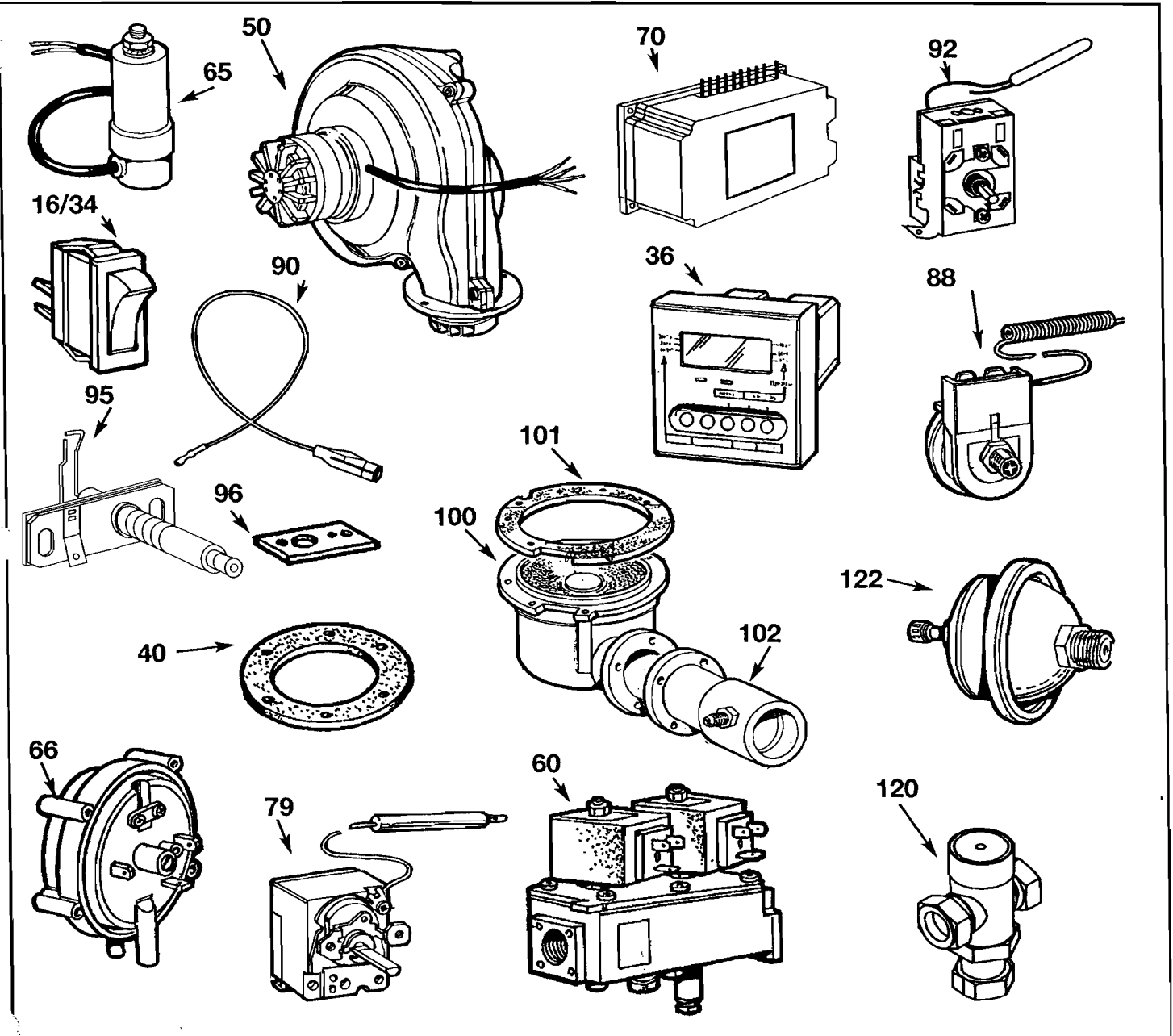
- a Refer to General.
 - b Isolate mains water supply and drain down as necessary.
 - c Exchange valve.
- Note:** The blender valve is pre-set to supply mixed water at approximately 55-60°C and does not normally require adjustment.

Programmer Fig. 12.5

- a Refer to General and 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 suitable qualified personnel. A discharged battery should be disposed of through a registered professional agency for waste material.

SHORT LIST OF SPARE PARTS



Key Number	Part Number	Qty Per Unit	Description
40/96/101	P493		SERVICE GASKET SET
16	P512	1	Rocker Switch (on-off position) Arco C1400 AB
34	P513	1	Rocker Switch (3 position) Arco-electric C1420 AB
36	P4231	1	Programmer - 7 Day Electronic
40	P340	1	Flue Collector Gasket
50	P504	1	Blower (c/w O-ring) G2E- 120
60	P466	1	Gas Valve Assembly, Johnson-Maclaren
60	P497	2	Solenoid Coil For Gas Valve
65	P503	1	Capacitor - Ducati 16.15.67 1.5mfd
66	P470	1	Pressure Switch-Beck 911-81L
70	P678	1	Full Sequence Ignition Controller ASS 0569G01A
79	P638/P520	1	Thermostat Ranco P1338/L & G RAK512
88	P481	1	Thermostat Limit Ranco LM7 - P5040
90	P487	1	HT Ignition Lead and Sleeving
92	P616	1	Thermostat, Cold Start - Ranco K36
95	P624	1	Ignition Electrode c/w Gasket
96	P510	1	Ignition Electrode Gasket
100	P473	1	Burner (c/w gasket)
101	P507	1	Burner Gasket
102	P474	1	Injector Module
120	P665	1	Thermostatic Blending Valve
122	P527	1	Expansion Vessel
136	P476	1	C.H. Pump WSP Gold Star

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 (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.

- 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' '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.

Remove side cover plate if required.

Push the plain end of a 90° into the flexible duct and secure with worm drive clip.

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

- c 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).
- d 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.

Routeing of Air/Flue Pipes

- a 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 the BF terminal if the maximum of 4 bends in each pipe is used - see Fig.17.2. There is no minimum length. If fewer than 4 pairs of bends are used between the appliance and the flue terminal assembly, then the maximum length of straight pipe can be increased if required - see table below.

MAX. NO OF BENDS- (90° OR 135°)			MAX. PIPE LENGTH
Air Inlet	Exhaust Flue	Total	Air/Flue + Term.
4	4	8	5.0m each
3	3	6	7.0m each

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

- a 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.
- b Using two screws and nuts provided, attach base of flue clamp to rear panel to suit left, right or upwards direction as indicated in Fig. 17.4 **Note:** When air/flue pipes leave appliance upwards, only half the clamp is used to secure air pipe only.

Place gasket on spigot of Appliance Bend. Fit appliance bend assembly into the outlet of flue collector and secure using the backing flange and two M6 set screws.

Fig. 17.1 Extended flue terminal assembly

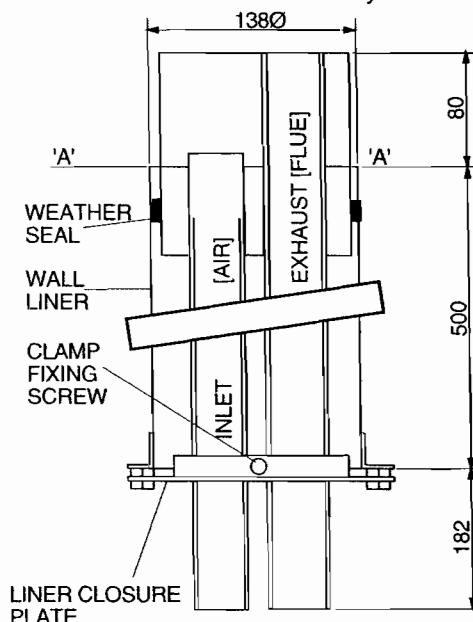
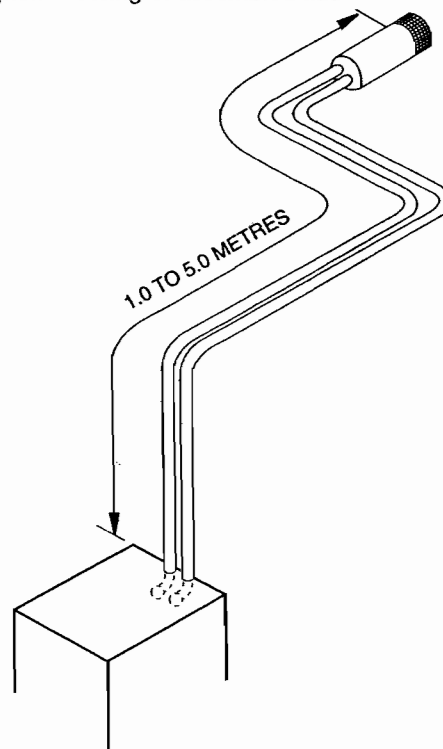
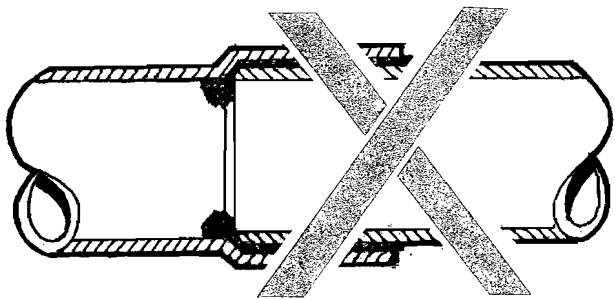


Fig. 17.2 Typical routeing of assembled flue

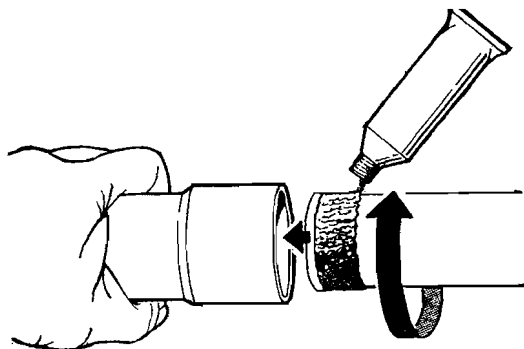


IMPORTANT NOTICE

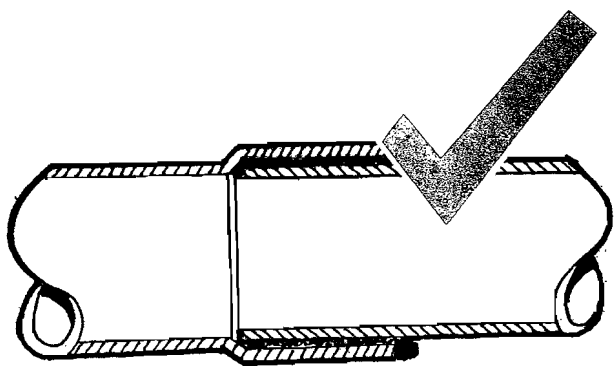
The sockets in Powermax Air/Flue pipes are manufactured to close tolerances to enable secure joints to be made with minimum use of sealant.



- 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.

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.

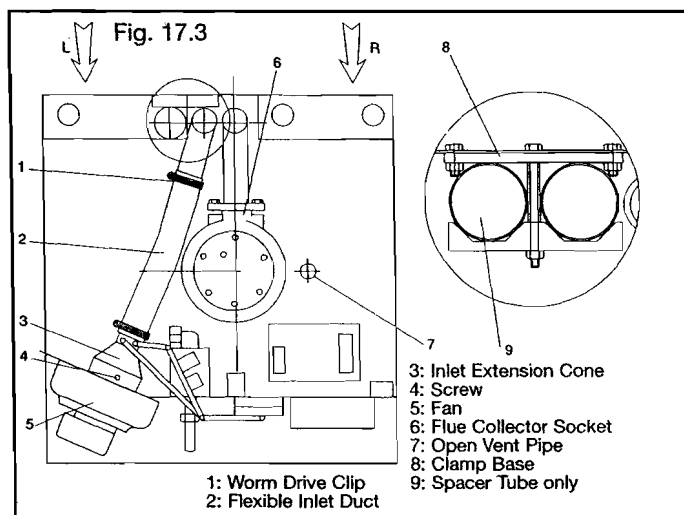
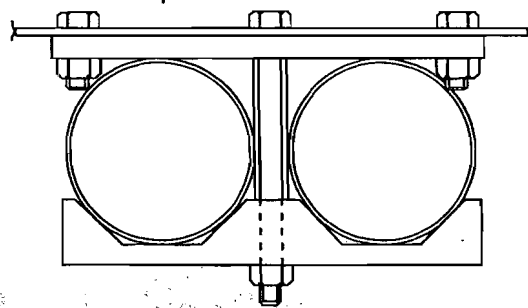


Fig. 17.4 Flue Clamp



- 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 outside 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 all the outside mating 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. Do not use sealant on female 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.

Fig. 17.5
Protective outer
duct

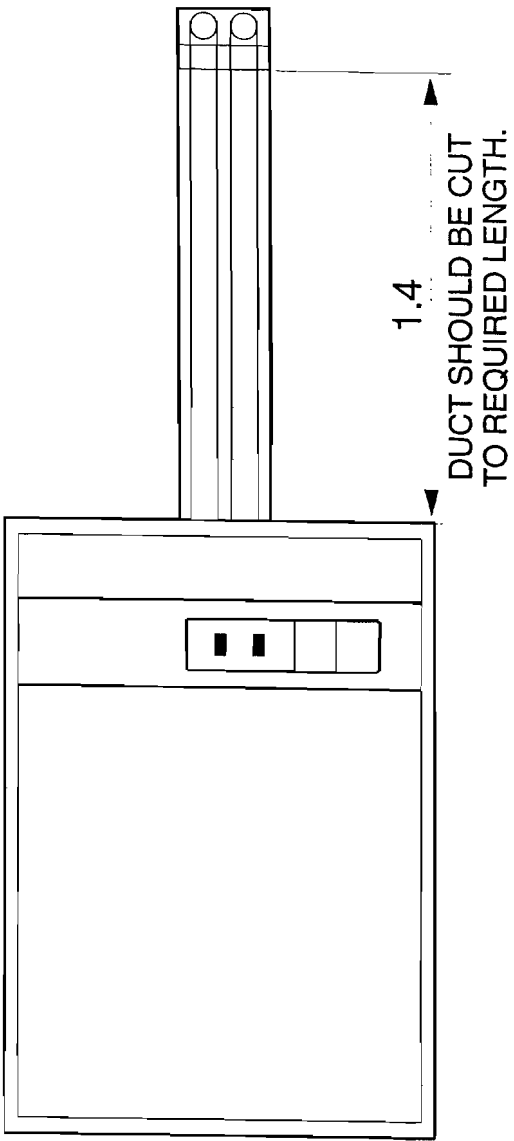
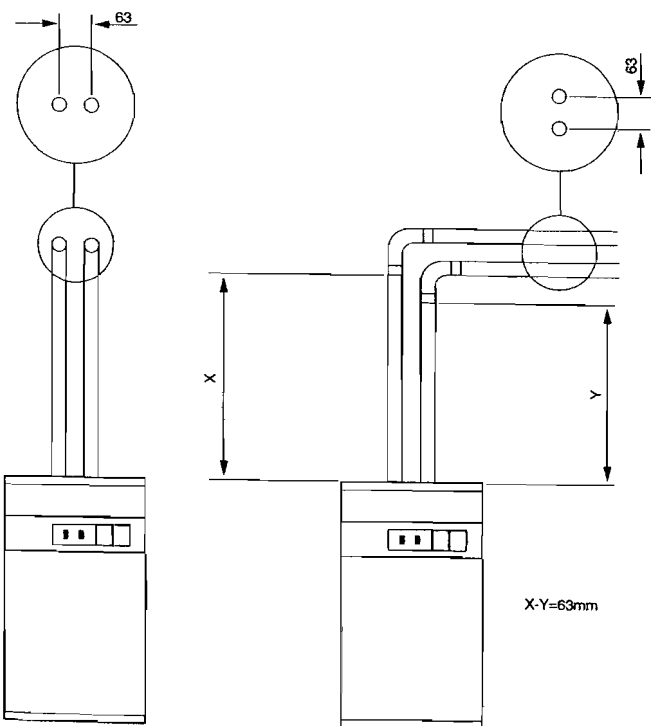
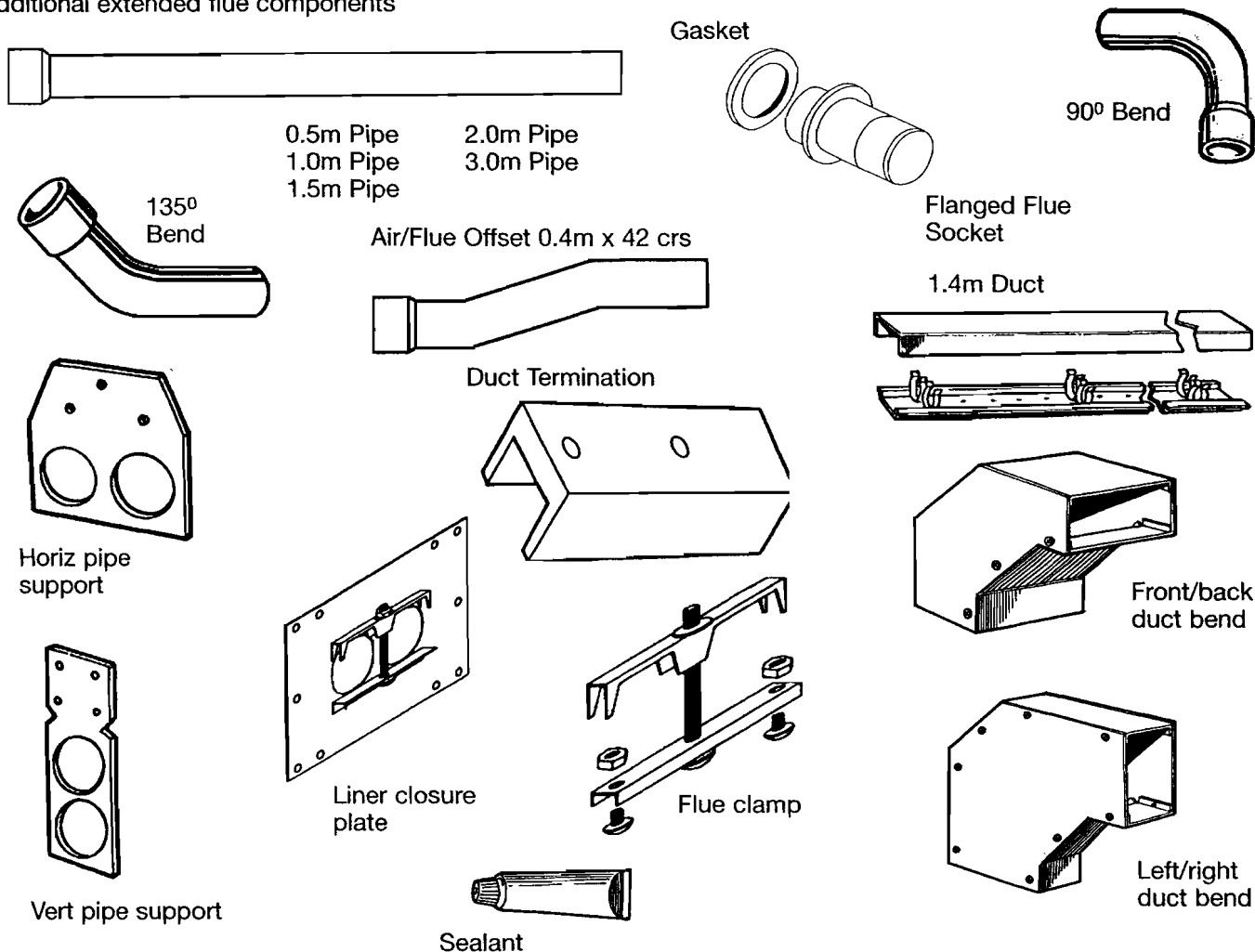


Fig. 17.6



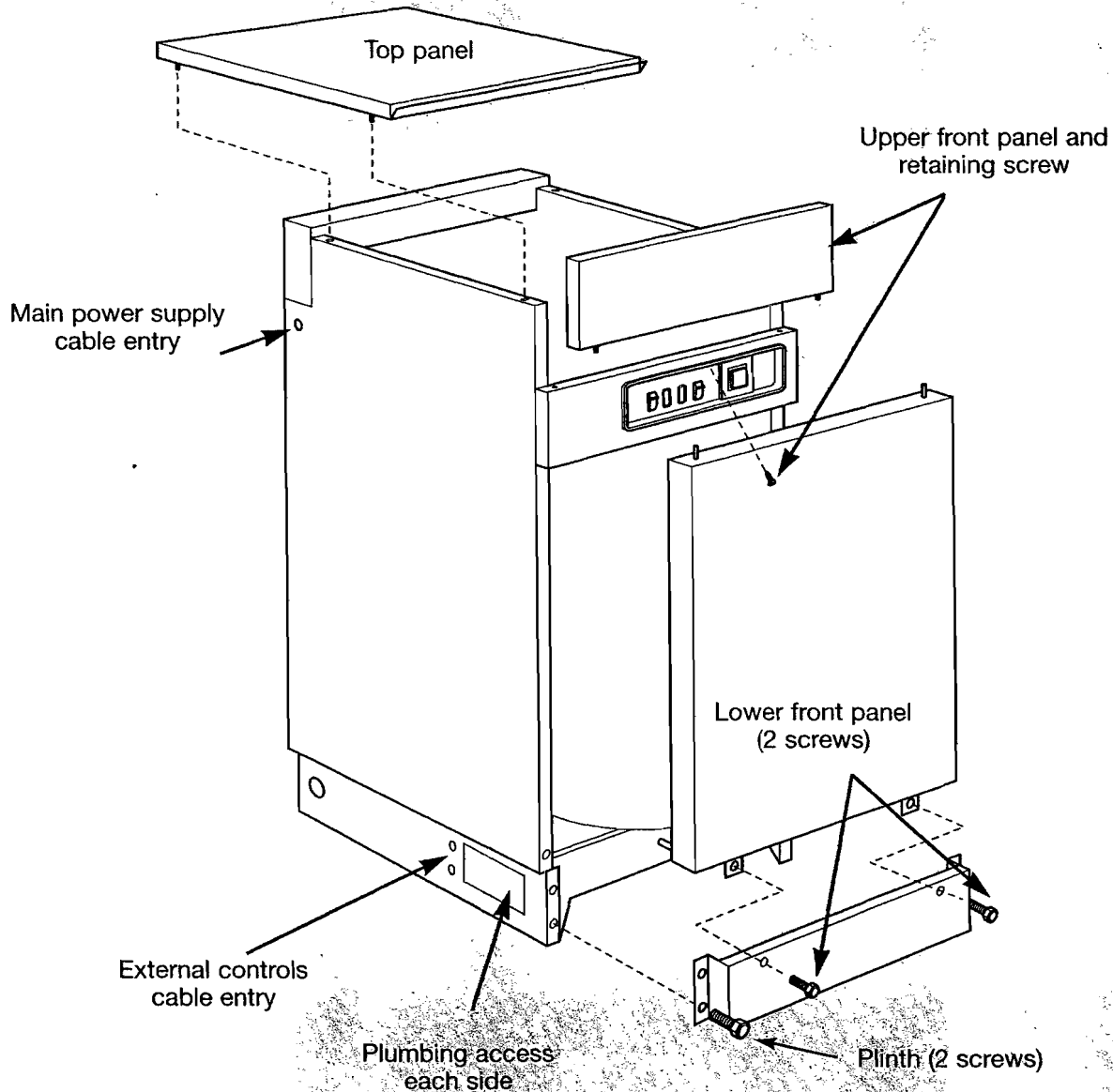
Additional extended flue components



List of Extended Flue Components

Air/flue pipe, socketed at one end 3.0m long	Part No.
2.0m long	P300
1.5m long	P354
1.0m long	P355
0.5m long	P356
0.4m long	P357
Pipe Offset	P369
90° bend	P358
125° bend	P385
135° bend	P359
170° bend	P320
1.4m Protective duct c/w clips and fixings	P360
Flanged flue socket (Straight)	P371
Appliance bend	P352
Gasket (for flanged flue socket/appliance bend)	P494
Horizontal pipe support, 63mm pipe centres	P361
Vertical pipe support, 63mm pipe centres	P362
Flue clamp assembly	P363
Liner closure plate	P366
FB duct bend (allows vertical duct to be extended to front or rear to maintain protection of air/flue bends)	P372
LR duct bend (allows vertical duct to be extended to left or right to maintain protection of air/flue bends)	P373
Worm drive clip	P314
40 ml tube silicone sealant	P315
Ridge Terminal Adaptor	P367
Gasket for Ridge Terminal Adaptor	P353
Air Inlet Guard	P368
Duct Termination	P370
Slip Coupling	P382

Guide to Panel Removal



SBCI 



RANGE
POWERMAX

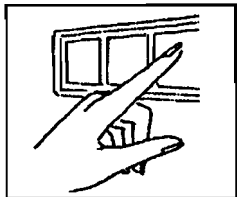
is a Division of RSA Waterheating Limited.

benchmark

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

RSA WATERHEATING LIMITED
JAMES NICOLSON LINK
CLIFTON MOOR
YORK YO30 4WG
TEL 01904 464300 FAX 01904 690775 (Gen. Enquiries)
TEL 01904 464343 FAX 01904 691934 (Service)

RSA Waterheating Limited has a policy of continuous improvement
and the right to change a specification at any time without notice is reserved.



USER'S INSTRUCTIONS

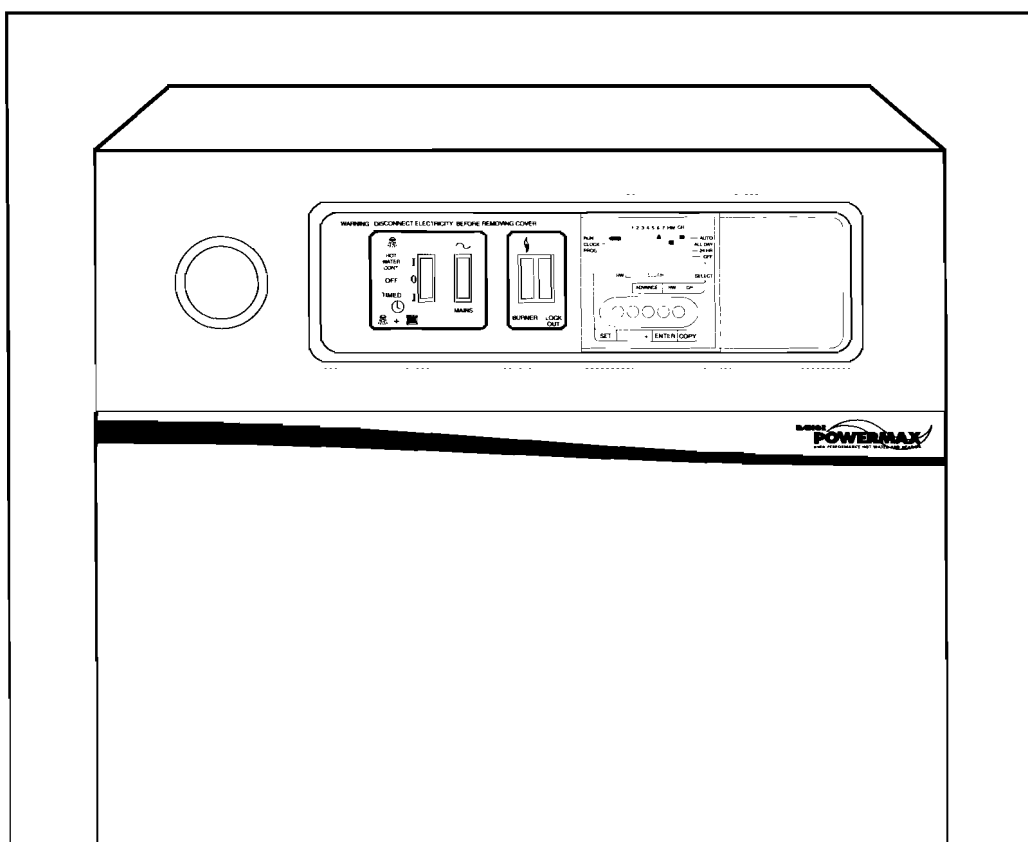
TO BE LEFT WITH BOILER OR GIVEN TO HOUSEHOLDER

For 140,155x & 185

RANGE

POWERMAX

HIGH PERFORMANCE HOT WATER AND HEATING



POWERMAX OPEN VENT MODELS :

OV 140 P	OV 155x P	185 P	WITH FITTED PUMP
OV 140 CP	OV 155x CP	185 CP	WITH FITTED PUMP & PROGRAMMER

POWERMAX SEALED SYSTEM MODELS :

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



RANGE POWERMAX

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 CORGI on 01256 372300.

DESCRIPTION

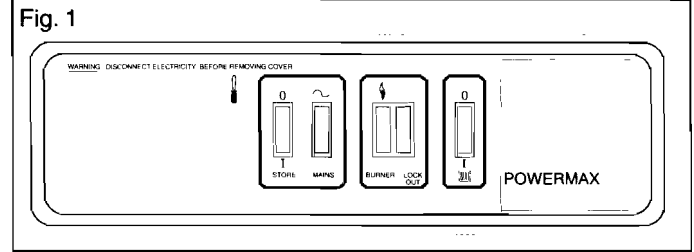
'Powermax' is a combination boiler in which the gas burner heats the contents of a built-in thermal store. This heated water is used as 'primary' water and circulated, as required, to the radiators. Domestic hot water ('secondary' water) is heated by a heat exchanger and delivered via a blending valve which is preset to 55 - 60°C for domestic use.

Operation is fully automatic and a pre-mixed burner is used to ensure that gas is burned cleanly and efficiently. The boiler control thermostat will try to maintain the thermal store at the correct temperature (around 80°C). A thermostat prevents the central heating pump from operating if the store is too cold. Note that hot water performance will be temporarily reduced after the central heating has been switched on with the heating system cold. It is normal for the outlet temperature to fall as more hot water is drawn off. We therefore recommend that showers supplied by this appliance should be of the thermostatic type.

To reduce heating costs, timed operation of the central heating is essential and a Powermax programmer (built-in or remote) is recommended. It will enable both hot water and heating periods - up to 3 per day - to be timed for both comfort and economy. The built-in programmer has 'average' time periods (5 days, plus 2 days) already in its memory - See Section 4 of the Setting Instructions. The central heating system should also include temperature controls and your installer will advise on these.

LIGHTING THE BOILER

- i Check that mains electricity and gas supply is turned on. An orange neon on the control panel glows when electricity is being supplied - see Fig.1.



- ii Move the appliance on/off switch to 'I' (ON). For programmer models move the 3-way appliance switch up to 'I' 'HOT WATER CONT' - See Fig 2. The boiler is now operational, the burner will ignite and the green neon will glow, indicating the burner is working.
- iii 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.**

A. FRONT PANEL OPERATION

- When the Powermax unit has an electricity supply the orange indicator light will be illuminated.
- When the burner is heating the unit, the green indicator light will be illuminated.
- If the red indicator is illuminated, the ignition is at lock-out and the boiler must be re-started as in C1.
- For programmer models the main operating switch should be set in the "Timed" heating and hot water position. The unit can then be controlled through the programmer settings.

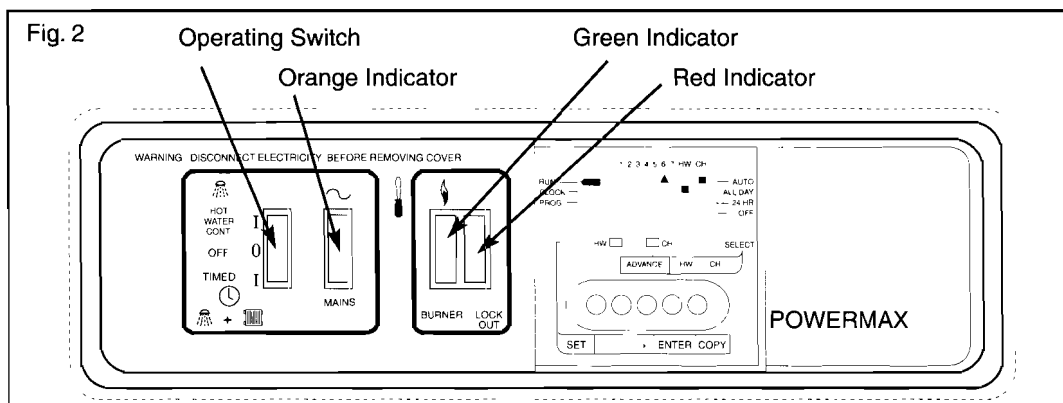
B. BUILT-IN PROGRAMMER OPERATION

- The programmer clock should be set at the correct time of day. Note: am/pm setting.
- The programmer should be set to give the timed hot water and central heating periods which you require. Hot water is always on whenever central heating is requested and the programmer will automatically set this.
- If the central heating and hot water are out of a timed period, ie. OFF and you wish to bring it ON manually, just press the Advance button. Similarly if the system is ON and you wish it to switch OFF again press the Advance button.

C. SIMPLE FAULT RECTIFICATION

- If the Powermax burner has not ignited, ie. green light is not on but large red light is illuminated, switch OFF at the operating switch, leave for at least 10 seconds and switch back to Timed ensuring that the hot water or heating is switched ON, ie. the red indicator light on the programmer is illuminated. The unit will then try to light the burner again.
- If the built-in programmer becomes frozen or scrambled you may return it to the factory pre-set programme by pressing the Minus (-) button and Enter button simultaneously. If this resolves the problem you will need to re-enter the clock and timed periods to your requirements.
- If the programmer fault cannot be rectified then put the operating switch on 'Hot Water Cont' which will allow the unit to heat up and provide hot water. The programmer will then need rectifying before central heating can be operated.

Note that separate operating instructions are supplied with the optional Powermax 'Diadem' remote programmer.



NOTES

If the green neon fails to glow (indicating the burner is not working) it may be for several reasons :

- An external thermostat may be turned off and/or the stored water may already be at working temperature.
- The electric supply may have failed (the orange neon will not glow) - check 3amp fuse in switch or in plug if fitted.
- The gas supply may have been turned off (check gas service cock at the meter).
- Water loss from the central heating system may have caused safety shut down - Refer to Sealed System Models.

IMPORTANT

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.

OPERATING HINTS

- To turn the appliance OFF for short periods switch the appliance on/off switch to the 'O' (OFF) position.
- To turn appliance OFF for long periods switch off the electricity supply and also turn off the gas supply.
- During the summer months, the central heating can be switched off by the RH switch (Fig.1 non-programmer model); or by the RH button of the programmer (Fig.2). NB THE LIFE OF THE CENTRAL HEATING PUMP WILL BE PROLONGED IF YOU SWITCH THE CENTRAL HEATING ON FOR A MINUTE OR SO EACH WEEK DURING THE SUMMER OFF PERIOD.

WARNING : DO NOT HANG ITEMS UPON THE APPLIANCE TO DRY. If a storage shelf is constructed above the appliance it should be removable and must be at least 75mm above the top of the casing.

PROGRAMMER MODELS

The built-in Powermax programmer is an electronic 7-day central heating and hot water control, designed to be easy to use and understand. Properly programmed it will help you save energy and create a comfortable environment in your home.

For convenience morning and evening ON/OFF periods have been pre-set in the programmer 'memory' and will be retained, even if the mains power supply is interrupted. Details of these ON/OFF periods are given in the next section, together with step-by-step setting instructions.

The programmer automatically links the hot water HW and central heating CH operations. This ensures that central heating is only available during hot water ON time periods when the burner can keep the thermal store hot.

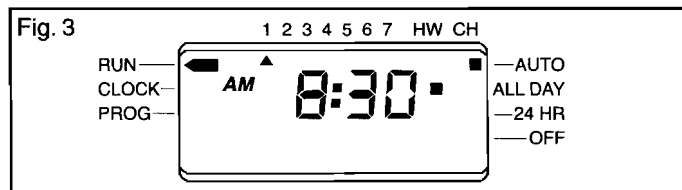
The following combinations can be set in the RUN mode (using the ENTER and COPY buttons):-

Hot Water Programme	C/Heating Programme
AUTO	AUTO OFF
ALL DAY	AUTO ALL DAY (First ON to last OFF time) OFF (eg : Summertime)
24 HOUR	AUTO ALL DAY 24 HOUR (Continuous) OFF
OFF	OFF

THE RECOMMENDED COMBINATION IS :

Hot Water Programme	C/Heating Programme
ALL DAY	AUTO

The display should then look like this :



The Powermax programmer also offers the following features :

- Up to 3 On-Off time periods every 24 hours plus the option of programming different times for each day of the week.
- A central heating ADVANCE button allowing an instant switch from OFF to ON or ON to OFF without affecting normal settings.

HOW TO SET 7 DAY PROGRAMMER

Your installer should have commissioned the programmer by moving the slider switch on the rear of the programmer to the right. If this has not been done the display will show **SWITCH ON** and your installer should then carry out the operations as described in section 12 of the installation instructions.

1. BUTTONS, INDICATORS & SYMBOLS

Most of the control buttons on the programmer are dual purpose. They can be used as SET buttons for inputting time of day, ON/OFF times, etc, or as SELECT buttons for using the advance facility and choosing override programme options.

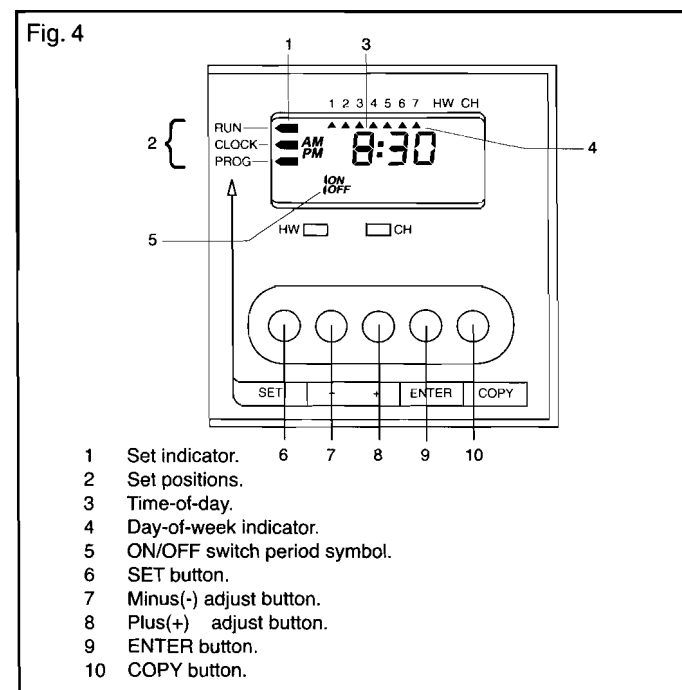
Figure 4 can be used to identify the SET buttons, indicators and symbols referred to in sections 3 and 4.

2. APPLIANCE SWITCH

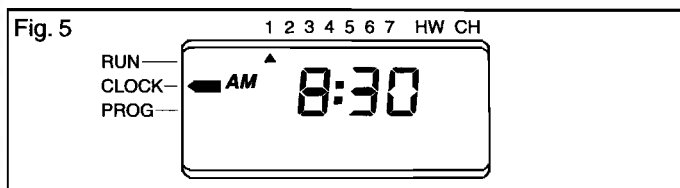
Move 3-way appliance switch Fig.2 down to **TIMED**.

3. SETTING DAY & TIME

NOTE : When setting the day, time of day or switch times, if a period exceeding 60 seconds is allowed to elapse between button presses, the programmer will automatically return to normal RUN mode and any changes made since the last press of the ENTER button will not be saved.

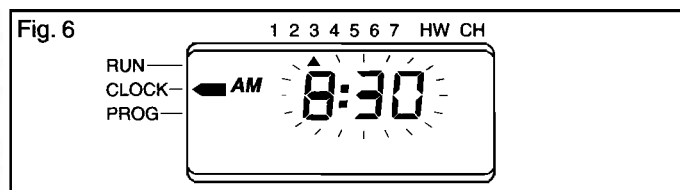


- i Press the SET button so that the SET INDICATOR is pointing to the CLOCK position on the front of the programmer. the DAY OF THE WEEK INDICATOR will now flash (see Fig.5).



- ii Use the PLUS (+) or MINUS (-) to move the DAY OF THE WEEK INDICATOR to the current day of the week. Numbers relating to the day of the week are printed along the top of the programmer display, ie 1=Monday, 2=Tuesday and so on.

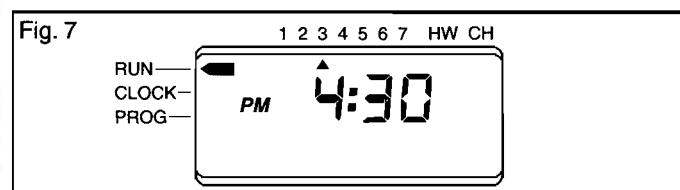
- iii Press the ENTER button. The TIME OF DAY will now flash (Fig.6).



- iv Now use the (+) or (-) BUTTONS to alter the display to the correct time of day making sure that the AM/PM SYMBOL is also correct (Fig.7).

Note : By pressing and releasing the (+) or (-) buttons you advance or retard the time in 1 minute steps. If you keep the button depressed the display will fast cycle and the time can be changed more rapidly.

- v Press the ENTER button. Now use the SET BUTTON to return the SET INDICATOR to the RUN POSITION.



4. SETTING 'ON' & 'OFF' TIMES

Note : The minimum ON or OFF period that can be set is ten minutes.

The Powermax programmer already has a factory pre-set programme of ON/OFF times in its memory. These are based on the most commonly used settings and are as follows:

Monday to Friday

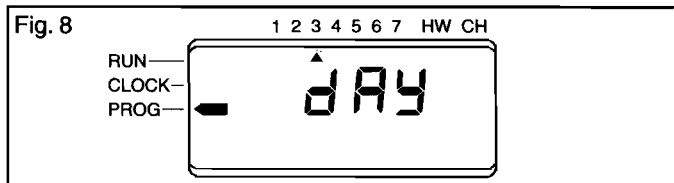
1st ON: 7.00 am	1st OFF 10.00 am
2nd ON: 12.00 pm	2nd OFF 12.00 pm
3rd ON: 5.00 pm	3rd OFF 11.00 pm

Saturday/Sunday

1st ON: 7.30 am	1st OFF 11.30 am
2nd ON: 12.00 pm	2nd OFF 12.00 pm
3rd ON: 5.00 pm	3rd OFF 11.00 pm

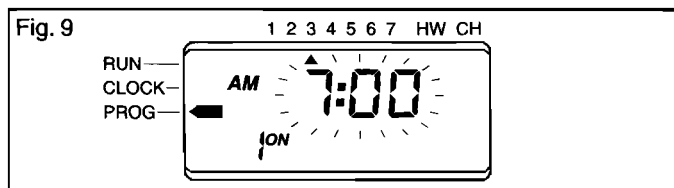
If these settings do not meet your own requirements then they can be easily changed as follows:

- i Press the SET BUTTON twice so that the SET INDICATOR is in the PROG position. The display will indicate the 'day' and the DAY OF THE WEEK INDICATOR will now flash.



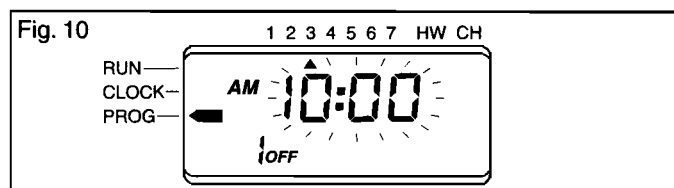
- ii Use the (+) or (-) BUTTONS to move the indicator to the day of the week that you wish to change the times for. Press ENTER

The display will show '1 ON' and then first ON time for that day will flash (see FIG.9).



- iii Adjust the flashing time as required by using the (+) and (-) buttons then press ENTER.

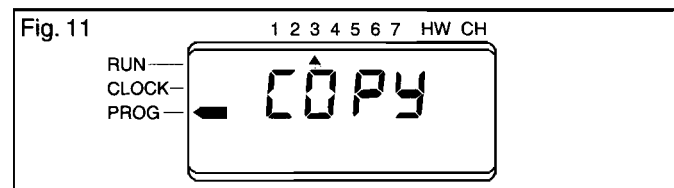
The display will now show '1 OFF' and the first programmed OFF time for the day will flash (see Fig.10).



- iv This can now be altered in the same way as the '1 ON' time mentioned above.

- v Follow the same procedure for the 2nd and 3rd ON/OFF times remembering to press ENTER after each change to the programme. If you do not wish to alter a particular time then simply press ENTER and the display will move on to the next ON/OFF time leaving the previous one unchanged.

Note: The programmer provides up to three ON/OFF periods each day. If you do **not** want to use all these, a switch period can be cancelled by programming the ON operation for the same time as the OFF operation eg 2nd ON at 12.00 pm and 2nd OFF at 12.00 pm. When the 3rd OFF time has been entered the programmer will display the word COPY and the DAY OF THE WEEK INDICATOR will flash (see Fig.11).



If required these ON/OFF times can now be quickly copied so that they apply to any other day(s) you choose. This avoids separately programming days with identical switching times eg Monday to Friday. If not copying press ENTER and press SET button to return SET INDICATOR to run position.

- vi Use the (+) and (-) BUTTONS to move the DAY OF THE WEEK INDICATOR to the next day that you wish the times to apply and press the COPY BUTTON, the display will indicate 'IN'.

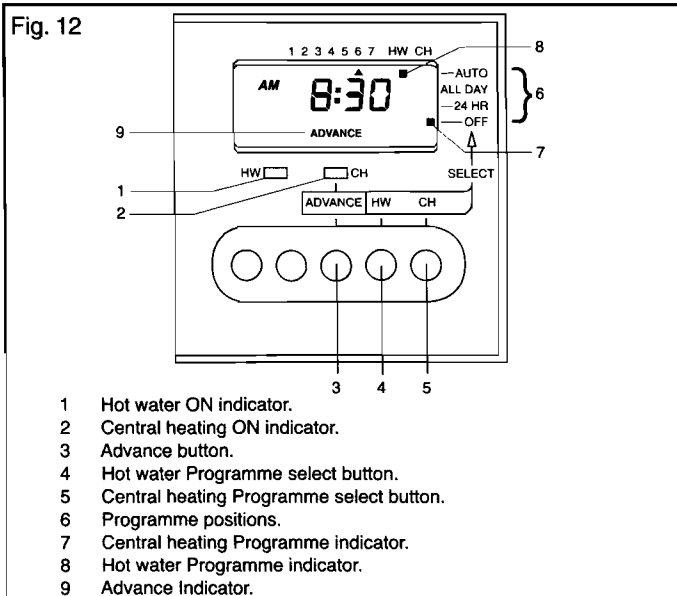
Continue in this way until the programme has been copied to all the days that you wish it to apply to.

- vii When you have finished copying simply press ENTER. The word COPY will be replaced with 'day' and the DAY OF THE WEEK INDICATOR will flash.

You can now programme those days that require different times to the ones you have just copied by following the same procedure as described at the start of this section, parts ii to v.

5. SELECT BUTTONS, INDICATORS & SYMBOLS

The following diagram (Fig.12) can be used to identify the SELECT buttons and indicators referred to in sections 5 to 7.

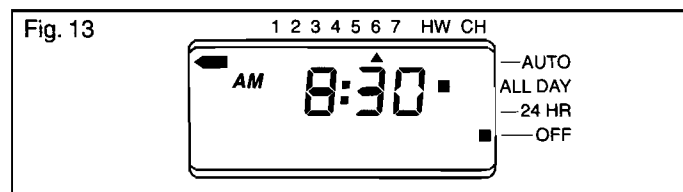


6. PROGRAMME SELECTION

The following programmes can be selected for either HOT WATER by itself or HOT WATER and HEATING together.

- AUTO:** When AUTO is selected the programmer will switch ON and OFF according to the switching times held in the memory, ie up to three ON/OFF periods per day.
- ALL DAY:** When ALL DAY is selected the programmer will switch the system on at the 1st ON TIME and OFF at the 3rd OFF TIME.
- 24 HOUR:** When 24 HOUR is selected the system remains on continuously, ignoring all the time settings.
- OFF:** When OFF is selected the programmer clock continues to operate but the system remains off.

To select a hot water programme press the HW PROGRAMME SELECT BUTTON until the HW (HOT WATER) PROGRAMME INDICATOR is pointing to the required programme, e.g. ALL DAY (see Fig. 13)



To select a central heating programme follow the same procedure using the CH PROGRAMME SELECT BUTTON.

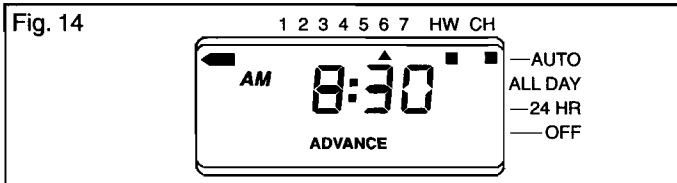
Note: When either HOT WATER or HEATING is switched to ON the relevant INDICATOR LIGHT will be illuminated (see Fig.12).

7. USING THE ADVANCE BUTTON

The ADVANCE facility allows you to bring forward the next ON or OFF period without having to alter the programmed ON/OFF times.

Press the ADVANCE BUTTON once and release. The word ADVANCE will appear in the display (see Fig.14).

Fig. 14



If the programmer was originally ON it will now switch OFF and stay OFF until the next programmed ON time.

The opposite will apply if the programmer was originally OFF.

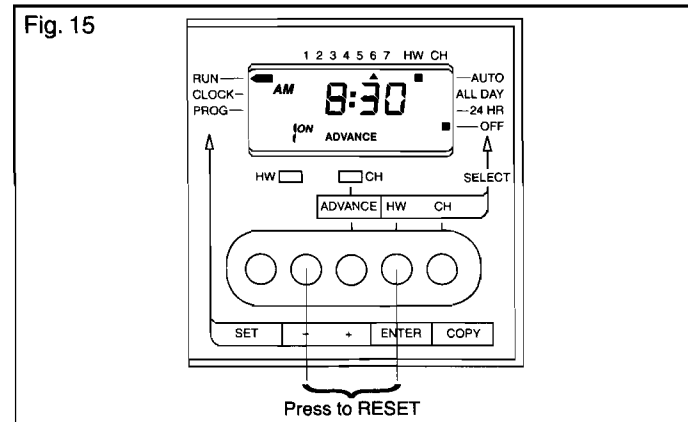
In both cases the unit will then revert to the normal programme times.

If you wish to cancel the advance simply press the ADVANCE BUTTON again and the word ADVANCE will disappear from the display.

Note: The ADVANCE facility has no effect when the CH PROGRAMME INDICATOR is in either the 24 Hour or the OFF position.

8. PROGRAMMER FAULTS

Electronic equipment can, in exceptional circumstances be affected by electrical interference. If the display or switching programme becomes frozen or scrambled, or you wish to revert to the factory pre-set programme, you can RESET the programmer by pressing the MINUS (-) adjust button and the ENTER/HW SELECT BUTTON together (see Fig. 15).



After using the RESET procedure you will need to reprogramme the day and time of day plus any changes you wish to make to the factory pre-set programme.

The Powermax programmer is not user serviceable. DO NOT ATTEMPT TO DISMANTLE IT.

In the unlikely event of it developing a fault, contact your CORGI Registered Installer, or British Gas, or RSA Waterheating Limited; but before doing so try the RESET PROCEDURE above.

Should a replacement programmer be required your Installer can obtain this as product Code No. P458.

9. RESERVE BATTERY

The programmer is fitted with a NON-RECHARGEABLE LONG LIFE battery which will maintain the programmed ON/OFF settings for a period in excess of 2 years.

This is more than sufficient to cover all the expected power interruptions during the life of the unit.

Note: If a power interruption of more than 48 hours occurs the 'time of day' will need to be re-adjusted once the power is restored.

THERMOSTATIC SAFETY CUT-OUTS

There are two thermal cut-outs which will only operate if a fault condition arises. They require manually resetting by your installer after the fault has been rectified.

SEALED SYSTEM MODELS 140 & 155x ONLY

Powermax combination boilers installed with a 'sealed system' primary circuit have some additional features the householder should be aware of:

Safety Relief Valve - Your installer will have fitted a pipe where it can discharge safely.

Low Water Level Float Switch - This is a safety device designed to shut down the boiler if the heating system has lost water or air has collected in the thermal store.

Pressure Gauge - On front of boiler.

Automatic Air Vent Fitting - Access is via the blue cap on top of the boiler and must not be obstructed.

Expansion Vessel - This is not built into the boiler and your installer will have fitted it nearby; probably close to the filling loop.

Water Filling Loop - For topping up system occasionally or replacing water lost, eg when a radiator is removed for decorating.

CHECKING WATER PRESSURE IN HEATING SYSTEMS

Even a very small leak of water from the radiator circuit will, after a while, cause the float switch to shut down the boiler as a safety precaution. Should this occur, the leak must be repaired, the system re-filled and the switch will then allow normal operation.

A pressure gauge is located on the switch panel at the front of the Powermax. (A second gauge might be fitted on the expansion vessel if this is some distance from the boiler.) The pressure in the heating system (ie thermal store, radiators and pipework circuit) can be read off the gauge and should normally be 0.9 to 1.0 bar with the system <40°C and the central heating pump switched off.

A loss of water will be indicated by the pressure gauge registering a low (or no) pressure.

If the pressure indicated at normal working temperatures - ca. 80°C - exceeds 2.5 bar, switch off the boiler and contact your installer.

NB : A pressure gauge is not fitted on Powermax boilers suitable only for low pressure open vented primary systems.

RE-FILLING

1. Remove blue moulded cover (on the top panel of boiler) by squeezing the 'ears' and pulling upwards. Release the small plastic cover on the automatic air vent by unscrewing one full turn. Do not remove. Switch off central heating.
2. Connect the filling loop flexible hose to the tap on the cold (mains) water supply. Loosely connect the other end of the hose to the valve on the radiator circuit (so that air can escape).
3. Turn on the tap slowly until water emerges from the coupling left untightened (showing that air has been expelled from hose). Tighten both couplings - open second tap if fitted - and gently admit water into system. Check that air is being expelled from air vent. Allow pressure to rise slowly to between 0.9 to 1.0 bar and turn off tap(s). This may take some time in large systems.
4. Bleed air from radiators and from vents fitted at the highest points of the circuit. When all air has been removed, re-check pressure on gauge and 'top-up' if necessary to approximately 0.9 bar.
5. With tap(s) closed, remove flexible hose and store nearby. Re-start the boiler and switch on central heating. The temperature of the water in the system now rises with the pressure constantly increasing.

NB: A pressure in excess of 2.5 bar indicates a fault condition and your installer should be consulted. Switch off boiler before the pressure reaches 3.0 bar.

SAFETY ADVICE

If a gas leak is found or suspected, turn off the gas supply, ventilate the area and contact the gas supplier or CORGI engineer. Do not use naked lights or electrical switches if a build up of gas is suspected.

This boiler when installed in a compartment (cupboard) requires adequate ventilation. **Do not obstruct ventilators.**

Do not drape or store clothes, or other combustible materials on the boiler itself or allow such materials to accumulate around the bottom of the casing where they may restrict air movement.

Boilers installed with an extended flue system may have an exposed flue pipe in the loft space. This pipe becomes very hot when the boiler is working. Do not touch. Do not allow flammable material to touch pipe.

It is important that no unauthorised modifications are made to this appliance and that only genuine Powermax parts are used for servicing. Critical components are sealed during manufacture and must not be interfered with.

Minimum clearances for servicing and safety

At the top 400mm - At the sides 10mm total

At the front 450mm unless behind an openable door

Sealed Systems

Ask your installer to identify the discharge pipe from the relief valve. Normally no water is vented but scalding water and steam may be emitted and indicate a fault condition. Switch off boiler and call installer. (Precautions should be taken to prevent the outlet becoming blocked and to minimise the hazard to persons (especially children) where the pipe discharges).

Electricity Supply

WARNING - THIS APPLIANCE MUST BE EARTHED AND THE SUPPLY PIPE SHOULD BE EARTH BONDED

Connections should be made to a 230V - 50 Hz supply. This appliance must be protected by a 3amp fuse. If a 13amp (BS.1363) plug is used or if any other type of plug is used, there should be a 3amp fuse in the circuit.

Frost Precautions

For short periods, where a room thermostat is fitted, turn to a low setting and leave the system on.

Provision is made inside the boiler for connecting to a 'frost protection' thermostat. The Sopac-Jaeger TA 547-04 (Double Outlet) is a suitable low temperature thermostat.

If the appliance is likely to be turned off for long periods in severe weather, to prevent freezing the complete system including the primary store should be drained.

To clean the appliance

Simply wipe the outer casing with a soft, damp cloth. DO NOT use scouring powders or steel wool pads as these will scratch the finish of the case.

SERVICE

If the boiler fails to work or if any gas leaks or faults are found or suspected, switch OFF boiler and turn off gas as above.

We care about the safety and efficiency of your Powermax boiler and our Customer Service Department will be pleased to arrange for a trained service engineer to call. Simply telephone 0870 606 0933 and ask for Customer Service.



RANGE

POWERMAX



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

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