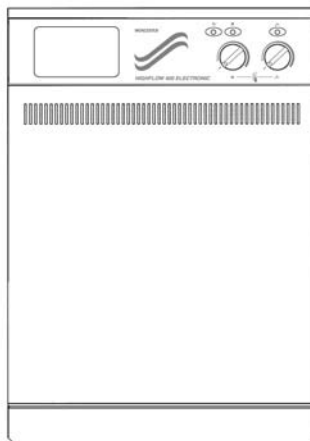


Highflow 400 ELECTRONIC RSF

FLOOR STANDING COMBINATION APPLIANCE FOR CENTRAL
HEATING AND MAINS FED DOMESTIC HOT WATER

INSTALLATION AND SERVICING INSTRUCTIONS



Worcester supports the
Benchmark code of practice

GC NUMBER NATURAL GAS 47 311 61

GC NUMBER LPG 47 311 64

BOILER OUTPUT

Automatic Modulating Control

Domestic Hot Water and Central Heating

Minimum 8.8 kW DHW

11.0 kW CH

Maximum 24.0 kW

IMPORTANT: THESE INSTRUCTIONS APPLY IN THE UK ONLY
THESE INSTRUCTIONS ARE TO BE LEFT WITH THE USER OR AT THE GAS METER

This appliance must be installed by a competent person in accordance
with the Gas Safety (Installation and Use) Regulations 1998

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1. Installation Requirements

1.1 Gas Safety (Installation and Use) Regulations 1998: All gas appliances must be installed by a competent person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

1.2 The manufacturers notes must not be taken, in any way, as overriding statutory obligations.

1.3 The compliance with a British Standard does not, of itself, confer immunity from legal obligations. In particular the installation of this appliance must be in accordance with the relevant requirements of the following: Gas Safety (Installation and Use) Regulations 1998, current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) (Consolidation), byelaws of the local Water Company and Health and Safety Document No. 635 (Electricity at Work Regulations 1989). It should be in accordance with the relevant recommendations of the following British Standards:

BS 6798: Specification for Installation of gas fired hot water boilers of rated input not exceeding 60 kW (Gross)

BS 5449: Central Heating for Domestic Premises

BS 5546: Installation of gas hot water supplies for domestic purposes.

BS 5440:1: Flues and Ventilation for gas appliances of rated input not exceeding 60kW (Gross): Flues.

BS 5440:2: Flues and ventilation for gas appliances of rated input not exceeding 60kW (Gross): Air Supply.

BS 6891: Installation of low pressure gas pipework installations up to 28mm (R1).

BS 6700: Domestic Water Supply in Buildings.

BS 7593: Water Treatment in domestic heating systems.

1.4 To ensure that the installation will perform to the highest standards, the system and components should conform to any other relevant British Standards in addition to those mentioned in the instructions.

1.5 In accordance with the requirements of COSHH the appliance does not contain any substances which are harmful to health.

1.6 Product Liability regulations indicate that, in certain circumstances, the installer can be held responsible, not only for mistakes on his part but also for damage resulting from the use of faulty materials. We advise that, to avoid any risk, only quality approved branded fittings are used.

1.7 LPG Installation. The appliance shall not be installed in a room or internal space below ground level when it is intended for use with LPG. This does not preclude the installation into rooms which are basements with respect to one side of the building but open to the ground on the opposite side.

1.8 The advice and instructions given in this document covers, as far as possible, the foreseeable situations which may arise. Contact The Worcester Technical Department, Telephone: 08705 266241, for advice on specific installations.

2. General Information

(benchmark) The **Benchmark** initiative is the new code of practice to encourage the correct installation, commissioning and servicing of domestic central heating boilers and system equipment.

The 'checklist' is a vital document that must be completed by the installer at the time of installation. It confirms that the boiler has been installed and commissioned according to the manufacturers instructions.

Without the completion of the checklist, manufacturers may refuse to respond to a call-out from a householder, who will be advised that he or she must call back the installer, who has not fulfilled his obligations to record the information required by the initiative.

It is important that:

The services and the system are properly flushed as specified.

The User is clearly instructed on the correct operation of the appliance.

The benefits of regular servicing are explained - to maintain the efficiency and extend the life of the appliance.

2.1. GENERAL INFORMATION

2.1.1 The appliance is set to provide the maximum output of 24kW to the domestic hot water and to the central heating .

2.1.2. The domestic water section of the appliance is suitable for mains water pressures of up to 10bar.

2.1.3. Conversion kits are available to convert the appliance from Natural Gas to Propane operation and vice versa.

2.2 ELECTRICAL SUPPLY

Mains supply: 230V ~ 50 Hz. 140Watts.

External fuse: 3A. Internal fuses: T 2A (F1), and T 1A (F2).

2.3 GAS SUPPLY.

Check the data plate (located on the inner cover of the appliance) to ensure the appliance has been set up for the correct gas supply. The appliance can be set up for either of the following gases: Natural Gas (G20) or Propane (G31). **A conversion kit is available to change the appliance from one gas to the other.** The boiler requires a gas flow of 2.9 m³/h of natural gas (G20) or 1.09 m³/h of LPG (G31).

The meter governor or regulator should deliver a dynamic pressure of 20mbar for natural gas or 37mbar for propane at the appliance, which is about 18.5mbar or 35.5 mbar at gas valve inlet pressure test point.

The complete installation, including the gas meter (G20), must be tested for soundness and purged. Refer to BS 6891.

2.4 PACKING. The appliance and flue components are packed in separate cartons.

2.5 INSTALLATION.

The appliance is suitable for indoor installation only.

The appliance is supplied for connection to a sealed system but is suitable for use with an open vent system.

Any specified ventilation openings made into a wall or

compartment door must not be obstructed.

If the appliance is to be fitted into a compartment then the compartment must conform to the requirements of BS 6798:1987: Section 6.

The clearances specified for installation and servicing must be maintained.

A water filter, flow turbine and regulator, nominal flow 18 l/min. to supply water at an average temperature rise of 40°C, are fitted to the mains cold water inlet on the appliance.

A heatbank of 60 litres of circulating primary water with a diverter valve to direct the primary water to the heat store or to the central heating system is contained within the casing.

NOTE: As the dry weight of the appliance is 96kg, more than one person will be required when moving the appliance.

2.6 FLUE.

The appliance has a multi-directional balanced fanned flue system : rear, right or left.

A terminal guard, Type K2, GC 393 553, is available from Tower Flue Components, Vale Rise, Tonbridge, TN9 1TB.

The standard horizontal rear flue assembly length is from 100 mm to 500 mm. The standard side flue length is from 100 mm to 1000 mm.

Extended flue lengths up to 3000 mm are available in 1000 mm lengths as optional extras. For suggested options see Section 11.

To flue the appliance right, left or upwards, 90° flue bends are available as optional extras.

A maximum of three 90° flue bends may be used in the flue system.

N.B. When using an extra 90° flue bend or bends the maximum flue length is reduced. Refer to Section 11.

Do not allow the flue terminal fitted to the outside wall to become obstructed or damaged.

An optional extra internal flue fixing kit is available. Full fitting instructions are supplied with the kit and are also included within these Installation and Service Instructions. Refer to Section 11.7.

A vertical balanced flue system is available with a flue length from 100 mm to 4500 mm , excluding the terminal assembly.

2.6 CONTROLS.

The electronic control system via the gas valve modulates the heat input in response to the central heating and domestic hot water temperature settings. The control circuit provides automatic ignition of the main burner through an intermittent pilot.

A full range of control and safety devices are provided including an additional safety cut-off as required by the regulations relating to unvented systems.

A fascia mounted twin-channel programmer is available as an optional extra. A remote mounted twin-channel programmer may be connected to the appliance.

The temperature controls for central heating and domestic hot water are mounted on the fascia.

There is provision for the connection of a mains voltage room thermostat. Refer to Section 10.

Frost Protection.

An automatic frost protection facility is incorporated within the control system. If some parts of the system are remote from the appliance then it may be advisable to fit an external remote frost thermostat. Refer to Section 10.

Thermostatic radiator valves should be used in the system. The appliance incorporates an adjustable by-pass between the central heating flow and return.

2.7 SYSTEM NOTES.

WARNING:

CHECK THAT NO DIRT IS LEFT IN EITHER THE GAS OR WATER PIPEWORK AS THIS COULD CAUSE DAMAGE TO THE APPLIANCE.

THOROUGHLY FLUSH THE HEATING SYSTEM AND THE WATER SUPPLY IN ACCORDANCE WITH THE RECOMMENDATIONS OF BS 7593:1992 AND THE BENCHMARK CODE OF PRACTICE.

The water pipe connections throughout a sealed system must be capable of sustaining a pressure of up to 3 bar.

Radiator valves must conform to the requirements of BS2767(10):1972.

The relief valve drain outlet must be directed away from any electrical components or where it would cause a hazard to the user.

A drain cock to BS 2879 must be fitted to the lowest point of the system.

For circuit design purposes it is important that due note is taken of the information given in Table 4 relating to the available pump head.

2.8 SHOWERS, BIDETS, TAPS AND MIXING VALVES.

Hot and cold taps and mixing valves used in the system must be suitable for operating at the available mains pressure.

Thermostatically controlled shower valves will guard against the flow of water at too high a temperature.

Hot and cold mains fed water can be supplied direct to an over-rim flushing bidet subject to local water company requirements.

With all mains fed systems the flow of water from the individual taps will vary with the number of outlets operated simultaneously and the cold water mains supply pressure to the property. Flow balancing using 'Ball-o-Fix' type valves is recommended to avoid an excessive reduction in flow to individual outlets. For further information contact Worcester, Bosch Group Ltd.

IMPORTANT: Where back-flow prevention devices including water meters are fitted the expansion of hot water into the cold water main can be prevented. This can result in a pressure build-up that may cause damage to the boiler and household devices such as showers, washing machines etc.

In these cases a mini-expansion vessel should be fitted adjacent to the boiler in the cold water supply pipe.

2.9 SAFETY CONSIDERATIONS.

The appliance must not be operated in a waterless condition.

The appliance must not be operated with the boiler inner casing cover removed.

Work must not be carried out on the appliance without the gas and electricity supplies being turned off.

Checks must be made to ensure that, where applicable, the ventilation openings made into walls and partitions are of the correct size and are not obstructed.

2.10 OPERATION. See Fig. 1.

HOT WATER MODE:

With the appliance in a standby condition, i.e. heatbank at the temperature set by the hot water temperature control, burner off, fan off, pump off, a demand is made for hot water:

The flow turbine will energise the pump and circulate primary hot water around the boiler, heatbank and water to water heat exchanger. The fan will start and the burner will light and modulate to maintain the temperature of the delivered water.

When hot water is no longer required the appliance will continue to operate for a short time until the heatbank has returned to temperature. The pump may continue to run for a few seconds to dissipate the residual heat from the appliance.

NOTE: The appliance may be used for Hot Water only before the central heating circuit is completed. **The primary system in the appliance must be filled with water.**

CENTRAL HEATING MODE:

With the appliance in a standby condition, a demand is made for heating.

The water diverter valve will open, pump will energise and circulate primary water around the heating system. The fan will start and the burner will light at minimum and modulate as

necessary.

With the system at the temperature set by the heating temperature control, on the facia, the burner will modulate to maintain the required output to the system.

If the system no longer requires heat to maintain the desired room temperature, the burner will extinguish. The pump will continue to run for about four minutes to dissipate the residual heat from the appliance through the CH circuit and then switch off.

When there is another heat demand the operating sequence will re-start. If the primary temperature is greater than the temperature control setting then there will be an anti-cycle

period of three minutes.

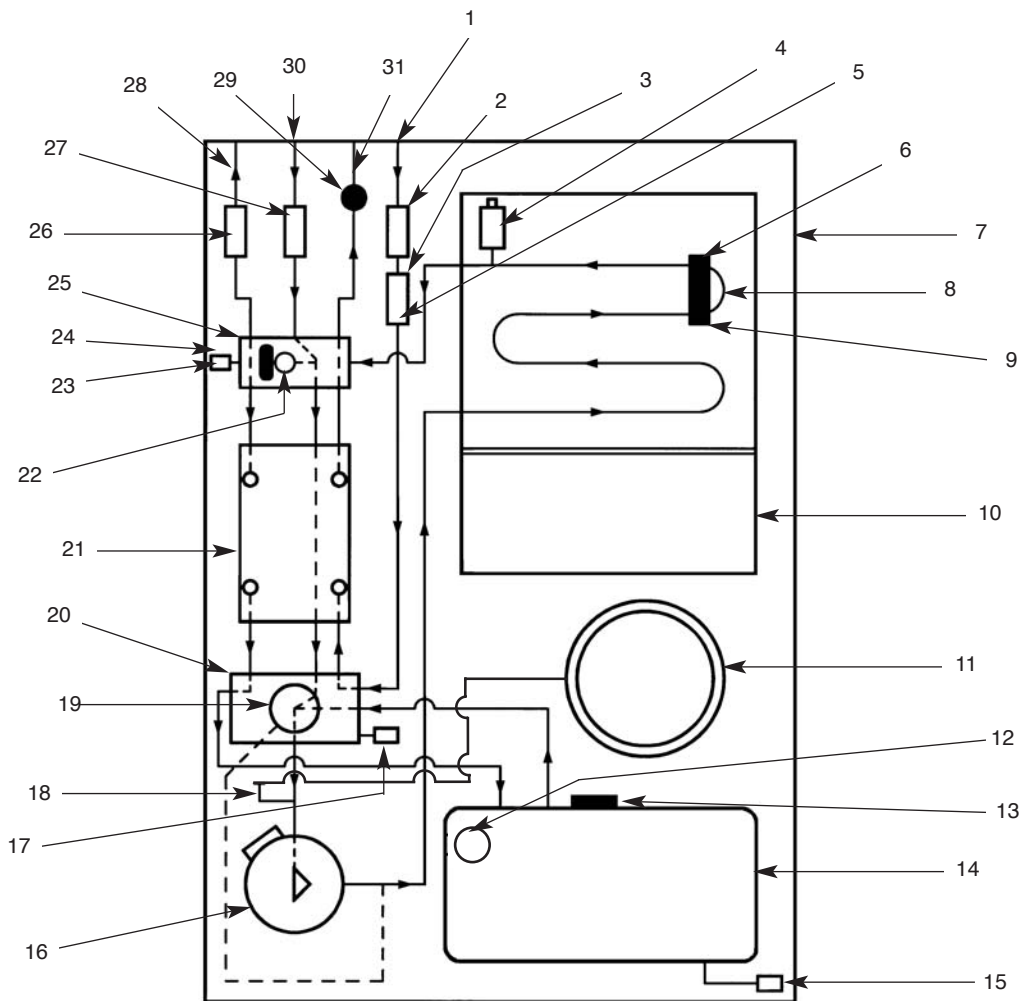
HOT WATER AND CENTRAL HEATING MODE:

The appliance will supply heat to the central heating system as required. A demand for hot water at a tap or shower will override the central heating function for the period of the hot water demand.

When hot water is no longer required the burner and pump will continue to operate until the heatbank is back to the required temperature.

The appliance will then return to the central heating state and its normal mode of operation.

Fig. 1. Appliance water flow diagram.



- | | | |
|--------------------------------------|-------------------------------------|----------------------------------|
| 1. Mains Cold Water IN | 12. Tank Sensor | 23. Pressure Relief Valve |
| 2. Water Filter | 13. Heatbank Overheat Thermostat | 24. Manual Air Vent |
| 3. Flow Turbine | 14. Heatbank (Capacity 60 Litres) | 25. Water Manifold (Top Section) |
| 4. Automatic Air Vent | 15. Drain (Primary Water) | 26. CH Flow Valve |
| 5. Water Flow Regulator | 16. Circulating Pump | 27. CH Return Valve |
| 6. C.H. Primary Sensor (Front) | 17. Drain (Secondary Water) | 28. Central Heating Flow |
| 7. Appliance cabinet | 18. Open Vent Connection | 29. H.W. Sensor |
| 8. Gas to Water Heat Exchanger | 19. Water Diverter Valve | 30. Central Heating Return |
| 9. Safety Temperature Limiter (Rear) | 20. Water Manifold (Bottom Section) | 31. Domestic Hot Water OUT |
| 10. Inner Casing | 21. Water to Water Heat Exchanger | |
| 11. Sealed System Expansion Vessel | 22. By-Pass Adjuster | |

3. Technical Data

See Fig. 2 and 3.

The Data Plate is fixed to the top of the control box casing.

Table 1

NOMINAL BOILER RATINGS (10 minutes after lighting)		BOILER ADJUSTED FOR	BOILER ADJUSTED FOR
		G20 (Natural Gas)	G31 (Propane)
MAX. OUTPUT	kW	24.0	24.0
MAX. INPUT (net)	kW	27.0	26.7
BURNER PRESSURE	mbar	13.5	28.7
GAS RATE	m ³ /h	2.90	1.09
MIN. OUTPUT (CH)	kW	11.0	11.0
MIN. INPUT (CH) (net)	kW	13.5	13.0
BURNER PRESSURE	mbar	3.5	6.4
GAS RATE	m ³ /h	1.45	0.54
MIN. OUTPUT (DHW)	kW	8.8	8.8
MIN. INPUT (DHW) (net)	kW	10.9	10.3
BURNER PRESSURE	mbar	1.0	3.5
GAS RATE	m ³ /h	1.11	0.42

NOTE: Gross Heat Input x 0.901 (NG) or x 0.922 (Propane) = Net Heat Input.

Table 2: Horizontal Flue System.

FLUE DETAILS		
		mm
WALL HOLE DIAMETER		120
WALL HOLE DIAMETER FOR INTERNAL FLUE FIXING KIT (OPTIONAL)		150
STANDARD HORIZONTAL FLUE MINIMUM LENGTH SIDE AND REAR		100
STANDARD HORIZONTAL FLUE MAXIMUM LENGTHS	– REAR KIT WITH ADAPTOR	500
	– SIDE KIT WITH ELBOW	1000
EXTENDED HORIZONTAL FLUE MAXIMUM LENGTH	– SIDE AND REAR	3000

Table 3: Vertical Flue System

FLUE DETAILS	
	mm
CEILING HOLE DIAMETER	130
MINIMUM AIR DUCT LENGTH	100
MAXIMUM AIR DUCT LENGTH	4500
VERTICAL TERMINAL LENGTH	1100

- NOTE:** 1. Optional extra flue bends are available. The maximum flue length is reduced when an extra flue bend or bends are used. to Note
 2. When using two flue bends the maximum extended straight flue length must not exceed 2300 mm.
 3. When using three flue bends the maximum extended straight flue length must not exceed 1000 mm .
 4. See Section 11 “Flue Options” for further information.
 5. No more than three 90° flue bends can be used.

VERTICAL BALANCED FLUE.

Instructions describing the fitting of the vertical balanced flue system are sent with the vertical flue kit.

IMPORTANT: It will be necessary to purchase at least one 90° flue bend when installing the vertical balanced flue system.

NOTE: The maximum overall height of the vertical balanced flue measured from the top of the appliance casing to the top of the vertical balanced flue terminal is 5600 mm.

Table 4

PUMP HEAD			
BOILER OUTPUT	HEAD	MIN. FLOW RATE	FLOW/ RETURN DIFFERENTIAL
kW	Metres	L/min.	°C
11.0	6.1	11.5	11 °C
24.0	5.0	16.5	21 °C

Table 5: Nominal Weight of Appliance

DRY WEIGHT OF APPLIANCE	96kg
PACKAGED WEIGHT OF APPLIANCE	98kg
MAXIMUM INSTALLED WEIGHT	156kg

Table 6:

SPECIFICATIONS	
CENTRAL HEATING FLOW	22 mm Copper Tube
CENTRAL HEATING RETURN	22 mm Copper Tube
COLD WATER MAINS INLET	15 mm Copper Tube
DOMESTIC HOT WATER OUTLET	15 mm Copper Tube
GAS INLET	22 mm Copper Tube
PRESSURE RELIEF VALVE DRAIN CONNECTION	15 mm Copper Tube
OVERALL CASING HEIGHT	860 mm
OVERALL CASING WIDTH	600 mm
OVERALL CASING DEPTH	600 mm

Table 7

SPECIFICATIONS	
PRIMARY CAPACITY INCLUDING HEATBANK	60 Litres
MAXIMUM INLET DOMESTIC WATER PRESSURE	10 Bar
MINIMUM INLET DOMESTIC WATER PRESSURE (WORKING) FOR MAXIMUM HOT WATER FLOW	2.2 Bar 1.3 Bar with flow regulator removed
MINIMUM INLET DOMESTIC WATER PRESSURE (WORKING) TO OPERATE THE APPLIANCE	0.1 Bar
MAXIMUM CENTRAL HEATING FLOW TEMPERATURE	Nominally 82°C
MAXIMUM STATIC HEAD – PRIMARY	30m
MINIMUM STATIC HEAD – PRIMARY	1.0m
OUTPUT TO CENTRAL HEATING & DOMESTIC HOT WATER	8.8 (DHW), 11.0 (CH) to 24.0kW (Modulating)
MAXIMUM DOMESTIC HOT WATER FLOW RATE FROM THE APPLIANCE	Nominally 18.0 l/min. ± 15%
EQUIVALENT HOT WATER FLOW RATE FROM THIS APPLIANCE TO GIVE 30°C RISE (SPECIFIC RATE D)	20 l/min.
FLUE PRODUCTS	12.9 gm/sec
FLUE PRODUCTS TEMPERATURE	160°C
NOx CLASSIFICATION	Class 3
SEDBUG	NG LPG
	78.8 % BAND D
	80.7 % BAND D

Table 8

Minimum Clearances	Installation	Service
Above the appliance	450 mm	10 mm
In front	600 mm	600 mm
Right side	5 mm	5 mm
Left side	300 mm	5 mm

Fig. 2. Appliance cabinet dimensions and minimum clearances required.

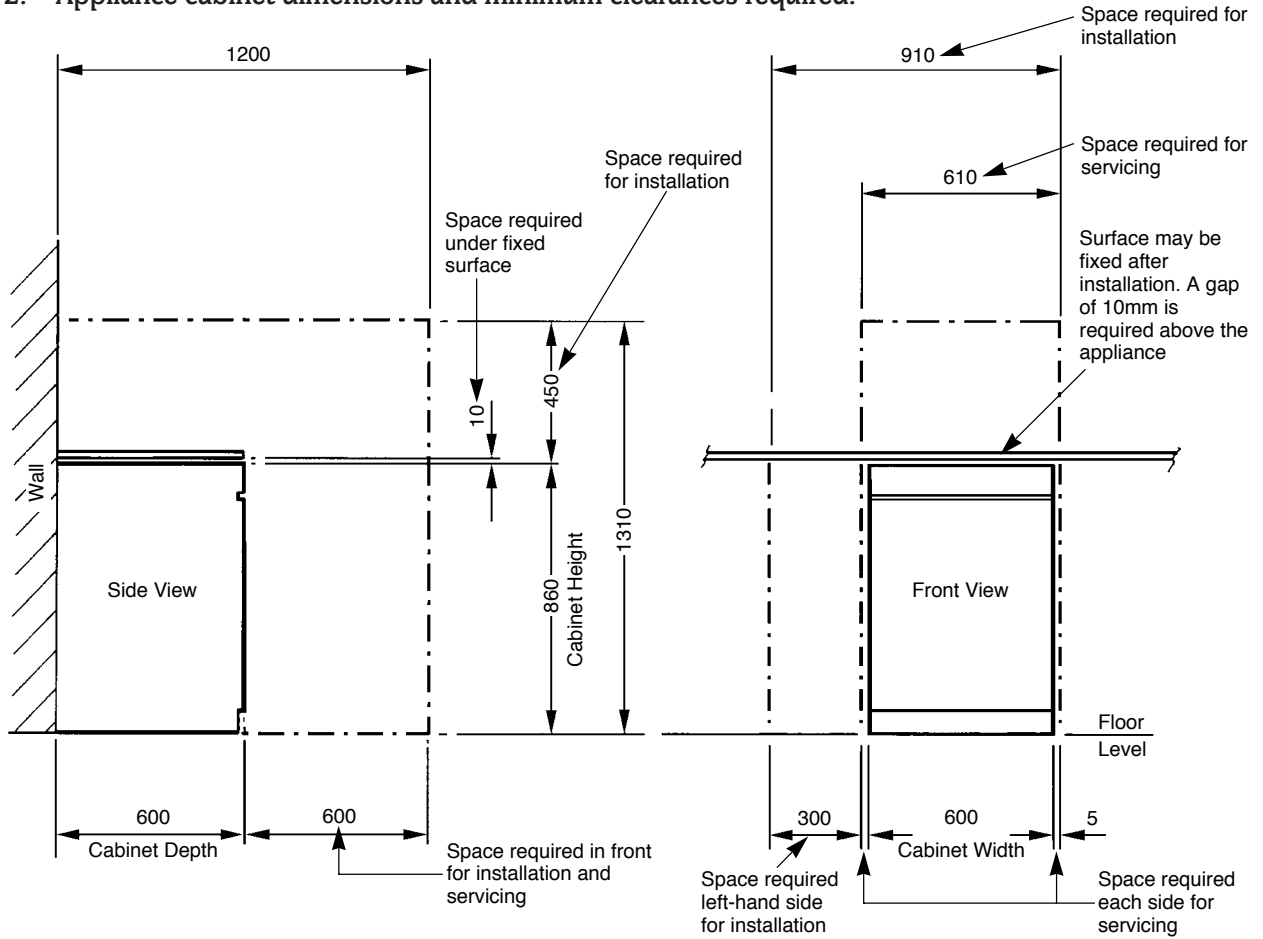
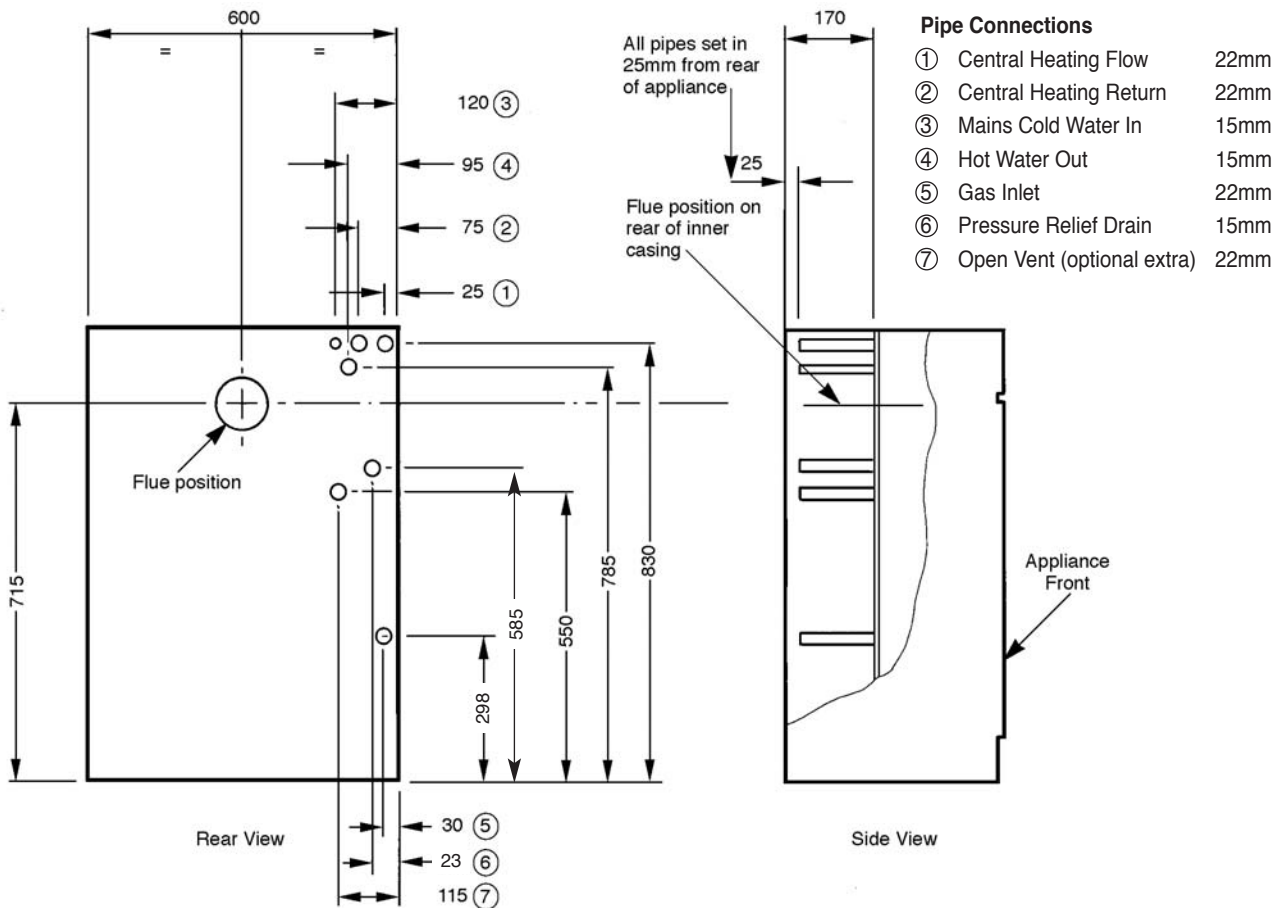


Fig. 3. Appliance pipework connections and flue position.



4. Siting The Appliance

4.1 THE APPLIANCE MAY BE INSTALLED IN ANY ROOM ALTHOUGH PARTICULAR ATTENTION IS DRAWN TO THE REQUIREMENTS OF THE CURRENT I.E.E. WIRING REGULATIONS AND, IN SCOTLAND, THE ELECTRICAL PROVISIONS OF THE BUILDING REGULATIONS APPLICABLE IN SCOTLAND, WITH RESPECT TO THE INSTALLATION OF APPLIANCES IN ROOMS CONTAINING BATHS OR SHOWERS.

WHERE A ROOM SEALED APPLIANCE IS INSTALLED IN A ROOM CONTAINING A BATH OR SHOWER, ANY ELECTRICAL SWITCH OR APPLIANCE CONTROL USING MAINS ELECTRICITY MUST NOT BE ABLE TO BE TOUCHED BY A PERSON USING THE BATH OR SHOWER.

A minimum of 75mm must be achieved where the terminal is near fusible or combustible materials such as a plastic drain pipe or guttering or carport roof etc, unless suitable heat shields are provided.

4.2 The appliance is not suitable for external installation.

4.3 The appliance is floor standing, the floor must be firm and level. Special floor protection is not required.

4.4 The floor must be capable of supporting the weight of the appliance. Refer to Section 3 Table 5.

4.5 If the appliance is to be fitted in a timber framed building refer to the CORGI guidelines and BS 5440.

4.6 Minimum clearances must be available for installation and for servicing. See Fig. 4 and Table 8.

4.7 The appliance can be installed in a cupboard to be used for airing clothes provided that the requirements of BS 6798 and BS 5440:2 are strictly followed.

4.8 The airing space must be separated from the boiler space by a perforated non-combustible partition. Expanded metal or rigid wire mesh are acceptable provided that the major dimension is less than 13mm. See BS 6798:1987.

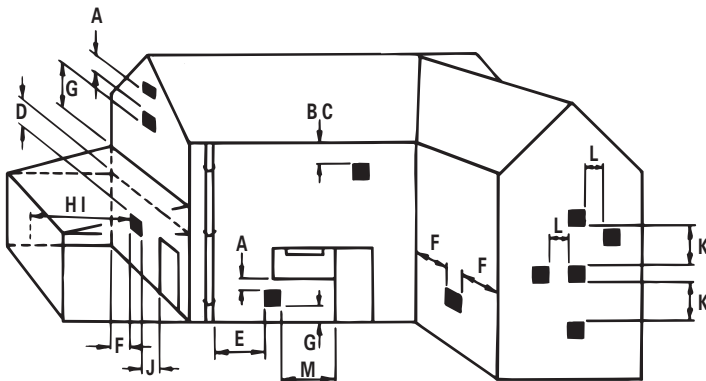
4.9 The distance between the inner face of a cupboard door and the cabinet front should not be less than 75mm for air circulation.

4.10 The appliance has a vertical flue option.

4.11 **LPG Installation:** The appliance shall not be installed in a room or internal space below ground level when it is intended for use with LPG. This does not preclude the installation into rooms which are basements with respect to one side of the building but open to ground level on the opposite side.

Fig. 4. Siting of the flue terminal.

MINIMUM SITING DIMENSIONS FOR POSITIONING THE BALANCED FLUE TERMINAL



TERMINAL POSITION	MIN. DISTANCE
A- Directly below an openable window or other opening e.g. air brick.	300 mm
B- Below gutters, soil pipes or drain pipes.	75 mm
C- Below eaves.	25 mm
D- Below balconies or car port roof.	25 mm
E- From vertical drain pipes and soil pipes.	25 mm
F- From internal or external corners.	25 mm
G- Above ground, roof or balcony level.	300 mm
H- From a surface facing a terminal.	600 mm
I- From a terminal facing a terminal	1200 mm
J- From an opening in a car port (e.g. door window) into dwelling.	1200 mm
K- Vertically from a terminal on the same wall.	150 mm
L- Horizontally from a terminal on the same wall.	300 mm
M- From door, window or air vent.	300 mm

5. Flue Terminal Position

5.1 The flue must be installed as specified by BS 5440:Part 1 and in accordance with the relevant Building Regulations.

5.2 The terminal must not cause an obstruction nor the discharge a nuisance.

5.3 If the terminal is less than 2m above a surface to which people have access then a guard must be fitted. The guard must be evenly spaced about the terminal and fixed with plated screws. A guard Type K2 can be obtained from Tower Flue Components, Vale Rise, Tonbridge, TN9 1TB.

5.4 Take care to ensure that combustion products do not enter ventilated roof voids. Refer to Fig. 4.

5.5 For siting the Vertical Balanced Flue Terminal refer to the Installation Instructions packed with the vertical flue kit.

6. Air Supply

6.1 The appliance does not require a separate vent for combustion air.

6.2 Installations in cupboards or compartments require permanent vents for cooling purposes, one at high level and one at low level, either direct to outside air or to a room. Both vents must pass to the same room or be on the same wall to the outside air.

6.3 There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. Refer to Section 4. Item 4.9. and Table 8.

6.4 The minimum free areas required are given below:

POSITION OF VENTS	AIR FROM THE ROOM	AIR DIRECT FROM OUTSIDE
HIGH LEVEL	270 cm ²	135 cm ²
LOW LEVEL	270 cm ²	135 cm ²

6.5 Refer to BS 6798 and BS 5440:2 for additional information.

7a. Sealed System

See Fig. 5 and 6.

7a.1 The system must comply with the requirements of BS 6798 and BS 5449:1.

7a.2 The appliance must not be operated without the system being full of water, properly vented and pressurised.

7a.3 The pressure relief valve operates at 3bar. The discharge must be directed away from electrical items or where it might be a hazard to the user. The pressure relief valve must not be used for any other purpose.

7a.4 The pressure gauge indicates the system pressure which must be maintained.

7a.5 The 12 litre expansion vessel is charged to 0.5 bar and is suitable for a static head of 5m. The pressure can be increased if the static head is greater than 5m.

7a.6 With an initial system pressure of 0.5 bar, a system capacity of about 104 litres can be accommodated. Refer to BS 7074 Part 1 for more information.

7a.7 The filling point must be at low level. See Fig. 6.

7a.8 Water loss must be replaced. The connection should be made in the central heating return as close to the appliance as possible. See Fig. 6.

7a.9 Any make-up vessel installed must be fitted with a non-return valve.

7a.10 Repeated venting loses water from the system. It is essential that this water is replaced and the system pressure maintained.

7a.11 The pump is set at maximum and must not be adjusted.

7a.12 Connections in the system must resist a pressure of up to 3 bar.

7a.13 Radiator valves must conform to BS 2767(10): 1972.

7a.14 Other valves used should conform to the requirements of BS 1010.

7a.15 Any system cleaner must be flushed out before an inhibitor is used.

Fig. 5. Sealed primary water system.

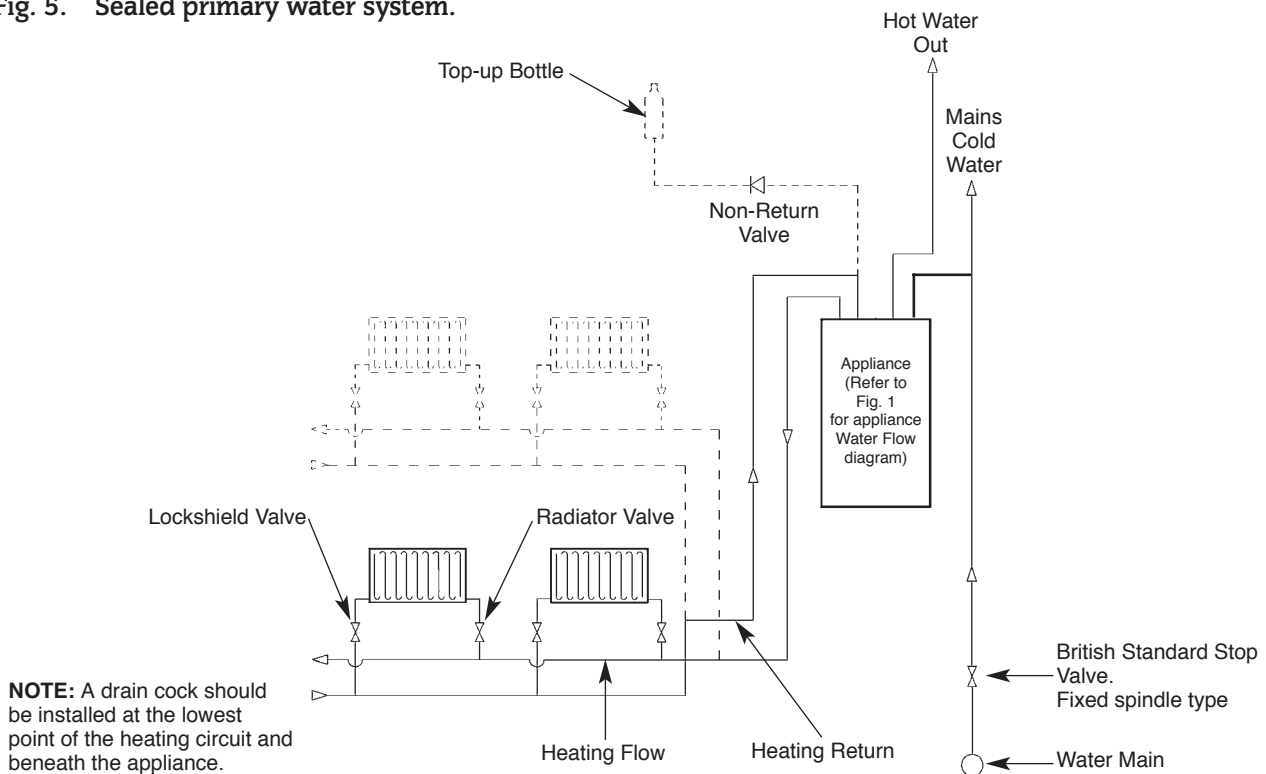
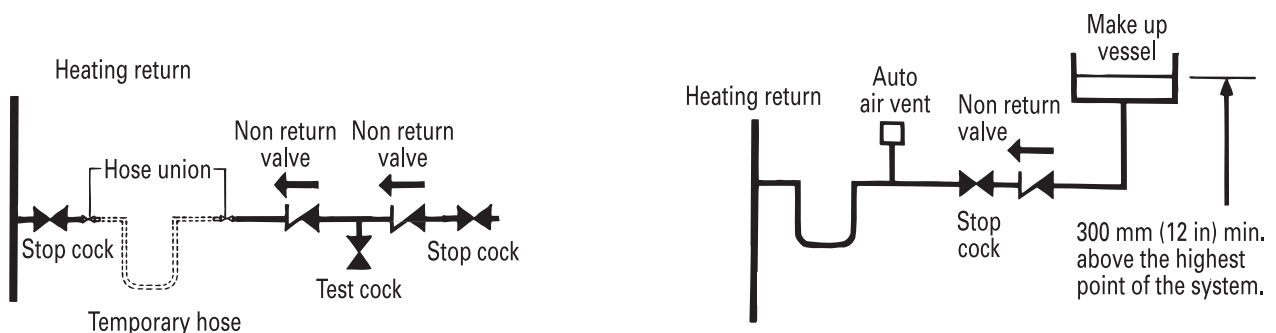


Fig. 6. System filling and make-up.



7b. Open Vent Primary System

See Fig. 7.

7b.1 The appliance is supplied suitable for connection to a sealed system. If it is to be used with an open vent system then the instructions given below must be followed.

7b.2 A 22 mm preformed combined feed and vent pipe available as an optional extra must be connected to the appliance. See Section 11.3 and Fig. 18.

Note: Refer to Section 2 – Table 4, for the sizes of the flow and return pipework.

7b.3 The feed and expansion cistern should be arranged so that a minimum static head of 1.0m above the top of the appliance or above the highest point in the heating circuit, whichever is the highest, is achieved. See Fig. 7.

7b.4 The feed and vent pipe must rise continuously from the appliance to the feed and expansion cistern.

7b.5 A pressure relief valve is not required on an open vented system. With the pressure relief valve left in position a pipe must be fitted which terminates such that any discharge does not cause a hazard to the occupants or damage to electrical components.

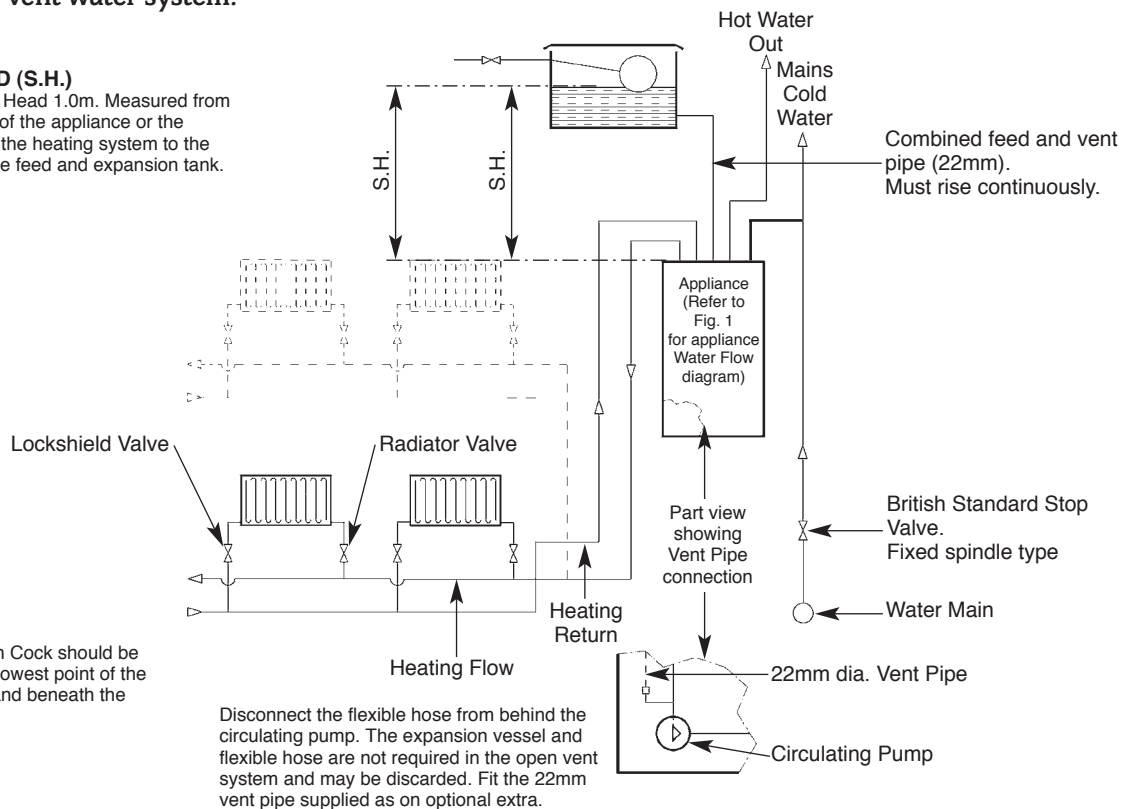
7b.6 Air within the appliance will be expelled via the feed and vent connection or dissipated into the rest of the system which must be fitted with manual air vents at any high point.

7b.7 The pump is set to maximum and must not be reset.

Fig. 7. Open vent water system.

STATIC HEAD (S.H.)

Minimum Static Head 1.0m. Measured from the top surface of the appliance or the highest point in the heating system to the water level in the feed and expansion tank.



8. Domestic Water Supply

8.1 The final 600mm of the mains cold water connection to the appliance should be made in copper tube only.

8.2 The appliance is suitable for a mains pressure of up to 10 bar.

8.3 The appliance is fitted with a mains supply isolating valve. A pressure reducing valve should be fitted if necessary.

8.4 The maximum hot water flow rate, via the flow regulator, is nominally 18 l/m \pm 15%

8.5 It is suggested that long pipe runs to the taps or shower should be insulated to prevent the rapid cooling of hot water after the tap or shower has been turned off.

8.6 Hot and cold taps and mixing valves used with this appliance must be suitable for operating at the available mains pressure and up to 65°C.

8.7 Anti-syphonage arrangements are normally not necessary except for some loose-head showers. See paragraph 8.10 following.

8.8 Thermostatically controlled shower valves will guard against the flow of water at too high a temperature.

8.10 The head of a loose head shower must not fall closer than 25mm above the top edge of the bath to prevent its immersion in bath water. Alternatively the shower must be fitted with an anti-syphonage device at the point of the flexible hose connections.

8.11 The supply of hot and cold mains water direct to a bidet is permitted, subject to local Water Company requirements, provided that the bidet is of the over-rim flushing type. The outlet(s) should be shrouded and unable to have any temporary hand held spray attached. No anti-syphonage arrangements are necessary.

8.12 As the maximum temperature of the hot water heat exchanger is limited by the control circuit, there is normally no need for water treatment to prevent scale accumulation. In exceptional circumstances a device to prevent scale formation can be fitted.

8.13 Installation of a scale inhibitor assembly should be in accordance with the requirements of the local Water Company. An isolating valve to allow servicing should be fitted.

8.14 The temporary water hardness can be determined using a standard test paper or by reference to the local water company.

8.15 A miniature expansion vessel (Zilmet R $\frac{1}{2}$, 160ml, 15bar), available as an optional extra, should be fitted into the domestic water supply circuit if there is evidence of water hammer.

8.16 A mini-expansion vessel must also be fitted if a back flow prevention device or a water meter has been fitted to the cold water mains supply.

9. Gas Supply

9.1 The boiler requires a gas flow of 2.9m³/h (NG-G20) or 1.09m³/h (LPG-G31). Check that the supply system can accommodate this together with any other appliances connected to it.

9.2 A natural gas appliance must be connected to a governed meter.

9.3 There must be a dynamic pressure of 20 mbar (G20) or 37 mbar (G31) at the inlet to the appliance. This is equivalent to a pressure of 18.5 - 19.0 mbar (G20) or 35 - 35.5 mbar (G31) at the inlet pressure tapping on the gas valve.

10. Electrical

Refer to Figs. 8, 9, 10 and 11.

10.1 Mains Supply 230V ~ 50Hz 140 watts. External Fuse 3A. Internal Fuses: 2A Slow (F1), 1A Fast (F2). Both 20mm long.

10.2 Mains cable. PVC insulated 0.75mm (24 x 0.20mm) to BS 6500 Table 16. The mains cable must be connected into terminal X1, marked L (brown or red lead), N (blue or black lead), and the earth cable fixed to the earth bracket at the top of the electrical box, using a screw and cup washer. Ensure the earth cable is longer than the other two cables so that it will not be taut, should the mains cable be pulled.

Feed the mains cable through the top hole at the rear of the electrical box. Do not omit the cable clamp.

For access to the electrical box, refer to Section 15.

10.3 The appliance must be earthed.

10.4 The wiring between the appliance and the electricity supply shall comply with current IEE wiring regulations (and any local regulations which apply) for fixed wiring to a stationary appliance. NB It must be possible to completely isolate the appliance with at least 3mm contact separation in both poles.

10.5 If a room thermostat and/or frost thermostat is to be fitted, refer to Fig.10. These must be suitable for mains voltage operation.

10.6 A facia mounted twin channel digital programmer is available as an optional extra. Instructions are supplied with the programmer kit. Alternatively an external programmer or timeswitch may be fitted. Refer to Fig.11. This must be suitable for mains voltage operation.

10.7 SAFETY CHECK

After installation or as a result of an electrical fault, the electrical system shall be checked for short circuits, fuse failure, incorrect polarity of connections, earth continuity and resistance to earth.

Fig.8. Wiring diagram.

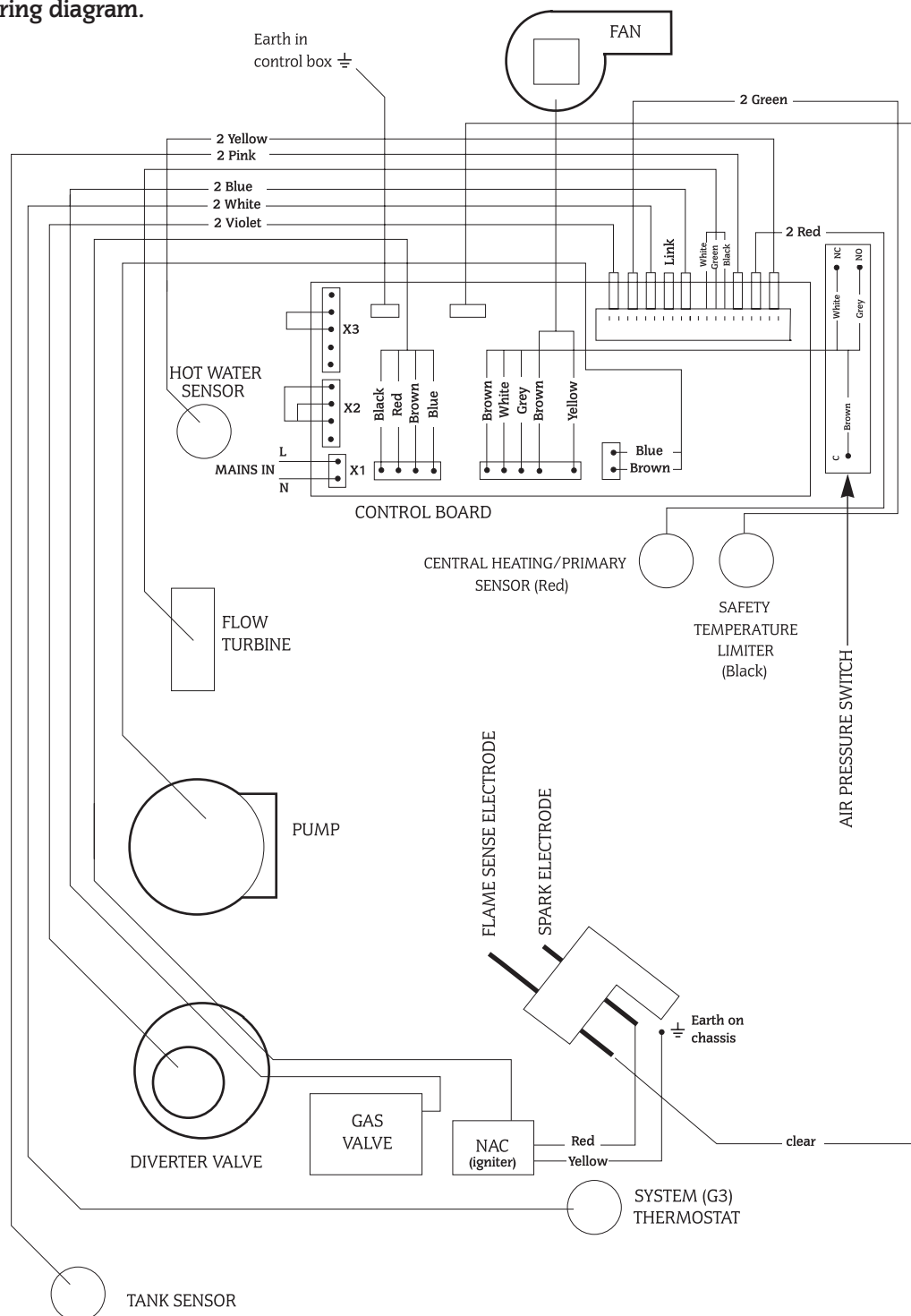


Fig. 9. Functional flow diagram.

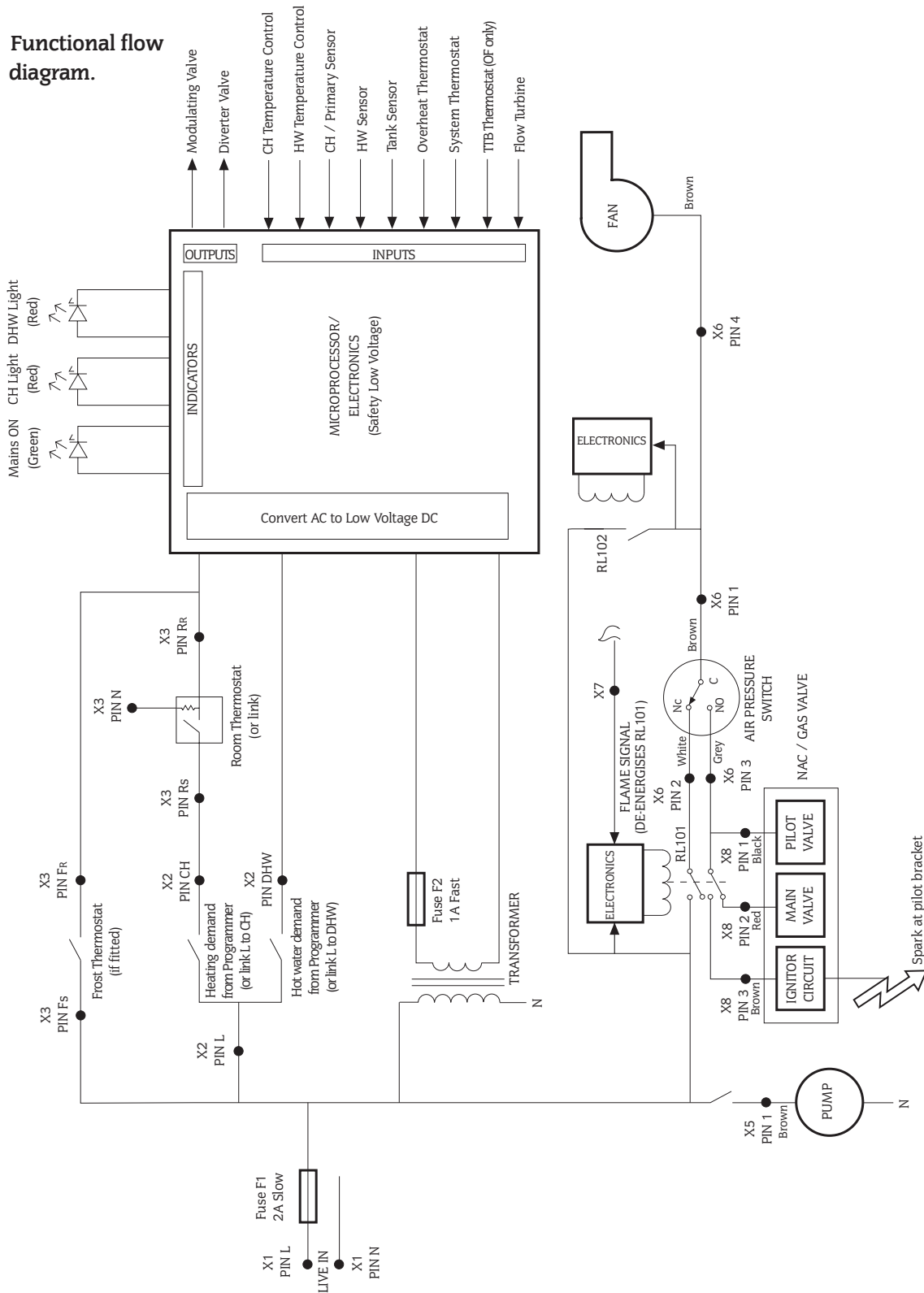


Fig. 10. Room/frost thermostats.

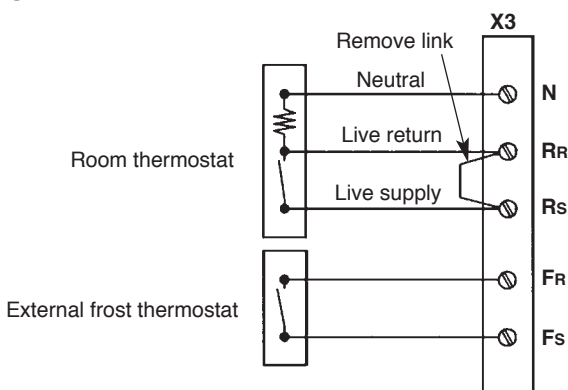
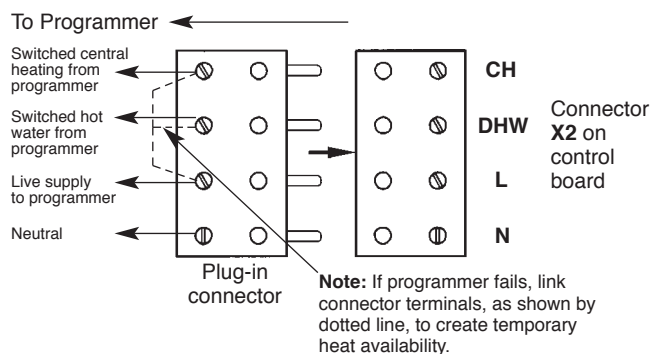


Fig. 11. Programmer connections.



11. Installing The Appliance

The appliance is supplied suitable for fitting to a sealed system. If it is to be fitted to an open vent system refer to paragraph 11.2.5 and Section 7.

EXTENSION FLUE KITS.

Extension flue kits and 90° flue bends are available to increase the length and redirect the flue as follows:

- (a) From the standard flue length up to 3000 mm straight flue. Refer to 11.1.3, 11.1.4.
- (b) From the standard flue length to up 2300 mm when a second 90° flue bend is used. Refer to 11.1.5, 11.1.6.
- (c) From the standard flue length up to 1000 mm when a second and third 90° flue bend is used. Refer to 11.1.7, 11.1.8.

VERTICAL BALANCED FLUE OPTION.

A vertical balanced flue system with a length of between 100 mm and 4500 mm can be fitted to the appliance.

Instructions describing the fitting of the vertical balanced flue system are packed with the vertical flue terminal assembly.

The maximum overall height of the vertical balanced flue measured from the top of the appliance cabinet to the top of the vertical balanced flue terminal is 5600 mm.

The flue must be installed as specified in BS 5440 Part 1.

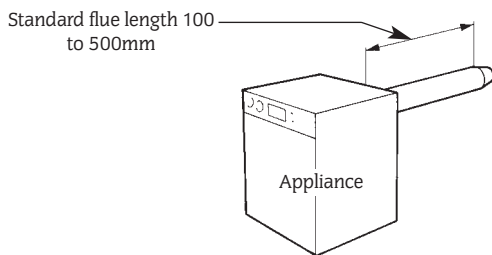
Detailed fitting instructions are given in Section 11.5.

11.1 FLUE OPTIONS

Two standard flue kits are available for the appliance:

11.1.1 STANDARD HORIZONTAL REAR FLUE KIT.

Fig. 12. 1: Flue Option 1.



The maximum flue length when measured from the **REAR** of the appliance casing top panel is 500 mm. See Fig. 12.1.

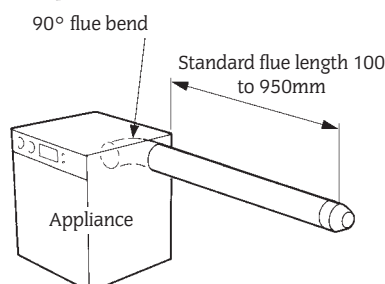
NOTE: Top panel is 60mm deeper than the side panels.

The following items are included in this flue kit:

- 1 – Air duct 675 mm long (including fixing length inside appliance cabinet).
- 1 – Flue duct 725 mm long (including fixing length inside appliance cabinet).
- 1 – Balanced Flue Terminal.
- 1 – Flue Adaptor.
- 2 – Fixing screws.
- 1 – Tube of silicone sealant.

11.1.2 STANDARD HORIZONTAL SIDE FLUE KIT.

Fig. 12. 2: Flue Option 2.



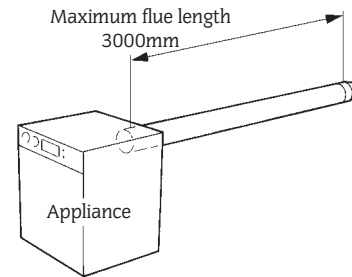
The maximum flue length when measured from the **RIGHT OR LEFT HAND SIDE** of the appliance casing is 950 mm. See Fig. 12.2.

The following items are included in this flue kit:

- 1 – Air duct 1170 mm long (including fixing length inside appliance casing.)
- 1 – Flue duct 1170 mm long (including fixing length inside appliance casing.)
- 1 – Balanced Flue Terminal.
- 1 – 90° Flue Bend.
- 4 – Fixing screws.
- 1 – Tube of silicone sealant.

11.1.3 EXTENSION HORIZONTAL REAR FLUE.

Fig. 12. 3: Flue Option 3.

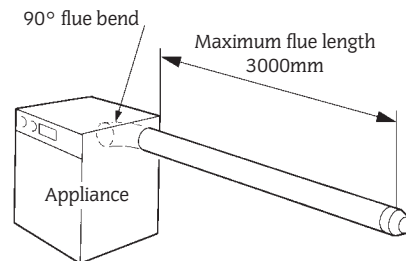


Extension flue lengths may be added to the rear of the appliance up to 3000mm from the rear of the appliance. The flue must be assembled from the Standard Horizontal Rear Flue Kit and extension flue kits. See Fig. 12.3.

The flue assembly must remain horizontal when installed.

11.1.4 EXTENSION HORIZONTAL SIDE FLUE.

Fig. 12. 4: Flue Option 4.

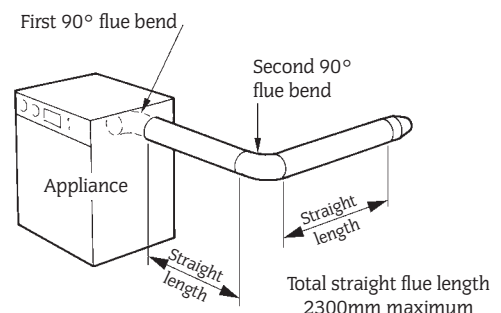


Extension flue lengths may be added horizontally to the right or left hand side of the appliance up to 3000mm from the side of the casing. The flue must be assembled from the standard flue supplied, one 90° flue bend and extension flue kits. See Fig. 12.4.

The flue assembly must remain horizontal when installed.

11.1.5 EXTENSION HORIZONTAL FLUE USING A SECOND 90° FLUE BEND.

Fig. 12. 5: Flue Option 5.

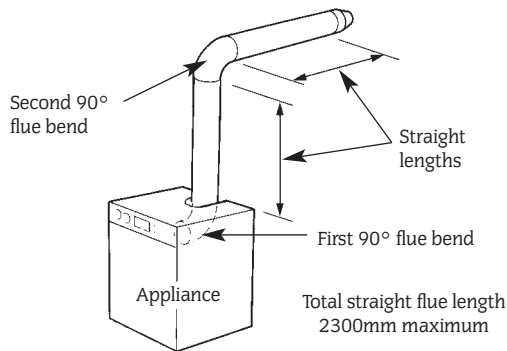


Extension flue lengths may be added horizontally and include a second 90° flue bend providing the total straight length does not exceed 2300 mm when measured from the side of the casing. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits and a second 90° flue bend. See Fig. 12. 5.

The flue including the second 90° flue bend may be positioned in any horizontal direction to suit the installation.

11.1.6 EXTENSION UPWARDS AND HORIZONTAL FLUE USING A SECOND 90° FLUE BEND.

Fig. 12. 6.: Flue Option 6.

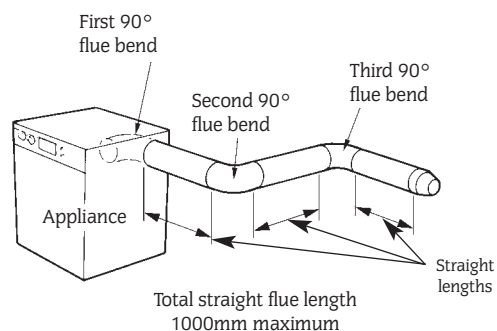


Extension flue lengths may be added upwards and horizontally and include a second 90° flue bend providing the total straight length does not exceed 2300 mm when measured from the side of the casing. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits and a second 90° flue bend. See Fig. 12. 6.

The horizontal section of flue and second 90° flue bend may be positioned in any horizontal direction to suit the installation.

11.1.7 EXTENSION HORIZONTAL FLUE USING A SECOND AND THIRD 90° FLUE BEND.

Fig. 12. 7.: Flue Option 7.

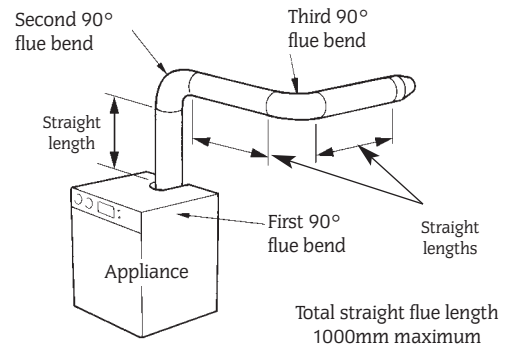


Extension flue lengths may be added horizontally and include a second and third 90° flue bend providing the total straight length does not exceed 1000 mm when measured from the side of the casing. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits, second and third 90° flue bends. See Fig. 12. 7.

The flue including the second and third 90° flue bends may be positioned in any horizontal direction to suit the installation.

11.1.8 EXTENSION UPWARDS AND HORIZONTAL FLUE USING A SECOND AND THIRD 90° FLUE BEND.

Fig. 12. 8.: Flue Option 8.



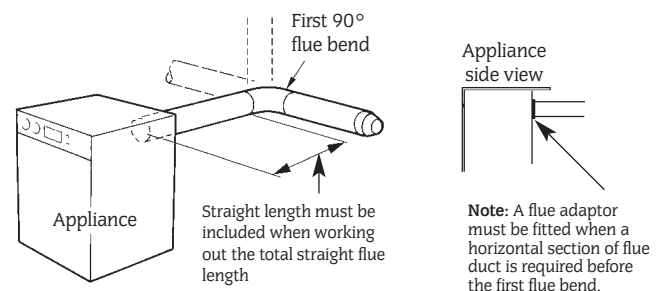
Extension flue lengths may be added upwards and horizontally and include a second and third 90° flue bend providing the total straight length does not exceed 1000 mm when measured from the side of the casing. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits, a second and third 90° flue bend. See Fig. 12. 8.

The horizontal section of flue, second and third 90° flue bend may be positioned in any horizontal direction to suit the installation.

11.1.9 EXTENSION HORIZONTAL FLUE FITTED BEFORE THE FIRST 90° FLUE BEND.

For Flue Options 2, 4, 5, 6, 7 and 8.

Fig. 12. 9.: Flue Option 9.



For Flue Options 2, 4, 5, 6, 7 and 8.

It may be required, because of site conditions, to fit a straight section of flue duct before the first 90° flue bend. A flue adaptor is required.

IMPORTANT: This section of flue duct must be included when working out the total straight flue length for each Flue Option. See Fig. 12. 9.

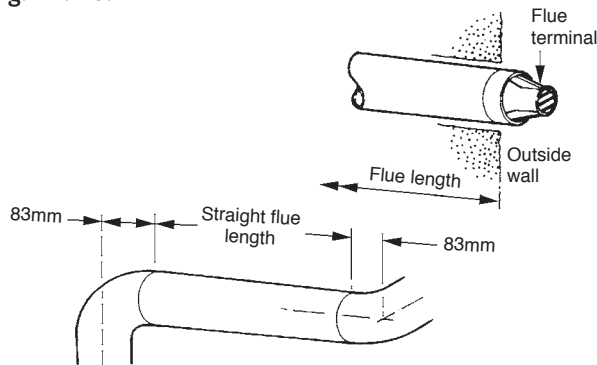
11.1.10 IMPORTANT: Extension flue kits, extra 90° flue bends, flue adaptor, flue spacer and air duct supports are all optional extras. All the extras required for the installation must be available before starting the installation.

Optional Extra	Part Number
Extension Flue kit 1000 mm long	7 716 191 026
Flue Adaptor.	7 716 191 025
90° Flue Bend	7 716 191 013
Air Duct Support Bracket	7 716 191 024

When determining the flue length required, always measure to the outside of the wall where the flue terminal will be fixed. See Fig. 12.10.

When measuring between the centre lines of flue ducts, allow 83 mm for each flue bend. See Fig. 12.10.

Fig. 12. 10.



11.2 GENERAL PREPARATION.

11.2.1 The following description covers one method of installation. Extra space may be required for installation if service connections are made in a different way.

Compression fittings may be used on all water connections to allow for the fitting of the appliance and servicing.

Pipework must be routed so as not to obstruct access to the circulating pump, diverting valve, gas valve, water to water heat exchanger or heat bank.

Removable sections are provided in the cabinet top panel to facilitate vertical pipe connections and flue system, if required.

Removable sections are provided in the side panels to accommodate a side flue system.

11.2.2 Check the appliance carton contains :

Appliance.

Installer's Instruction Pack.

User's Information Pack.

Hardware Pack with flue restrictor rings.

11.2.3 Carefully remove the appliance from the cardboard package and plinth.

Check the position chosen for the appliance is in accordance with the instructions given in Sections 4 and 5. Also refer to Fig. 2.

Do not place the appliance in its final position at this stage.

11.2.4 For all flue options from the dimensions given in Fig. 13 carefully mark out:

- (i) the wall with the centre-lines for the Rear Flue centre point position.
- (ii) the floor with the base outline of the appliance.

Having decided upon the most suitable flue option for the installation, the position of the hole for the flue must now be marked on the wall/walls.

FLUE OPTION 1. See Fig. 12. 1.

The location of the centre point position for the Rear Flue is obtained from the flue centre-lines previously marked.

This is the Rear Flue centre point position. See Fig. 13.

FLUE OPTION 2. See Fig. 12. 2.

Draw a horizontal line from the Rear Flue centre point position in the appropriate direction along the wall. Measure 94 mm from the junction of the walls and make a short vertical line. Extend the horizontal line to intersect the vertical line and mark the position.

This is the Side Flue centre point position. See Fig. 13.

FLUE OPTION 3. See Fig. 12. 3.

The location of the centre point position for the Rear Flue is obtained from the flue centre-lines previously marked.

If the flue duct extends through other walls ensure it remains horizontal.

This is the Rear Flue Extension centre point position. See Fig. 13.

FLUE OPTION 4. See Fig. 12. 4.

Draw a horizontal line from the Rear Flue centre point position, previously marked, in the appropriate direction along the wall/walls.

If the flue system extends through other walls or the appliance is not installed close to a wall, ensure it remains horizontal.

Measure 94 mm from the junction of the walls if the appliance is installed against a wall and make a short vertical line.

If the appliance is **NOT** installed against a wall, measure the distance from the junction of the walls, make a short vertical line to suit the installation. Extend the horizontal line to intersect the vertical line and mark the position.

This is the Side Flue Extension centre point position. See Fig. 13.

FLUE OPTION 5. See Fig. 12. 5.

Draw a horizontal line from the Rear Flue centre point position, previously marked, in the appropriate direction along the wall/walls. Check that it remains horizontal.

If the flue system extends through other walls or the appliance is not installed close to a wall, ensure it remains horizontal.

This is the Side Flue Extension centre point position. See Fig. 13.

FLUE OPTION 6. See Fig. 12. 6.

Draw a vertical line upwards from the Rear Flue centre point position previously marked. Extend the line, approximately 250 mm, above the position required for the centre-line of the horizontal flue duct. See Fig. 13.

Mark the position on the vertical line to coincide with the centre-line position of the horizontal duct.

This is the Rear Flue Upwards Extension centre point position. See Fig. 13.

FLUE OPTION 7. See Fig. 12. 7.

Follow the procedure as described in Flue Option 5 ensure the flue system remains horizontal.

This is the Side Flue Extension centre point position. See Fig. 13.

FLUE OPTION 8. See Fig. 12. 8.

Follow the procedure as described in Flue Option 6 ensure the flue system remains vertical and horizontal.

This is the Rear Flue Upwards Extension centre point position. See Fig. 13.

FLUE OPTION 9. See Fig. 12. 9.

NOTE: A flue adaptor is required for these flue options.

Refer to Flue Options: 2, 4, 5, 6, 7 and 8.

For installations that require a straight section of flue duct before the first 90° flue bend, follow the procedure as described in the appropriate Flue Option. Mark the flue centre point position.

Drill the flue hole/holes 120 mm diameter, ensure it is horizontal, through the wall/walls.

If the internal flue fitting kit is used the hole must be 150 mm diameter.

11.2.5 FIXING THE APPLIANCE FOR ALL FLUE OPTIONS.

Gas and Water connections

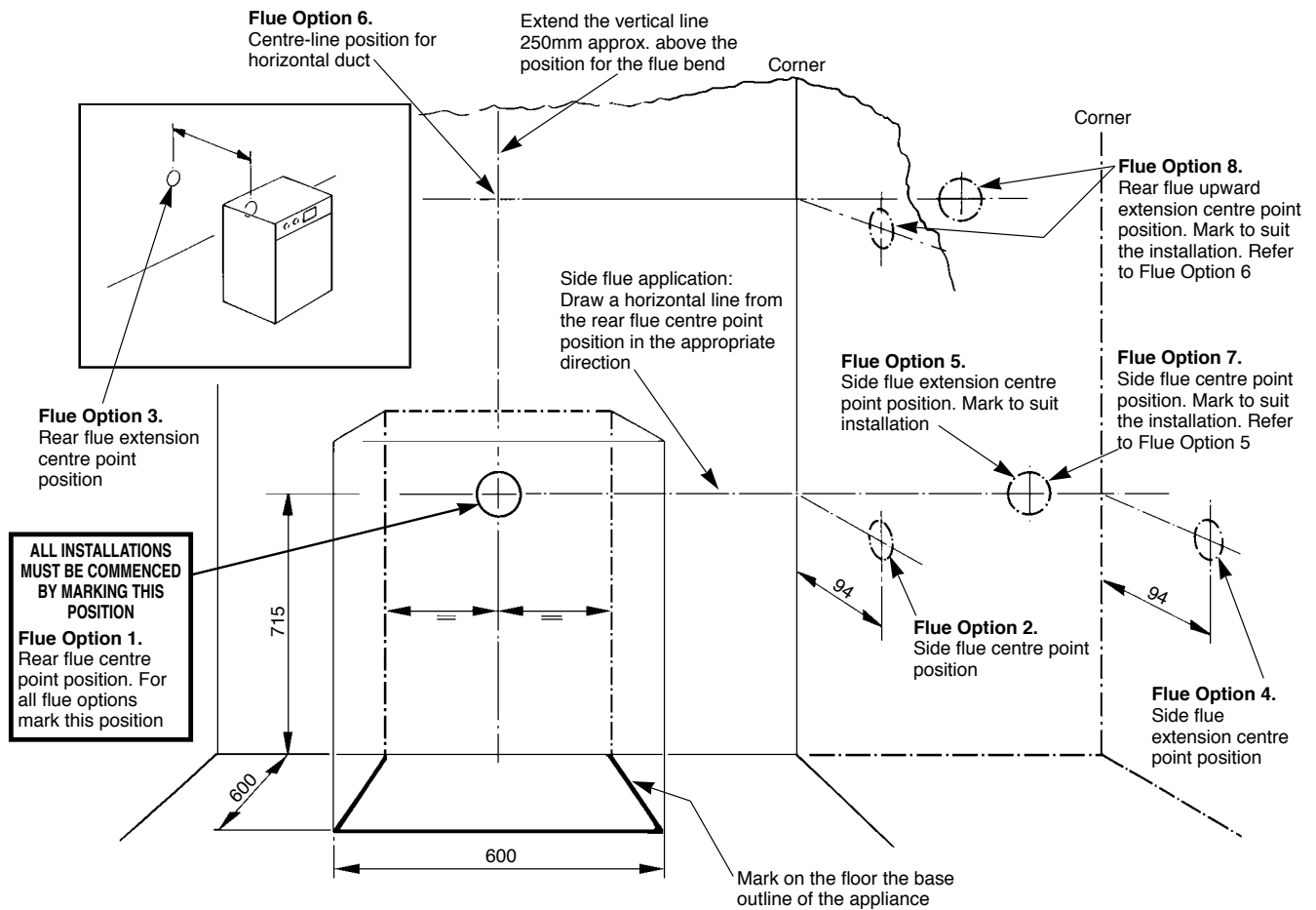
Depending upon the site conditions it may be helpful to pre-plumb the appliance before moving it into position. Fitting unions or stub pipes to the appliance pipework should be done at this stage. Refer to Section 3 and Fig. 3.

Pipework must be arranged to clear the flue system. See Section 5 and Fig. 5.

Before the appliance is connected to the central heating system, thoroughly flush the heating system and the mains cold water supply pipe.

IMPORTANT: Any proprietary cleanser must be flushed from the system.

Fig. 13. Marking the flue positions for all flue options.



To gain access to the appliance remove the cabinet front and top panel and place the facia and control box in the Service Position. Refer to Fig.14.

NOTE: As the dry weight of the appliance is 96Kg, more than one person will be required when moving the appliance.

When the appliance is flued to the rear ensure the flue position, on the rear of the appliance, is directly in line with the hole in the wall.

For all other flue applications, the centre of the flue position on the appliance must be in line with the centre-lines for the Rear Flue position, previously marked. See Fig. 13.

Always support the appliance pipework when tightening.

SEALED SYSTEM.

Connect a 15 mm copper drain pipe to the relief discharge connection at the rear of the appliance. Ensure that any discharge does not fall onto electrical components or where it might be a hazard to the user. Refer to Fig. 15.

OPEN VENT SYSTEM.

If the appliance is to be used on an open vent system the expansion vessel and flexible hose are not required. Remove from the bottom manifold connection and discard. Fit the 22 mm copper vent pipe, supplied as an optional extra, to this connection. See Fig. 18.

To access the open vent connection remove the pump head.

Withdraw the two securing clips from the pump body.

Ease the pump forwards about 10mm off the "O" ring seals. It is not necessary to disconnect the electrical cable. The cable is sufficient to allow the pump head to rest on top of the appliance. Do not allow the pump head to be suspended by the cable. See Figs. 18 and 46.

NOTE: INTERNAL FLUE FITTING KIT.

If the Internal Flue Fitting Kit is to be used refer to Section 11.7 describing the assembly of the flue components and fitting the Internal Flue Kit.

11.3 GUIDE LINES FOR ALL FLUE OPTIONS.

INTRODUCTION.

Remove ALL packaging from the ducts, flue bend or bends and flue terminal assembly.

Check the contents of the standard flue kit and extension flue kit or kits against the respective packing list.

IMPORTANT: The air duct, flue duct and flue bend/bends are manufactured from aluminium and must be handled with care.

MEASUREMENT AND CUT.

Measure and cut the air and flue ducts to length ensuring that the cuts are square and free from burrs. Always check the dimensions before cutting the duct.

Do not cut the expanded end of the extension ducts unless instructed to do so.

FLUE ADAPTOR.

The air and flue ducts supplied with the standard flue kits must connect to the flue adaptor or first flue bend. See Fig. 22 or 23.

The flue adaptor, supplied with the Standard Horizontal Rear Flue Kit, must be fitted for Flue Option 1 and 3. See Fig. 19.

Other flue options, that require a horizontal section of flue duct fitted directly to the rear of the appliance, must use the flue adaptor. See Fig. 12. 9. The flue adaptor is available as an optional extra.

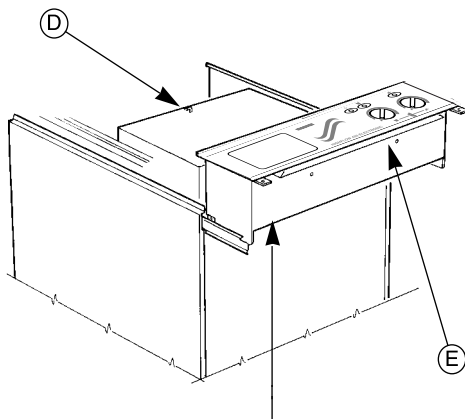
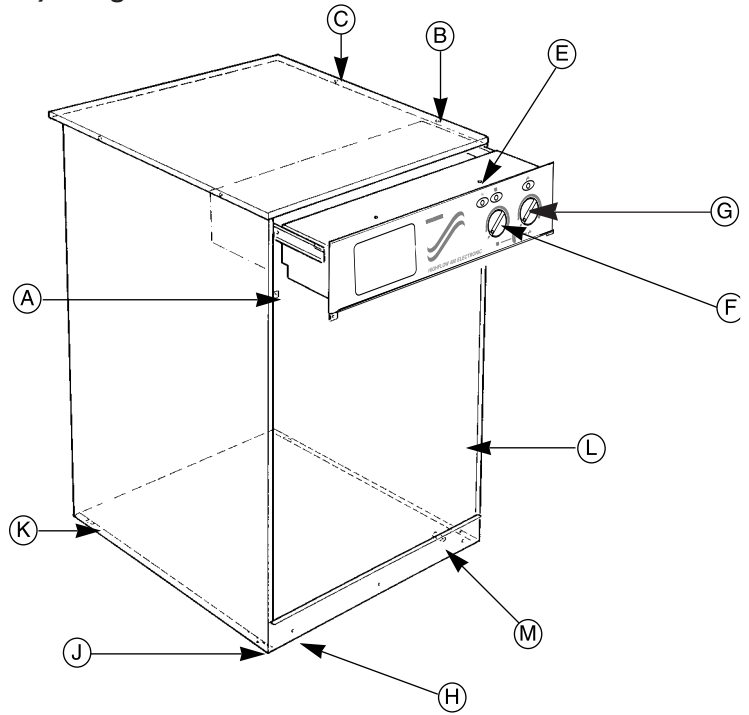
Fig. 14. Cabinet, fascia, control box and flue assembly fixing screws.

To gain access to the appliance:

1. Lift cabinet front panel **L** off top location and clear the return edge over the kick strip.
2. Remove screws **A** and ease fascia and control box forwards on the slide rails.
3. Remove screws **B**, accessible under cabinet top panel. Ease panel forwards clear of location **C** and remove.
4. Lift fascia and control box through 90° into the service position. Lodge in position on the outer locations.

To gain access to the control box from the service position:

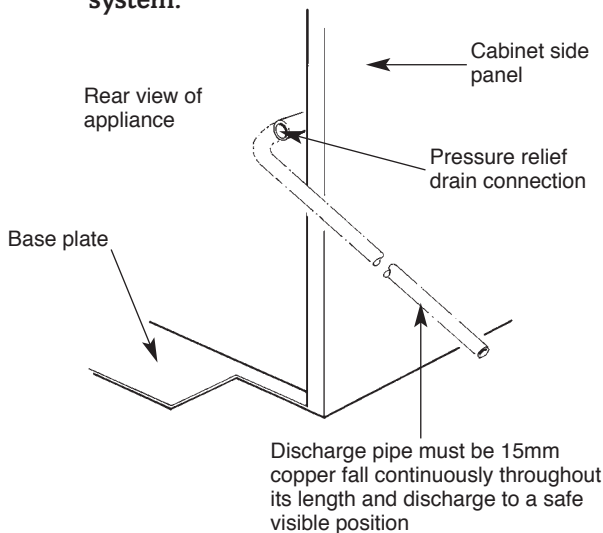
1. Pull the thermostat knobs **F** and **G** clear of the fascia.
2. Remove screws **E**.
3. Ease fascia out of control box.
4. Support the fascia out of the control box when carrying out installation or service operations.



Lift fascia and control box into the service position

- A** Fascia and control box fixing screws
- B** Cabinet top panel fixing screws
- C** Cabinet to panel fixing lugs
- D** Flue assembly clamping screw
- E** Fascia fixing screws
- F** Hot water control thermostat knob
- G** Heating control thermostat knob
- H** Kick strip fixing screws
- J** Cabinet side panel front location
- K** Cabinet side panel fixing lugs
- L** Cabinet front panel (no fastenings)
- M** Primary system drain. Remove kick strip for access

Fig. 15. Discharge pipe connection for sealed system.



Fit the flue adaptor into the flue sealing grommet, fully against the stop, located on the rear of the inner casing. Tighten the clamping screw (D) located on top of the inner casing. See Fig. 14.

When assembling extension ducts ensure that the ducts are correctly located in the socketed joints. See Fig. 23.

Measure the length of the air and flue ducts from the end that will be fixed into the adaptor or flue bend fitted to the appliance.

Before cutting the air or flue ducts ensure the final expanded section is at least 100 mm clear of the flue terminal end or flue bends. If it is not, then reduce the length of the adjacent air and flue ducts by cutting off from the non-expanded end the amount necessary to give the minimum clearance. See Fig. 23.

DUCT SEAL.

Take care to seal all the flue joints where indicated. See Fig. 23.

To seal the flue joints disengage the joint and apply a smear of silicone sealant around the duct. See Fig. 23.

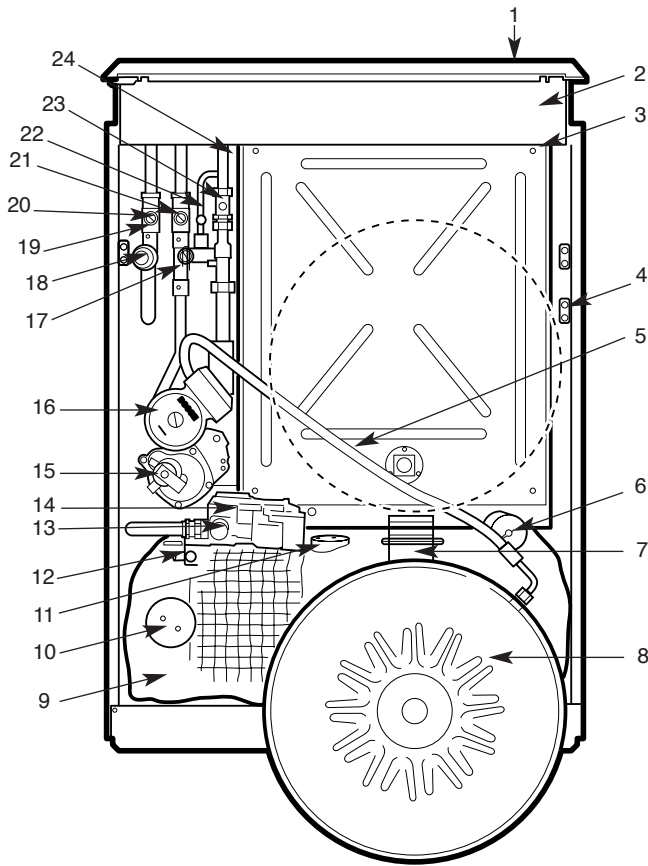
DUCT SUPPORT

If the flue assembly is longer than 1500 mm the flue duct must be supported within the air duct with a flue spacer available as an optional extra.

On final assembly the air duct must be adequately supported. Air duct support brackets are available as an optional extra.

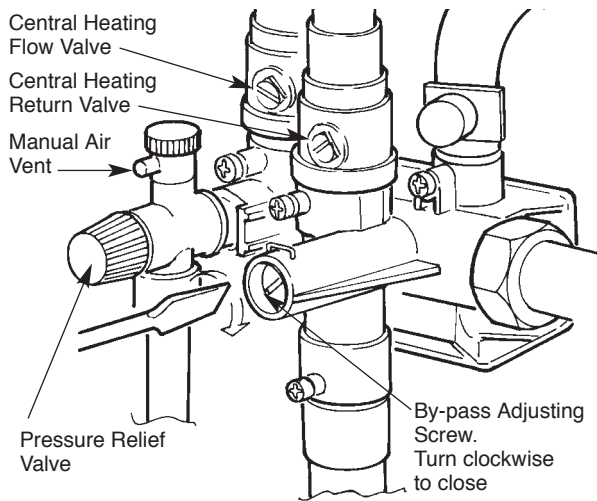
See Section 11.1.10 for flue spacer and air duct support bracket part number.

Fig. 16. Layout of components with expansion vessel in service position.



1. Facia.
2. Control box.
3. Inner casing cover fixing screws (4).
4. Expansion vessel fixing screw.
5. Expansion vessel flexible hose.
6. Pressure gauge.
7. Expansion vessel hinge.
8. Expansion vessel.
9. Heat bank.
10. Tank temperature sensor.
11. Unvented system thermostat.
12. Domestic water drain cock.
13. Gas service cock.
14. Gas valve.
15. Water diverter valve.
16. Pump.
17. By-pass adjustment screw.
18. Relief valve.
19. Primary manual air vent.
20. Central heating flow valve.
21. Central heating return valve.
22. Hot water sensor.
23. Mains cold water inlet valve.
24. Flue gas sample point.

Fig. 17. Central heating flow and return valves, by-pass adjustment, pressure relief and manual air vent.



RESTRICTOR RINGS.

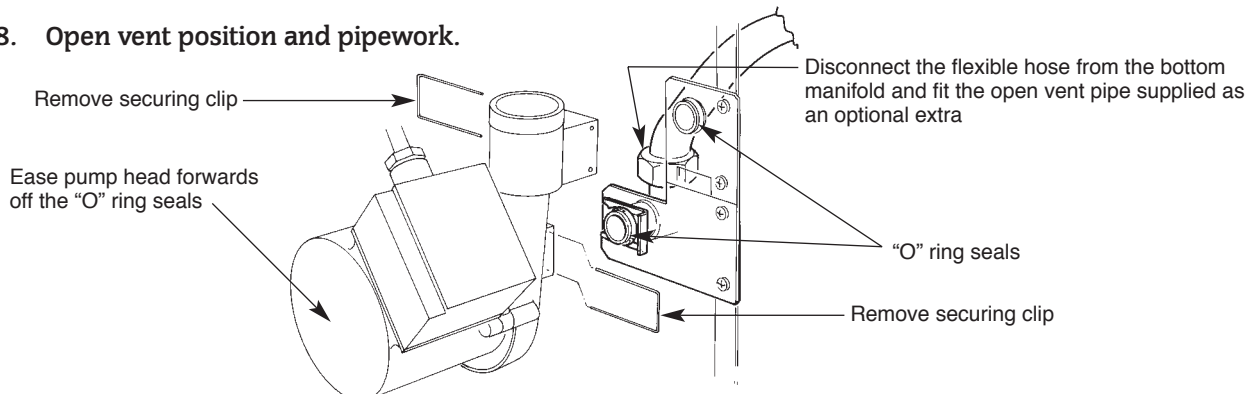
Flue Restrictor Rings are supplied with the hardware pack. A restrictor ring must be fitted into the flue terminal, the size will depend on the length. Refer to the following table for restrictor size and usage. When fixing the flue restrictor ring refer to Fig. 24.

NOTE: Restrictor rings must **NOT** be used in flue systems incorporating two or three bends, i.e. Flue Options 5, 6, 7 and 8.

See Section 11 for parts identification and part numbers.

Flue Option	Flue Length or Total Straight Flue Length (mm)	Flue Restrictor Size mm (dia.)
1	100 to 1000	72
2	100 to 1000	75
3	1000 to 3000	75
4	1000 to 3000	77
5	100 to 2300	Not required
6	100 to 2300	Not required
7	100 to 1000	Not required
8	100 to 1000	Not required

Fig. 18. Open vent position and pipework.



11.4 INSTALL THE FLUE SYSTEM.

Because of site conditions it may be necessary to deviate from the following method of installation. Joints must be sealed and fixed where applicable.

11.4.1 STANDARD HORIZONTAL REAR FLUE.

(FLUE OPTION 1). See Fig. 12. 1.

IMPORTANT: (i) A flue restrictor ring **MUST** be fitted in the flue terminal or flues with a total straight length of between 100 and 1000mm. See Fig. 24.

(ii) The flue adaptor **MUST** be fitted to connect the flue system to the appliance. See Fig. 21. **AIR AND FLUE DUCT PREPARATION.**

The standard flue assembly, supplied with the appliance, accommodates a maximum flue length of 500 mm measured from the **REAR** of the appliance casing. See Fig. 19.

Measure accurately the distance from the rear of the appliance, previously marked on the floor, to the outside surface of the wall. Dimension A. See Fig. 19.

Air duct length = A + 188 mm

Flue duct length = A + 228 mm.

Cut air and flue ducts to length. Do not cut the drilled end of the air duct.

IMPORTANT: Fit the flue restrictor ring marked **72** into the flue terminal. See Fig. 24.

Assemble the air duct to the flue terminal. Ensure it fits fully into the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. See Fig. 24.

Drill through the holes in the flue terminal into the air duct with the drill provided. Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided. See Fig. 21.

Fit the flue duct into the extended end of the flue adaptor, ensure it is located correctly against the stop. Drill two holes through the holes in the flue adaptor. See Fig. 21.

Fit the air duct over the outside of the flue duct and onto the flue adaptor.

Ensure it is located correctly against the stop and the flue duct fits into the flue terminal. Drill two holes through the holes in the air duct. See Fig. 21.

Disconnect the air and flue ducts from the flue adaptor.

Apply a smear of silicone sealant around the outside of the flue duct. Fit the flue duct into the flue adaptor and fix with the screws provided. See Fig. 21.

Apply a smear silicone sealant around the inside of the air duct.

Re-assembly the air duct over the flue duct, ensure the flue duct fits into the flue terminal and the air duct fits over the flue adaptor. Fix with the screws provided.

The flue system is now assembled. See Fig. 21.

From inside or outside the dwelling pass the flue assembly through the hole in the wall.

Temporarily support the flue system, ensure it is horizontal and will align with the flue position on the rear of the inner casing.

Carefully ease the appliance into the position previously marked. Ensure the flue position located on the rear of the appliance is correctly aligned with the centre-lines of the flue.

Fit the flue adaptor into the flue grommet located on the rear of the inner casing. See Fig. 21.

Ensure it is located correctly against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

Make good the internal and external brickwork or rendering .

11.4.2 STANDARD HORIZONTAL SIDE FLUE ASSEMBLY INCLUDING ONE 90° FLUE BEND.

(FLUE OPTION 2). See Fig. 12. 2.

IMPORTANT: A flue restrictor ring **MUST** be fitted in the flue terminal or flues with a total straight length of between 100 and 1000mm. See Fig. 24.

HORIZONTAL SIDE FLUE ASSEMBLY.

Measure accurately the distance from the side of the appliance casing, marked on the floor, to the outside surface of the wall. Dimension A. See Fig. 20.

Air duct length = A + 244 mm.

Flue duct length = A + 284 mm.

Cut the air and flue ducts to length. Do not cut the drilled end of the air duct.

IMPORTANT: Fit the flue restrictor ring marked **75** into the flue terminal. See Fig. 24.

Assemble the air duct to the flue terminal. Ensure it fits fully into the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. See Fig. 24.

Drill through the holes in the flue terminal into the air duct with the drill provided. Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided. See Fig. 22.

Fit the flue duct into the flue bend. Ensure it is located correctly against the stop. Drill two holes through the holes in the flue bend. See Fig. 22.

Fit the air duct over the outside of the flue duct. Ensure it is located correctly against the stop. Drill two holes through the holes in the air duct.

Disconnect the air and flue ducts from the flue bend.

Loosely assemble the flue duct into the air duct and engage in the flue terminal. From inside or outside the dwelling pass the assembly through the hole in the wall.

From inside ease the flue duct sufficiently clear of the air duct to fit the flue bend.

Apply a smear of silicone sealant around the outside of the flue duct. Fit the flue duct into the flue bend and fix with the screws provided. See Fig. 22.

Apply a smear of silicone sealant around the outside of the flue bend.

Assemble the flue bend into the air duct and fix with the two screws provided. Ensure the flue duct is correctly engaged in the flue terminal. See Fig. 22.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

The flue system is now assembled. See Fig. 22.

Support the flue system temporarily so that it lines up with the flue centre-lines previously marked.

Carefully ease the appliance into the position previously marked. Ensure the flue position, located on the rear of the appliance, is correctly aligned with the flue centre-lines previously marked.

Fit the flue bend into the flue grommet located on the rear of the inner casing.

Ensure it is correctly located against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

Make good the internal and external brickwork or rendering.

11.4.3 Fitting Extension Flues and Extra 90° Flue Bend or Bends.

Refer to the appropriate instructions. See Table and Fig. 124. - 12.10.

Option No.	Flue Option	Section
3	Extension horizontal rear flue.....	11.1.3
4	Extension horizontal side flue.....	11.1.4
5	Extension horizontal flue using a second 90° flue bend	11.1.5
6	Extension upwards and horizontal flue using a second 90° flue bend.....	11.1.6
7	Extension horizontal flue using a second and third 90° flue bend.....	11.1.7
8	Extension upwards and horizontal flue using a second and third 90° flue bend.....	11.1.8
9	To fit a horizontal section of flue duct before the first 90° flue bend for flue options 2, 4, 5, 6, 7 and 8.	11.1.9

**11.4.3.1 EXTENSION HORIZONTAL REAR FLUE.
(FLUE OPTION 3).** See Fig. 12. 3.

- IMPORTANT:**
- i) Length of flue when measured from the rear of the appliance casing must not exceed 3000 mm.
 - ii) A 75mm flue restrictor ring **MUST** be fitted into the flue terminal. See Fig. 24.
 - iii) The flue adaptor **MUST** be fitted to connect the flue system to the appliance. See Fig. 21.

HORIZONTAL REAR FLUE ASSEMBLY.

Measure accurately the distance from the rear of the appliance, previously marked on the floor, to the outside surface of the wall. Dimension A mm. See Fig. 19.

- Air duct length = $A + 188$ mm,
- Flue duct length = $A + 288$ mm,

Cut the air and flue ducts to length. Do not cut the drilled end of the air duct that will fit adjacent to the appliance.

IMPORTANT: Fit the flue restrictor marked **75** into the flue terminal. See Fig. 24.

ASSEMBLE THE AIR DUCTS.

Continue the installation by following the procedure as described in Section 11.3.

If necessary, assemble and check the air duct length. Drill two holes through the holes, in the expanded end of each air duct with the drill provided. Disengage each air duct and apply a smear of silicone sealant around of the air duct to seal the joint. See Fig. 23.

Reassemble and fix the air ducts together with the screws provided.

ASSEMBLE THE FLUE DUCTS.

Follow the procedure for measuring, cutting, sealing and fixing as described in Section 11.3.

Note: If the extension is longer than 1500 mm a flue duct support must be fitted before the ducts are finally assembled. The flue duct support must be fitted half-way along the flue duct for effective support. See Fig. 23.

ASSEMBLE THE FLUE DUCT INTO THE AIR DUCT.

Assemble the air and flue ducts into the flue terminal. Ensure the air duct fits fully into the flue terminal and the restrictor ring is located

firmly between the end of the air duct and flue terminal. See Fig. 24. Drill through the holes in the flue terminal into the air duct with the drill provided.

Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided. See Fig. 23.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

Fit the flue adaptor to the air and flue ducts and assemble the flue system. Follow the procedure as described in Section 11.3 and 11.4 to fit the flue adaptor and assemble the flue system.

The flue system is now assembled.

From inside or outside the dwelling pass the flue assembly through the hole/holes in the wall/walls.

Temporarily support the flue system, ensure it is horizontal and will align with the flue position, located on the rear of the appliance.

Carefully ease the appliance into the position previously marked. Ensure the flue location is correctly aligned with the centre-lines of the flue.

Fit the flue adaptor into the flue grommet located on the rear of the inner casing. See Fig. 23.

Ensure it is located correctly against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

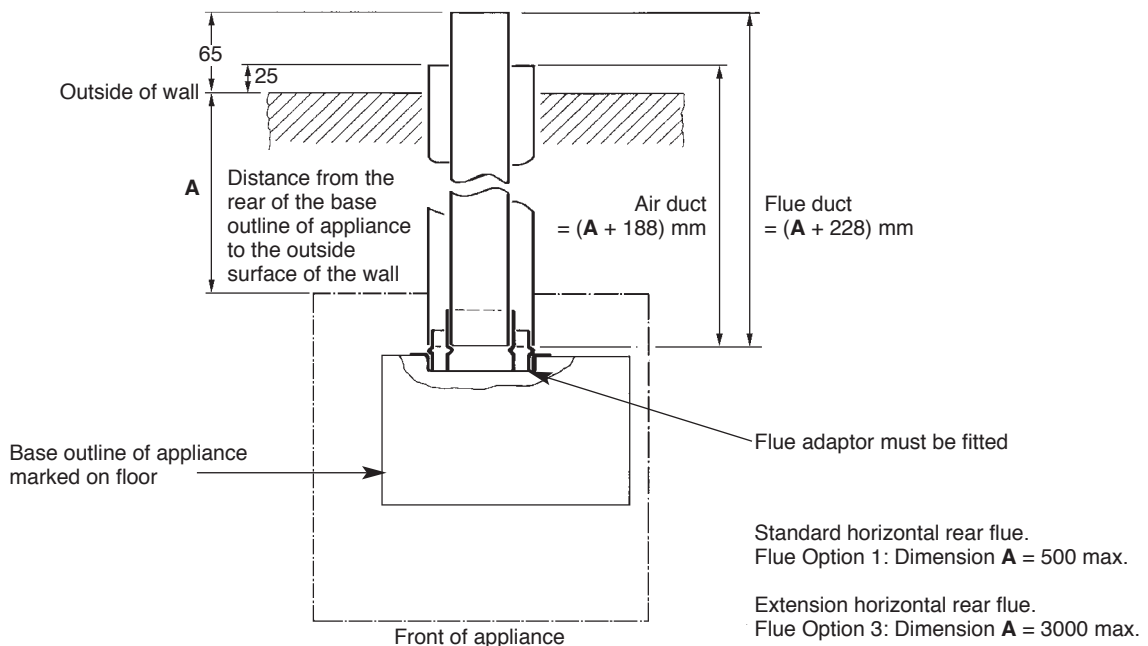
- NOTE:**
- i) Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.
 - ii) Flues longer than 1500 mm must be adequately supported. Air duct support brackets are available as an optional extra.
 - iii) Make good the internal and external brickwork or rendering.

**11.4.3.2. EXTENSION HORIZONTAL SIDE FLUE.
(FLUE OPTION 4).** See Fig. 12.4.

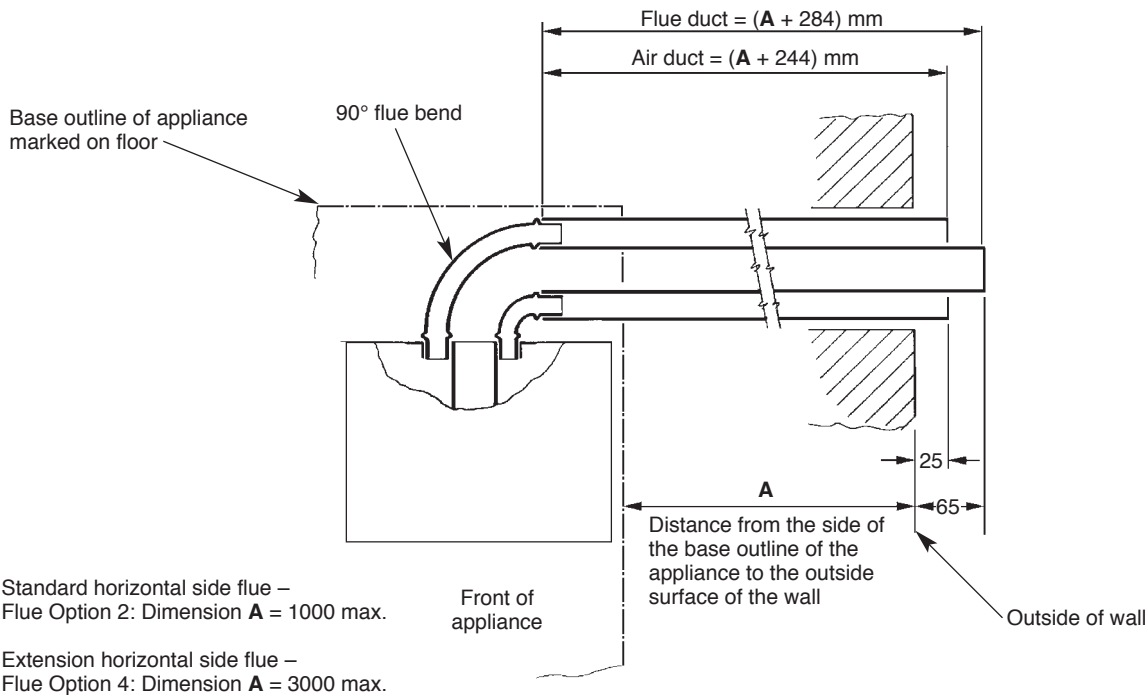
- IMPORTANT:**
- i) Length of flue when measured from the side of the appliance casing must not exceed 3000 mm.
 - ii) A Ø77 flue restrictor ring **MUST** be fitted into the flue terminal. Refer to Section 11.3 for the correct size and the following instructions for fixing. See Fig. 24.
 - iii) A flue adaptor is not required.

Measure accurately the distance from the side of the appliance casing, marked on the floor, to the outside surface of the wall.

**Fig. 19. Flue Option 1: Standard horizontal rear flue.
Flue Option 2: Extension horizontal rear flue.**



**Fig. 20. Flue Option 3. Standard horizontal side flue.
Flue Option 4. Extension horizontal side flue.**



Dimension A mm. See Fig. 20.

Air duct length = $A + 244$ mm,

Flue duct length = $A + 284$ mm,

Cut the air and flue ducts to length. Do not cut the drilled end of the air duct that will fit adjacent to the appliance.

IMPORTANT: Fit the flue restrictor ring marked **77** into the flue terminal. See Fig. 24.

Assemble the air ducts.

Continue the installation by following the procedure as described in Section 11.3.

If necessary assemble and check the air duct length. Drill two holes through the holes in the expanded end of each air duct with the drill provided. Disengage each air duct and apply a smear of silicone sealant around of the air duct to seal the joint. See Fig. 23.

Reassemble and fix the air ducts together with the screws provided.

Assemble the flue ducts.

Follow the procedure for measuring, cutting, sealing and fixing as described in Section 11.3.

Note: If the extension is longer than 1500 mm a flue duct support must be fitted before the ducts are finally assembled. The flue duct support must be fitted half-way along the flue duct for effective support. See Fig. 23

Assemble the flue duct into the air duct.

Fit the air and flue ducts into the flue terminal. Ensure the air duct fits fully into the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. See Fig. 24. Drill through the holes in the flue terminal into the air duct with the drill provided.

Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

Fit the flue duct into the flue bend. Ensure it is located correctly against the stop. Drill two holes through the holes in the bend. See Fig. 23.

Fit the air duct over the outside of the flue bend. Ensure it is located correctly against the stop. Drill two holes through the holes in the air duct.

Disconnect the air and flue ducts from the flue bend.

Loosely assemble the flue duct into the air duct and engage in the flue terminal.

From outside the dwelling pass the assembly through the hole in the wall. From inside ease the flue duct sufficiently clear of the air duct to fit the flue bend.

Apply a smear of silicone sealant around the outside of the flue duct. Fit the flue duct into the flue bend and fix with the screws provided. See Fig. 23.

Apply a smear of silicone sealant around the outside of the flue bend.

Assemble the flue bend into the air duct and fix with the two screws provided.

Ensure the flue duct is correctly engaged in the flue terminal. See Fig. 23.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

The flue system is now assembled.

Temporarily support the flue system, ensure it is horizontal and the flue bend will align with the flue position, located on the rear of the inner casing. See Fig. 23.

Carefully ease the appliance into the position previously marked. Ensure the flue position is correctly aligned with the flue centre-lines previously marked

Fit the flue bend into the flue grommet located on the rear of the inner casing See Fig. 23.

Ensure it is located correctly against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

- NOTE:**
- i) Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.
 - ii) Flues longer than 1500 mm must be adequately supported. Air duct support brackets are available as an optional extra.
 - iii) Make good the internal and external brickwork or rendering.

11.4.3.3 EXTENSION HORIZONTAL FLUE USING A SECOND 90° FLUE BEND.

(FLUE OPTION 5). See Fig. 12.5.

- IMPORTANT:**
- i) The two lengths of straight air duct when added together must not exceed 2300 mm.
 - ii) A flue restrictor ring is not required.
 - iii) A flue adaptor is not required.

Refer to the instructions in Section 11.3.

First flue length from the appliance to the second flue bend.

The first flue bend will fit into the flue position located on the rear of the inner casing. See Fig. 25.

Measure the horizontal distance between the centre of the flue position located on the rear of the inner casing and the centre of the second flue bend.

Dimension B. See Fig. 25.

Dimension B must not be less than 210 mm.

$$\text{Air duct length} = B - 166 \text{ mm}$$

$$\text{Flue duct length} = B - 152 \text{ mm}$$

The section of horizontal air and flue duct fitted adjacent to the first flue bend will not require expanded ends. Cut off the expanded ends from this section.

Second flue length.

Measure the distance between the centre of the second flue bend and the outside surface of the wall. Dimension C. See Fig. 25.

$$\text{Air duct length} = C - 58 \text{ mm.}$$

$$\text{Flue duct length} = C - 14 \text{ mm.}$$

Assemble the air and flue ducts as described in Sections 11.3, 11.4 and 11.5 with attention to the following:

Fit the flue terminal and second flue bend to the second flue length.

Ensure the air duct is fixed at both ends and the flue duct fixed to the flue bend only. Fix with the screws provided. See Figs. 25 and 26.

Fit the first flue length to this flue bend followed by the first flue bend.

Ensure the first flue bend is aligned correctly with the appliance.

Fix each end of the air duct to the bends with the screws provided.

The flue duct must fit correctly between the flue bends. The flue duct is trapped between the flue bends and does not require fixing screws. See Fig. 26.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2.

11.4.3.4 EXTENSION FLUE UPWARDS AND HORIZONTAL USING A SECOND 90° FLUE BEND. (FLUE OPTION 6). See Fig. 12. 6.

- IMPORTANT:**
- i) The two lengths of straight air duct when added together must not exceed 2300 mm.
 - ii) A flue restrictor ring is not required.
 - iii) The flue adaptor is not required.

Refer to the instructions in Section 11.3

First flue length from the appliance to the second flue bend.

The first flue bend will fit into the flue position located on the rear of the inner casing.

Measure the distance upwards between the centre of the flue position located on the rear of the inner casing and the centre of the second flue bend.

Dimension B See Fig. 27.

Dimension B must not be less than 210 mm.

$$\text{Air duct length} = B - 166$$

$$\text{Flue duct length} = B - 152$$

The upward section of air and flue duct fitted adjacent to the first flue bend will not require expanded ends. Cut off the expanded ends from this section.

Second flue length.

Measure the distance between the centre of the second flue bend and the outside surface of the wall. Dimension C.

$$\text{Air duct length} = C - 58 \text{ mm.}$$

$$\text{Flue duct length} = C - 14 \text{ mm.}$$

Assemble the air and flue ducts as described in Sections 11.3, 11.4 and 11.5 with attention to the following:

Fit the flue terminal and second flue bend to the second flue length.

Ensure the air duct is fixed at both ends and the flue duct fixed to the flue bend only. Fix with the screws provided. See Figs. 26 and 27.

Fit the first flue length to this flue bend followed by the first flue bend.

Ensure the first flue bend is aligned correctly with the appliance.

Fix each end of the air duct to the flue bends with the screws provided.

The flue duct must fit correctly between the flue bends. The duct is trapped between the flue bends and does not require fixing screws. See Fig. 26.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2.

11.4.3.5 EXTENSION FLUE HORIZONTAL USING A SECOND AND THIRD 90° FLUE BEND. (FLUE OPTION 7). See Fig. 12. 7.

- IMPORTANT:**
- i) The three lengths of straight air duct when added together must not exceed 1000 mm.
 - ii) A flue restrictor is not required.
 - iii) A flue adaptor is not required.

Refer to the instructions in Section 11.3.

Refer to Section 11.6.3 and measure Dimension B and C. See Fig. 28.

For this flue option Dimension B is the centre distance between each flue bend. The dimension may vary between each bend. The minimum dimension must not be less than 210 mm.

First and second flue lengths:

$$\text{Air duct length} = B - 166 \text{ mm.}$$

$$\text{Flue duct length} = B - 152 \text{ mm.}$$

Third flue length:

$$\text{Air duct length} = C - 58 \text{ mm.}$$

$$\text{Flue duct length} = C - 14 \text{ mm.}$$

Assemble the air and flue ducts as described in Section 11.3 and 11.5.

Before fixing each section of duct, ensure each flue bend is aligned correctly.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2. See Figs. 26 and 28.

11.4.3.6 EXTENSION FLUE UPWARDS AND HORIZONTAL USING A SECOND AND THIRD 90° FLUE BEND. (FLUE OPTION 8). See Fig. 12. 8.

- IMPORTANT:**
- i) The three lengths of straight air duct when added together must not exceed 1000 mm.
 - ii) A flue restrictor is not required
 - iii) A flue adaptor is not required.

Refer to the instructions in Section 11.3.

Follow the instructions in Section 11.6.5.

Refer to Section 11.6.4 and measure Dimension B and C. See Fig. 29.

For this flue option Dimension B is the centre distance between each flue bend. The dimension may vary between each bend. The minimum dimension must not be less than 210 mm.

Upwards Section:

$$\text{Air duct length} = B - 166 \text{ mm.}$$

$$\text{Flue duct length} = B - 152 \text{ mm.}$$

Horizontal Section:

First Section:

$$\text{Air duct length} = B - 166 \text{ mm.}$$

$$\text{Flue duct length} = B - 152 \text{ mm.}$$

Second Section:

$$\text{Air duct length} = C - 58 \text{ mm.}$$

$$\text{Flue duct length} = C - 14 \text{ mm.}$$

Assemble the air and flue ducts as described in Section 11.3 and 11.5.

Before fixing each section of duct, ensure each flue bend is aligned correctly.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2. See Figs. 26 and 29.

11.4.3.7 TO FIT A HORIZONTAL SECTION OF FLUE DUCT BEFORE THE FIRST 90° FLUE BEND FOR FLUE OPTIONS 2, 4, 5, 6, 7 AND 8. (FLUE OPTION 9). See Fig. 12. 9.

- IMPORTANT:**
- i) The total length of straight flue including this section **MUST** not exceed the length stated in the Flue Option chosen.

- ii) A flue restrictor ring may be required. Refer to Section 11.3 to determine the size or whether the restrictor is necessary.
- iii) A flue adaptor **MUST** be fitted to connect the flue system to the appliance. Refer to the instructions in Section 11.4.

Measure accurately the distance from the rear of the appliance, previously marked on the floor, to the centre of the first 90° flue bend. Dimension D. See Fig. 30.

The minimum dimension must not be less than 105 mm.

$$\text{Air duct length} = D + 82 \text{ mm.}$$

$$\text{Flue duct length} = D + 80 \text{ mm.}$$

Cut air and flue ducts to length. Do not cut the drilled end of the air duct.

Horizontal section of flue duct from the rear of the appliance casing to the first 90° flue bend.

Fig. 21. Fixing the flue terminal and flue adaptor to the air duct, flue duct and flue position located on the rear of the inner casing for rear flue applications.

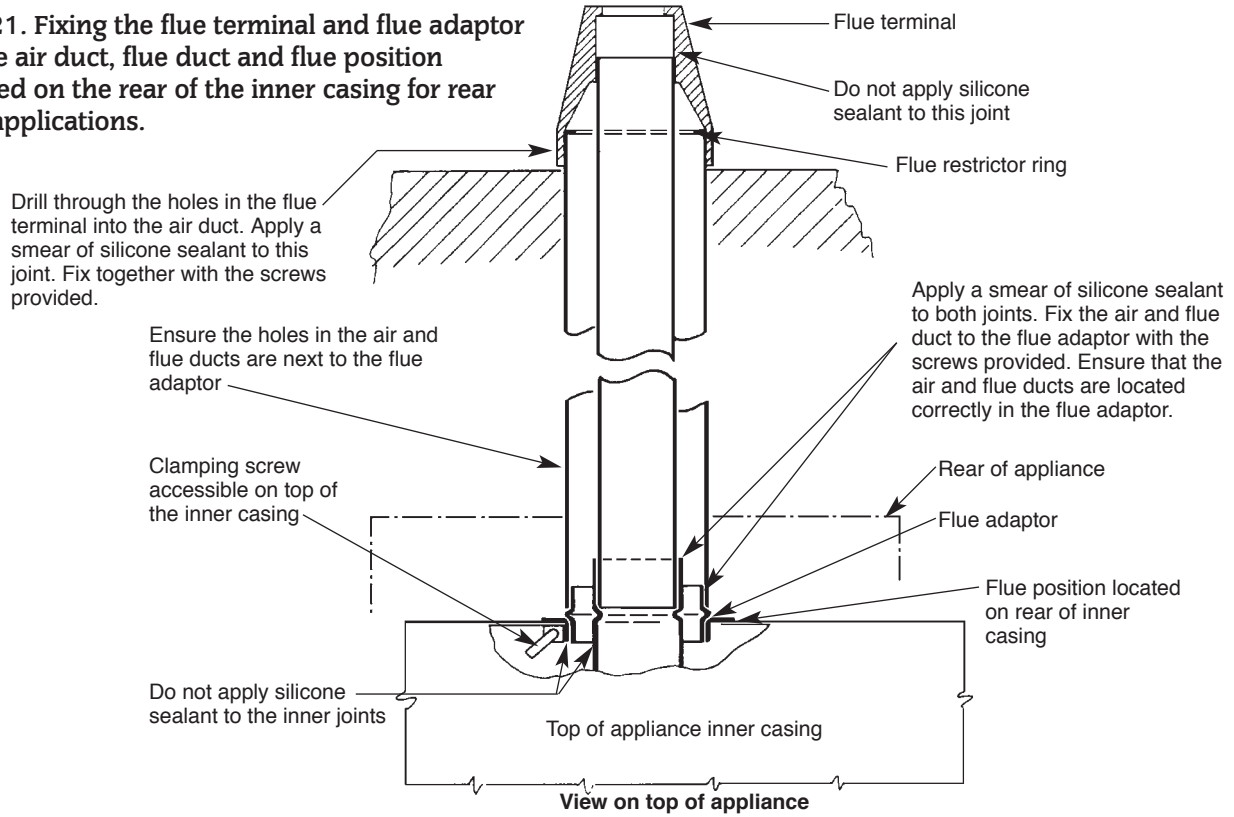
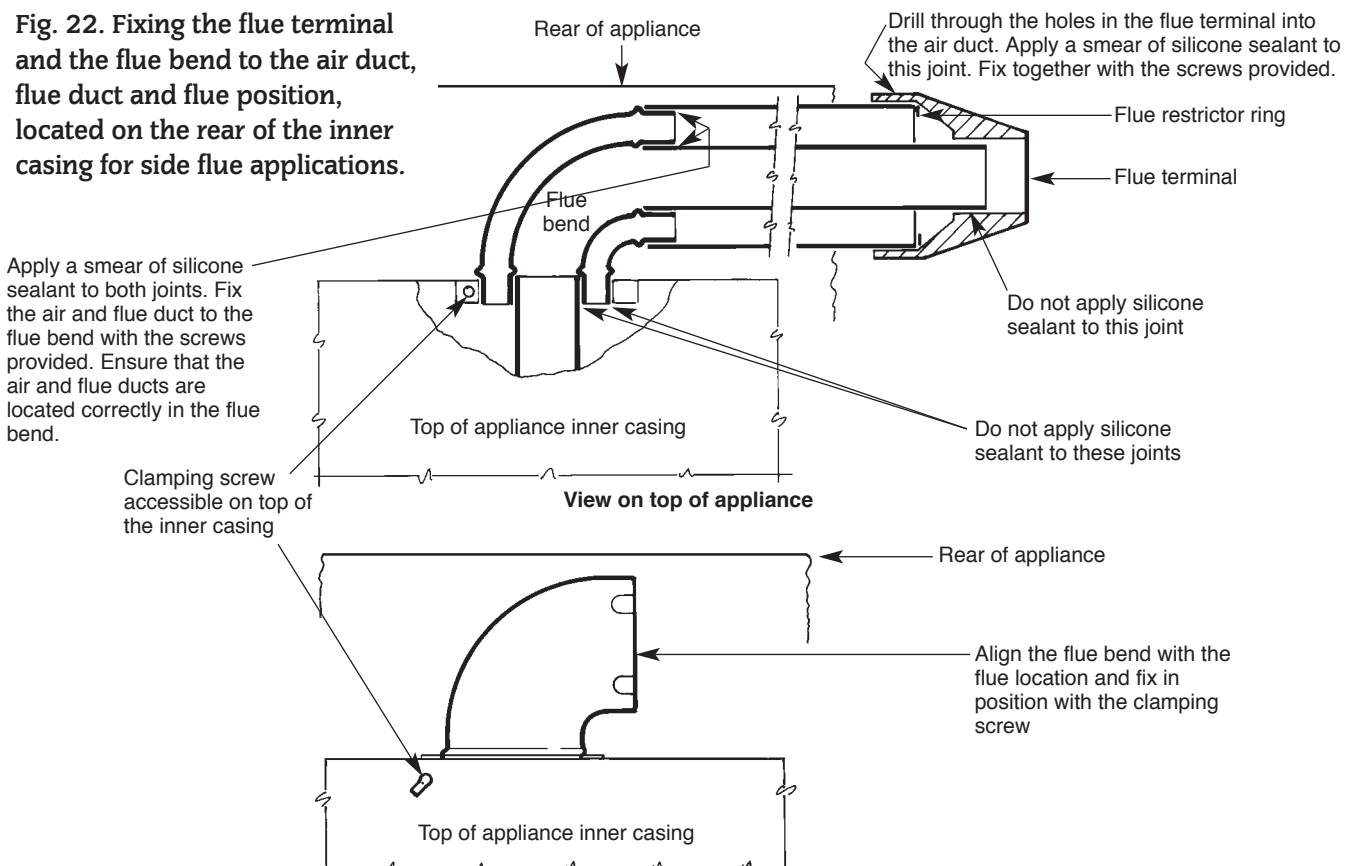


Fig. 22. Fixing the flue terminal and the flue bend to the air duct, flue duct and flue position, located on the rear of the inner casing for side flue applications.



Continue the installation by following the procedure for the flue option chosen. Refer to Section 11.4.1, 11.4.2, 11.4.3, 11.4.3.1, 11.4.3.2, 11.4.3.3, 11.4.3.4, 11.4.3.5, 11.4.3.6 or 11.4.3.7.

11.5 INTERNAL FLUE FITTING.

If it is required to install the flue system from inside the building the hole in the wall must be 150 mm diameter.

Measure and cut the ducts as previously described. See Section 11.3.

Assemble the air and flue ducts to the flue terminal and flue bend as previously described. See Section 11.4 and 11.5.

Fit the rubber sealing gasket to the flue terminal. Centralise the gasket and tighten the clamping ring. See Fig. 31.

Pass the assembly through the wall from inside the building so that the gasket flange is against the outside face of the wall. See Fig. 32.

carefully ease the appliance into position previously marked.

Align the flue outlet or flue bend with the flue position on rear of the appliance. Ensure the flue outlet or flue bend is correctly located against the stop. See Fig. 23.

Tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

Make good the internal brickwork.

11.6 FINAL INSTALLATION.

Check that all the water connections and the gas connection have been tightened.

Facia Mounted Programmer (where applicable).

Remove the facia panel as described in Section 11.3. Refer to Fig. 14.

Fit the programmer to the facia and fix using the four nuts and washers. Plug the lead into the connection on the control board. See Fig. 11. The programmer can be set when the electricity supply has been turned on at the commissioning stage.

Connect the mains electricity supply to the appliance and connect any room and/or frost thermostats. Refer to Section 10, Fig. 10 and 11. The leads from the thermostats must pass through holes provided in the control box at the left hand side and be clamped using the strain relief bushes provided in the pack. Check that the control box and facia can be withdrawn into the Service Position before fixing any leads outside the appliance.

Refit the control box and facia in the reverse order.

Test the gas supply for soundness as indicated in BS 6891.

If the appliance is not to be commissioned immediately, replace the cabinet top and front panel. See Fig. 14.

Check that the gas supply, the electricity supply and the water connections are all turned off.

Fig. 23. Typical extension horizontal side and rear flue assemblies.

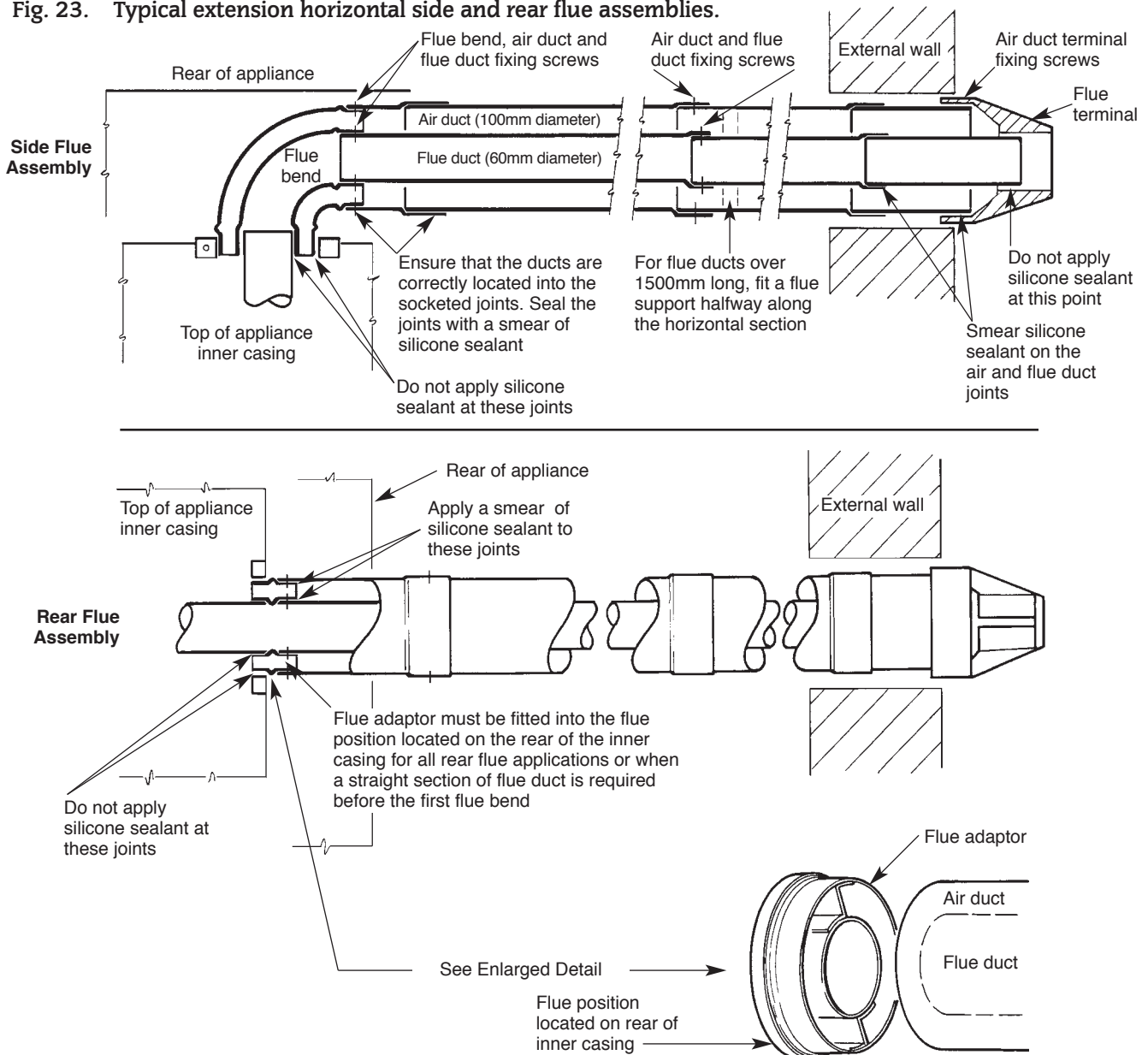
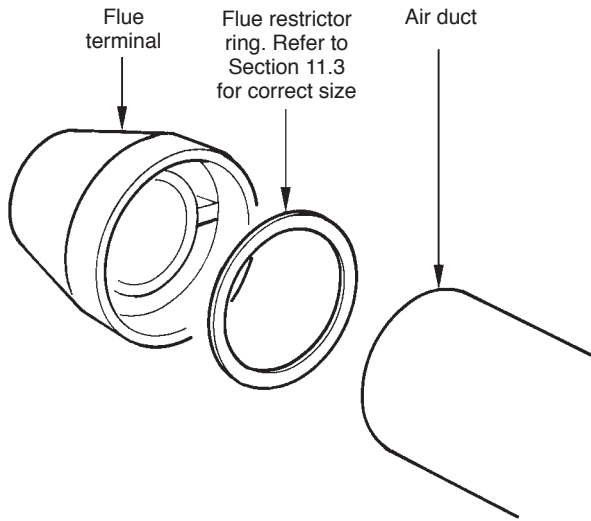


Fig. 24. Fixing the flue restrictor ring into the flue terminal.



Fit the flue restrictor ring into the flue terminal. Ensure the air duct is fully engaged in the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. Drill through the holes in the flue terminal into the air duct with the drill provided. Apply a smear of silicone sealant to the outside end of the air duct and fit into the flue terminal using the screws provided.

Fig. 25. Flue Option 5. Extension horizontal flue using a second 90° flue bend.

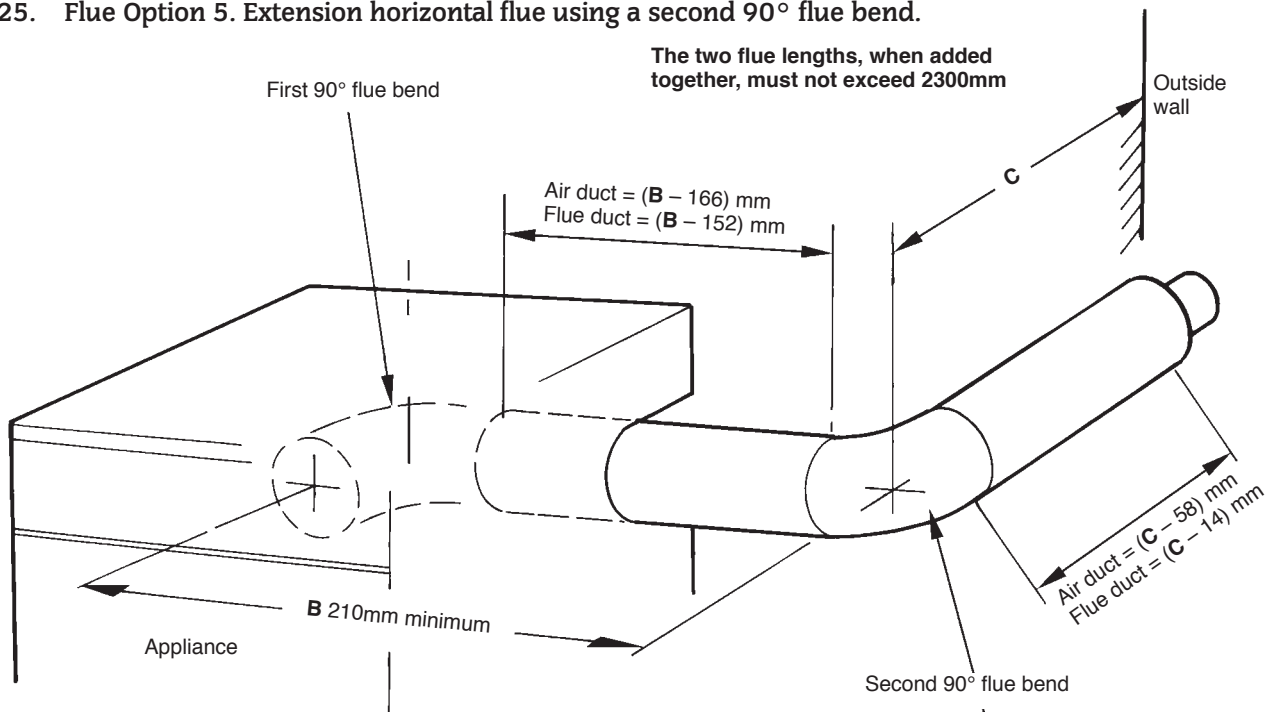


Fig. 26. Fitting the flue bends to the intermediate sections of the flue duct.

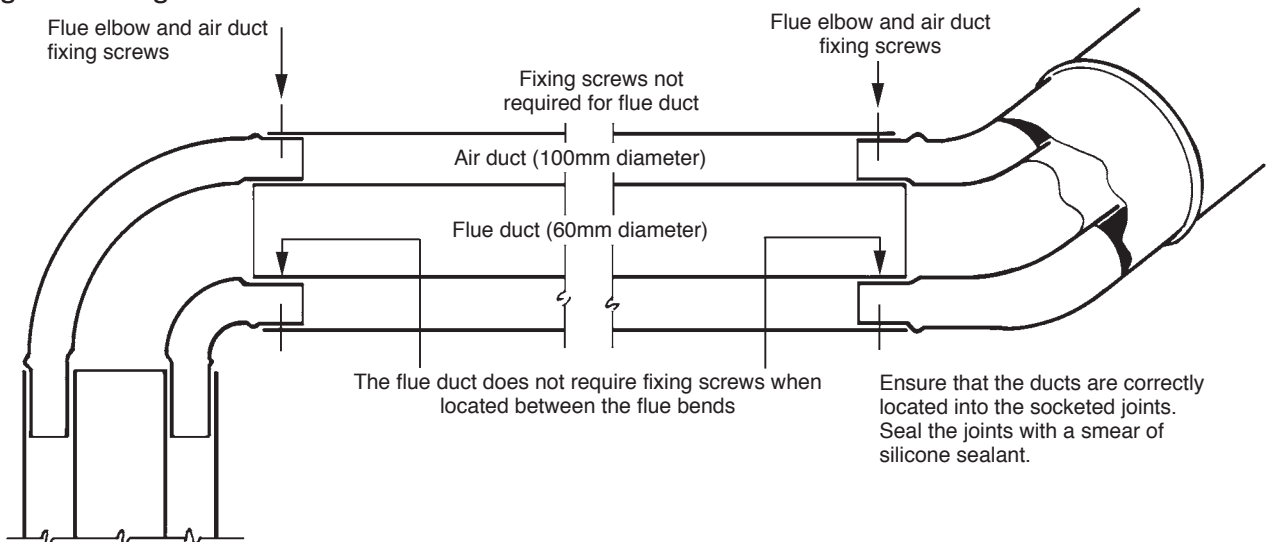


Fig. 27. Flue Option 6. Extension flue upwards and horizontal using a second 90° flue bend.

The two flue lengths, when added together, must not exceed 2300mm

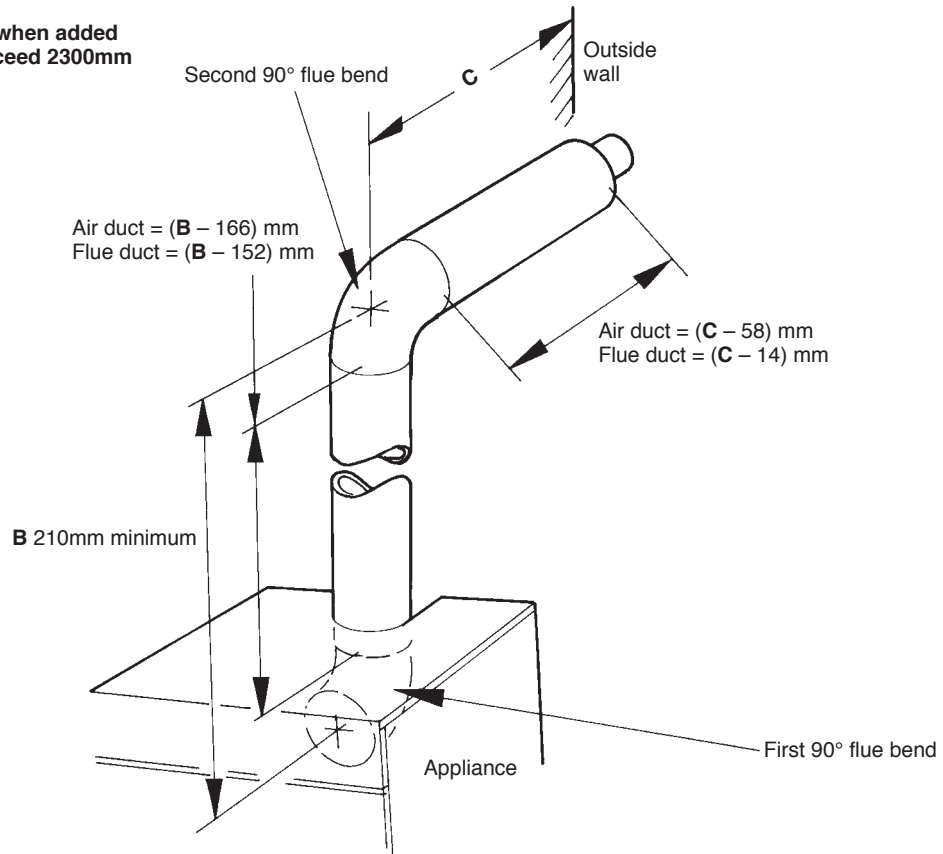


Fig. 28. Flue Option 7. Extension flue horizontal using a second and third 90° flue bend.

The three lengths, when added together, must not exceed 1000mm,

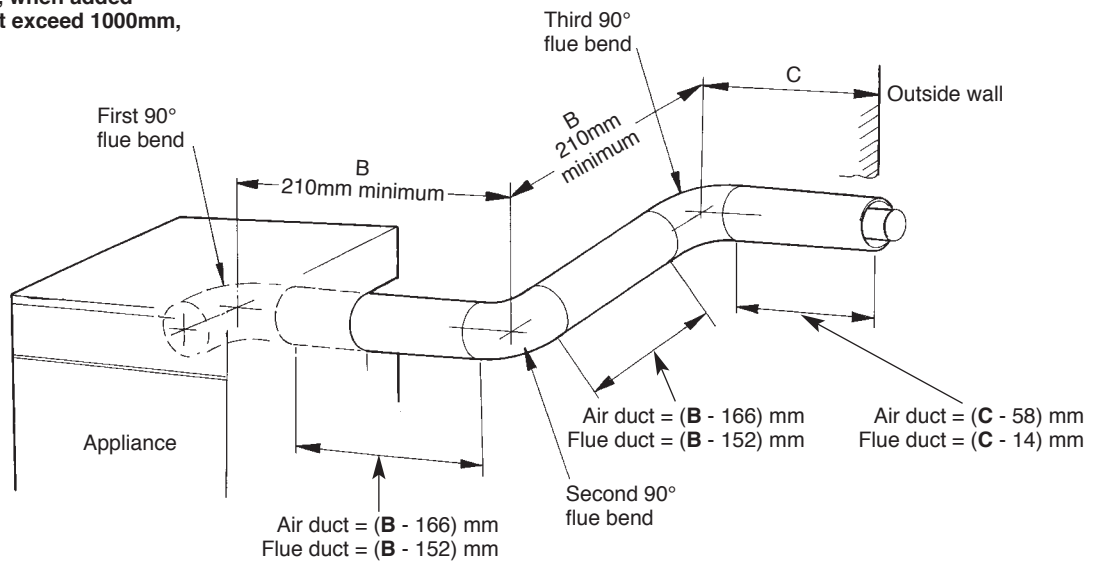


Fig. 29. Flue Option 8. Extension flue upwards and horizontal using a second and third 90° flue bend.

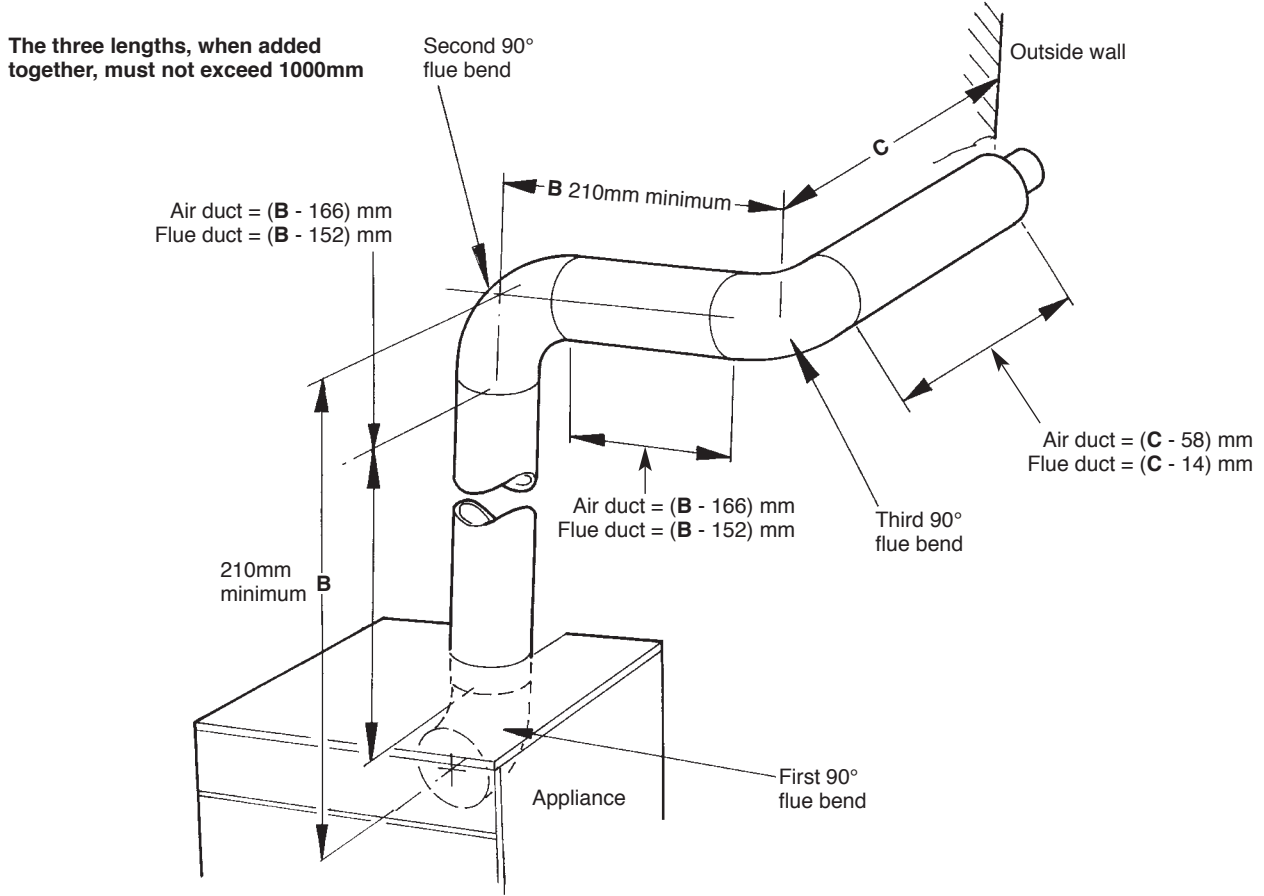


Fig. 30. Flue Option 9. Horizontal section of flue duct before the first 90° flue bend.
For Flue Options 2, 4, 5, 6, 7 and 8.

Total length of straight flue including this section must not exceed the length stated in the flue option chosen.

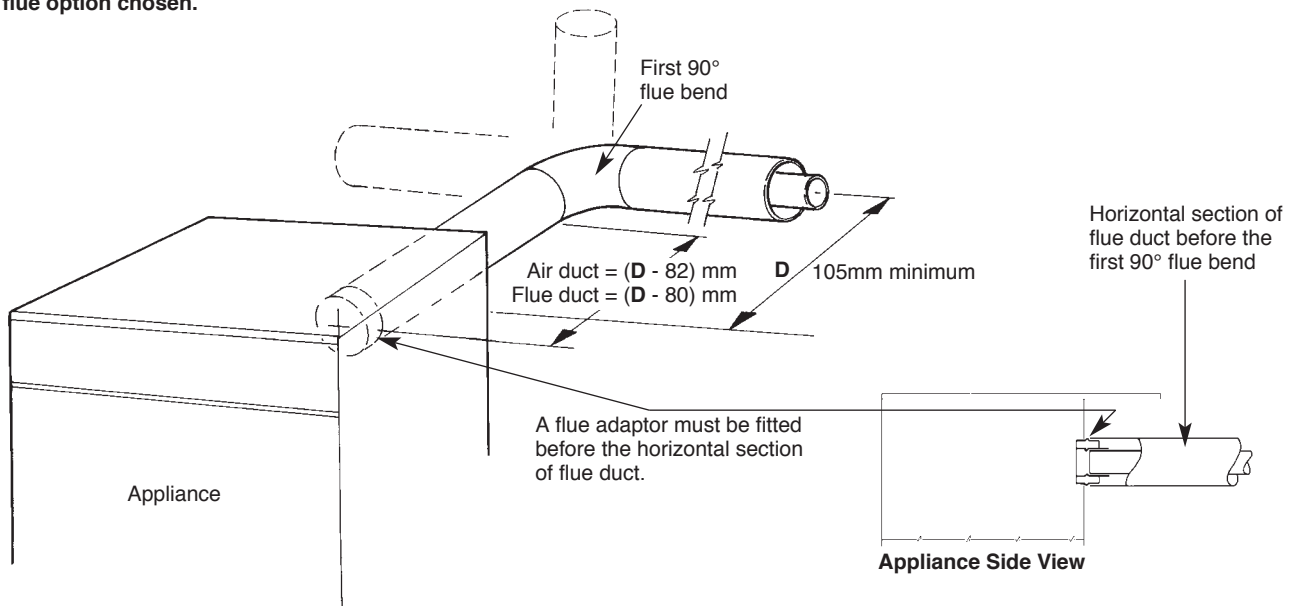


Fig.31. Terminal assembly for internal fitting of the flue.

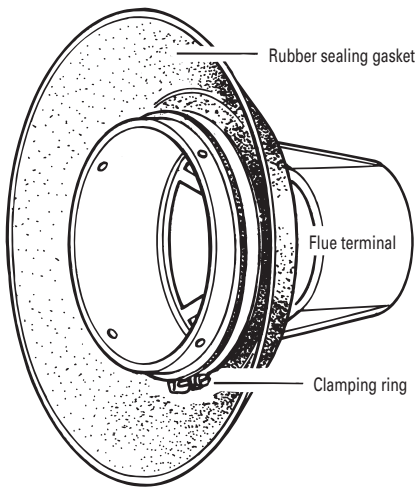


Fig. 32. Duct and terminal assembly for internal fitting of the flue.

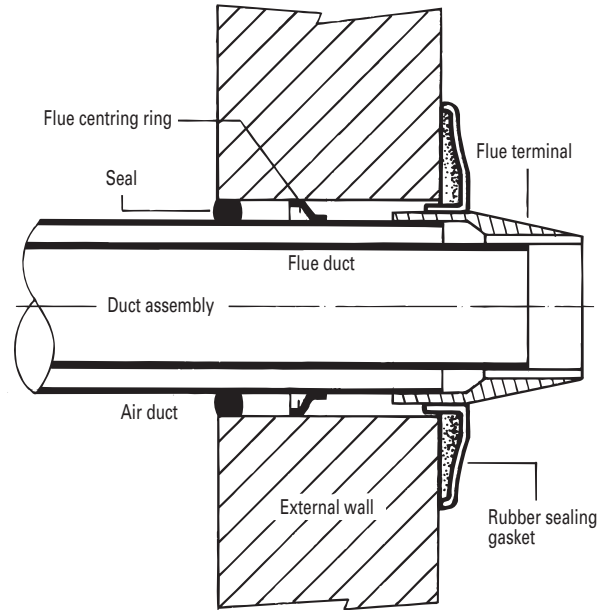
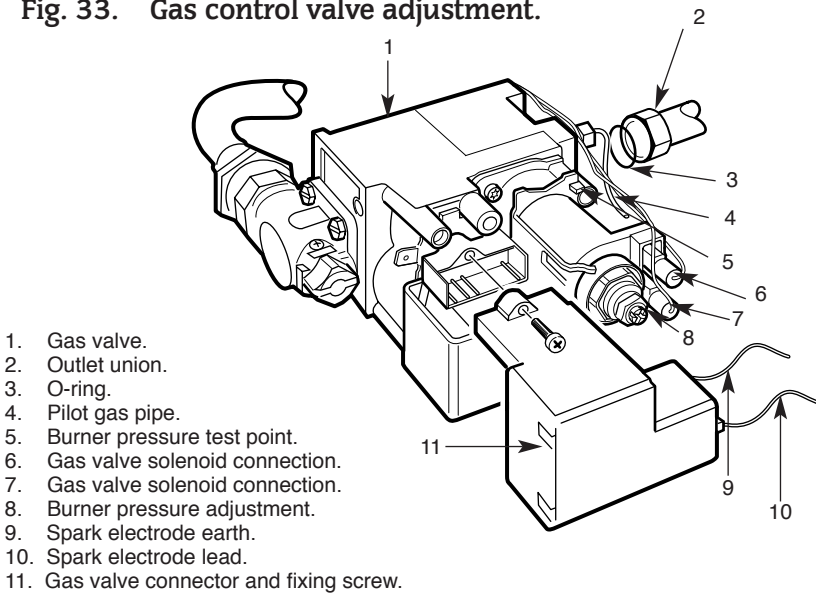
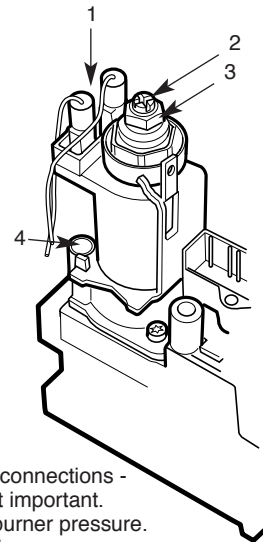


Fig. 33. Gas control valve adjustment.



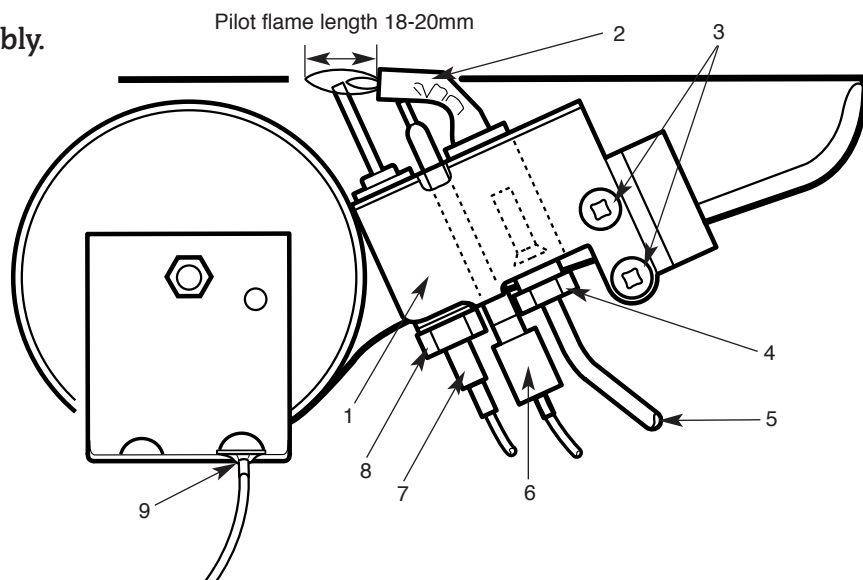
1. Gas valve.
2. Outlet union.
3. O-ring.
4. Pilot gas pipe.
5. Burner pressure test point.
6. Gas valve solenoid connection.
7. Gas valve solenoid connection.
8. Burner pressure adjustment.
9. Spark electrode earth.
10. Spark electrode lead.
11. Gas valve connector and fixing screw.



1. Modulator connections - polarity not important.
2. Minimum burner pressure.
3. Maximum burner pressure.
4. Burner pressure test point.

NOTE: Remove the adjustment cover.

Fig. 34. Pilot burner assembly.



1. Pilot assembly
2. Pilot head
3. Pilot assembly fixing screws (2)
4. Pilot gas pipe fixing nut
5. Pilot gas pipe
6. Spark electrode (secured by clip)
7. Flame sense electrode
8. Flame sense electrode fixing nut
9. Spark electrode earth lead

12. Commissioning The Appliance



Benchmark Water Treatment: For optimum performance after installation, this boiler 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 inhibitor manufacturers instructions.

Suitable flushing agents and inhibitors are available from Betz Dearborn Tel: 0151 4245351 and Fernox Tel: 01799 521133. Instructions for use are supplied with these products.

IMPORTANT: Any system cleanser must be fully flushed from the system before any inhibitor is added.

12.1 SUMMARY

The appliance is dispatched with the controls set to provide a maximum output for domestic hot water and central heating load of 24 kW.

The appliance automatically modulates to satisfy lower heat loads.

Domestic Hot Water Circuit

Confirm that the mains water supply has been flushed out at installation. If not it will be necessary to disconnect the cold water inlet pipe from the appliance and thoroughly flush.

Central Heating System

Flush the system before starting to commission the appliance and, at the end of the commissioning procedure, drain whilst hot. Immediately refill and re-pressurise adding an inhibitor as necessary.

Gas Service.

The complete system, including the meter, must be inspected and tested for soundness and purged as indicated in BS 6891. In the event of a leak, or suspected leak, at the 'O' ring joint on the main appliance manifold, connect a manometer to the test point on the inlet of the multifunctional gas valve. A soundness test carried out after turning off the appliance gas cock will test the section between the gas cock and the gas valve, thus enabling the leak to be traced to the 'O' ring.

12.2 APPLIANCE AND CENTRAL HEATING SYSTEM PREPARATION.

12.2.1 VENT THE APPLIANCE.

Remove the cabinet front panel before starting the commissioning procedure. See Fig. 14.

Check that the gas service and the electrical supply to the appliance are turned off.

Raise the fascia and control box into the Service Position. Refer to Fig. 14.

Lower the expansion vessel into the Service Position and remove the inner casing cover. See Fig. 16.

Check that all the water connections throughout the system are tight.

Open the system valves at the appliance. See Figs. 3 and 17.

Open all the radiator valves, fill the system and vent each radiator in turn.

Vent the heatbank from the manual air vent. See Figs. 16 and 17. The automatic air vent (fixed to the flow manifold) will vent the boiler section for sealed systems. Do not replace the inner casing cover until instructed in Section 12.4 Appliance Operation.

In order to thoroughly vent the appliance and system the appliance may be operated without gas turned on as follows:

Switch on the electricity supply.

Set the heating temperature control (or, if fitted, Programmer to Heating and Water) to maximum.

The pump and fan will run for five minutes, a continuous spark will occur two minutes before lock-out occurs. Reset by turning the heating temperature control OFF and ON.

Primary water will circulate around the appliance.

Allow the appliance to operate in this condition for a few minutes.

Set the room thermostat (if fitted) to maximum. The water diverter will open to central heating and the appliance will operate. See Fig. 16.

Primary water will now circulate around the central heating system. Allow the appliance to operate in this condition for a few minutes. Vent all radiators again during this period until air is cleared from the system.

When the system has been fully vented set the heating temperature control to the Off position.

Note: The water diverter valve, in the de-energised condition, is always open to provide hot water. The controls give priority to reheating the heatbank following a demand for hot water. If the valve fails to open when energised to the central heating system, hot water will still be available.

The valve does not have a manually open position.

Set the temperature controls (or Programmer) to OFF.

Switch off the electrical supply.

The appliance and central heating system should have been successfully vented. **It is important that it is fully vented.**

Check the pressure relief valve operates by turning the knob anti-clockwise until it releases. Water should be expelled from the discharge pipe. See Fig.15.

12.2.2 SEALED SYSTEMS ONLY.

SET THE EXPANSION VESSEL PRESSURE

The charge pressure of the expansion vessel (as supplied) is 0.5 bar, which is equivalent to a static head of 5 metres. The charge pressure must not be less than the static head at the point of connection. See Fig 6. A Schraider type tyre valve is fitted to the expansion vessel to allow the charge pressure to be increased if necessary.

SET THE SYSTEM PRESSURE

Fill the system until the pressure gauge shows 2.5 bar and check for water soundness. Release water from the system using the pressure relief valve test knob until the System Design Pressure is obtained up to a maximum of 1.5 bar.

System Design Pressure in bar = Static Head of the System in bar + 0.3

Note: 1 bar is equivalent 10.2 metres of water

Set the movable pointer on the pressure gauge to coincide with the indicating pointer, giving a permanent record of the set system pressure. See Fig. 16.

If the pressure indicated on the pressure gauge is greater than 2.5 bar when operating at the maximum central heating temperature, an extra expansion vessel must be fitted to the system as close to the appliance central heating return connection as possible.

The appliance (as despatched) can accommodate a system volume of about 104 litres. Refer to BS 7074 Part 1. If the system volume is in excess of that accommodated by the expansion vessel fitted to the appliance then an extra vessel must be fitted as close as possible to the central heating return connection of the appliance.

Any extra vessel fitted must be pressurised to the same figure as the integral vessel. If the expansion vessel fails then the specified replacement must be fitted.

12.3 PROGRAMMER.

Any programmer fitted to the appliance should be set up at this stage following the instructions sent with the programmer.

12.4 APPLIANCE OPERATION.

12.4.1 Check that the electrical supply to the appliance is off.

Turn the room thermostat (if fitted) to maximum.

Set the temperature controls (or Programmer) to OFF.

12.4.2 Pilot operation.

Disconnect the flame sense electrode lead at the control board.

Turn on the gas supply and reconnect the electricity supply.

Put the heating control to **MAX** (or Programmer to heating and water).

A continuous spark will occur for up to two minutes until the pilot is alight. The fan and pump will run but the main burner will not light. Test for gas soundness at the joint between the pilot pipe and the burner with leak detection fluid. See Fig. 34.

Observe the pilot flame. It should be about 20mm long and envelope the spark electrode tip. See Fig. 34.

Put the temperature control (or Programmer) to **OFF** and disconnect the electrical supply at the mains.

IMPORTANT: Replace the inner casing cover and reposition the pressure vessel. See Fig. 16.

Reconnect the flame sense electrode lead at the control board.

Turn off the gas supply at the appliance.

Loosen the burner pressure test point screw and connect a pressure gauge. See Fig. 33.

12.4.3 Check the maximum burner pressure.

NOTE: The maximum burner pressure is the same for central heating and domestic hot water.

Turn the hot water temperature control to **MAX** and set the programmer (if fitted) to **HW ON**.

Turn on the gas supply to the appliance.

Turn on the electricity supply to the appliance.

The burner will light at minimum pressure and increase over a few seconds to the maximum burner pressure to satisfy the heat bank.

If the required maximum burner pressure is not achieved and the inlet pressure to the appliance is correct i.e. 20 mbar for natural gas or 37 mbar for propane which is equivalent to 18.5 or 35.5 mbar at the gas valve inlet, then the burner pressure must be reset. Refer to Fig.33.

If the heatbank is satisfied then it may be necessary to fully open one or two hot water taps to ensure the maximum heat requirement.

12.4.4 Check the minimum burner pressure.

NOTE: The minimum burner pressures are different for central heating and domestic hot water.

The minimum burner pressure to be set is the domestic hot water pressure.

The central heating minimum burner pressure is a control function and is not adjustable.

Repeat the procedure for checking the maximum burner pressure but, carefully, pull-off one of the blue leads from the modulating control on the gas valve. **Ensure that the connector does not touch any metal.** Refer to Fig.33.

If the minimum burner pressure is not achieved then the burner pressure must be reset.

NOTE: The maximum burner pressure must be set first as this can affect the minimum burner pressure setting. Refer to Fig. 33.

Turn all the temperature controls to **OFF** (or **MIN**) and the programmer (if fitted) to **OFF**.

Turn off the gas and electricity supplies to the appliance.

12.4.5 Check the operation of the appliance.

Refer to the Operational Flow Diagrams, Section 16, for the sequence of events.

The appliance control system gives priority to the satisfying of the heatbank and the delivery of domestic hot water.

Check that all the system and radiator valves are open.

Set the hot water temperature control **MAX**. set the programmer (if fitted) to **DHW ON** or **CONTINUOUS**.

Turn on the gas and electricity supplies to the appliance.

The boiler will light and follow the Tank Mode of operation until the heatbank is satisfied (upto twelve minutes from cold) when the burner will go off.

Fully open a hot tap to put the appliance into the DHW draw-off mode. The burner will light to maintain the heatbank which is

supplying the hot water to the tap.

Shut the tap and the burner will go out, possibly after a short period of time filling the heatbank.

Set the programmer, if fitted, to central heating **ON**, the hot water temperature control to **MIN**, the heating temperature control to **MAX** and the room thermostat to **MAX**. Check that the system is pressurised, the burner will light and, after a possible short period topping-up the heatbank, will supply heat to the radiators.

Check that the radiators heat up evenly.

Balance the system so that the required temperature difference across the heating flow and return pipes is obtained. See Section 3, Table 4.

Adjust the by-pass valve until the same temperature difference is obtained. See Fig. 16 and 17. This should be carried out with only a single radiator operating.

If thermostatic radiator valves are fitted then, ideally, one radiator should be left uncontrolled. **The bypass valve should never be fully closed.**

Set the room thermostat to minimum and check that the burner goes out.

Reset the room thermostat to maximum and the burner will re-light and follow the normal operating procedure.

12.4.6 Check ignition after a break in the gas supply.

Turn off the gas service cock and wait for 60 seconds. The main burner and pilot will go out but sparking from the electrode will continue. Carefully open the gas service cock and observe the burner re-light and follow the normal sequence of operation.

Put the temperature controls (or Programmer) to **OFF**. Switch off the gas service cock and the electrical supply to the appliance.

12.4.7 Drain and reset system.

Drain the heating system whilst the appliance is still hot. Refer to Fig. 1. for the position of the appliance drain point.

Refill, vent and re-pressurise (sealed systems) as described previously.

Set the temperature controls to **MAX**. If a programmer is fitted set to Continuous or 24 Hrs and the Heating to **ON**. The boiler will fire and, when the heatbank is satisfied, commence to heat up the radiators. Allow to operate for 45 minutes, venting as necessary. Check for water soundness.

Note: From cold it will take about 12 minutes for the heatbank to be satisfied before the central heating system will receive heat.

IMPORTANT: The complete system must be checked for water leaks. Should any leaks be found they must be rectified before proceeding further.

Set the temperature controls to **OFF**, or if a programmer is fitted, switch to **OFF**. Switch electrical supply off at the mains.

Check for the correct operation of User's Controls including the room thermostat (if fitted).

12.5 COMPLETION OF COMMISSIONING.

Disconnect the pressure gauge and tighten the test point screw.

Restart the appliance and check for gas soundness around the test point screw.

Replace the burner pressure adjustment cover. Fix with the screw and seal with suitable marking e.g red paint.

Refit the expansion vessel and cabinet front panel. See Fig. 16.

If the appliance is being passed over to the User immediately refer to Section 13, Users Instructions and set the controls to the user's requirements.

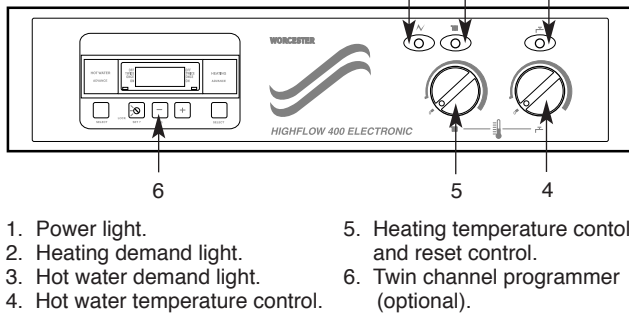
If the appliance is to be left inoperative check that the programmer and the controls are set to **OFF**. Turn the gas service cock to off and switch off the electricity supply.

For short inoperative periods leave the appliance under the control of a frost thermostat, if fitted, or operating continuously under the control of a room thermostat set at 6°C.

If there is any possibility of the appliance and system being left inoperative during frosty conditions then drain the appliance and system.

13. Instructions to the User

Fig. 35. Facia Controls.



13.1 Tell the user how to operate the appliance and hand over the Users Instructions leaflet and the completed **Benchmark** log book.

13.2 Tell the user what to do if the heating system is not to be used in frosty weather. Also tell the user that if the appliance is not to be used for long periods during frosty weather, the system must be drained and the gas and electricity supplies turned off.

13.3 Tell the user the Sealed System set pressure if applicable.

13.4 Tell the user of the importance of regular servicing. Worcester offer a comprehensive maintenance contract.

13.5 Set the system controls to the users requirements.

13.6 If an external programmer has been fitted instruct the user how to set the programmes.

13.7 Tell the user about the safety devices and any hazard notices.

14. Inspection and Servicing

To ensure continued efficient operation of the appliance it must be checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but once per year should generally be adequate. The extent of the service required by the appliance is determined by the operating condition of the appliance when tested by fully qualified engineers.

It is the law that any service work must be carried out by competent engineers such as British Gas or Corgi registered personnel.

14.1 PRE-SERVICE INSPECTION.

14.1.1 Check that the flue terminal and the terminal guard, if fitted, are clear.

If the appliance is in a compartment check that the ventilation openings in the compartment door or walls are clear. Refer to Section 6, Air Supply.

Check the operation of the pressure relief valve. Reset the system pressure if necessary.

Check the expansion vessel pressure and reset as necessary.

Check the system and remake any joints or fittings which show signs of leakage. Refill, vent and re-pressurise sealed systems as described in Section 12, Commissioning.

Operate the appliance and the system taking note of any faults.

14.1.2 MEASUREMENT OF FLUE GASES.

For consistency of flue gas measurements it is necessary to have a constant maximum output and the appliance to be at equilibrium.

Switch the temperature controls to **MAX**.

Hinge down the facia into the service position. Refer to Fig. 14.

Wait until the appliance reaches equilibrium (approx. 10 minutes).

Remove the cap from the sensing point at the top left of the inner casing and connect the gauge. See Fig. 16.

Expected measurements should be between:

CO: 0.001 and 0.003 %.

CO₂: 6.7 and 7.0 %.

After taking the measurement:

Disconnect the gauge

Replace the sealing cap.

Put the facia back in to its normal position.

Reset the controls.

SAFETY:

Disconnect the electrical supply at the mains and turn off the gas supply at the gas service cock on the appliance before servicing the appliance. See Fig. 16.

After completing the service always test for gas soundness as indicated in BS 6891.

14.2 DISMANTLE THE APPLIANCE.

To carry out a full and comprehensive service of the appliance remove the following parts to gain access to the components which need to be checked or serviced.

(a) Cabinet Front Panel.

Lift the panel to clear the top locator and the kick strip. See Fig. 14.

(b) Facia and Control Box.

Remove the cabinet front panel. Unscrew the two screws securing the facia to the outer edges of the cabinet, accessible under the facia. Ease the facia forwards on the slide rails until fully extended. Lift the facia and control box upwards through 90° into the Service Position. Lodge in the Service Position on the outer locations. See Fig. 14.

(c) Expansion Vessel.

Remove the cabinet front panel.

Unscrew one screw securing the expansion vessel support bracket to the right hand side panel and carefully lower the vessel. See Fig. 16.

(d) Inner Casing Cover.

Repeat operations a, b and c. Unscrew the four screws securing the cover to the inner casing and lift off. See Fig. 16.

(e) Fan.

Repeat operations a,b,c and d. Ease the two electrical connections from the fan motor and the two flexible pipes from the venturi housing. Unscrew the two screws securing the front of the fan mounting plate to the flue hood. Ease the fan assembly out of the flue bend or flue adaptor by gently pulling the mounting plate forwards about 20 mm to clear the flue bend or flue adaptor. Remove the fan and mounting plate assembly from the inner casing. See Fig. 36.

(f) Flue Hood.

Repeat operations a,b,c,d and e. Unscrew the two screws locating the front of the flue hood to the combustion chamber cover. Ease the flue hood forwards about 15 mm to clear the rear locator. Remove the flue hood off the heat exchanger and clear of the inner casing. See Fig. 36.

(g) Combustion Chamber Cover.

Repeat operations a,b,c,d,e, and f. Unscrew the four screws securing the combustion chamber cover and remove the cover. See Fig. 36.

(h) Burner.

Repeat operations a,b,c,d,e,f and g. Unscrew the two screws securing the pilot bracket. Unscrew the two screws securing the front of the burner and the spark electrode earth lead to the burner bracket located inside the inner casing. Remove the burner by easing forwards and upwards off the main burner injector and clear of the pilot bracket. See Fig. 36.

(i) Pilot.

Repeat operations a,b,c,d,e,f and g. Unscrew the two screws securing the pilot bracket to the burner bracket. Unscrew and remove the flame sense electrode. Unclip the spark igniter and remove.

Support the pilot bracket with a suitable tool. Unscrew the pilot pipe union nut and ease the pipe clear of the bracket. Remove the pilot injector from the pilot bracket. See Figs. 34 and 36.

14.3 Servicing of Components.

Clean the Fan.

Unscrew the three screws securing the fan mounting plate to the fan. Unscrew the two screws securing the venturi assembly to the fan and ease out of the fan outlet. Any dust or fluff accumulated on the fan or venturi should be removed with a soft brush or by blowing. Reassemble the venturi and fan mounting plate in the reverse order. Ensure that the short leg on the venturi faces into the fan. See Fig. 36.

Clean the Burner.

Brush the blade tops and mixing tube with a soft brush and check that all the flame ports are clear. Remove any blockages with a non-metallic brush.

Clean the Main Burner Injector.

Inspect the main burner injector located at the rear of the inner casing. Clean with a soft brush. Do not use a wire brush or anything likely to cause damage.

Clean the Pilot Bracket.

Brush with a soft brush. Clean the pilot injector by rinsing it in warm water. Check the condition of the electrode.

Clean the Gas to Water Heat Exchanger.

Cover the main burner injector and pilot bracket with a cloth. Clean the heat exchanger using a soft brush. Remove the deposits from the bottom of the combustion chamber. Take care not to distort any of the fins.

Combustion Chamber Insulation.

Examine and replace any pads that are damaged. Refer to Section 15.3.4.

Controls.

Remove any dust or deposits using a soft brush. Take care not to mishandle any component connections.

NOTE: Should any of the components be damaged they must be replaced before the service is completed. Refer to the appropriate item in Section 15 "Replacement of Parts."

After servicing, reassemble the appliance in the reverse order. Check that all components are in place and correctly fixed. See Fig.16 and 36. Leave the cabinet front panel to be fitted after checking the operation of the appliance.

14.4 Test the Appliance.

On completion of the service and reassembly of the appliance, check for gas soundness and the correct operation of the appliance as described in Section 12 - Commissioning.

Refit the cabinet front panel and reset the controls to the users requirements.

15. Replacement of Parts

WARNING. Switch off the electricity and gas supplies before replacing any components. After the replacement of any components check for gas soundness (where relevant) and carry out functional checks as described in Section 14.

15.1 COMPONENT ACCESS.

To replace components:

It is necessary to remove one or more sections of the cabinet and cover plates within the appliance. Refer to Section 14.2 a, b, c and d.

To access the control box:

Place the facia and control box in the Service Position. Refer to Section 14.2, (b) and Fig. 14.

Unscrew two fixing screws at the top and two on the underside securing the facia to the control box. Ease the facia clear of the control box. Take care not to strain the connector or wiring. Ensure the facia is supported when out of the control box. See Fig. 14.

IMPORTANT:

Comprehensive gasket/ O-ring packs are available for the gas and water connections on the appliance. Refer to Section 18 - Short Parts List.

When replacing components that use clip fixings, the connections must be fully entered so that the clips can pass completely into the locating groove. The clips must not be forced into place.

When a component is replaced or disturbed it is recommended the "O" ring is replaced.

The "O" rings can be lubricated with a silicon based grease or glycerine which is non-reactive with the ethylene - propylene nitrile "O" rings.

15.2 Draining The Appliance.

Check that the electricity supply to the appliance is turned off.

Before removing any component holding water it is important that as much water as possible is drained from the appliance.

CAUTION: Some water will remain in the expansion vessel, pump, water diverter valve, water to water heat exchanger and gas to water heat exchanger. Extra care must be taken when removing these components.

Place a towel or cloth beneath the component to absorb the excess system water.

The water may be contaminated and any absorbent material used must be discarded or washed thoroughly after use.

Any inhibitor in the primary water should be replenished.

(a) Appliance Heatbank and Heating Circuit:

Turn off the central heating flow and return valves at the appliance using a flat blade screwdriver. See Fig. 17. Remove the kick strip secured to the cabinet side panels and base plate with five screws. See Fig. 14. Fit a tube to the drain tap located on the right hand side, front, of the heatbank and open the tap. See Fig. 16.

NOTE: The heatbank contains about 60 litres of primary water and sufficient time must be allowed to drain the heatbank. Close the drain tap when the flow has stopped.

(b) Appliance Hot Water Circuit:

Turn off the mains water supply valve at the appliance using a flat blade screwdriver. See Figs. 16 and 17. Fit a tube to the drain tap located to the left of the gas valve. See Fig. 16.

Open the tap and drain the hot water circuit.

A quantity of water will remain in the water to water heat exchanger, extra care must be taken when removing this component.

15.3 COMPONENT REPLACEMENT.

1. Automatic Air Vent. See Fig. 36.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Drain the heating circuit as described in Section 15.2 (a).

Unscrew the automatic air vent and discard. Fit the replacement assembly. Ensure the plastic cap is removed and discarded.

Open the valves, fill and re-pressurise the system as described in Section 12.2.

Ensure the joint is water tight. Reassemble the appliance in the reverse order.

2. Fan. See Fig. 36.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a,b,c and d.

Remove the fan assembly as described in Section 14.2 (e) and discard.

Fit the replacement fan in the reverse order.

Reassemble the appliance in the reverse order.

Fig. 36. Inner casing assembly.

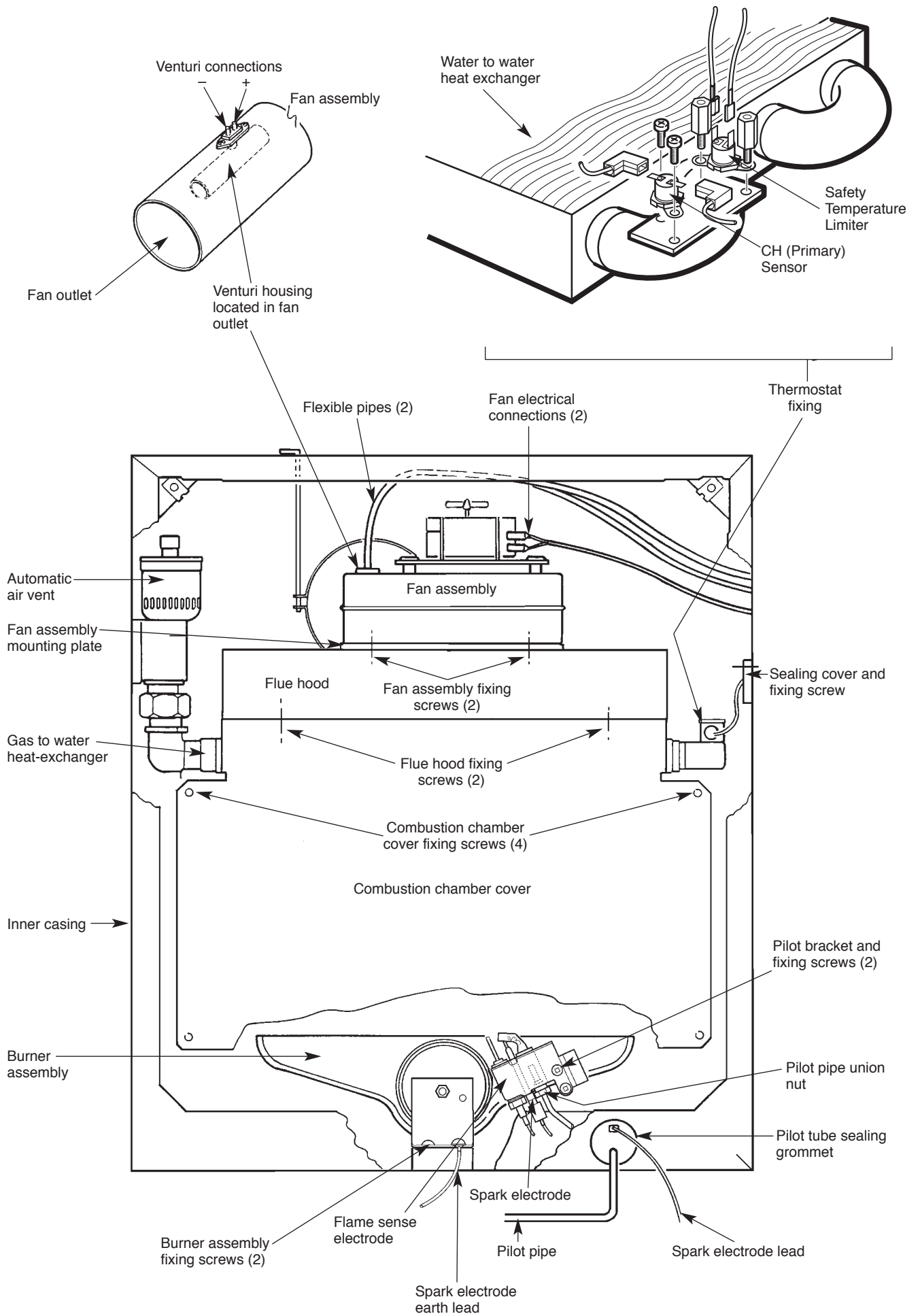
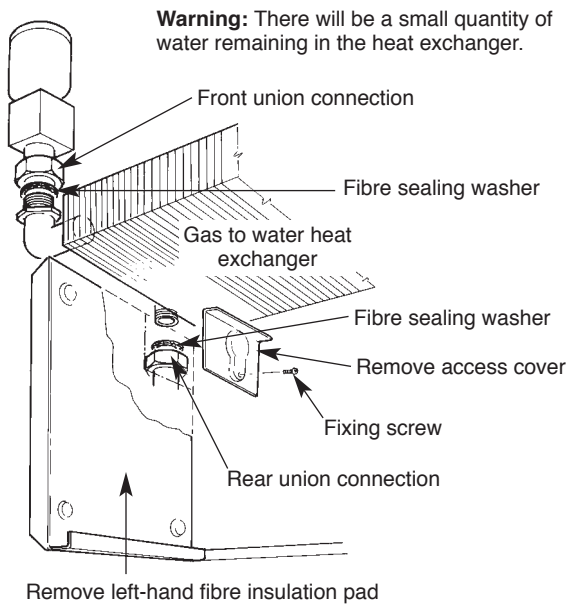


Fig. 37. Gas to water heat exchanger.



3. Gas to Water Heat Exchanger. See Figs. 17, 36 and 37.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Drain the heating circuit as described in Section 15.2 (a).

Remove the fan, flue hood, combustion chamber cover as described in Sections 14.2 e, f and g. Remove the Safety Temperature Limiter thermostat and the CH primary sensor from the pad as described in Section 15.3.11 and 13.

Remove the left hand fibre insulation pad from the combustion chamber. Remove the access cover in the left hand side of the combustion chamber held in position with one screw. Unscrew the front and rear heat exchanger union connections.

Lift the heat exchanger off the right hand side of the combustion chamber support and clear of the union connections. Remove the heat exchanger clear of the inner casing.

CAUTION: There will be a small quantity of water remaining in the heat exchanger.

Follow the procedure as described in 15.2.

Discard the heat exchanger.

Fit the replacement heat exchanger in the reverse order using new fibre sealing washers. Ensure the washers are in place and the heat exchanger correctly aligned.

Tighten the union connections. Refit the access cover to the left hand side of the combustion chamber and replace the fibre insulation pad. Refit the combustion chamber cover. Refit the sensor and thermostat with a layer of heat sink compound. Refer to wiring diagram Fig. 8. Reassemble the appliance in the reverse order.

Open the valves, fill and re-pressurise the system as described in Section 12.2.

4. Combustion Chamber Insulation. See Figs. 16, 17, 36 and 38.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Drain the heating circuit as described in Section 15.2 (a).

Remove the combustion chamber cover as described in Section 14.2 (g).

Remove the gas to water heat exchanger as described in Section 15.3.3.

Remove the fibre insulation pads from the combustion chamber

side, rear and front sections and discard.

Fit replacement fibre insulation pads in the reverse order.

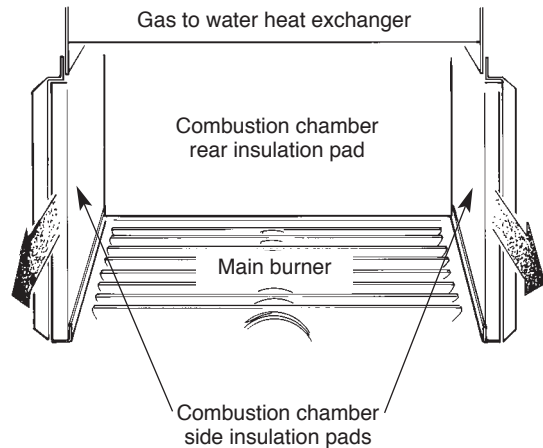
Note: The fibre pads are fragile so take care they are not damaged.

Ensure the insulation pad fitted to the combustion chamber cover has the pilot observation hole correctly aligned.

Reassemble the appliance in the reverse order.

Open the valves, fill and re-pressurise the system as described in Section 12.2

Fig. 38. Combustion chamber insulation.



5. Main Burner. See Figs. 36.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover and main burner assembly as described in Sections 14.2 g and h.

Discard the burner.

Fit a replacement main burner in the reverse order. Ensure the main burner is fitted correctly on the main burner injector located at the back of the inner casing. Reassemble the appliance in the reverse order.

6. Main Burner Injector. See Figs. 36 and 39.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover and main burner assembly as described in Sections 14.2 g and h.

Unscrew the brass injector at the rear of the inner casing and discard.

Fit the replacement injector in the reverse order. Thread sealing compound is not required. Reassemble the appliance in the reverse order.

Fig. 39. Main burner injector.

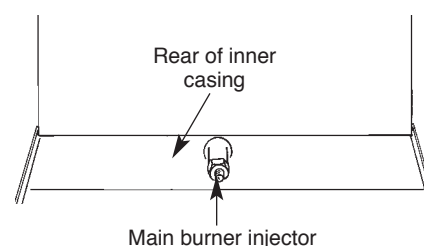
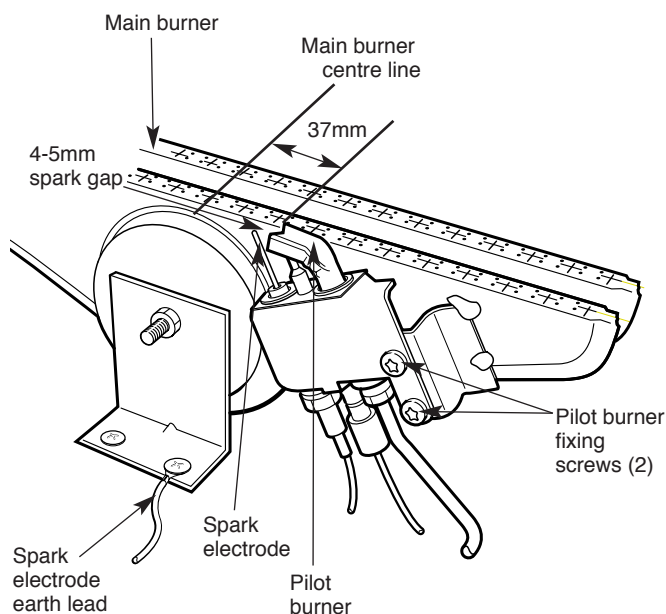


Fig. 40. Pilot burner setting.



7. Pilot Burner. See Figs. 36 and 40.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d. Remove the combustion chamber cover as described in Section 14.2 g. Unscrew the two screws securing the pilot burner to the main burner. Ease the pilot burner forwards sufficiently to allow a suitable tool to support it. Unscrew and withdraw the flame sense electrode. The spark electrode is held in position with a clip. Ease the clip backwards and remove the spark electrode and retain. Unscrew the union nut securing the pilot pipe and ease the pipe clear. Remove the pilot injector which is a push fit inside the pilot burner and retain. Discard the pilot burner. Fit a replacement pilot burner in the reverse order. Check the pilot burner settings and spark electrode gap is as shown in Fig. 40. Reassemble the appliance in the reverse order.

8. Pilot Injector. See Fig. 36.

Remove the pilot burner as described in Section 15.3.7 preceding. Remove the pilot injector which is a push fit inside the pilot burner and discard. Fit a replacement pilot injector in the reverse order. Check the pilot burner settings and spark gap is as shown in Fig. 40. Reassemble the appliance in the reverse order.

9. Spark Electrode. See Figs. 36 and 40.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d. Remove the combustion chamber cover as described in Sections 14.2 g. Unscrew the two screws securing the pilot burner and the spark electrode earth lead to the main burner. Ease the pilot burner forwards sufficiently to allow access.

The spark electrode is held in position with a clip. Ease the clip backwards and remove the spark electrode. Pull off the spark electrode cable at the gas valve and discard the spark electrode assembly.

Fit a replacement spark electrode in the reverse order. Check the pilot burner settings and spark electrode gap is 4 to 5mm, as shown in Fig. 40. Reassemble the appliance in the reverse order.

10. Flame Sense Electrode. See Figs. 36 and 40.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d. Remove the combustion chamber cover as described in Sections 14.2 g. Unscrew the two screws securing the pilot burner and the spark electrode earth lead to the main burner. Ease the pilot burner forwards sufficiently to allow access. Unscrew and withdraw the flame sense electrode. Remove the fascia as described in Section 15.1. Carefully pull the lead from the tag on the control board. Remove the electrode assembly from the appliance and discard. Fit replacement assembly in reverse order. Check the pilot burner settings and spark electrode gap is 4 to 5mm, as shown in Fig. 40. Reassemble the appliance in the reverse order.

11. Safety Temperature Limiter Thermostat. See Fig. 36.

Surface thermostat with vertical 4.8mm tabs. Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d. Remove the fascia as described in Section 15.1. Pull off the two electrical connections to the safety temperature limiter thermostat. Unscrew and discard the thermostat. Fit a new safety temperature limiter thermostat in the reverse order. The polarity of the connections is not important. Apply a smear of heat sink compound to the thermostat face. Reassemble the appliance in the reverse order.

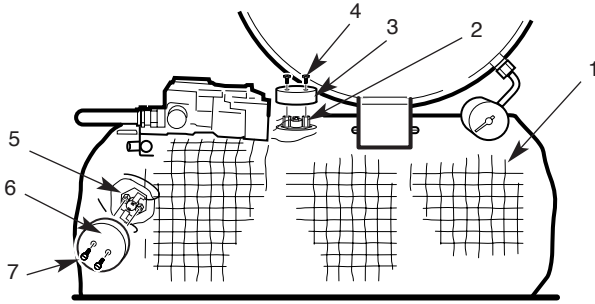
12. Hot Water Sensor. See Figs. 16 and 43.

Surface sensor with vertical 6.3mm tabs. Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel as described in Section 14.2 a. Carefully pull-off the leads to the sensor. Release the clip and remove the sensor. Fit a new sensor and re-assemble in the reverse order. Apply a smear of heat sink compound to the sensor face. Reassemble the appliance in the reverse order.

13. Heating (Primary) Sensor. See Fig. 36.

Surface sensor with angled 6.3mm tabs. Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel and remove the inner casing cover, as described in Section 14.2 a, b, c and d. Pull off the two electrical connections to the sensor. Unscrew the two screws securing the sensor and discard the sensor. Fit a new sensor in the reverse order. The polarity of the connections is not important. Apply a smear of heat sink compound to the thermostat face. Reassemble the appliance in the reverse order.

Fig. 41. Tank Sensor and heatbank overhear thermostat.



1. Heat bank
2. Unvented tank thermostat (G3)
3. Thermostat cover
4. Thermostat cover thermostat fixing screws (2)
5. Tank sensor
6. Sensor cover
7. Sensor cover fixing screws (2)

14. Water Filter Primary System. See Figs. 16 and 42.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the facia and control box in the Service Position, as described in Section 15.2.a.

NOTE: It is not necessary to drain the complete appliance. Fit a 5mm dia. plastic pipe to the manual air vent and drain the top manifold. See Fig. 49.

Loosen the top and bottom pipe fixing screws. Push the pipe into the slip joint and remove.

The water filter is located inside the top manifold. Remove the filter and clean or replace.

Reassemble the appliance in the reverse order using a new 'O' ring seals. Ensure that the screws are correctly located and tightened.

15. Tank Sensor. See Figs. 16 and 41.

Surface sensor with horizontal 6.3mm tabs.

Check that the electricity supply to the appliance is turned off.

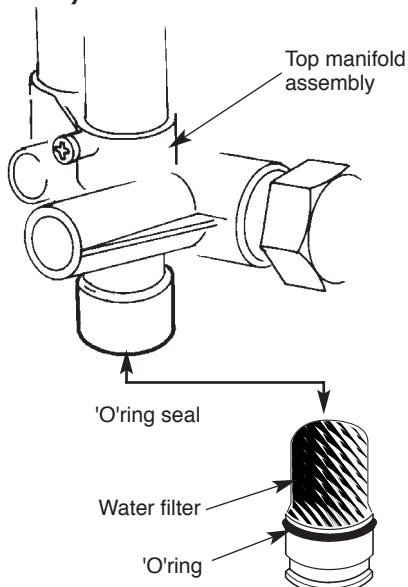
Remove the cabinet front panel as described in Section 14.2 a.

Unscrew the two screws and remove the cover.

Carefully pull-off the leads at the sensor.

Unscrew the two screws and remove the sensor. Fit a new sensor in the reverse order. Apply a smear of heat sink compound to the contact surface. The polarity of the connections is not important. Reassemble the appliance in the reverse order.

Fig. 42. Primary Water Filter



16. Heat Bank Overheat Thermostat. See Figs. 16 and 41. Surface thermostat with horizontal 4.8mm tabs. Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel as described in Section 14.2 a.

Unscrew the two screws and remove the cover.

Carefully pull-off the leads at the thermostat.

Unscrew the two screws and remove the thermostat.

Fit a new sensor in the reverse order. Apply a smear of heat sink compound to the contact surface. The polarity of the connections is not important. Reassemble the appliance in the reverse order.

17. Air Flow Switch. See Figs. 8, and 44.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel and place the facia and control box in the Service Position, as described in Section 14.2 a and b.

Remove the facia as described in Section 15.1.

Unscrew the two screws and remove the switch.

Carefully pull off the suction tubes and the electrical connections from the switch.

Note the position of the suction tubes and electrical connections.

Remove air pressure switch from the control box and discard.

Fit the replacement switch in reverse order. Ensure the electrical connections have been made to the correct terminals (Brown to "C" tag, White to "NC" and the Grey to "NO") and the suction tubes fitted to the correct connections on the switch. Connect Tube marked positive (+) to the top connection marked "H" and the tube marked negative (-) to the bottom connection marked "L".

Reassemble the appliance in the reverse order.

Fig. 43. Hot water high limit thermostat.

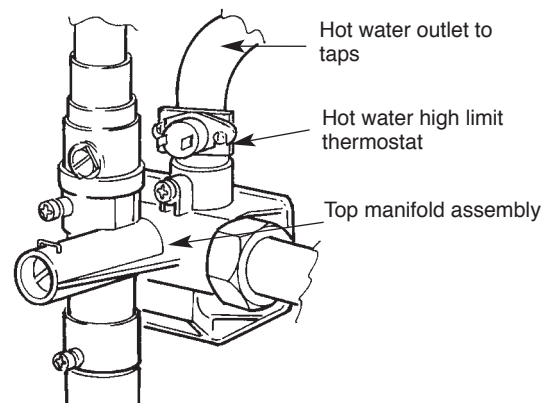
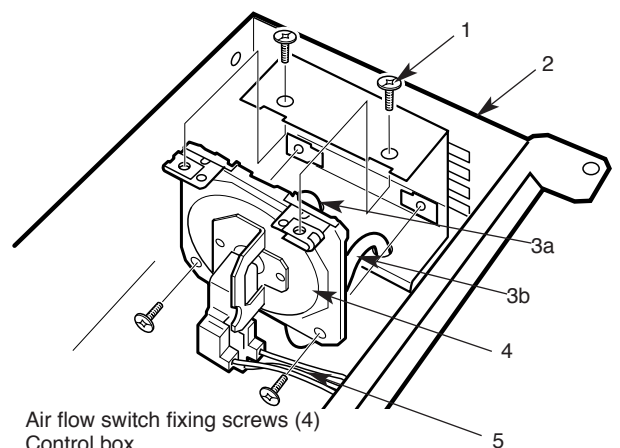


Fig. 44. Air flow pressure switch.



1. Air flow switch fixing screws (4)
2. Control box
3. Air flow sensing tubes (2)
3a + ve
3b - ve
4. Air flow switch
5. Air flow switch connections

18. Gas Valve.

See Figs. 8, 16 and 45.
Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel and lower the expansion vessel as described in Section 14.2 a, b and c.
Turn off the gas supply at the service cock.
Disconnect the pilot pipe at the gas valve and carefully move to one side.

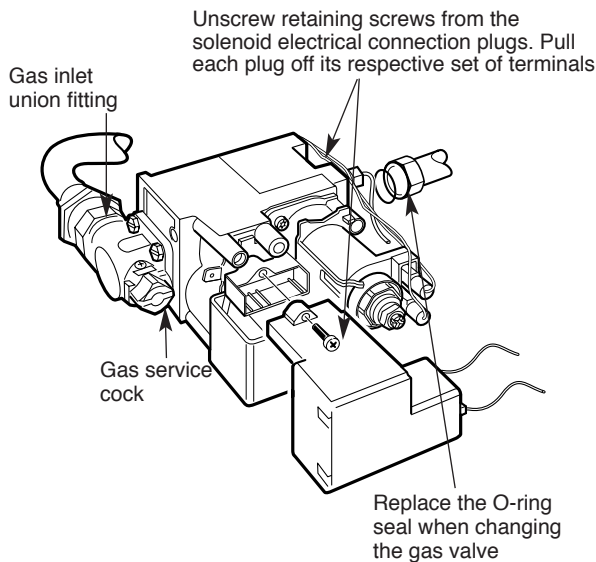
Unscrew the union securing the outlet flange connection to the side of the of the gas valve. Unscrew the four slotted hex head screws at the gas service cock at the valve. Support the valve and unscrew the retaining screw from the igniter unit and remove. Carefully pull off the leads from the valve.

Fit the replacement gas valve in the reverse order ensure the 'O' rings are renewed. Reconnect the electrical connections and the igniter unit. Reassemble the appliance in reverse order.

Turn on the gas supply at the service cock and check for gas soundness.

Re-commission the appliance and set the burner setting pressures. Refer to Section 12: Commissioning and Fig. 31.

Fig. 45. Gas valve.



19. Pilot Filter.

If problems are experienced with the pilot filter fit a replacement gas valve as described in Section 15.3.-18.

20. Circulating Pump.

See Figs. 16 and 46.
Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel as described in Section 14.2 a, b and c.
Drain the heating circuit as described in Section 15.2 a.
Remove the pump cover and disconnect the electrical connections. Release the cable clamp and remove the cable.
Withdraw the two securing clips from the pump body. Ease the pump forwards about 10 mm off the "O" ring seals and remove from the appliance.

CAUTION: There will be a small quantity of water remaining in the pump and pipework. Follow the procedure as described in 15.2. Discard the pump and "O" ring seals.

Fit new "O" ring seals. Fit a replacement pump in the reverse order taking care to ensure the securing clips are properly entered into the slots and not scoring the O-rings on entry. A smear of lubricant on each O-ring will ease the re-assembly. Check the pump head is set to maximum.

The pump head is a Grundfos 15/60. A replacement head may be

transferred to the special body. Take care not to mark the mating surfaces. Reconnect the cable and refit the cable clamp.
Open the valves, fill and repressurise the system as described in Section 12.2.

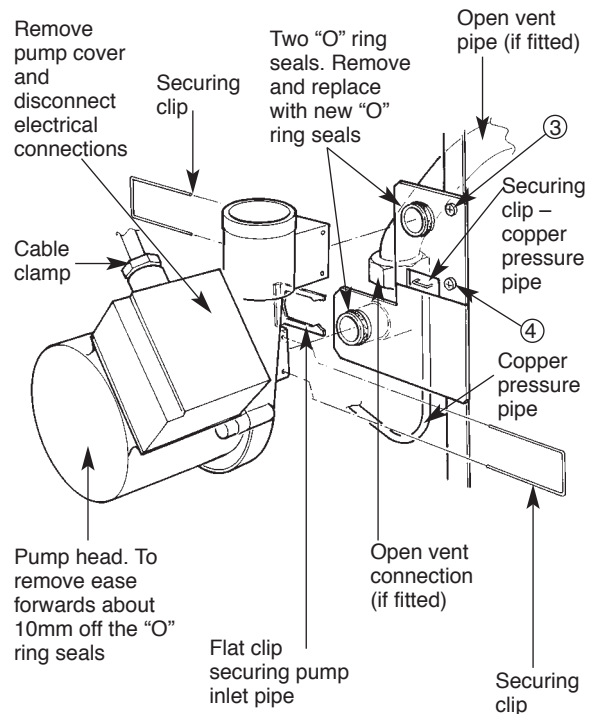
Reassemble the appliance in the reverse order.

21. Water Diverter Valve and Coil.

See Figs. 16, 46 and 47.
Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel and lower the expansion vessel as described in Section 14.2 a. Remove the fascia as described in Section 15.1 .

Fig. 46. Circulating pump.

Warning: There will be a small quantity of water remaining in the pump and pipework



Diverter Valve Coil.

Carefully remove the clip securing the locking bar and withdraw the coil.

Unplug the connector from the coil.

Fit the new coil ensuring that the clip is correctly fixed.

Diverter Valve

Note: It is not necessary to disconnect the electrical cable. The cable length is sufficient to allow the pump head to rest on top of the appliance. Do not allow the pump head to be suspended by the cable. Secure the pump head.

Unplug the connector at the diverter valve.

Using a pair of long nose pliers, remove the two clips securing the 6 mm copper pressure pipe, to the top left hand corner of the valve and pump connection. Retain the clips. Ease the pressure pipe out of the connections and clear of the appliance.

Retain the pressure pipe.

Unscrew the four fixing screws securing the water diverter valve to the bottom manifold. The bottom right hand screw is accessible using a "chubby" type screwdriver. Remove the water diverter valve clear of the appliance. Discard the valve and "O" ring seals. Retain the fixing screws.

CAUTION. There will be a small quantity of water remaining in the valve and lower manifold. Follow the procedure as described in Section 15.2.

NOTE: Three new "O" ring seals are provided with the

replacement valve. Two of the “O” rings are identical in diameter and cross - section and are required for the outer ports. The third “O” ring is smaller in diameter and cross-section and will seal the centre port.

IMPORTANT: Fit the two larger diameter “O” rings into the outer locations on the replacement valve. Fit the smaller diameter “O” ring over the centre spigot on the bottom manifold. Ensure the “O” ring is located correctly against the shoulder on the centre spigot.

Fit the replacement valve in reverse order ensure the four fixing screws are correctly engaged. Replace the “O” ring seals and refit the pressure pipe. Ensure the securing clips are fully engaged in the locating holes.

Reconnect the electric cable to the control board and replace the strain relief bush. Replace the circulating pump as described in Section 15.3-20.

Open the valves, fill and repressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

22. Water to Water Heat Exchanger. See Figs. 42, 46, 47, 49, 50, 51, 52 and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position and lower the expansion vessel as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Drain the hot water circuit as described in Section 15.2 b.

CAUTION: The weight of the water to water heat exchanger is 2 kg. approx. A quantity of water will remain in the heat exchanger and pipework. Follow the procedure as described in 15.2.

Remove the circulating pump as described in Section 15.3-20.

Remove the water diverter valve as described in Section 15.3-21.

NOTE: i). It is not necessary to disconnect the electrical cable

from the pump. The length of cable is sufficient to allow it to rest on top of the appliance cabinet. Do not allow it to be suspended by the cable. Secure the pump head.

ii). Unless otherwise stated all water joints are sealed with “O” rings. To disconnect twist the pipe and / or ease the joint apart. When re-connecting the joint a new “O” ring must be fitted. Silicone grease must be applied to the “O” ring.

Remove the pressure relief valve and manual air vent assembly as described in Section 15.3-27 and retain. See Fig. 49.

Unscrew locating screw No.1 in the bottom manifold two full turns. See Fig. 50.

Unscrew the flat faced union fitting below the flow turbine. Remove the sealing washer and discard. See Fig. 53. Move the cold water inlet pipe to the left to clear the flow turbine. Ease the pipe upwards, 10 mm approx. and remove from the bottom manifold. Retain the pipe.

Unscrew the union fitting below the cold water inlet valve and remove the flow turbine and water filter assembly. See Fig. 53.

Place the flow turbine and water filter assembly on top of the appliance cabinet and secure.

Unscrew locating screw No. 2 in the top manifold two full turns. See Fig. 50. Ease the heating return pipe downwards 10 mm approx. into the slip joint in the bottom manifold.

Move the pipe to the left to clear the top manifold. Ease the pipe upwards 10 mm approx. and remove the pipe from the bottom manifold. Retain the pipe.

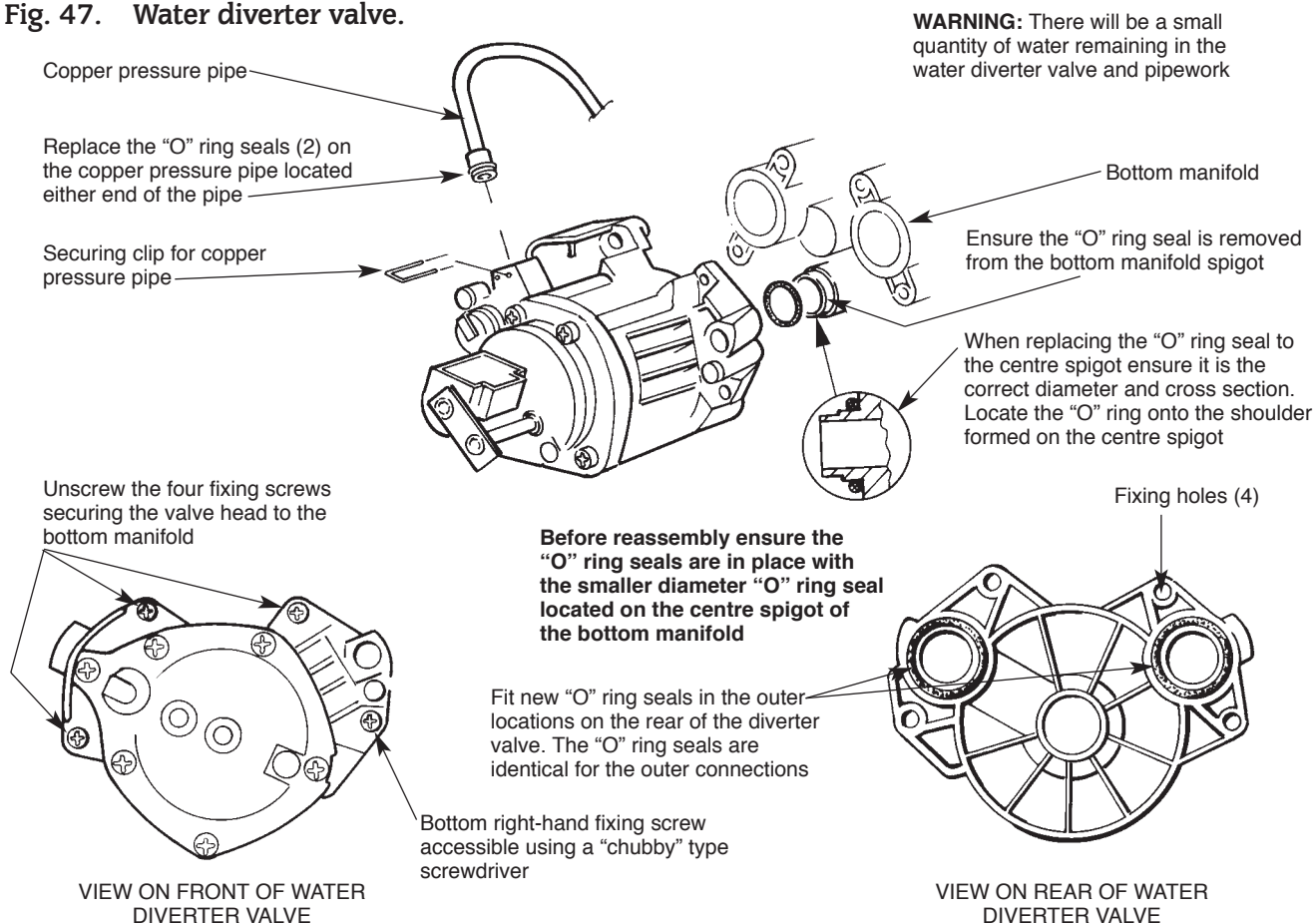
If the appliance is fitted to an open vent system unscrew the open vent union connection and remove the washer. See Fig. 46.

Remove the flat clip securing the pump inlet pipe to the pump lower support plate. Retain the clip. See Fig. 46.

Remove the two screws Nos. 3 and 4 securing the pump inlet pipe support plate and remove the plate. See Fig. 46.

Unscrew two full turns locating screw No. 5. See Fig. 50. Ease the

Fig. 47. Water diverter valve.



pump inlet pipe upwards 10 mm approx. and remove from the bottom manifold. Retain the pipe, plate and screws.

To access the water to water heat exchanger the top manifold must first be removed:

Unscrew locating screw Nos. 6, 7 and 8 in the top manifold two full turns. Unscrew and remove screws Nos. 9 and 10 securing the manifold to the water to water heat exchanger support bracket. Retain the screws. See Fig. 50.

Unscrew the flat faced union securing the manifold to the inner casing pipework. See Fig. 50.

Remove the sealing washer and discard. See Fig. 50.

Ease the manifold assembly downwards, 10 mm approx., until clear of the heating flow and return pipes and hot water outlet pipe. See Fig. 47.

Remove the top manifold clear of the appliance and retain.

Unscrew locating screws Nos.11 and 12 two full turns. Unscrew and remove screws Nos.13 and 14 securing the bottom manifold to the water to water heat exchanger support bracket. See Figs. 47 and 48. Retain the screws. Unscrew the bracket supporting the domestic drain from the left hand side of the gas valve. Using long nose pliers remove the clip securing the drain pipe to the bottom manifold. Ease the drain pipe downwards out of the manifold and remove. See Fig. 51.

Retain the clip, screw, bracket and drain pipe.

Ease the bottom manifold and water to water heat exchanger upwards 10 mm approx. until clear of the heat bank flow and return pipes. See Fig. 51.

NOTE: It may be necessary to push down on the flow and return pipes to release the “O” ring fittings. Before entering the heat bank the flow and return pipes are fitted into slip joints. The joints are sealed with “O” rings and allow some movement forwards or backwards when removing the bottom manifold and water to water heat exchanger. See Fig.48.

Ease the water to water heat exchanger and bottom manifold from the support bracket and clear of the appliance.

Release screw No.15 and remove the bottom manifold off the locations on the water to water heat exchanger. See Figs. 50 and 48. Discard the heat exchanger. Retain the fixing screw.

IMPORTANT: Two new “O” ring seals must be fitted to the rear of each manifold. See Fig. 52.

If the flow and return pipes to the heat bank have been disturbed when removing the water to water heat exchanger the “O” ring seals must be replaced :

Ease the heat bank flow pipe out of the front slip joint and return pipe out of the rear slip joint and clear of the push in elbows. See Fig. 51.

Remove and discard the “O” ring seals from each pipe. Replace with new “O” ring seals.

Pull out the flat clip from the front push in elbow and remove the elbow. Retain the clip and push in elbow. See Fig. 51.

To release the rear elbow reach under the water to water heat exchanger bracket and push in fully the flat plate clamp mechanism. Remove the rear push in elbow and retain. See Fig. 51.

Remove and discard the elbow “O” ring seals. Replace with new “O” ring seals.

Re-assemble the rear and front push in elbows. Ensure the rear clamp mechanism is engaged and fully pulled into the location. Engage the front flat clip into the slot correctly.

Re-assemble the flow and return pipes into the slip joints. The pipe lengths are not identical, the longest pipe is the rear/return pipe. See Fig. 51.

Re-assemble the bottom manifold to the replacement water to water heat exchanger. Ensure the heat exchanger is located correctly with the internally threaded boss fitting through the fixing hole in the manifold and the raised section on the manifold port fitting into the bottom right hand port on the heat

exchanger. See Fig. 49. Replace screw No. 15 and tighten.

Fit the replacement water to water heat exchanger and bottom manifold assembly into the support bracket. Ensure the heat bank flow and return connections are fully engaged. Secure the assembly to the support bracket with screw Nos.13 and 14. Fully tighten the screws fixing the “O” rings Nos. 11 and 12. See Figs. 50 and 51.

Re-assemble the top manifold in the reverse order.

Ensure the heating flow and heating return and hot water pipes are fully engaged.

Ensure a new sealing washer and “O” ring is fitted when re-connecting the union securing the top manifold to the inner casing pipework. Replace the manifold top fixing screws Nos.9 and 10. Tighten screws Nos. 6, 7 and 8 and manifold union fitting. See Fig. 50.

Re-assemble the pump outlet pipe and tighten screw No. 5. Re-fit the pump support plate and secure with screw Nos. 3 and 4. Ensure the flat clip is re-located.

Re-connect the open vent pipe (if applicable). Ensure a new sealing washer is fitted.

Re-assemble the heating return pipe using the slip joint in the bottom manifold to manoeuvre the pipe into position.

Re-assemble the cold water inlet pipe and flow switch ensure the sealing washer is renewed. Re-connect the union fitting to the cold water inlet valve. See Fig. 53.

Re-assemble the pressure relief valve ensure clip is replaced. See Fig. 49.

Re-assemble the domestic drain pipe renewing the “O” seal. Re-locate the securing clip and fixing bracket to the gas valve. See Fig. 51.

Before continuing ensure screws 1, 2, 5, 6, 7, 8, 11 and 12 are fully engaged. The “O” ring seals must be pushed fully into the housing.

Re-assemble the water diverter valve. Re-assemble the 6 mm diameter pressure pipe to the pump inlet pipe and diverter valve renewing the “O” ring seals. Ensure the securing clips are replaced.

Re-assemble the circulating pump ensure the securing clips are re-placed.

Open the valves, fill and repressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

23. Water to Water Heat Exchanger Top Manifold. See Figs. 42, 46, 47, 49, 59, 51, 52 and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel as described in Section 14.2 a, b and c.

Drain the heating and hot water circuit as described in Section 15.2.

Refer to Section 15.3-22 and remove the Top Manifold commencing from the instruction:

CAUTION: The weight of the water to water heat exchanger is 2 kg. approx. A quantity of water will remain in the heat exchanger and pipework. Follow the procedure as described in 15.2.

Remove the manifold clear of the appliance Remove and retain the brass stub connection and nut from the manifold.

Withdraw the by-pass adjuster retaining clip and unscrew the adjuster from the manifold retaining both items.

Undo and remove the phial pocket securing clip screw and clip. Retain both the clip and screw. Extract the phial pocket and retain.

Unscrew and retain all locating screws.

Before reassembling the appliance refit the by-pass adjuster and phial pocket in the reverse order using new “O” rings.

Screw all locating screws fully home then unscrew each of them two full turns. Check that none of the screws protrude into their relevant bores.

Reassemble the manifold in the reverse order using new “O”

rings to replace any “O” rings which have been disturbed. Use new sealing washers where appropriate.

Ensure that all clips and screws are correctly refitted.

Open the valves, fill and repressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

24. Water to Water Heat Exchanger Bottom Manifold.

Refer to Section 15.3.22 Water to Water Heat Exchanger.

Follow this procedure and replace the bottom manifold after the bottom manifold/ water to water heat exchanger assembly has been removed from the appliance. Retain the original water to water heat exchanger and fit the new manifold using new “O” rings. Reassemble the appliance as described in Section 15.3-22.

25. Expansion Vessel. See Figs. 16 and 48.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Unscrew the union fitting on the right hand side of the expansion vessel and remove the sealing washer. Ease the expansion vessel assembly upwards to clear the support bracket and remove from the appliance. Take care when removing as a small quantity of water remains inside the vessel. Follow the procedure as described in 15.2. Discard the expansion vessel.

Fit a replacement expansion vessel into the support bracket and reconnect the union fitting using a new sealing washer.

Open the valves, fill and repressurise the system as described in Section 12.2.

Reassemble the appliance in the reverse order.

26. Expansion Vessel Flexible Hose. See Fig. 48.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

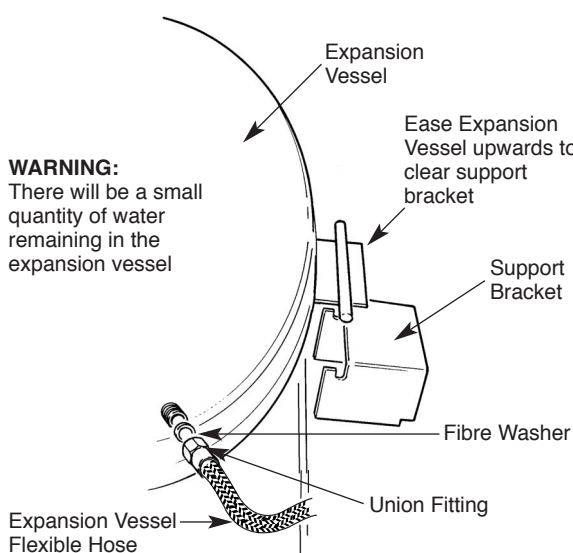
Unscrew the union fitting from behind the pump.

Remove and discard the sealing washer. Ease the expansion vessel assembly upwards to clear the support bracket and remove from the appliance. Take care when removing as a small quantity of water remains inside the vessel. Follow the procedure as described in Section 15.2.

Unscrew the union fitting on the right hand side of the expansion vessel. Remove and discard the sealing washer.

Reconnect the hose in the reverse order using new sealing

Fig. 48. Expansion vessel and flexible hose.



washers. Ensure the orientation of the hose fittings does not cause twisting or crimping of the hose when the expansion vessel is repositioned in the boiler.

Open the valves, fill and repressurise the system as described in Section 12.2.

Reassemble the appliance in the reverse order.

27. Pressure Relief Valve. See Figs. 16 and 49.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Slacken the two screws in the holes securing the discharge pipe bracket. Disconnect the discharge pipe and withdraw it from the valve.

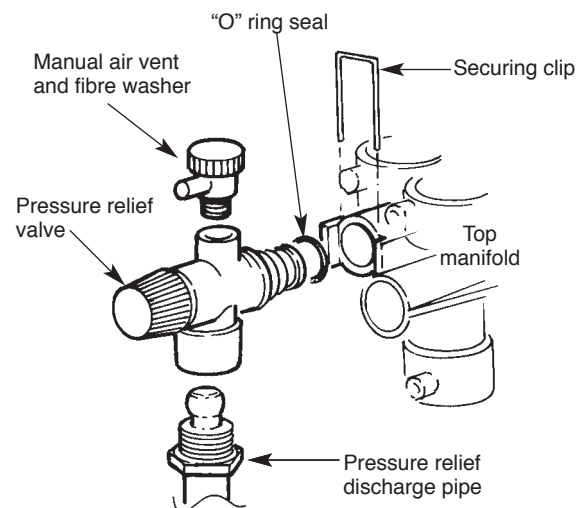
Withdraw the securing clip from the top manifold and ease the pressure relief valve assembly forwards until clear of the appliance.

Unscrew the manual air vent. Discard the valve and “O” ring seal. Reconnect the overflow pipe and manual air vent to the replacement valve. Fit a new “O” ring seal to the valve.

Re-connect the assembly to the appliance and replace the securing clip.

Open the valves, fill and re-pressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

Fig. 49. Pressure relief valve and manual air vent.



28. Manual Air Vent. See Figs. 16 and 49.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Remove the Pressure Relief Valve as described in Section 15.3-27.

Unscrew the manual air vent and discard along with its washer.

Replace with a new manual air vent and washer.

Re-connect in the reverse order using a new “O” ring seal.

Reassemble the appliance in the reverse order.

29. Pressure Gauge. See Fig. 16.

Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel as described in Section 14.2 a.
Drain the heating circuit as described in Section 15.2 a.
Unscrew the pressure gauge out of the heat bank. Fit the replacement pressure gauge using suitable thread sealing compound. Open the valves, fill and re-pressurise the system as described in Section 12.2.
Reassemble the appliance in the reverse order.

30. Flow Turbine. See Figs. 6 and 53.

Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel, place the facia and control box in the Service Position as described in Section 14.2 a and b.
Drain the hot water circuit as described in Section 15.2 b.
Separate the in-line connector.
Carefully unscrew the union connection.
Fit a replacement flow turbine in the reverse order. Ensure the arrow on the end of the black plastic body points **downwards** and new sealing washers are fitted.
Reconnect the in-line connector.
Open the valve and fill the hot water circuit.
Reassemble the appliance in the reverse order.

31. Hot Water Filter. See Figs. 16 and 53.

Check that the electricity supply to the appliance is turned off.
Remove the flow turbine as described in 15.2.30 preceding.
The water filter is located in the top of the housing. Remove the filter clean or replace.
Reassemble in the reverse order and replace the sealing washer. No sealing compound is required. Open the mains water valve and fill the hot water circuit.
Reassemble the appliance in the reverse order.

32. Hot Water Flow Regulator. See Figs. 16 and 53.

Check that the electricity supply to the appliance is turned off.
Remove the flow turbine as described in 15.2.30 preceding.
The water flow regulator is located in the turbine. It may be necessary to prise the regulator from its housing. Remove and discard.
Fit a new flow regulator, small diameter section first. Reassemble in the reverse order and replace the sealing washer. No sealing compound is required.
Open the mains water valve and fill the hot water circuit.
Reassemble the appliance in the reverse order.

33. Inner Casing Cover Seal. See Fig.16.

Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel, place the facia and control box in the Service Position and lower the expansion vessel as described in Section 14.2 a, b and c.
Remove the inner casing cover as described in Section 14.2 d.
Remove the inner casing cover seal and discard. Fit a replacement seal using silicon adhesive. Check that the seal passes completely around the edge of the inner casing cover leaving no gaps.
Reassemble the appliance in the reverse order.

34. Control Board. See Figs. 8 and 54.

Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel as described in Section 14.2 a.
Unscrew the four fixing screws - two at the top and two at the bottom and withdraw the facia assembly.
Rest the assembly in the channel and cut-out supports provided.

Unscrew the L and N mains connection and carefully unplug all the other connections from the board not forgetting the earth tag.
Unscrew the 6 fixing screws and lift out the board.
Re-assemble the facia assembly in the reverse order ensuring that the control knobs are correctly aligned..

35. Facia Mounted Programmer. See Figs. 8 and 12.

Check that the electricity supply to the appliance is turned off.
Remove the cabinet front panel, place the facia and control box in the Service Position as described in Section 14.2 a and b.
Remove the facia as described in Section 15.1.
Unplug the programmer from the control board from terminals marked **X2** "Programmer/Switch". Undo the four nuts securing the programmer to the facia and remove. Fit a new programmer in the reverse order and connect the plug at the driver board.
Reassemble the facia in the reverse order.

36. Remote Mounted Programmer. See Fig. 8.

Check that the electricity has been turned off and isolate the programmer.
Disconnect the leads from the programmer noting their alignment. Fit the replacement programmer and reconnect the leads checking that they are correctly positioned.

Fig.50. Water to water heat exchanger.

Note: Screw Nos. ① ②, ⑤ ⑥ ⑦ ⑧, ⑪ ⑫ unscrew two full turns – **Do not remove.**
 Screw Nos. ③ ④ (Refer to Fig. 31) ⑨ ⑩, ⑬ ⑭ ⑮ remove and retain.

CAUTION: There will be a small quantity of water remaining in the pipework and water-to-water heat exchanger.

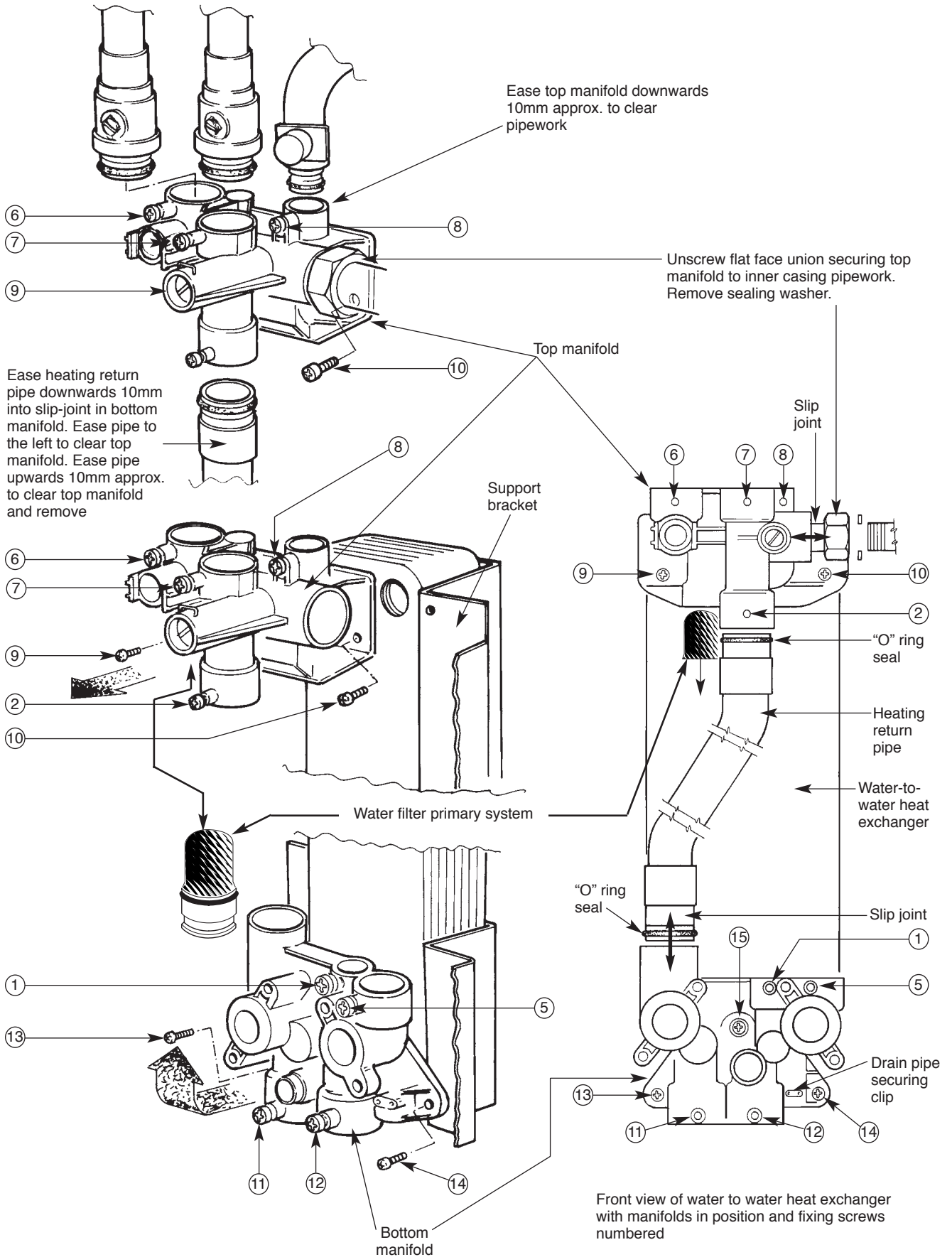


Fig. 51. Water to water heat exchanger.

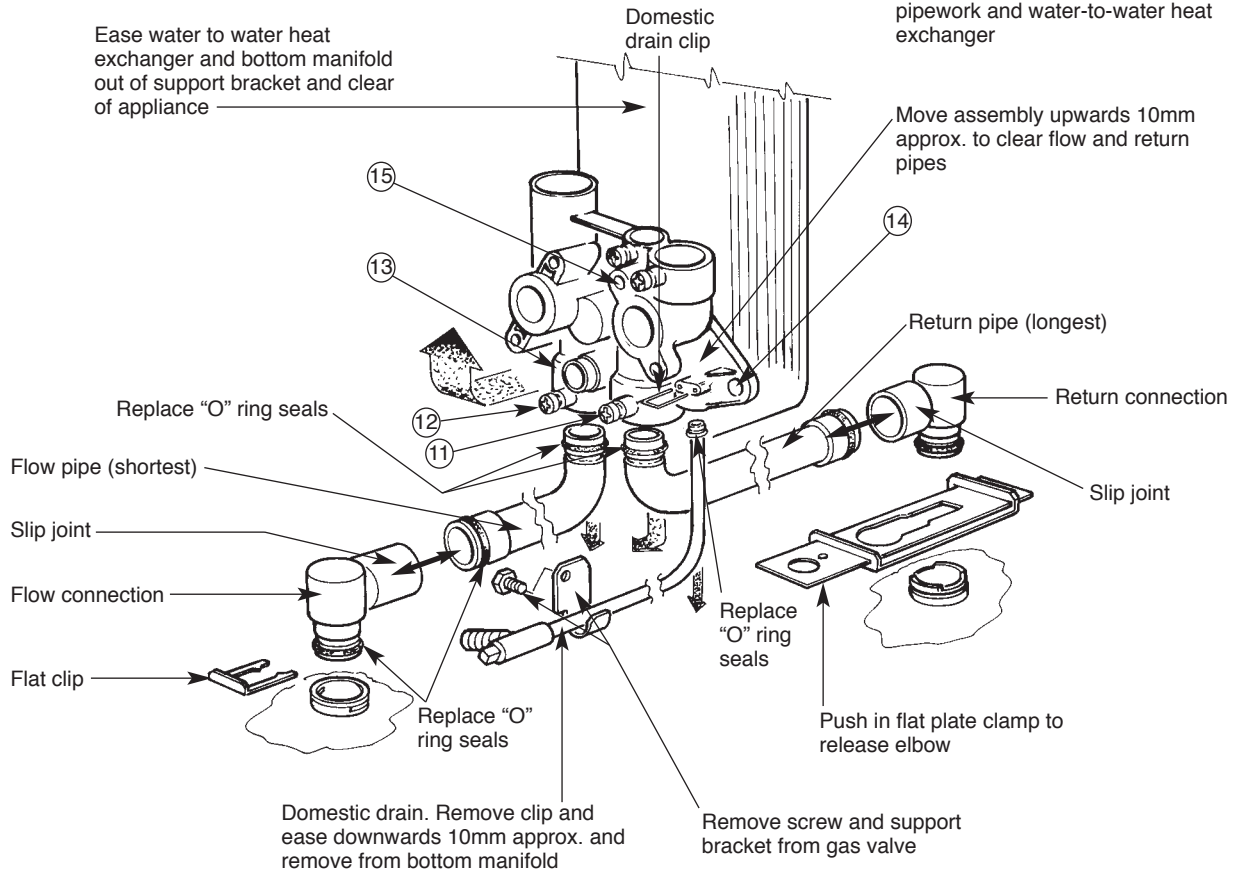
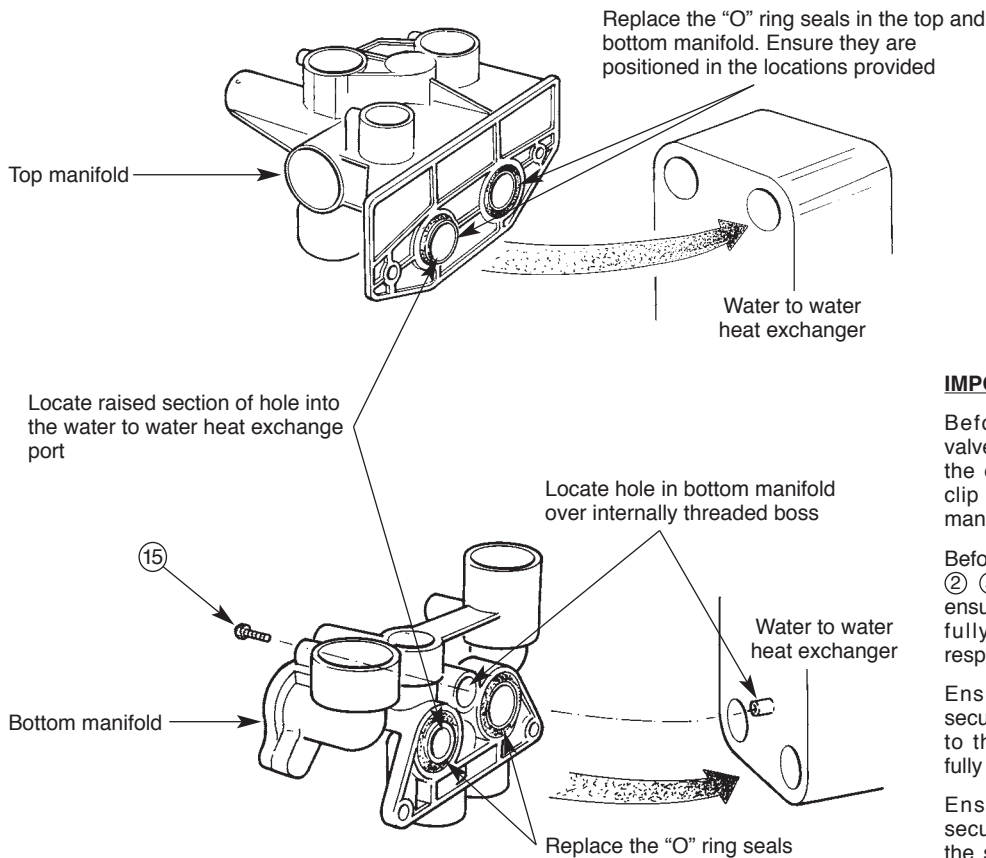


Fig. 52. Replacing the "O" ring seals in top and bottom manifolds.



IMPORTANT:

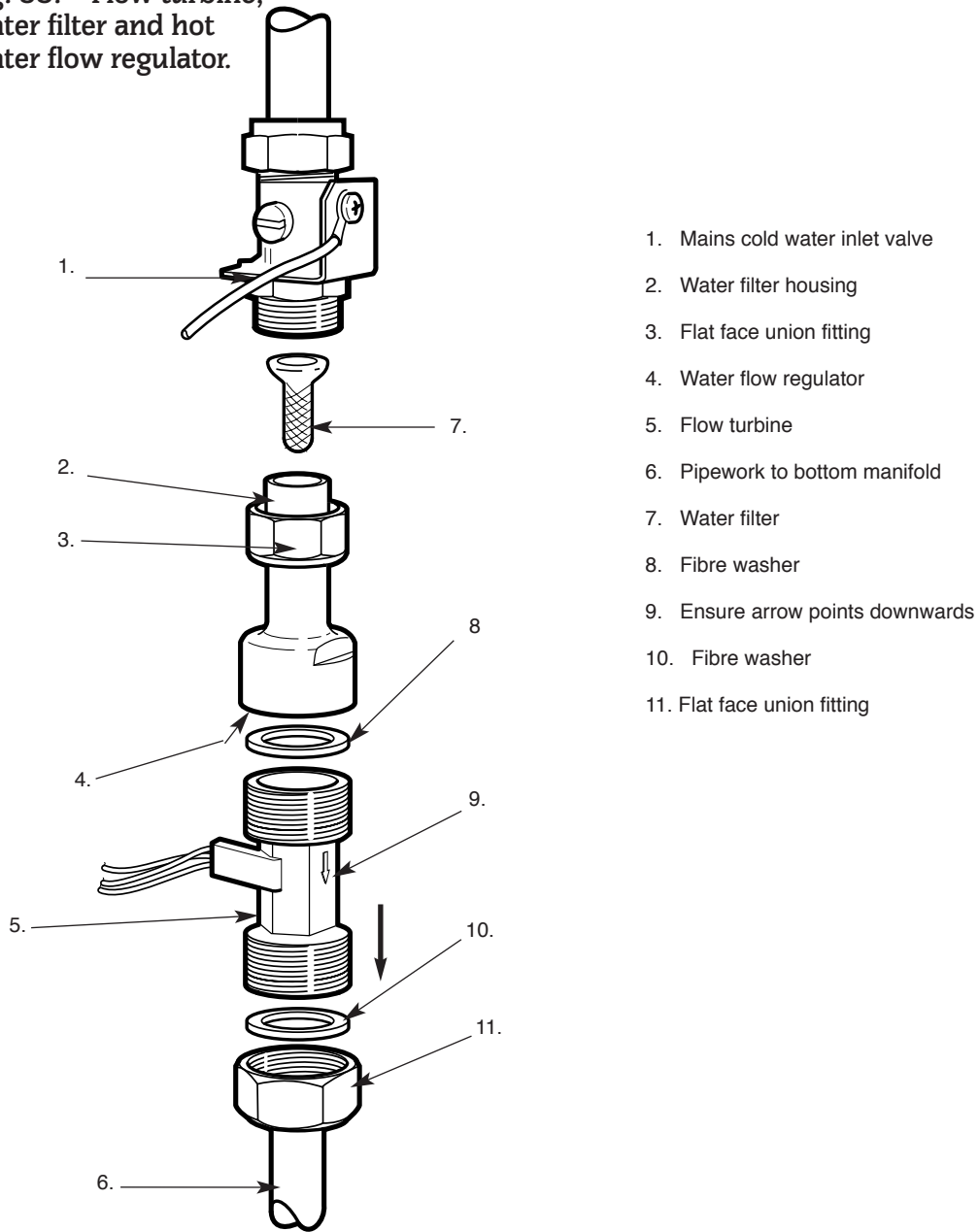
Before the water diverter valve is re-assembled ensure the domestic drain pipe and clip are fitted to the bottom manifold. Refer to Fig. 48.

Before tightening screws ① ② ⑤ ⑥ ⑦ ⑧ ⑪ ⑫ ensure the "O" ring seals are fully pushed into their respective housing.

Ensure screws ⑬ and ⑭, securing the bottom manifold to the support bracket, are fully tightened.

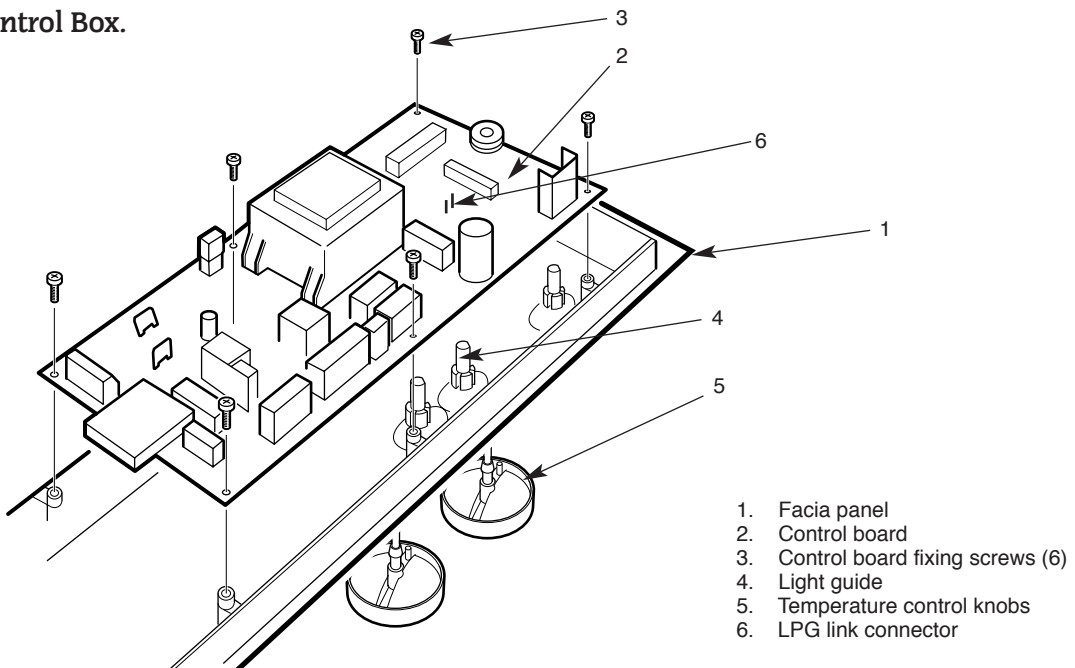
Ensure screws ⑨ and ⑩, securing the top manifold to the support bracket, are fully tightened.

Fig. 53. Flow turbine, water filter and hot water flow regulator.



1. Mains cold water inlet valve
2. Water filter housing
3. Flat face union fitting
4. Water flow regulator
5. Flow turbine
6. Pipework to bottom manifold
7. Water filter
8. Fibre washer
9. Fibre washer
10. Fibre washer
11. Flat face union fitting

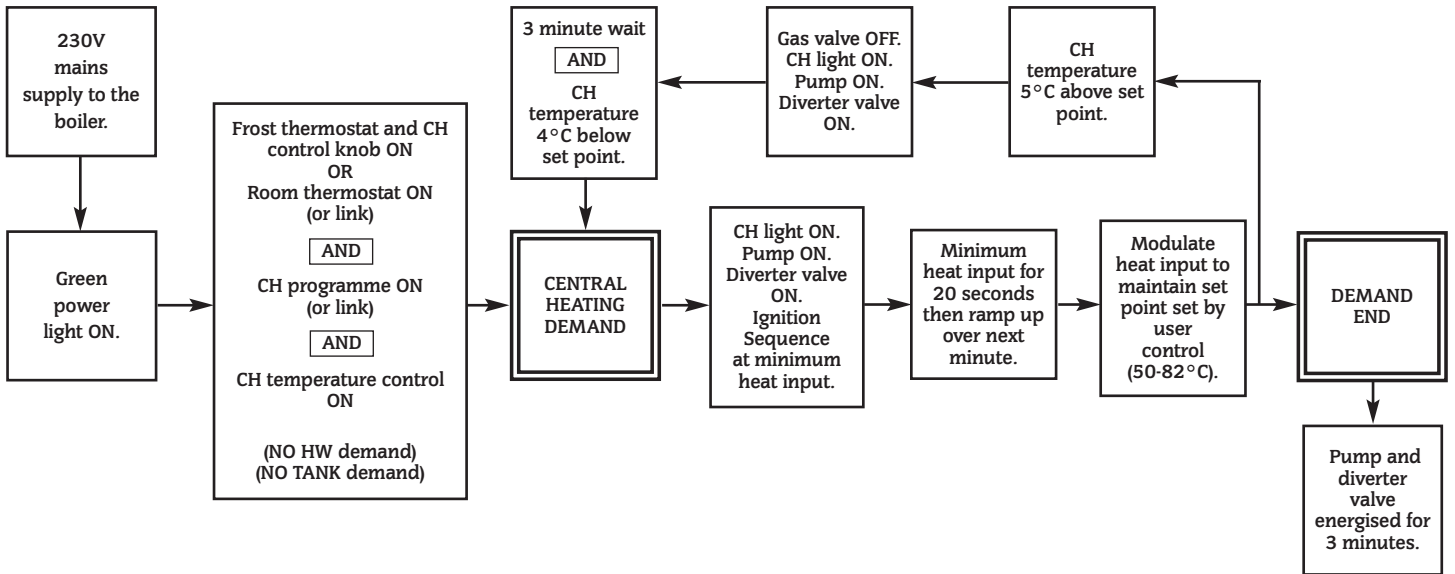
Fig. 54. Control Box.



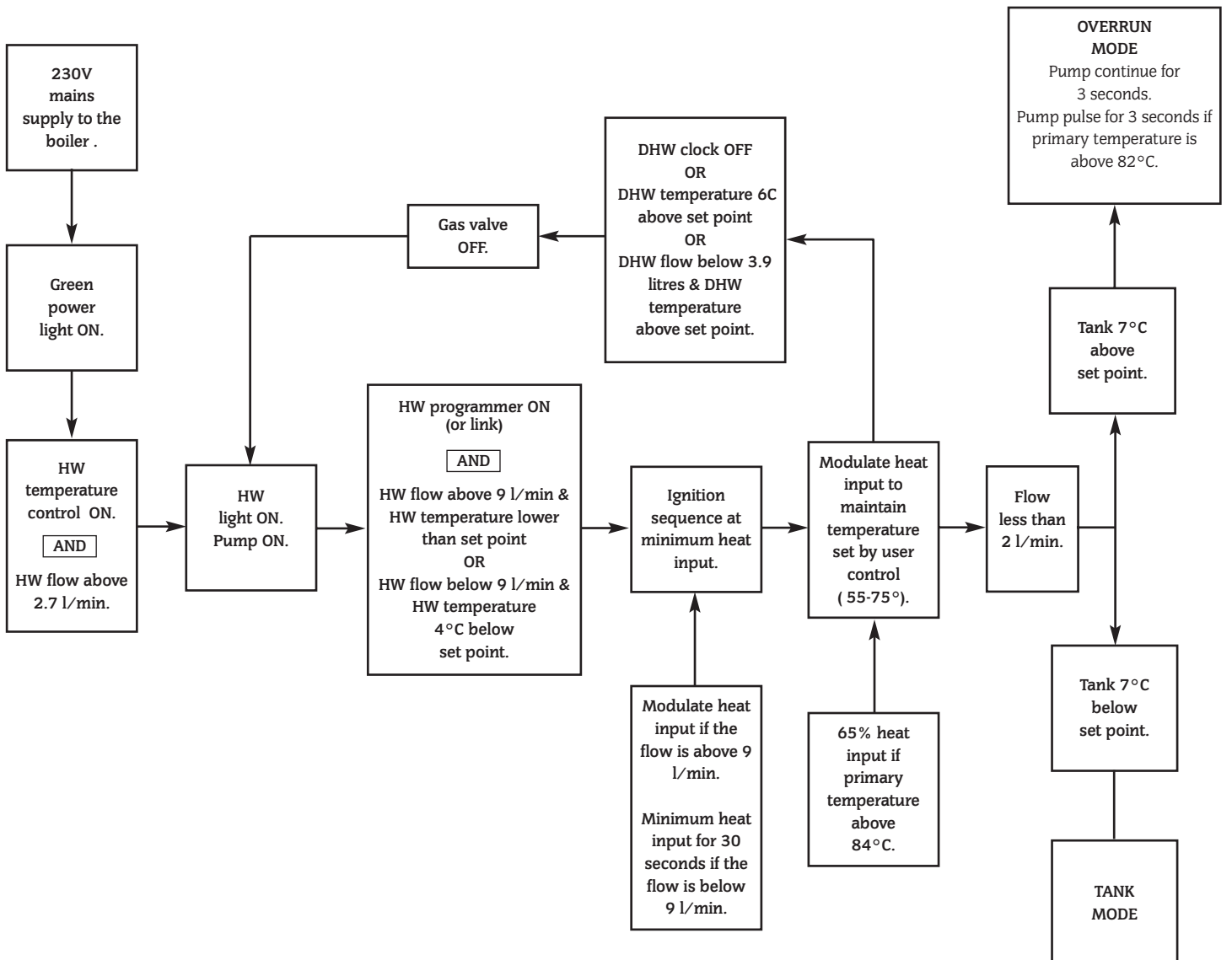
1. Facia panel
2. Control board
3. Control board fixing screws (6)
4. Light guide
5. Temperature control knobs
6. LPG link connector

16. Operational Flow Diagrams

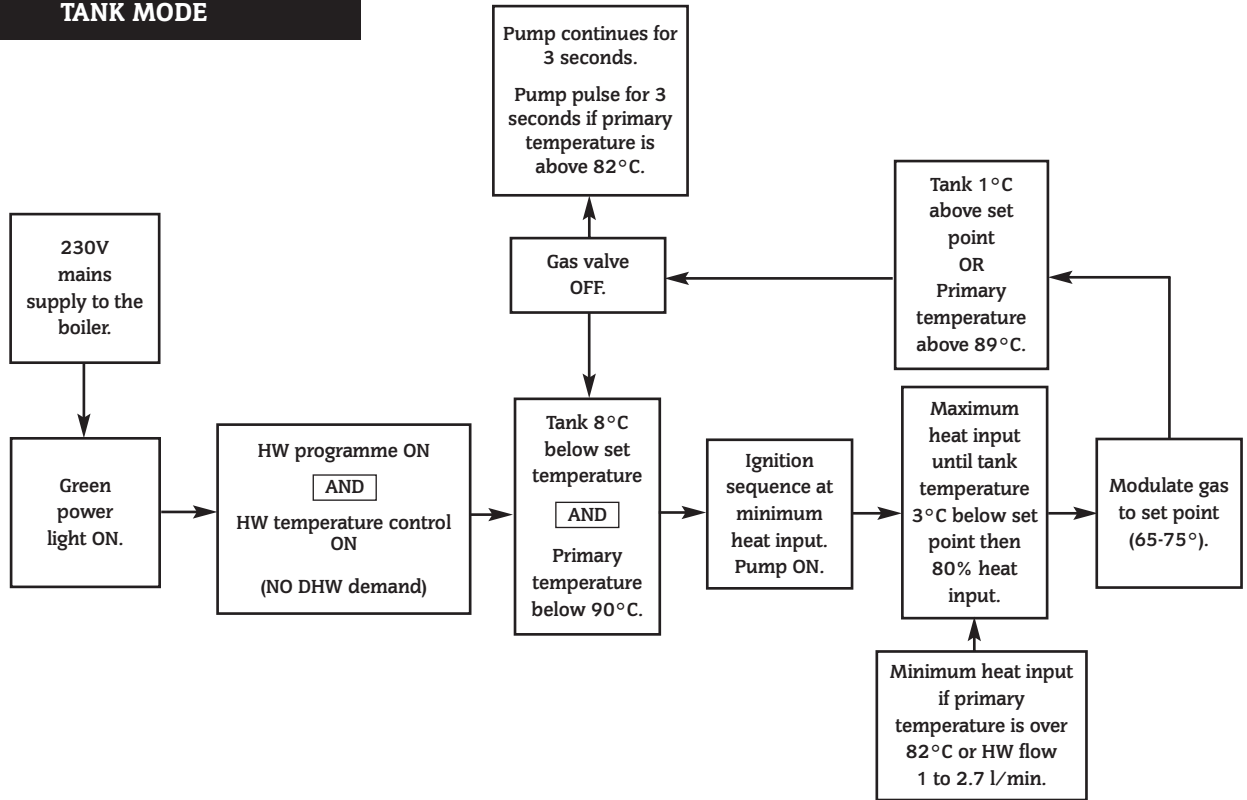
CENTRAL HEATING MODE



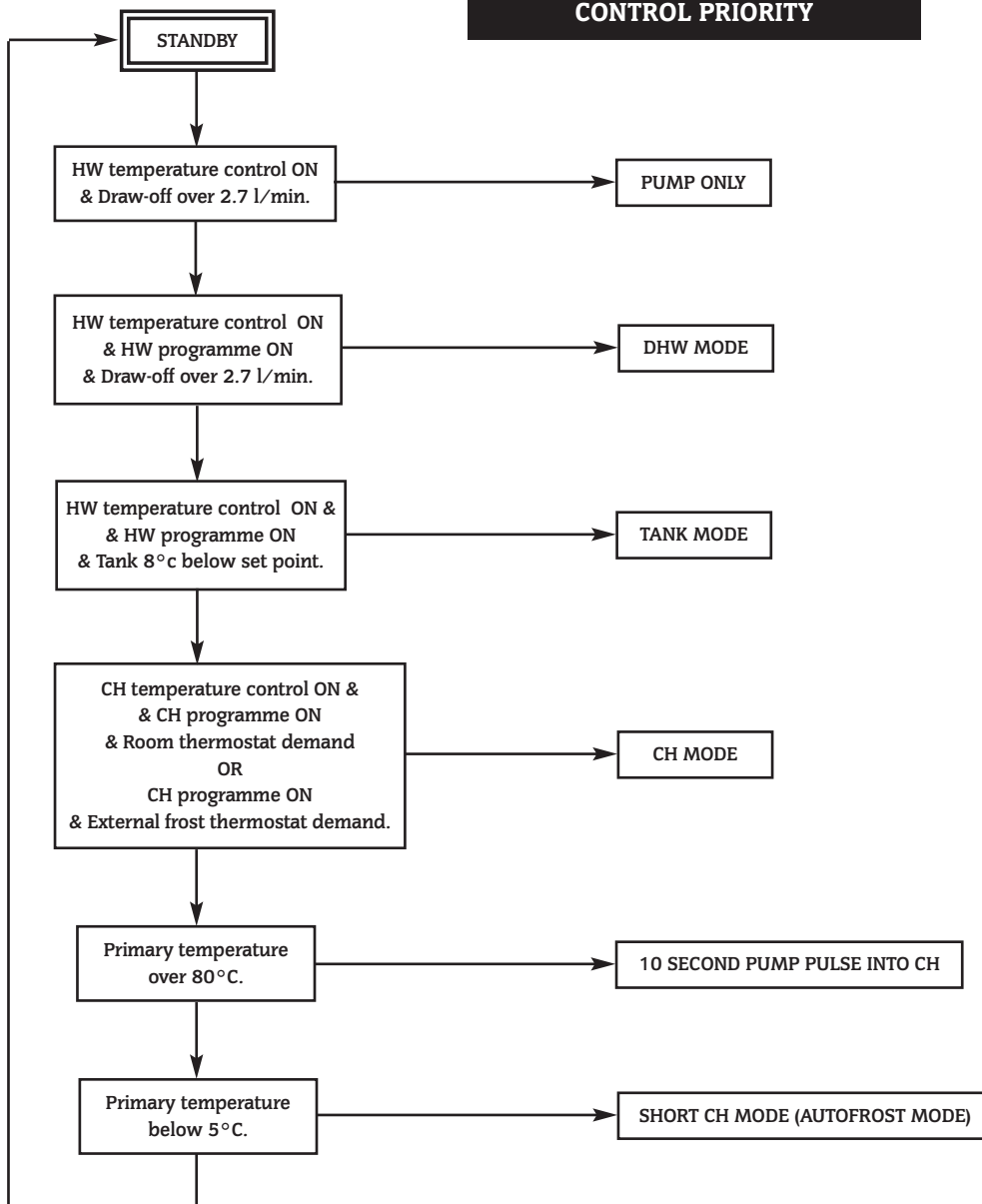
DOMESTIC HOT WATER MODE



TANK MODE



CONTROL PRIORITY



17. Fault Finding

Note: This fault-finding information is for guidance only. Worcester, Bosch Group cannot be held responsible for costs incurred by persons not deemed to be competent.

The electronic control system for this boiler incorporates three lights on the fascia. These are used to show normal operating status. But as a secondary function, by flashing, they can also be used to help provide fault diagnostics. Therefore, with individual or groups of lights being permanently off, on or flashing, every normal fault can be identified.

To use the fault finding system, select a box below which represents the light situation during your fault. Then refer to the appropriate fail point. This fault-finding system assumes that the appliance has been operating correctly until the time of failure and not an installation error.

PRELIMINARY CHECKS

Preliminary electrical system checks are the first electrical checks to be carried out during a fault-finding procedure. On completion of the Service/Fault-Finding task which has required the breaking and remaking of electrical connections, check (a) EARTH CONTINUITY, (b) SHORT CIRCUIT CHECK, (c) POLARITY and (d) RESISTANCE TO EARTH.

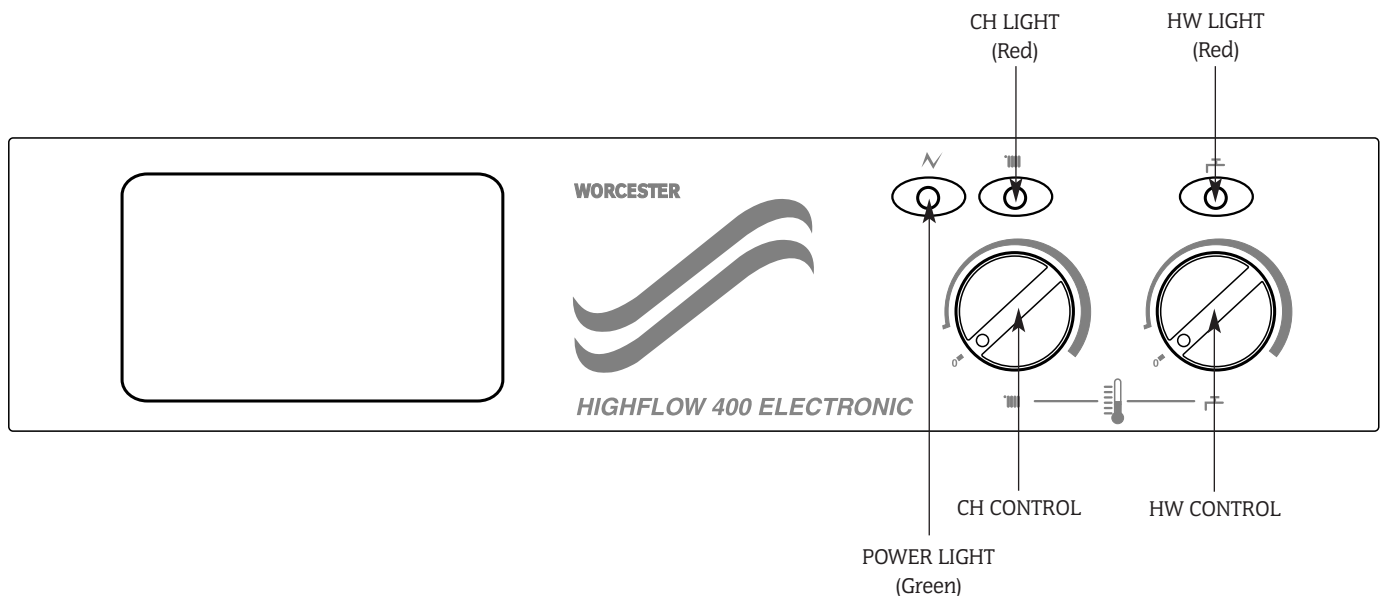
Light Situation During Fault

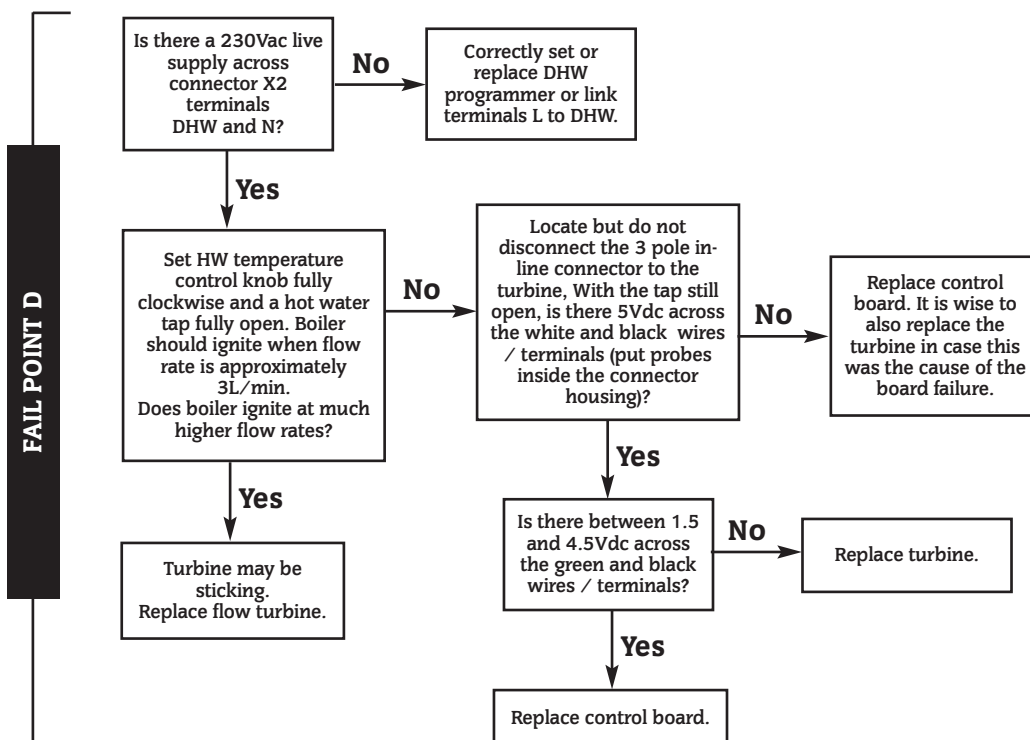
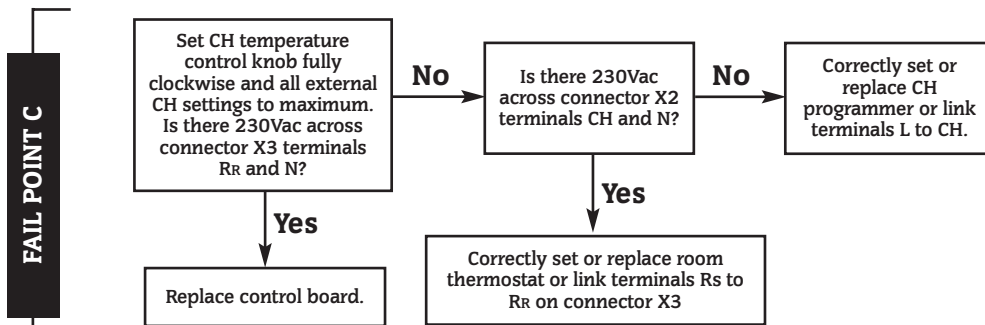
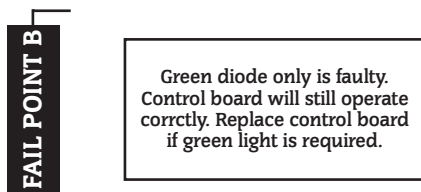
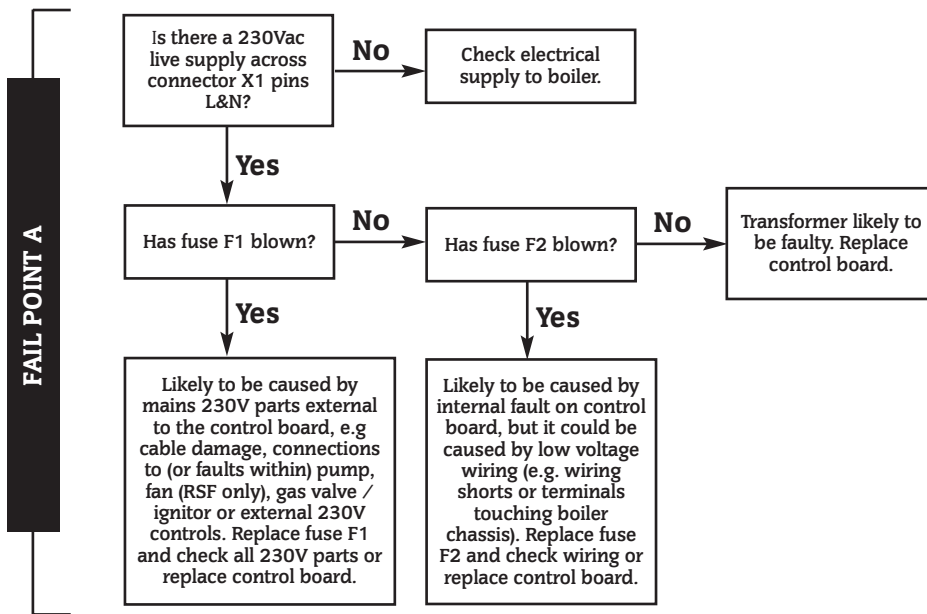
GREEN LIGHT	RED CH LIGHT	RED HW LIGHT	FAILURE DESCRIPTION	FAIL POINT
OFF	OFF	OFF	No lights and no functions	A
OFF			No green light. All functions o.k and red lights o.k.	B
ON	OFF		No CH light and no CH function. HW function o.k.	C
ON		OFF	No HW light and no HW function. CH function o.k.	D
ON			Serious temperature fault in CH or HW mode.	E
ON	SLOW FLASH		Ignition sequence failure lockout. Pilot gas not detected after 2 minutes (reset using CH temperature control).	F
ON	FAST FLASH		Sensor failure.	G
ON	SLOW FLASH	SLOW FLASH	Safety Temperature Limiter lockout (reset using CH temperature control).	H
ON	ALTERNATE FLASH		Tank overheat lockout (call Service Engineer).	I
ON	FAST FLASH	FAST FLASH	Diverter spillage trip (OF only)	J
			Other faults	K

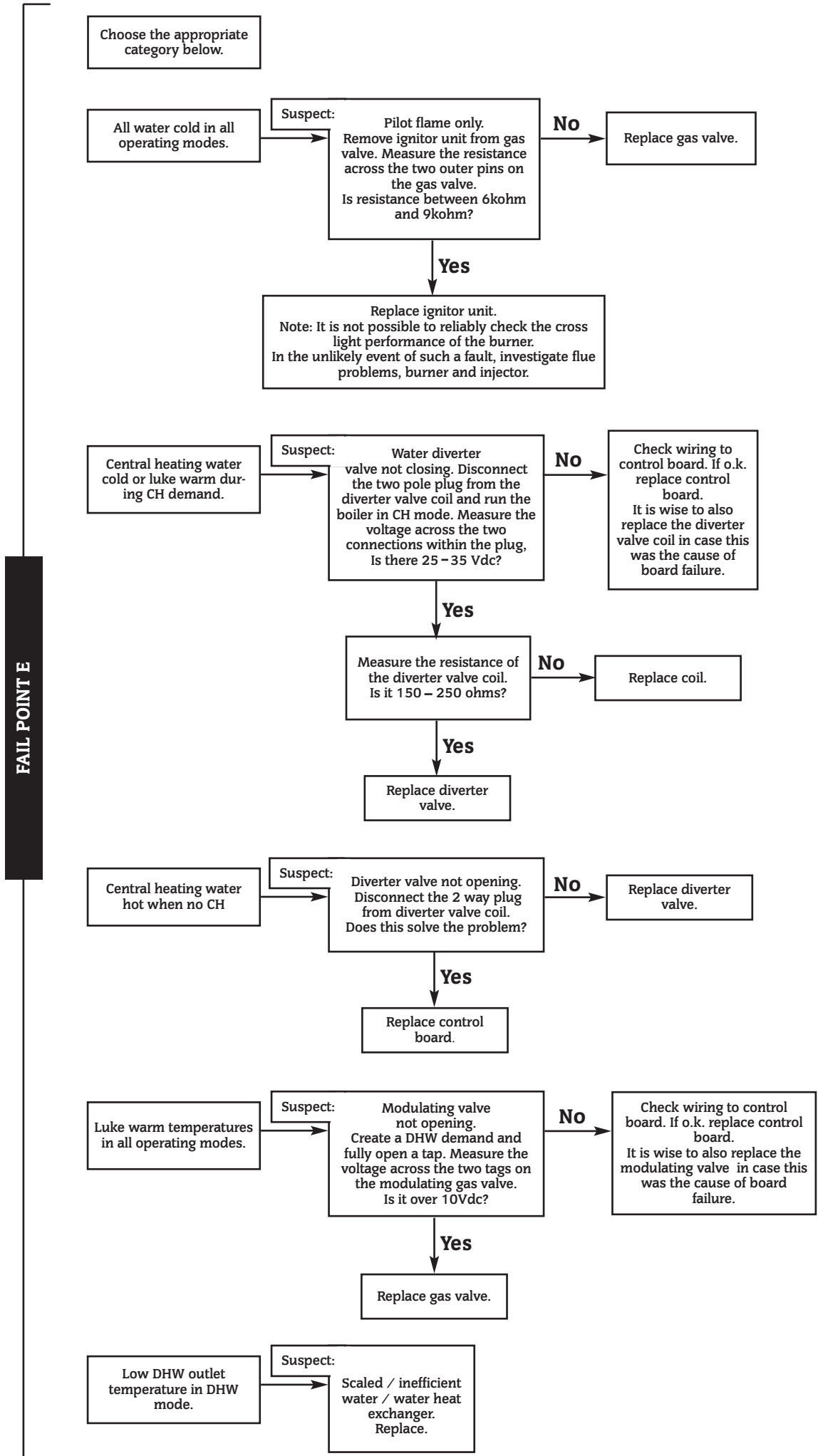
SLOW FLASH is once per second

FAST FLASH is five times per second

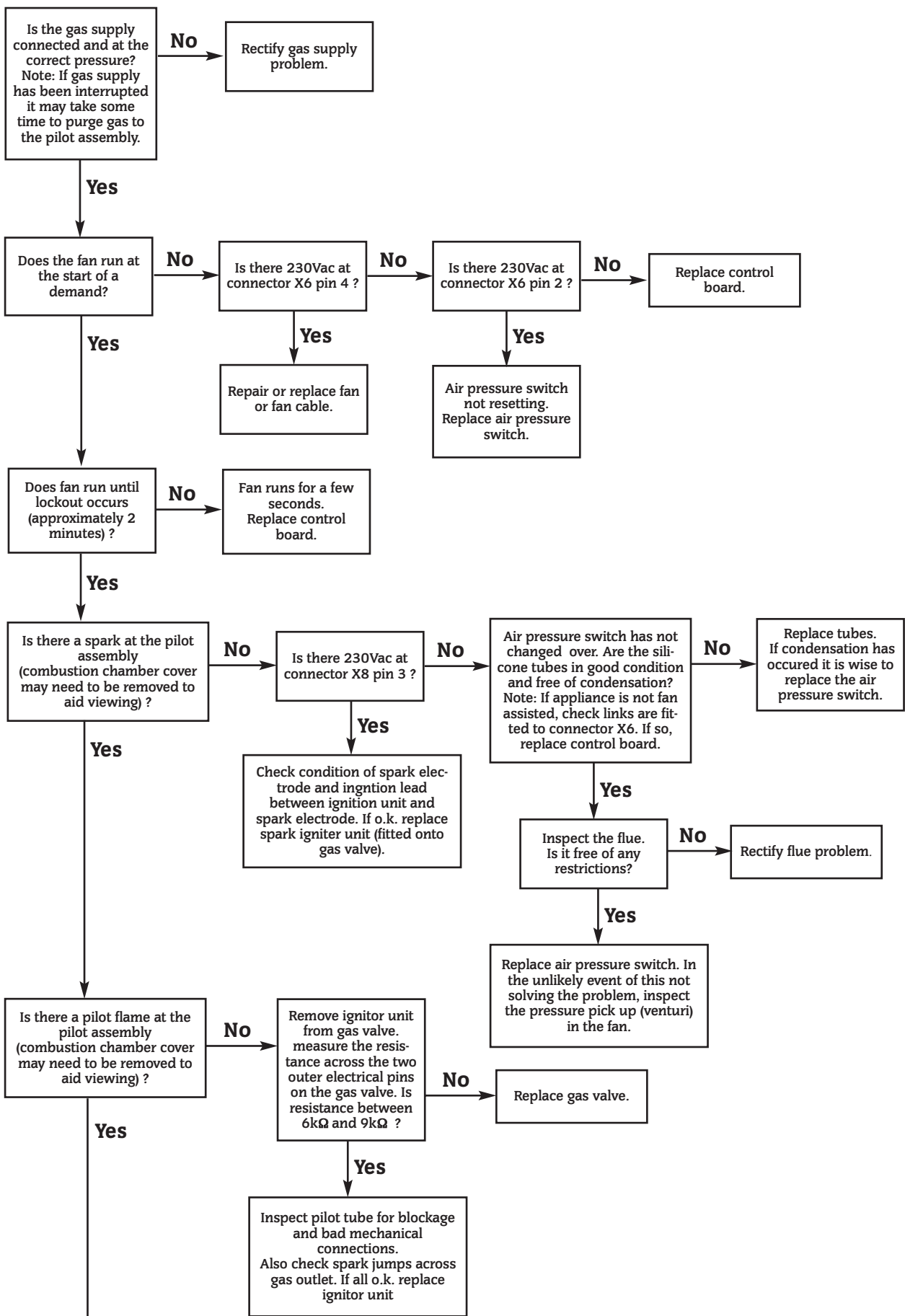
NOTE: There is no mains supply isolating switch on the appliance

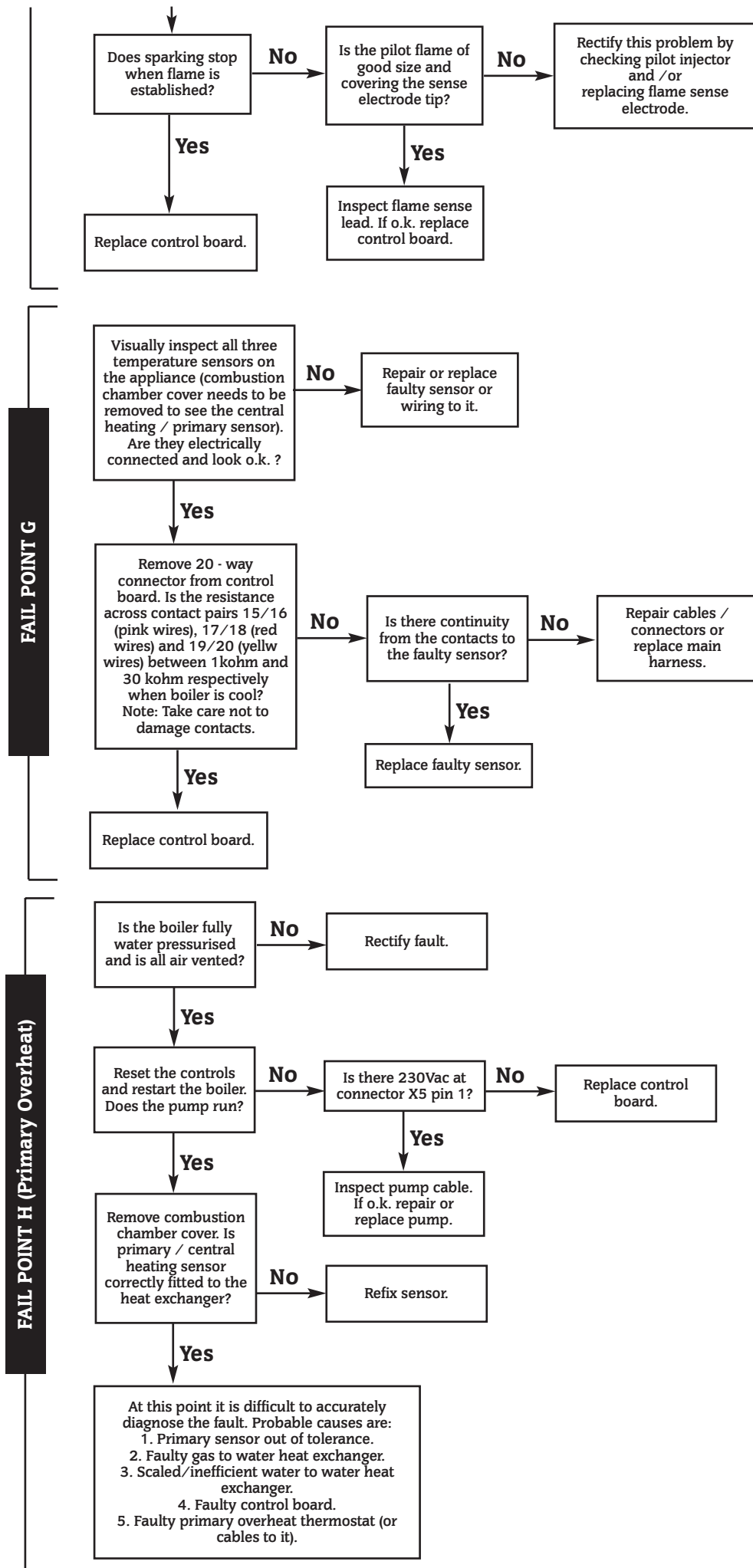






FAIL POINT F (Ignition Sequence Lockout)





FAIL POINT I

Storage tank has overheated.
This is a serious fault.
Call Service Engineer.

FAIL POINT J

Flue gas detected inside boiler.
Note 1:
It is possible that during extreme weather conditions this fault may occur intermittently.
Note 2:
Lights will flash until detector thermostat self resets.

Is flue correctly installed and free of blockages?

No

Unblock/rectify fault.

Yes

Check air/gas channels in gas/water heat exchanger. Are they free of restrictions?

No

Clean or replace heat exchanger.

Yes

Replace flue gas safety device (TTB).
If this fails to solve the problem then replace control board.

FAIL POINT K

If the boiler has developed erratic or poor performance and the above information has not satisfactorily located the fault, the following information may be useful:

Temperature sensors:
These are critical to provide temperature information for the control system.
Check they are fitted securely with conductive paste. May be out of tolerance.

Control board:
May have component failure.

Gas Valve:
Modulating valve may be sticking.

Burner:
May not be cross-lighting effectively.

18. Component Parts List

Key No.	GC No.	Description	Manufacturer's Reference	Qty	WHS Part No.
1	378 025	Burner NG	Aeromatic AC23/053625	1	8 716 105 990 0
2	379 040	Burner Injector NG	4.4mm diameter	1	8 716 156 337 0
3		Gas Valve	SIT Sigma	1	8 716 102 995 0
4	378 819	Air Pressure Switch	Honeywell C6065AH1038	1	8 716 142 409 0
5	379 562	Pilot Burner	Honeywell Q38A2051	1	8 716 142 612 0
6	382 850	Pilot Injector	Honeywell 45.004.108.001B	1	8 716 156 300 0
7	386 575	Spark Electrode	Honeywell 45900413-004	1	8 716 142 104 0
8		Spark Electrode Lead		1	8 716 104 553 0
9		Flame Sense Electrode		1	8 716 104 511 0
10		Flame Sense Electrode Lead		1	8 716 104 554 0
11		Gas to Water Heat Exchanger	c/w washers	1	8 716 102 310 0
12	374 607	Combustion Chamber Insulation		1	7 716 192 227 0
13	E00 717	Auto Air Vent	Caleffi Minical 503020	1	8 716 140 500 0
14	386 244	Pressure Gauge	c/w washers	1	8 716 142 325 0
15	378 810	Pressure Relief Valve	c/w 'O' rings Caleffi 314439	1	8 716 142 422 0
16	325 269	Pump	Grundfos 59876516	1	8 716 102 257 0
17	299 341	Expansion Vessel	12 litres c/w washers	1	8 716 142 507 0
18	299 323	DHW Heat Exchanger	SWEP E8-18 c/w "O" Rings	1	8 716 142 904 0
19		Water Diverter Valve	Bosch c/w "O" Rings	1	8 716 104 569 0
20		Heatbank Overheat Thermostat	Elmwood	1	8 716 103 217 0
21		Safety Temperature Limiter	Elmwood	1	8 716 103 216 0
22		CH/ Primary Sensor	Elmwood 6655-9488-4	1	8 716 142 319 0
23		Tank Sensor	Elmwood	1	8 716 770 425 0
24		HW Sensor Kit	Elmwood 6655-9003-5	1	8 716 142 302 0
25		Programmer Kit (Optional)	Twin Channel	1	7 716 192 007 0
26	299 338	Fan Assembly		1	8 716 120 738 0
27	324 822	Gauze Filter (HW)		1	8 716 148 401 0
28	378 809	Manual Air Vent	1/4 BSP	1	8 716 140 516 0
29	E57 945	Turbine Assembly	c/w washer and harness	1	8 716 146 160 0
30		Flow Regulator	Type A 18 L/min \pm 15%, Purple with sleeve	1	8 716 104 479 0
31	299 337	Flexible Hose	c/w washers	1	8 716 140 557 0
32		Control Board	Pactrol 423800	1	8 716 102 339 0
33	299 093	Inner Casing Seal		1	8 716 140 747 0
34	299 342	Top Manifold Block	c/w with "O" Rings	1	8 716 143 017 0
35	299 343	Bottom Manifold Block	c/w with "O" Rings	1	8 716 143 016 0
36	299 346	Gasket/ "O" Ring Pack		1	7 716 192 228 0
37		Water Filter Primary System		1	8 716 148 411 0
38		Diverter Valve Coil	c/w clip	1	

SUPPLEMENTARY LIST FOR LPG APPLIANCES

1	378 386	Burner LPG	Aeromatic AC23/053578	1	8 716 142 608 0
2		Burner Injector LPG	1/8 x 120° x 2.8mm Ø	1	8 716 156 338 0
3		Pilot Injector LPG	Honewell 45004114-005	1	8 716 148 153 0
4		PCB Link LPG		1	8 716 104 555 0
5		Fan Restrictor Assembly		1	8 716 120 706 0

19. Conversion Instructions

These instructions describe the conversion of the appliance.

Conversion Kit:

Natural Gas to LPG	7 716 192 304
LPG to Natural Gas	7 716 192 305

Component	Qty	Part Numbers	
		NG to LPG	LPG to NG
Burner	1	8 716 142 608	
Burner Injector	1	8 716 156 338	8 716 156 337
Pilot Burner Injector	1	8 716 148 153	8 716 156 300
PCB Link	1	8 716 104 555	
Fan Restrictor Assembly	1	8 716 120 706	

CONVERSION: NATURAL GAS TO LPG

SHUT OFF GAS AND ELECTRIC SUPPLIES TO THE APPLIANCE

1. Remove the burner as described in Section 15.2.5 and discard.
2. Remove the main burner injector as described in Section 15.2.6. and discard.
3. Remove the pilot injector as described in Section 15.2.8. and discard.
4. Remove the fan assembly as described in Section 15.3.2. Release the venturi and re-assemble incorporating the fan restrictor assembly. Join the restrictor to the adjacent venturi connectoin (+ Ve) using the short length of silicone tube supplied. Refer to Fig. 55.
5. Refit the fan assembly and re-connect the sensing tubes. **Note:** + tube to the restrictor inlet. Clear tube to the -Ve side of the venturi. Refer to Fig. 55
6. Re-assemble the appliance using the new injectors and the new burner.
7. Remove the facia and fit the link to the terminals marked LPG on the control board. Refer to Fig. 54.
8. Re-commission the appliance as described in Section 13 and reset the burner pressures. Refer to Table 1. and Fig. 33.
IMPORTANT: Set the maximum burner pressure before the minimum burner pressure. The minimum burner pressure to be used is that for the hot water.
9. Fix the appropriate labels and re-position the red arrow on the data plate to indicate the gas type.
10. Up-date the Benchmark log book.

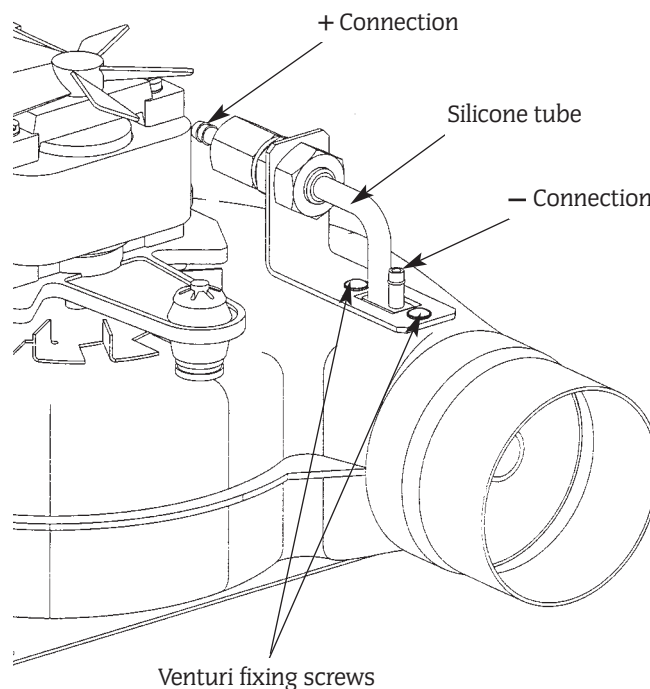
CONVERSION: LPG TO NATURAL GAS

SHUT OFF GAS AND ELECTRIC SUPPLIES TO THE APPLIANCE

1. Remove the burner as described in Section 15.2.5. Remove the end-cap and withdraw the gauze tube. Replace and refix the end-cap.
2. Remove the main burner injector as described in Section 15.2.6. and discard.
3. Remove the pilot injector as described in Section 15.2.8. and discard.
4. Remove the fan assembly as described in Section 15.3.2. Remove the fan restrictor assembly (see Fig. 55) and refix the venturi.
5. Refit the fan assembly and re-connect the sensing tubes.
Note: + tube to the + Ve side of the venturi. Clear tube to the -Ve side of the venturi.

6. Re-assemble the appliance using the new injectors and the new burner.
7. Remove the facia and remove the link from the terminals marked LPG on the control board. Refer to Fig. 54.
8. Re-commission the appliance as described in Section 13 and reset the burner pressures. Refer to Table 1. and Fig. 33.
IMPORTANT: Set the maximum burner pressure before the minimum burner pressure. The minimum burner pressure to be used is that for the hot water.
9. Fix the appropriate labels and re-position the red arrow on the data plate to indicate the gas type.
10. Fill in the Benchmark checklist.

Fig. 55 Fan Restrictor Assembly





GAS BOILER COMMISSIONING CHECKLIST

BOILER SERIAL No. _____ NOTIFICATION No. _____

CONTROLS To comply with the Building Regulations, each section must have a tick in one or other of the boxes

TIME & TEMPERATURE CONTROL TO HEATING	ROOM T/STAT & PROGRAMMER/TIMER <input type="checkbox"/>	PROGRAMMABLE ROOMSTAT <input type="checkbox"/>
TIME & TEMPERATURE CONTROL TO HOT WATER	CYLINDER T/STAT & PROGRAMMER/TIMER <input type="checkbox"/>	COMBI BOILER <input type="checkbox"/>
HEATING ZONE VALVES	FITTED <input type="checkbox"/>	NOT REQUIRED <input type="checkbox"/>
HOT WATER ZONE VALVES	FITTED <input type="checkbox"/>	NOT REQUIRED <input type="checkbox"/>
THERMOSTATIC RADIATOR VALVES	FITTED <input type="checkbox"/>	
AUTOMATIC BYPASS TO SYSTEM	FITTED <input type="checkbox"/>	NOT REQUIRED <input type="checkbox"/>

FOR ALL BOILERS CONFIRM THE FOLLOWING

THE SYSTEM HAS BEEN FLUSHED IN ACCORDANCE WITH THE BOILER MANUFACTURER[S] INSTRUCTIONS?

THE SYSTEM CLEANER USED _____

THE INHIBITOR USED _____

FOR THE CENTRAL HEATING MODE, MEASURE & RECORD

GAS RATE	<input type="text"/>	m ³ /hr	<input type="text"/>	ft ³ /hr
BURNER OPERATING PRESSURE (IF APPLICABLE)	<input type="checkbox"/>	N/A	<input type="text"/>	mbar
CENTRAL HEATING FLOW TEMPERATURE			<input type="text"/>	°C
CENTRAL HEATING RETURN TEMPERATURE			<input type="text"/>	°C

FOR COMBINATION BOILERS ONLY

HAS A WATER SCALE REDUCER BEEN FITTED? YES NO

WHAT TYPE OF SCALE REDUCER HAS BEEN FITTED? _____

FOR THE DOMESTIC HOT WATER MODE, MEASURE & RECORD

GAS RATE	<input type="text"/>	m ³ /hr	<input type="text"/>	ft ³ /hr
MAXIMUM BURNER OPERATING PRESSURE (IF APPLICABLE)	<input type="checkbox"/>	N/A	<input type="text"/>	mbar
COLD WATER INLET TEMPERATURE			<input type="text"/>	°C
HOT WATER OUTLET TEMPERATURE			<input type="text"/>	°C
WATER FLOW RATE			<input type="text"/>	lts/min

FOR CONDENSING BOILERS ONLY CONFIRM THE FOLLOWING

THE CONDENSATE DRAIN HAS BEEN INSTALLED IN ACCORDANCE WITH THE MANUFACTURER[S] INSTRUCTIONS? YES

FOR ALL INSTALLATIONS CONFIRM THE FOLLOWING

THE HEATING AND HOT WATER SYSTEM COMPLIES WITH CURRENT BUILDING REGULATIONS

THE APPLIANCE AND ASSOCIATED EQUIPMENT HAS BEEN INSTALLED AND COMMISSIONED IN ACCORDANCE WITH THE MANUFACTURER[S] INSTRUCTIONS

IF REQUIRED BY THE MANUFACTURER, HAVE YOU RECORDED A CO/CO₂ RATIO READING? N/A YES CO/CO₂ RATIO

THE OPERATION OF THE APPLIANCE AND SYSTEM CONTROLS HAVE BEEN DEMONSTRATED TO THE CUSTOMER

THE MANUFACTURER[S] LITERATURE HAS BEEN LEFT WITH THE CUSTOMER

COMMISSIONING ENG[S] NAME PRINT _____ CORGI ID No. _____

SIGN _____ DATE _____

SERVICE INTERVAL RECORD

It is recommended that your heating system is serviced regularly and that you complete the appropriate Service Interval Record Below.

Service Provider. Before completing the appropriate Service Interval Record below, please ensure you have carried out the service as described in the boiler manufacturer's instructions. Always use the manufacturer's specified spare part when replacing all controls

SERVICE 1 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 2 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 3 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 4 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 5 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 6 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 7 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 8 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 9 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 10 DATE

ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

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