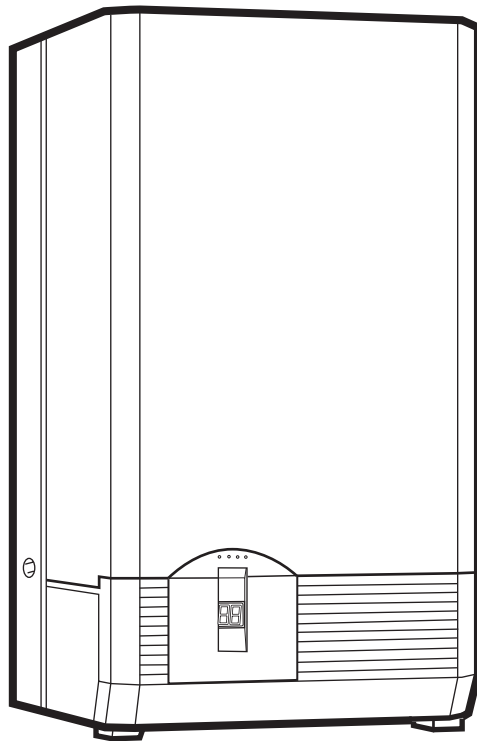


BOSCH

GREENSTAR

WALL MOUNTED CONDENSING BOILER FOR CENTRAL HEATING
AND MAINS FED DOMESTIC HOT WATER

INSTALLATION AND SERVICING INSTRUCTIONS



Cat II 2H 3P appliance

GC NUMBERS

Greenstar ZWBR 7-25 A23 (N.G.) 47 311 44

Greenstar ZWBR 11-25 A31 (L.P.G.) 47 311 45



THIS APPLIANCE IS FOR USE ON SEALED PRIMARY SYSTEMS ONLY

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 Regulations

Gas Safety (Installation & Use) Regulations 1998: All gas appliances must be installed by a competent person. Failure to install correctly could lead to prosecution.

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

The appliance must be installed in accordance with the current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) (Consolidation), bye-laws of the local Water Company, Health and Safety Document 635 (Electricity at Work Regulations 1989) and any other local requirements.

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 the installer to avoid any risk by using only quality approved branded fittings.

The relevant British Standards should be followed i.e.

- BS 6798 Specification for the installation of gas fired hot water boilers of rated input not exceeding 60kW
- 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: Flues
- BS 5440:2 Flues and ventilation for gas appliances of rated input not exceeding 60kW: Air Supply
- BS 6891 Installation of low pressure gas pipework installations up to 28mm (R1).
- BS 7074:1 Code of practice for domestic heating and hot water supply.

These instructions must be followed.

2. Introduction

The appliance output of 25.3kW in the condensing mode is available for the heating system and up to 23.5kW for the domestic hot water with the domestic hot water having the priority. An automatic hot water pre-heat facility is available to give an almost instant supply of hot water at the tap or shower.

The appliance is supplied for use on a sealed system only and is not suitable for external installation. It must be connected to a governed metered gas supply. It is dispatched suitable for use on Natural Gas.

It is a room sealed appliance and does not require a separate combustion air supply – because of the low casing losses ventilation are not required when the appliance is installed in a cupboard or compartment.

Do not block the specified space left for servicing.

An electrical supply failure will stop the appliance. Normal operation will resume upon the restoration of the supply.

A standard 100mm flue system is available for horizontal flues upto 2m.

Multi-directional flue systems are available up to 10m vertical and 8m horizontal. A twin-pipe system is available.

An integral fascia display shows the central heating flow temperature or a fault condition of the appliance. Comprehensive safety features are standard as is an automatic ignition system. The use of a pre-mixed burner gives a very low NO_x discharge level.

Do not run the appliance in the waterless condition.

The condensing mode gives very high efficiency figures which can be utilised fully by sizing the system to match the condensing parameters i.e. low temperature radiators. However the appliance will operate at normal flow temperatures when required to do so and still maintain high system efficiencies.

To ensure that the appliance gives the best performance possible it is recommended that an outside temperature compensator (Junkers TA211E) and a twin-channel digital programmer (Junkers EU2D) are fitted.

Full installation and operating instructions are packed with the controls.

Check that no dirt is left in either the gas or water pipework as this could damage the appliance. Thoroughly flush the heating system and mains water supply in accordance with the recommendations of BS 7593:1992.

The heat exchanger is manufactured from aluminium and only compatible flushing agents shall be used.

A link is provided to allow flushing of the system before the appliance is hung on the mounting manifold.

Purge the gas supply before finally connecting the appliance.

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.

The boiler, when in use, will operate at high efficiency emitting a white plume of condensation from the flue terminal.

Positions that might cause a nuisance should be avoided.

A condensate drain and syphon is provided on the appliance.

Take special note of the requirements for the drainage of condensate.

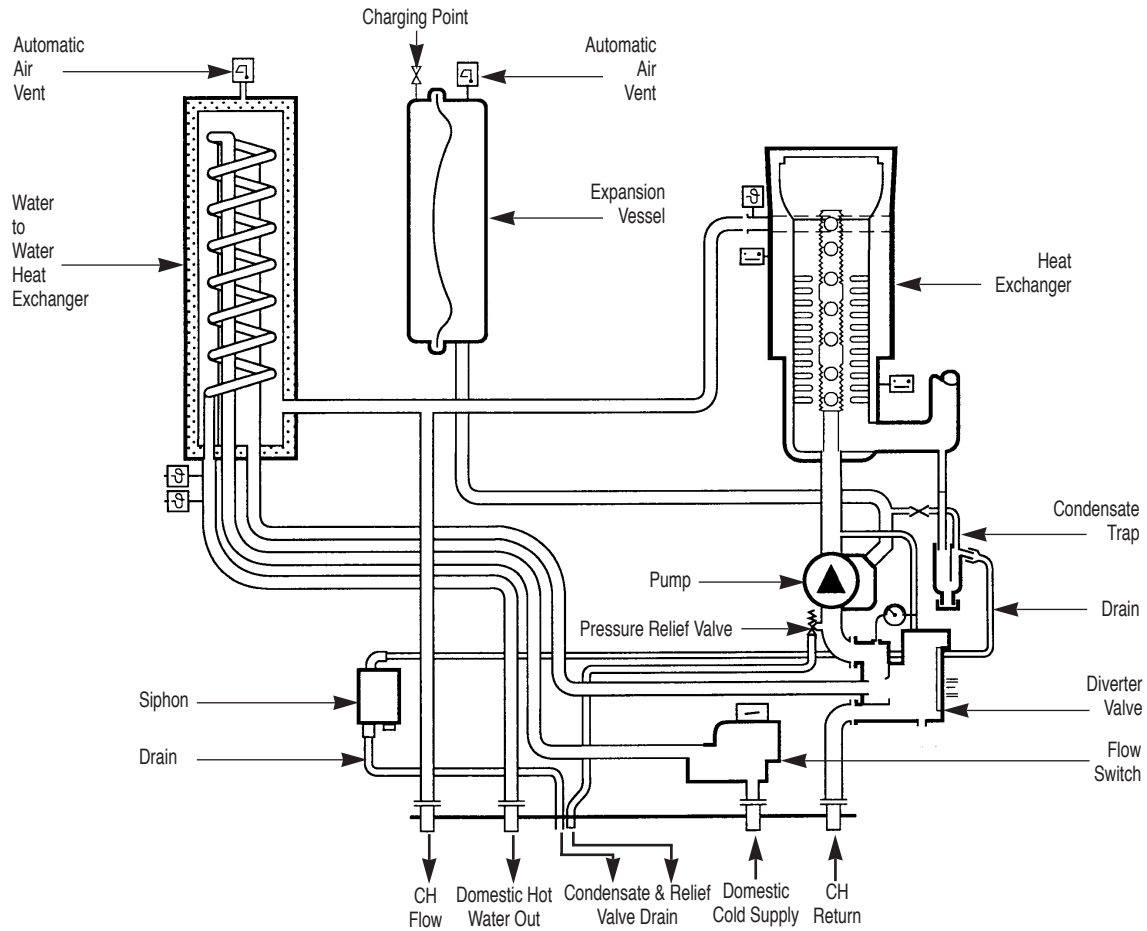
The advice and instructions in this document covers, as far as possible, the foreseeable situations which may arise. Contact Worcester Heat Systems for advice on specific installations.

LPG Installation

The appliance shall not be installed in a room or internal space below ground level when it is intended to be used 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.

Asbestos or asbestos based products are not used on this appliance nor in the manufacturing process.

Fig. 1. Appliance water flow diagram.



3. Technical Data

Table 1

NOMINAL BOILER RATINGS					
SETTING	FLOW TEMPERATURE °C	RETURN TEMPERATURE °C	OUTPUT kW	INPUT kW (Net)	GAS RATE-NG m ³ /h
MAXIMUM	80	60	23.0	24.0	2.54
	50	30	25.3	24.0	2.54
MINIMUM	80	60	6.7	7.2	0.762
	50	30	7.7	7.2	0.762

Table 2

APPLIANCE DIMENSIONS, WEIGHT & CONNECTIONS			
Height	mm	Casing	850
		Overall	1065-1165
Width	mm		512
Depth	mm		*360
Weight	kg	Installation	74
		Full	90
		Inc. Packing	76
Central Heating		Flow/Return	22mm comp.
Domestic Hot Water		Inlet/Flow	15mm comp.
Gas Inlet			R ³ / ₄

NOTE: Net Input = Gross Input x 0.901 - Natural Gas

* Wall-mounting frame depth 30mm

Table 3

HORIZONTAL 100mm				
Overall Diameter of Duct	mm	100		Max. 2m
Flue Terminal/Duct Assembly Length	mm	600	Part No. 7 719 001 885	
Extension Duct Length	mm	1000	Part No. 7 719 001 888	

ALTERNATIVE HORIZONTAL 125mm FLUE SYSTEM

Overall Diameter of Duct	125mm			
ACCESSORIES				
Extension Flue Kit 100mm	Part No. 7 719 001 892			
Vertical Adaptor				
90° Elbow	Part No. 7 719 001 891			
45° Elbow	Part No. 7 719 001 899			
125MM STANDARD FLUE KIT comprises:				
1 x Flue turret Elbow	} Part No. 7 719 001 890			
670mm of Flue Duct				
(as measured from the centre of turret)				

VERTICAL BALANCED FLUE KIT comprises:			
1 x 1 Flue Terminal Assembly	} Part No. 7 719 001 890		
1 x Vertical Adaptor			
ACCESSORIES			
Extension Flue Kit 100mm	Part No. 7 719 001 892		
90° Elbow	Part No. 7 719 001 891		
45° Elbow	Part No. 7 719 001 899		

Note: The roof flashing is not supplied by Bosch.

Table 4

PUMP HEAD & PRIMARY FLOW				
BOILER OUTPUT kW	AVAILABLE HEAD m	NOMINAL SYSTEM FLOW RATE l/min	TEMPERATURE RISE ACROSS THE SYSTEM °C	BOILER FLOW TEMPERATURE °C
23.5	2	20	20	80
25.3	2	16-18	20	50

Table 5

FLUE GAS AND CONDENSATE DATA			
Flue Gas, Mass Flow	kg/h	Max.	38.5
		Min.	11.5
Flue Gas Temperature	°C	Max.	71
		Min.	62
Flow 80°C Return 60°C			
Flue Gas Temperature	°C	Max.	36
		Min.	32
Flow 50°C Return 30°C			
Condensate Volume	l/h	Max.	2.2
		Min.	0.94
Return 30°C			
Condensate	pH	Nominal	4.1
CO ₂	%	Min, = Max.	9.3 - 9.7
NOx			Class 5

Table 6

CENTRAL HEATING			
Heat Output	80/60°C kW	Max.	23.5
		Min.	6.7
Heat Output	50/30°C kW	Max.	25.3
		Min.	7.7
SEDBUK No.	BAND A		91.3

Note: To gain maximum benefit from the performance of the appliance the radiators must be sized according to the Flow/Return temperatures.

Table 7

Factory Setting			
Pump Control Mode	2		
Anti-Cycle Time	min	3	
Maximum CH Temperature	°C	80	
Thermostat Temperature Differential	°C	8	
Maximum CH Output	kw	23.0	standard
		25.3	condensing
Minimum CH Output	kw	6.7	standard
		7.7	condensing

Table 8

Total length of gas supply pipe (metres)			Pipe diameter (mm)
3	6	9	
Gas Discharge Rate (m ³ /h)			
8.7	5.8	4.6	22
18.0	12.0	9.4	28

Table 9.

EXPANSION VESSEL PRESSURE & SYSTEM CAPACITY			
Expansion Vessel	litres	10	
Expansion Vessel Charge Pressure	bar	0.75	
System Capacity	1 bar	litres	82
	Ref. BS 7074:1	1.5 bar	litres

Table 10

DOMESTIC WATER PERFORMANCE			
Domestic Water Flow Rate l/min	Temperature Rise	30°C	11.1
	Temperature Rise	35°C	9.5
	Temperature Rise	40°C	8.4
Maximum Mains Pressure	bar	8.0	
Minimum Mains Pressure	bar	0.2	

4. Siting the Appliance

The appliance is not suitable for external installation.

The appliance may be installed in any room subject to the requirements of the IEE Wiring Regulations or the electrical provisions of the Building Regulations applicable in Scotland relevant to appliances fitted in rooms containing baths or showers. It must not be possible for anyone using the bath or shower to touch any control using mains electricity.

No special wall protection is required. Ensure that the wall can support the appliance. Refer to the IGE publication "Guide for Gas Installations in Timber Framed Housing" where appropriate, IGE/UP/7:1998.

The specified clearances must be available for installation and servicing. Refer to Fig. 2 and 3.

The appliance can be installed in a cupboard/compartment to be used for airing clothes providing that the requirements of BS6798 and BS45440:2 are followed. The low casing losses from the appliance eliminate the need for ventilation openings in the compartment.

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

The clearance between the front of the appliance and the cupboard or compartment door should not be less than 75mm.

The pipe connection positions on the manifold are shown in Fig.4 and on the wall template allowing the system to be pre-piped and flushed before the appliance is fitted.

Always consider the possibility that the pipes may need to be separated from the appliance after installation.

5. Flue Systems

The only flue systems that may be used are those sold by Bosch. The flue system must be installed in accordance with the requirements of BS5440:1.

Standard 100mm flue system.

The standard concentric flue system provides for a horizontal length of upto 2m. Full instructions for fitting this flue are in Section 12 Installation.

Alternative 125mm diameter flue systems.

Systems are available to give a maximum horizontal length of 8m (this system requires a greater clearance above the appliance. Refer to Fig.3.) A vertical flue system upto a height of 10 metres is available.

NOTE: A 100mm vertical flue systems will be available in the future.

Installation instructions for the alternative flue systems are sent with the appropriate flue kit.

IMPORTANT: The horizontal flue system fitted to a condensing boiler must incline towards the appliance at an angle of $2\frac{1}{2}^\circ$ (44mm per metre length) to prevent condensate dripping from the flue terminal. This means that the clearance above the appliance must be increased to match the duct length.

Fig. 2. Casing dimensions and clearances.

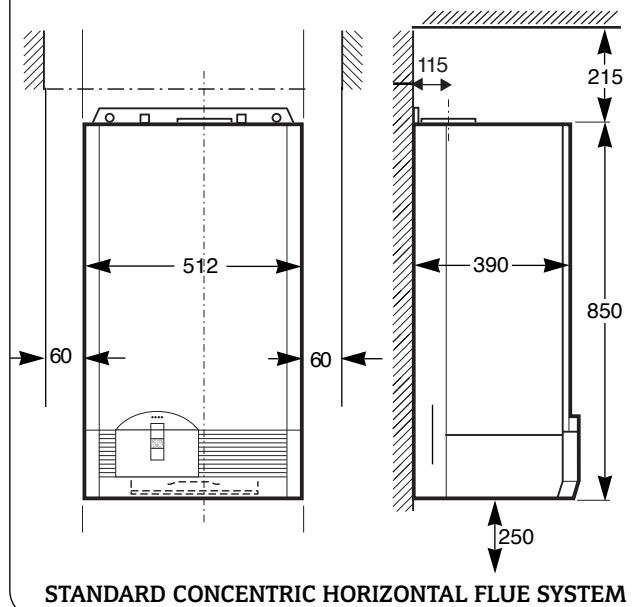


Fig.3. Casing dimensions and clearances.

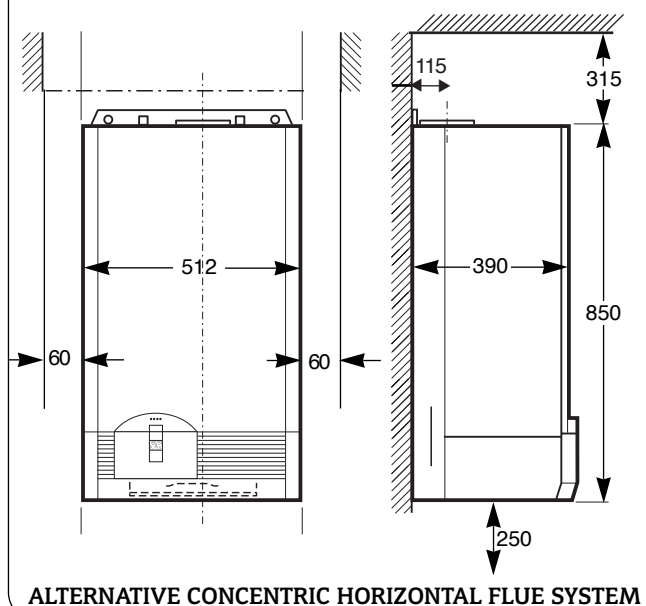
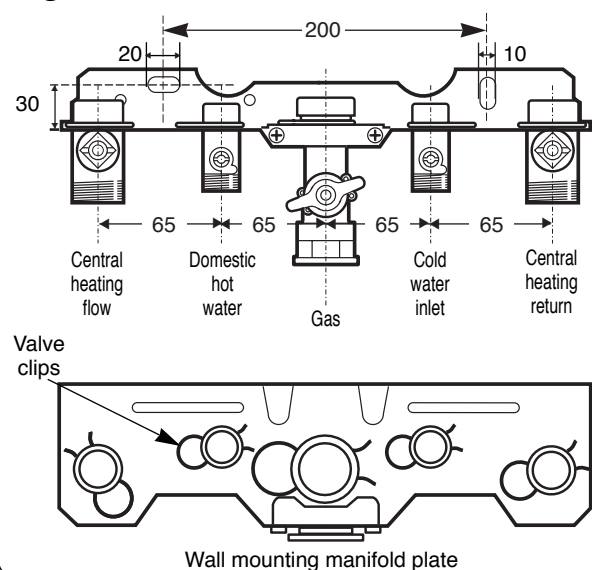


Fig. 4. Manifold connections.



6. Siting the Flue Terminal

The flue must be installed in accordance with BS 5440:1 and the Building Regulations.

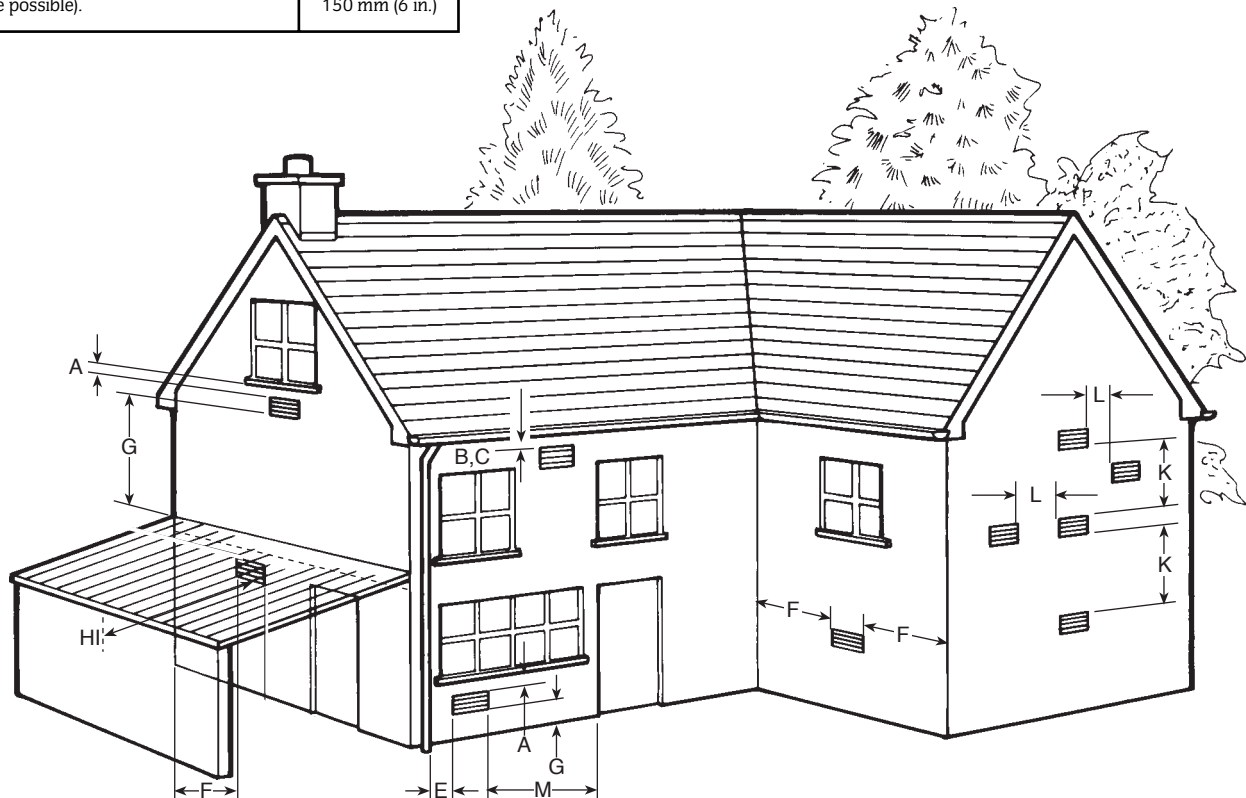
The terminal must be positioned so that it does not cause an obstruction or the combustion products a nuisance. See Fig.5.

The terminal will, at times, give out a plume of water vapour and consideration must be given to this when choosing a terminal position. Keep clear of security lighting, activated by passive infra-red sensing heads.

If the terminal is within 1m of a plastic or painted gutter or within 500mm of painted eaves then an aluminium shield at least 750mm long should be fitted to the underside of the gutter or painted surface.

Fig. 5. Acceptable terminal positions.

TERMINAL POSITION	MIN. DISTANCE
A- Directly below an openable window or other opening e.g. air brick.	300 mm (12 in.)
B- Below gutters, soil pipes or drain pipes.	75 mm (3 in.)
C- Below eaves.	200 mm (8 in.)
E- From vertical drain pipes and soil pipes.	75 mm (3 in.)
F- From internal or external corners.	300 mm (12 in.)
G- Above ground, roof or balcony level.	300 mm (12 in.)
H- From a surface facing a terminal.	600 mm (24 in.)
I- From a terminal facing a terminal	1200 mm (47 in.)
K- Vertically from a terminal on the same wall.	1500 mm (59 in.)
L- Horizontally from a terminal on the same wall.	300 mm (12 in.)
M- From door, window or air vent (achieve where possible).	150 mm (6 in.)



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 with a space of 50mm in each direction and fixed with plated screws.

A guard, can be obtained from Tower Flue Components, Vale Rise, Tonbridge TN9 1TB.

7. Gas Supply

The appliance requires 2.54m³/h of natural gas. The gas meter and supply pipes must be capable of supplying this quantity of gas in addition to the demand from any other appliances being served.

The meter governor should deliver a dynamic pressure of 20 mbar at the appliance, equivalent to a pressure of about 18.5 – 19mbar at the gas valve inlet.

Where LPG is used, following conversion from Natural Gas, then a dynamic inlet pressure of 37mbar at the inlet to the appliance is required. Equivalent to a pressure of about 34.5 – 35mbar at the gas valve inlet.

The complete installation, including the meter, must be tested for soundness and purged. See BS 6891.

8. Air Supply

A separate air supply for combustion is not required.

If the appliance is in a cupboard or compartment then, because of the low casing losses, it is not necessary to have additional ventilation for the boiler.

The specified clearances around the appliance must be maintained to allow the free movement of the air. Refer to Fig.2,3.

Note: In order to prevent corrosion the air for combustion must not contain corrosive substances such as solvents, paints, adhesives, household cleaners etc. The combustion air should be dust free to reduce the risk of the pre-mix burner becoming blocked.

9. Sealed Systems

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

The expansion vessel has a volume of 10 litres and is charged to a pressure of 0.75 bar.

The water capacity of the system is shown in Table 9. If a greater capacity is required then an additional expansion vessel must be fitted into the system return as close to the appliance as possible. The system pressure can be set up to a maximum of 1.5 bar with 1 bar being the normal setting.

If the system pressure is greater than 2.5bar when the appliance is operating at maximum temperature then an additional expansion vessel must be fitted into the system return as close to the appliance as possible.

The filling point must be at low level and arranged as shown in Figs. 6 and 7

The pressure relief valve is set to operate at 3 bar.

There must be no connection to the mains without the approval of the local water company. All connections in the system must be capable of withstanding a pressure of up to 3 bar and the radiator valves conform to the requirements of BS 2767:10.

If Thermostatic Radiator Valves are fitted then it is recommended that one radiator is left open.

Repeated venting probably indicates a leak and this must be rectified to ensure the proper operation of the appliance.

No galvanised radiators or pipes must be used.

If any system water treatment is required then only Sentinal X100 shall be used, in accordance with the manufacturers instructions. The use of any other substances will invalidate the guarantee. The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.

A drain cock to BS2879 must be fitted to the lowest point of the system.

IMPORTANT: Check that no dirt is left in the water pipework as this could damage the appliance. Thoroughly flush the heating system and the mains water supply before fitting the appliance to the wall in accordance with the recommendations of BS7593:1992.

Fig. 6. Sealed primary water system.

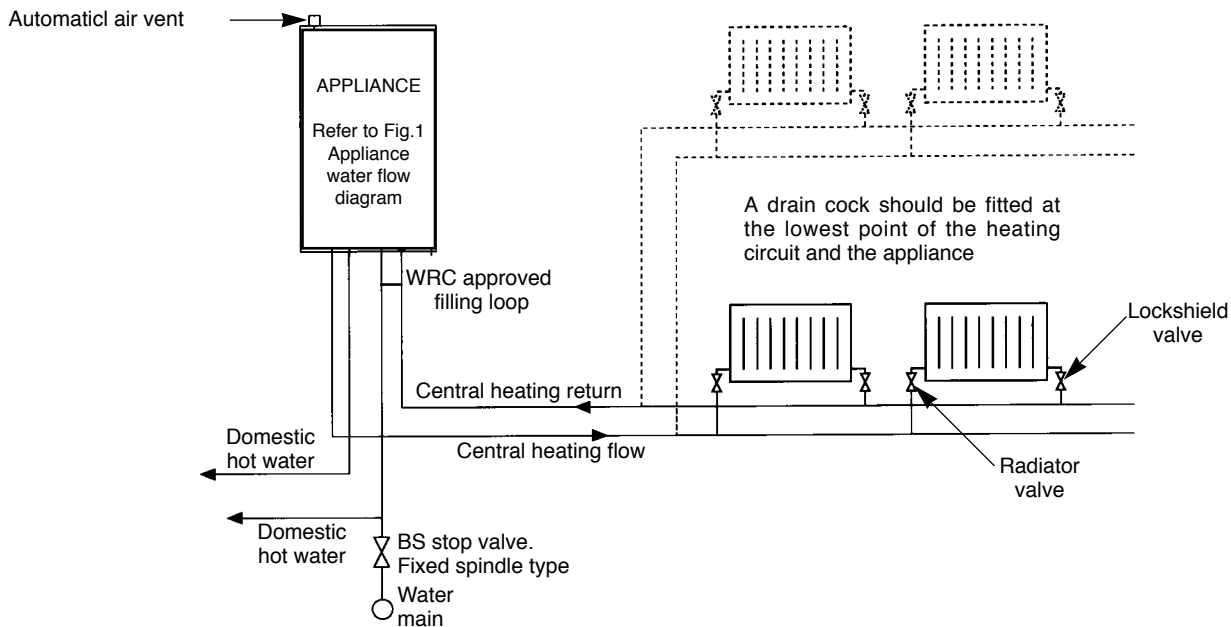
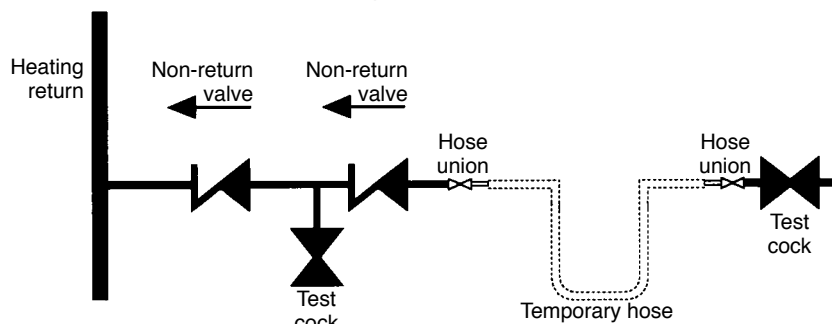


Fig. 7. Sealed primary water system – filling method.



10. Domestic Hot Water

Any regulations specified by the local water company must be observed.

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

The appliance is suitable for a mains supply having a maximum pressure of 8 bar. A pressure reducing valve must be fitted, if necessary.

The hot water outlet temperature is set to be capable of operating between 40 - 60°C. When operating normally the boiler operates occasionally to maintain an 8 litre heat store at this temperature ensuring that hot water is available at the tap or shower almost immediately it is required. The maximum temperature and the frequency of the recharge of the heat store may be reset.

The maximum water flow rate is factory set at 9.5l/min to give temperature rise of 35°C. If a higher rise is required then the flow must be reduced at the tap and the discharge temperature will rise up to the maximum set figure.

The temperature rise, upto the maximum set by the user, is automatically maintained by the modulation of the heat input.

In winter, when the mains temperature is very low, the water flow, adjusted at the tap or shower, should be reduced to maintain the required delivery temperature.

It is suggested that long pipe runs to taps or showers be insulated to prevent the rapid cooling of the water.

All types of single lever mixer taps and thermostatic mixer units suitable for a mains pressure of up to 8 bar can be used.

The head of a loose-head shower must not be allowed to fall within 25mm of the top the bath to prevent the risk of water being drawn back into the mains. Alternatively the shower must be fitted with an anti-syphonage device at the point of the flexible hose connections.

Over-rim bidets may be connected to the appliance provided that it is in accordance with the requirements of the local water company. The outlet(s) should be shrouded and unable to have any temporary hand held spray attached. No anti-syphonage arrangements are necessary.

In exceptionally hard water areas a device to prevent scale formation may be fitted or, alternatively, the maximum temperature reset to about 45°C which may reduce the risk of scale formation. The installation of a scale inhibitor assembly should be in accordance with the requirements of the local water company. Artificially softened water must not be used. An isolating valve should be fitted to allow for servicing.

Devices capable of preventing the flow of expansion water must not be fitted unless separate arrangements have been made.

A Zilmet Z160 expansion vessel is the preferred type. A thread sealant compatible with potable water must be used.

11. Electrical

Supply: 230V ~ 50Hz 140 watts. External fuse 3A. Protection IPX4D.

Mains cable: PVC insulated 0.75mm² (24 x 0.20mm) to BS 6500-Table 6. Temperature rated 100°C.

It must be possible to isolate the appliance
The appliance must be earthed.

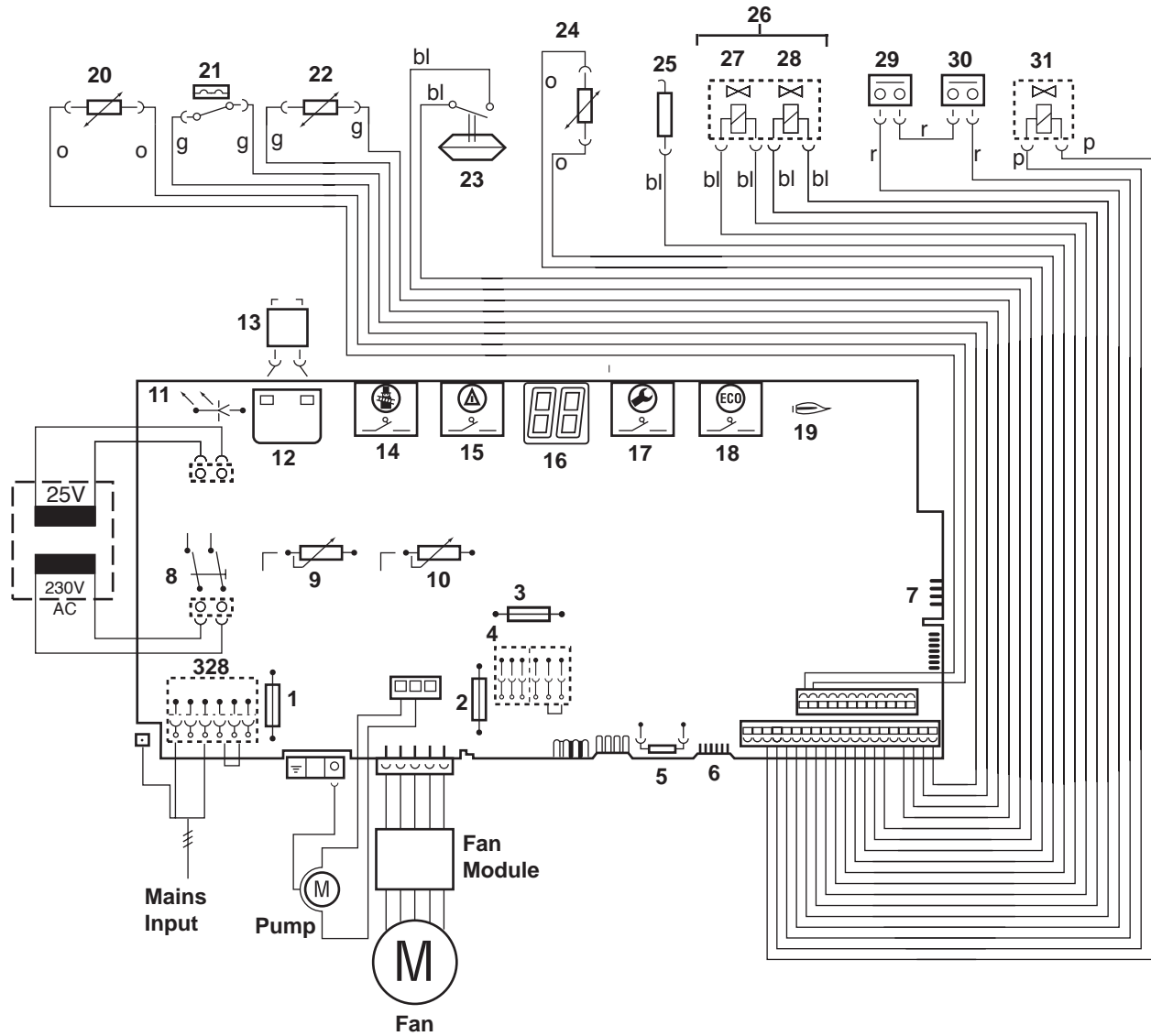
The appliance must be connected to the mains through a 6A double pole isolator with a contact separation 3mm in all poles and supplying the appliance and controls only. The wiring must comply with the current requirements of the IEE Wiring Regulations and any local regulations which apply.

To gain access to the mains connection remove the drop down facia cover. The drop down cover is removed by lowering it to the horizontal position and pushing firmly upwards at the rear of the supports to release the cover. Lift cover from the appliance. Remove the facia connection cover. Refer to Fig.

After installation (or in the event 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. Pictorial wiring diagram.

o - orange g - green bl - black r - red p - purple



- | | | | |
|----|----------------------------|----|-------------------------------------|
| 1 | Fuse 2.5A, 230V AC | 20 | DHW temperature sensor |
| 2 | Fuse 0.5A | 21 | Water pressure switch (flow switch) |
| 3 | Fuse 1.6A | 22 | DHW inlet sensor |
| 4 | Control unit connection | 23 | Air flow switch |
| 5 | Key Plug | 24 | CH flow temperature sensor |
| 6 | TA 211E control connection | 25 | Flame sense electrode |
| 7 | Time switch connection | 26 | Gas valve |
| 8 | On/off switch | 27 | Gas solenoid valve No.1 |
| 9 | CH temperature | 28 | Gas solenoid valve No.2 |
| 10 | DHW temperature control | 29 | Flue gas temperature limiter |
| 11 | Power on indicator | 30 | Overheat temperature limiter |
| 12 | Ignition transformer | 31 | Diverter valve solenoid |
| 13 | Ignition electrodes | | |
| 14 | Setting button | | |
| 15 | Reset button | | |
| 16 | Display | | |
| 17 | Service button | | |
| 18 | ECO button | | |
| 19 | Burner indicator | | |

12. Installation

The standard 100mm diameter horizontal flue system is suitable for lengths up to 2m.

Flues up to 670mm do not require an extension duct assembly.

Flues between 670mm and 1620mm require 1 extension duct assembly.

Flues between 1620mm and 2000mm require 2 extension duct assemblies.

NOTE: Flue lengths between 670mm and 730mm cannot be accommodated.

Refer to Fig.F1,F2 and F3.

Standard system comprise:

Flue turret - Flue turret clamp - Terminal assembly - Wall sealing plates.

Extension kit comprises:

Air duct - Flue duct - Duct clamp.

Refer to Fig.F4.

Fig. F1. Standard Flue.

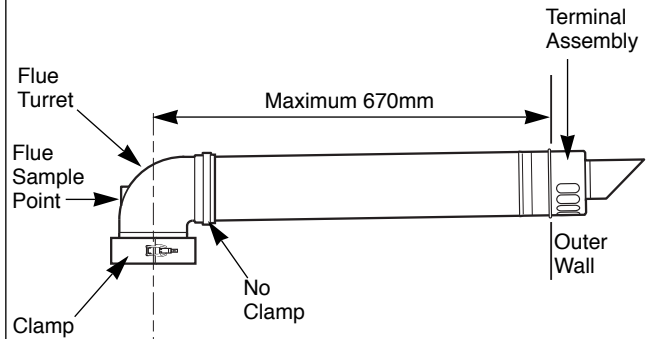


Fig. F2. Flue with One Extension .

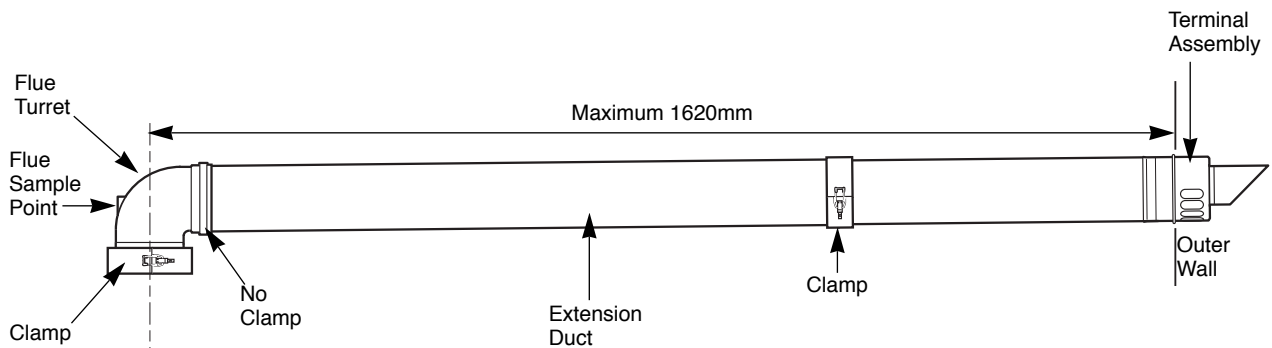


Fig. F3. Flue with Two Extensions .

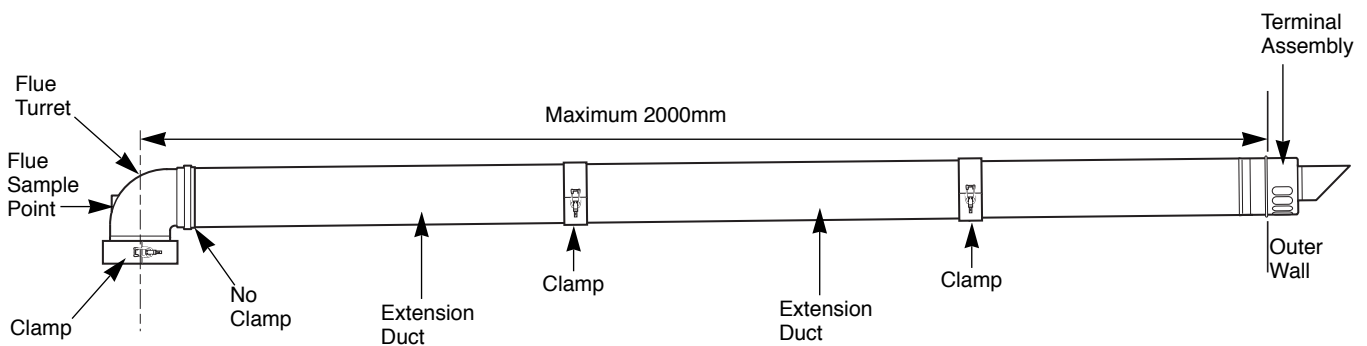


Fig. F4. Flue Components.

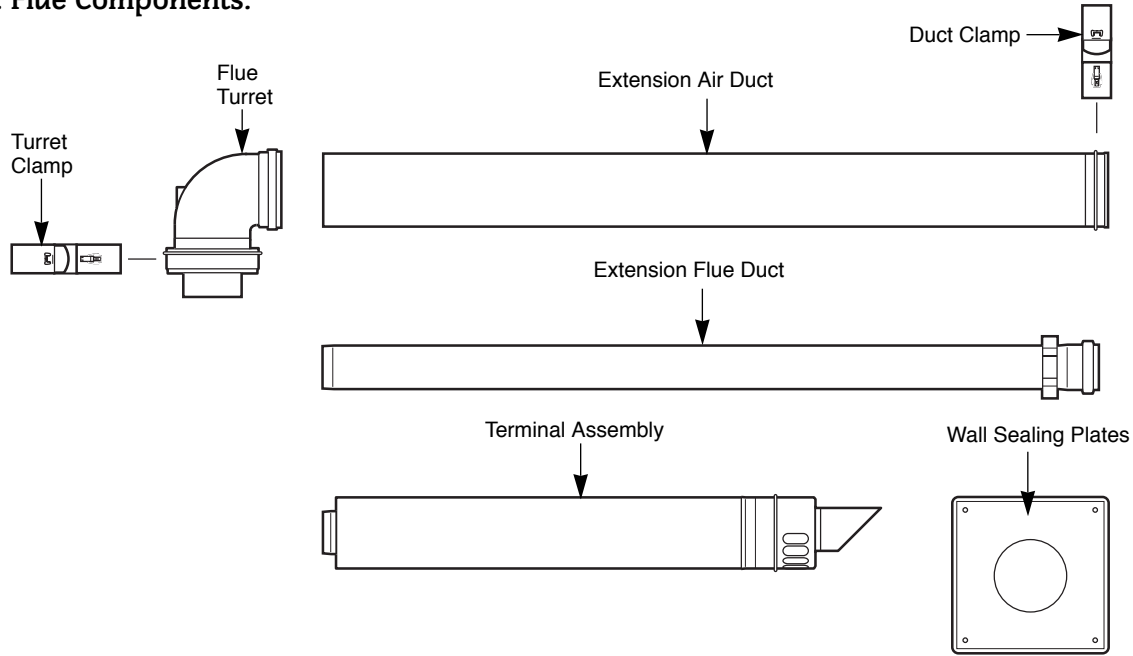
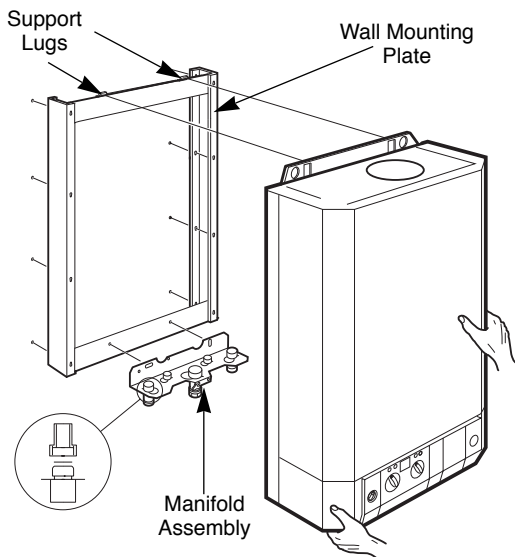


Fig. 9. Wall mounting assembly.



The fitting of this flue system is described later in the installation process.

Instructions for fitting other flue systems are packed with the relevant flue kit.

NOTE: The 125mm diameter horizontal flue system to be used for lengths between 2m and 8m requires a clearance of 365mm above the appliance casing to accommodate the rise in the flue over the full length.

Check that the position chosen for the appliance is satisfactory. Unpack the appliance.

A wall mounting plate and manifold assembly are supplied in a separate pack to allow the pre-installation connection to the system and flushing.

NOTE: The wall-mounting assembly is not absolutely necessary if a side flue is to be fitted. The wall to flue centre-line dimension will reduce to 85mm. Refer to Fig. 10.

Fix the wall mounting assembly together using the screws supplied to secure the top and bottom cross-members. Refer to Fig. 9.

Ensure that the top section has the support lugs facing upwards and outwards.

Fig. 10. Marking the position of the side flue opening.

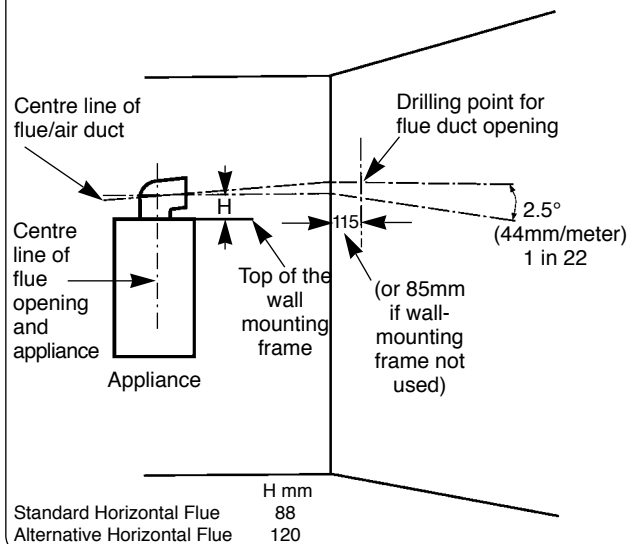


Fig. 11. Manifold connections.

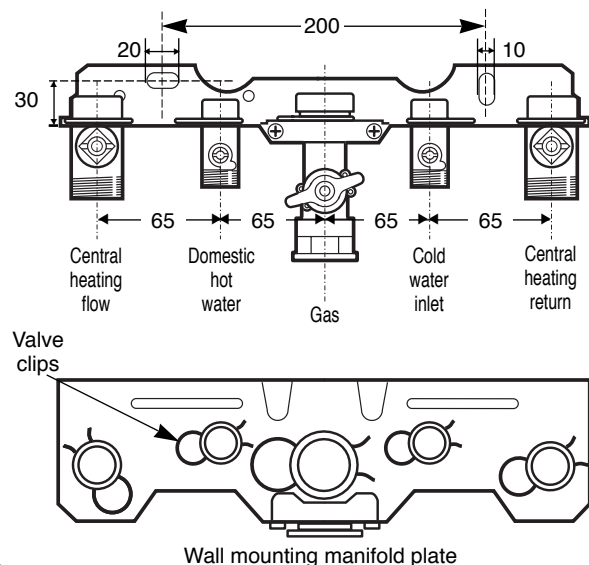


Fig. 12. Removal of casing

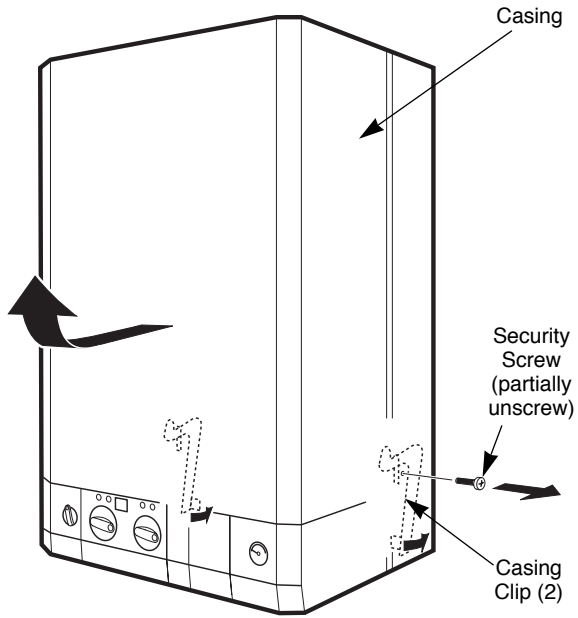
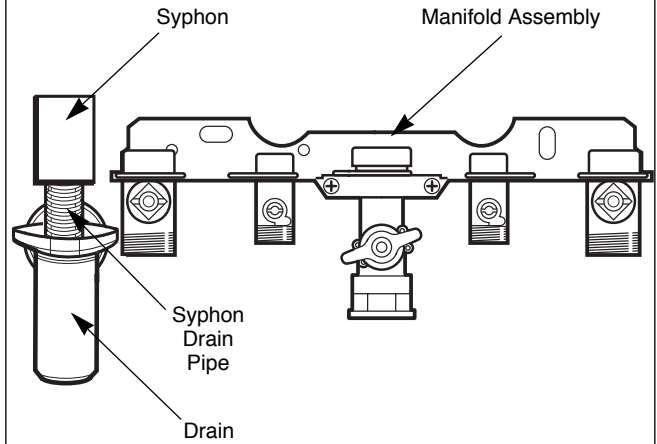


Fig. 13. Condensate discharge system.



NOTE We should state that:

Although the Tundish is supplied, it may be more suitable to connect directly to the 3/4" connection on the syphon with the plastic pipe supplied.

Fig. 14. Inner Casing Controls / Components.

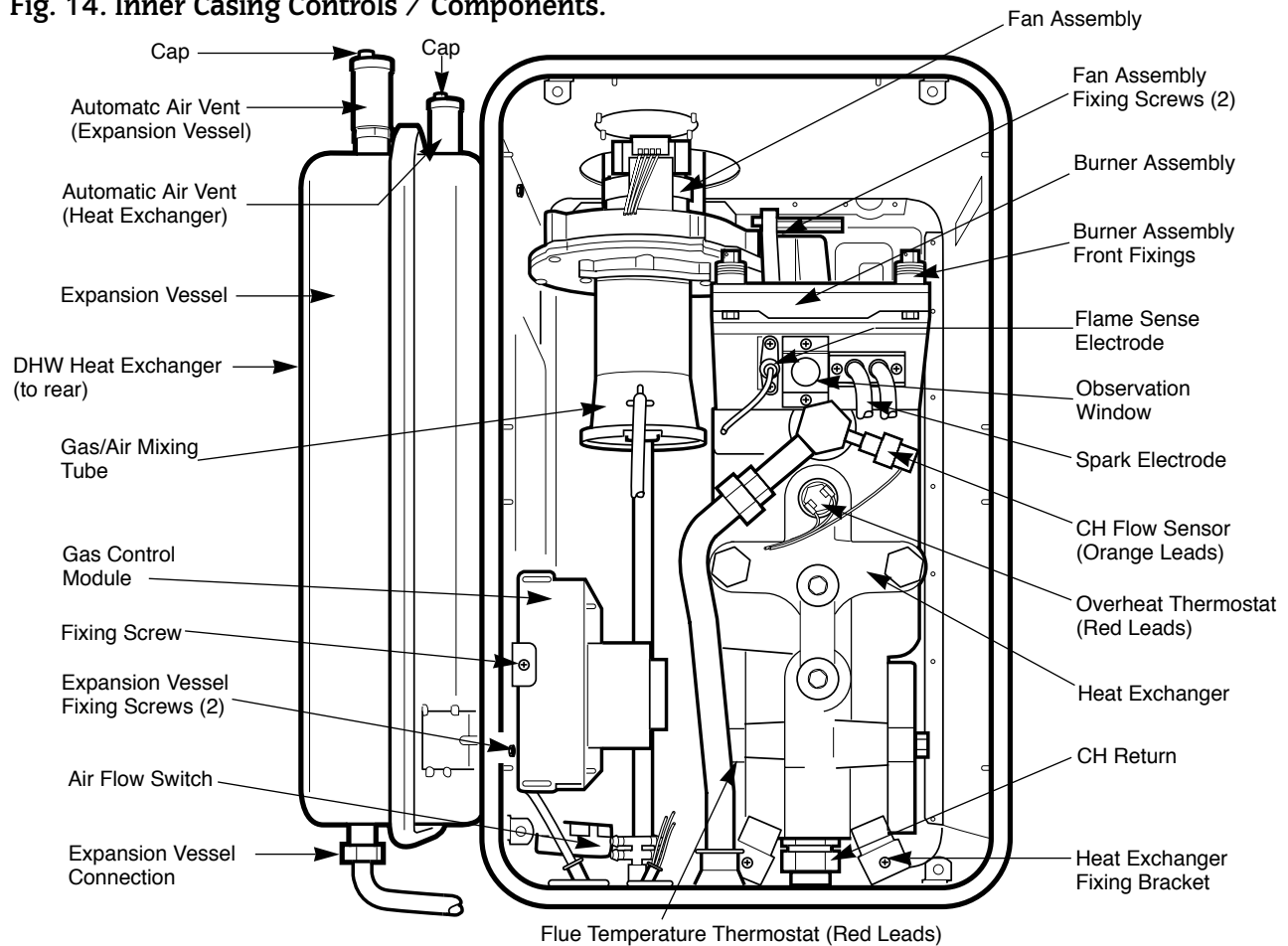
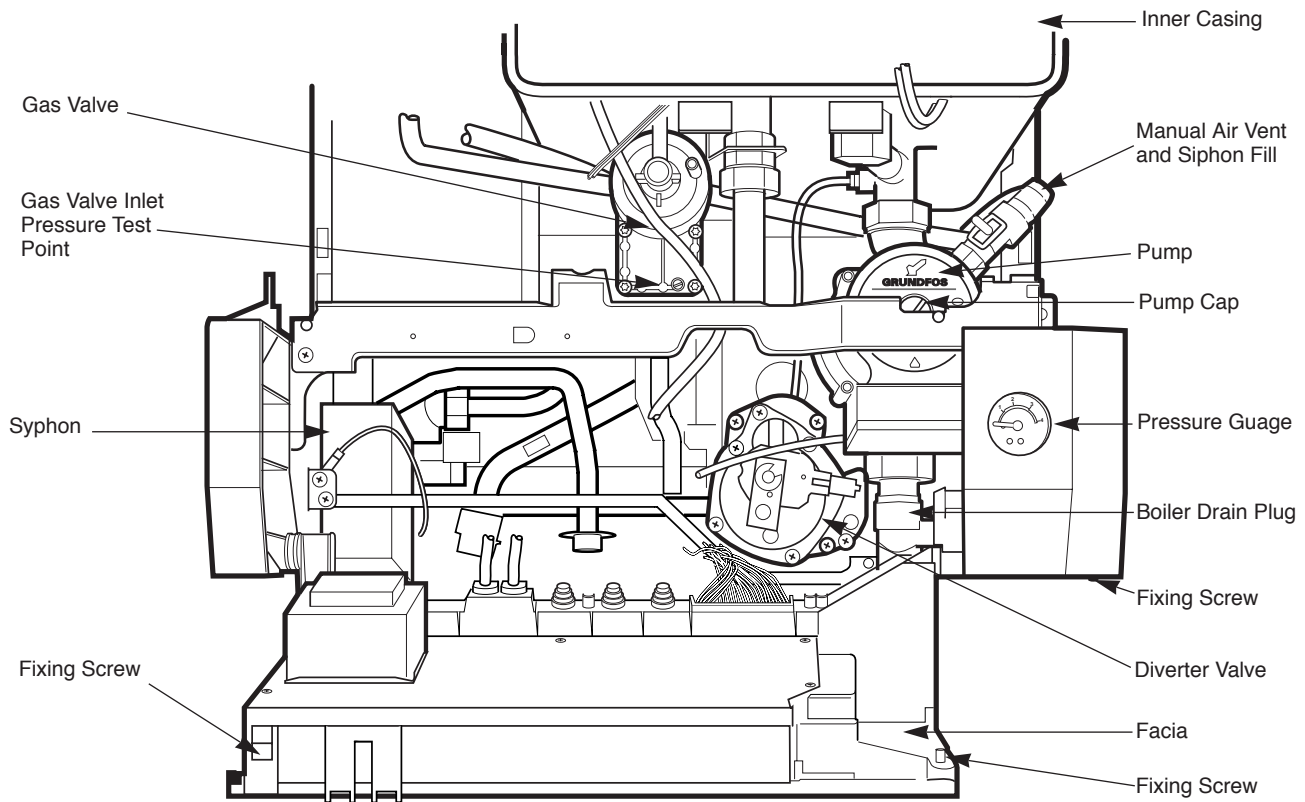


Fig. 15. Lower Controls / Components.



Using the template or the wall mounting plate mark the positions of the fixing holes and the position of the rear, if applicable, flue.

Drill, plug and fix the wall mounting plate to the wall. Fix the manifold assembly to the wall mounting plate. Refer to Fig.9.

Mark the position of the flue opening if a side flue is to be used. Refer to Fig.10.

The manifold assembly is supplied assembled with the water valves in the positions shown in Fig.11 and fixed with the clips provided. Fix a connection to the gas cock. Refit the gas cock and clip, secure in position with the screwed clamp.

Drill a hole 180mm diameter through the wall for the rear or side flue assembly.

NOTE: The flue system must incline $2\frac{1}{2}^\circ$

(44mm/metre length) towards the appliance to prevent condensate dripping from the flue terminal. The diameter of the hole required for the alternative flue system can be found in the instructions sent with the flue kit.

The heating system and the domestic water pipes can now be connected if not already done so. Do not fix the pipes rigidly to the wall as some movement of them must be retained. A flexible link is provided to allow the flushing of the system.

NOTE: The domestic water inlet and delivery valves are not positively fixed. When tightening connections ensure that the shut-off control faces forward.

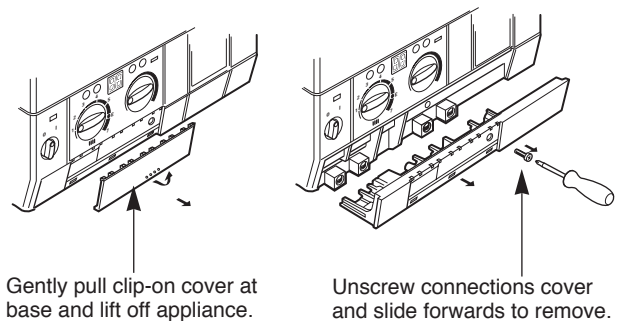
Fix a WRc approved filling loop in the central heating return as close as possible to the appliance.

Connect the gas supply pipe to the appliance.

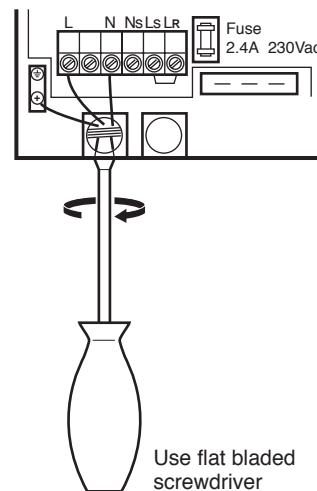
Condensate Discharge

Fix the condensate discharge system. See Fig.13. A tundish condensate and relief valve drain fitting is provided. Refer to the Building Regulations and the CIBSE Guidelines, where applicable, for details of the allowable condition of condensate discharge.

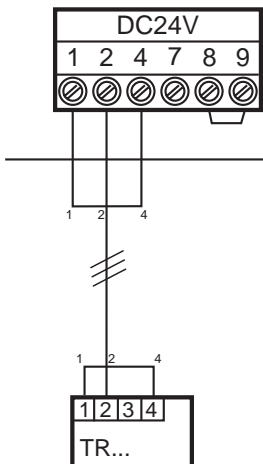
Fig. 16. Access cover and electrical connections.



Mains Connection



Heater Control Unit Connection



A condensate neutralisation kit is available. The condensate drain pipe and fittings must be made of plastic (NO OTHER MATERIALS SHALL BE USED) with a minimum diameter of 22mm.

The minimum fall for the drain pipe from the open tundish is 2.5° (1 in 20). Where it is not practical to terminate a condensate drain over a gully then an additional trap should be provided prior to any connection to a soil and vent pipe (discharge pipe) or waste pipe (branch discharge pipe).

Any connection to a waste pipe should be downstream of the appliance trap to prevent any household waste blocking the condensate drain or causing back flow or back pressure on the appliance.

Remove the security screw from the right-hand side of the casing. Refer to Fig.12

Remove the cabinet by pressing both levers backwards to release and lift off the cabinet. See Fig.12.

Hang the appliance onto the wall.

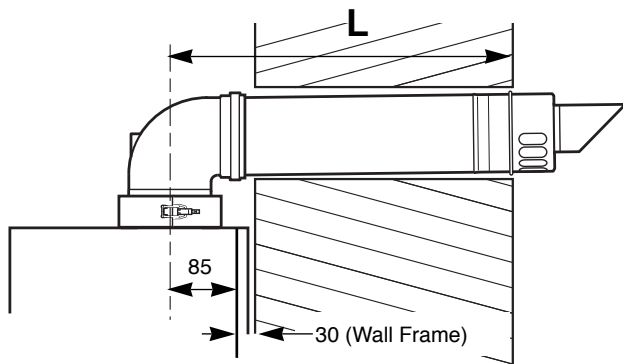
Fit the fibre washers to the gas and water connections on the manifold.

Tighten the service connections.

Flue duct preparation and assembly

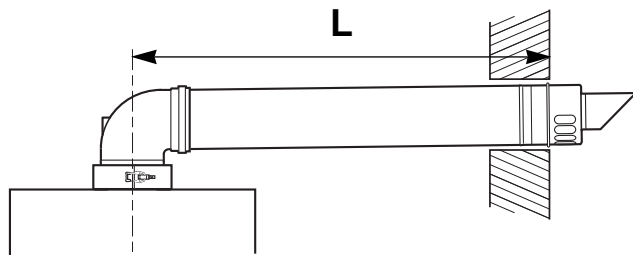
Measure the flue length L. Refer to Fig. F5 and F6.

Fig. F5. Flue length – rear



NOTE: THE FLUE MUST BE INCLINED TO THE BOILER

Fig. F6. Flue length – side



NOTE: THE FLUE MUST BE INCLINED TO THE BOILER

Mark off the lengths shown onto the ducts and cut to length. The cuts must be square and free from burrs.

Terminal assembly outer (air) duct – L-70mm

inner (flue) duct – L-50mm

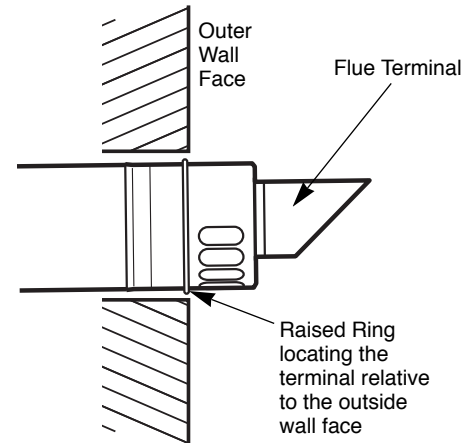
the measurement is made from the ridge at the terminal indicating the outer face of the wall. Refer to Fig.F7.

Extension air duct – L-70mm

flue duct – L-50mm

The measurement is from the formed end.

Fig. F7. Flue terminal position



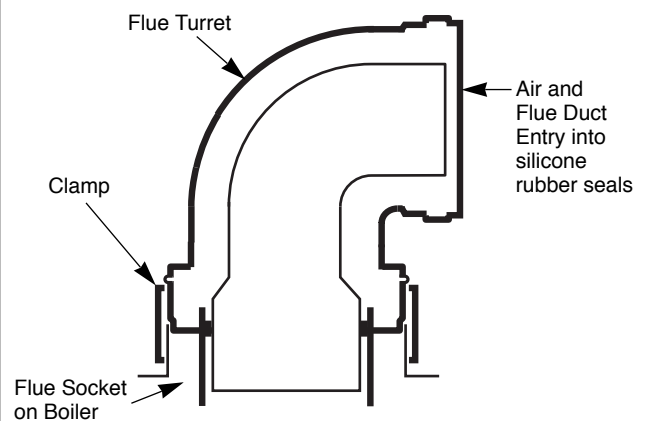
Assemble flue system completely. Push the ducts fully together and clamp in the positions shown in Fig. 2 and 3. The slope of the terminal outlet must face downwards.

The assembly will be made easier if a solvent free grease is lightly applied i.e. Vaseline, to the male end of the ducts.

NOTE: An inner wall sealing plate is provided which should be fitted to ducts before assembly.

Push the assembly through the wall and fix the turret to the appliance with the clamp. Refer to Fig.F8.

Fig. F8. Flue turret



Ensure that the turret is fully entered into the socket on the boiler. From outside fix the outer wall plate to the terminal and, after ensuring the duct is properly inclined towards the boiler, fix the plate to the wall.

If the terminal is within 2m of the ground where there is access then an approved terminal guard must be fitted. The guard must give a clearance of at least 50mm around the terminal and be fixed with corrosion resistant screws.

Connect a drain to the relief valve outlet ensuring that it does not discharge onto electric components or where it might be a hazard. The pipe must be not less than 15mm in diameter.

Make the electrical connections to the appliance through the cable clamps in the base of the appliance.

Remove the drop-down fascia cover by lowering it to the horizontal position and pushing firmly upwards at the rear supports to release the cover. Lift the cover from the appliance. Remove the clipped on-cover and unscrew the inner cover to expose the connectors. Refer to Fig.16.

Remove the automatic air vent cap. See Fig. 14. Check that all the gas and water connections on the manifold are tight.

Final Installation.

Replace the cabinet front panel.

Refer to Section 13 Commissioning, for a full description of the filling, venting and pressurisation of the system.

If the appliance is not to be commissioned immediately then check that the gas supply, the electrical supply and all the water connections are turned off.

If the premises are to be left unoccupied in very frosty conditions then drain any water from the appliance and the system

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

If the appliance is not to be commissioned immediately replace the cabinet. Turn off the gas, electrical and water connections.

13. Commissioning

The appliance is adjusted at the factory to give the settings shown in table 7.

If any changes are made to these settings they must be recorded on the commissioning label to be fixed to the appliance and in the relevant booklet.

The domestic hot water discharge temperature and the central heating flow temperature may be adjusted on the fascia to satisfy different conditions.

Domestic Hot Water

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 at the appliance and thoroughly flush.

Central Heating

Confirm that the central heating system has been fully flushed out at installation. If not then thoroughly flush the system using clean water if possible. Any additives must be compatible with aluminium heat exchangers.

The system water must not have a pH greater than 8 or the appliance guarantee will be rendered invalid. If any system water treatment is required then only products suitable for use with Aluminium shall be used i.e. Sentinel X100, in accordance with the manufacturers instructions. The use of any other substances will invalidate the guarantee.

Gas Service

The complete system, including the meter, must be inspected and tested for soundness and purged as described in BS 6891.

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

Check that any controls are in the off position.

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

Remove the cabinet by unclipping the two clips and lifting away. Refer to Fig.12.

Remove the automatic air vent caps. Refer to Fig.14.

Open the heating system valves on the manifold and all the radiator valves. Fill the system through the WRC approved filling connection to a pressure of about 1.5 bar and check for water soundness. Refer to Fig.6 and 7. The automatic air vents on the appliance will remove air from the appliance but each radiator must be vented separately. The manual air vent must be open to allow the venting of the appliance. Tighten the screw when venting is complete. Refer to Fig.15.

Fill the condensate trap by opening the manual air vent/siphon fill connection until water is discharged showing that the siphon is full. Refer to Fig.15.

Check that the pressure relief valve operates by, after removing the cap, turning the knob anti-clockwise until it releases and water is expelled from the discharge pipe. The relief valve is located beneath and behind the pump at the right-hand side.

Remove the plated cap from the pump and turn the shaft about half a turn using a flat blade screwdriver. Replace the cap. Refer to Fig.15.

Set the system pressure to 1bar by releasing water from the relief valve and, if necessary, the expansion vessel pressure.

The 10 L expansion vessel, supplied with a charge pressure of 0.75 bar (static head 7.5 metres), must not be at a pressure less than the static head of the system. A schraeider type valve is provided on top of the vessel if it is necessary to increase the charge pressure.

Refer to BS7074:1 and Table 9 for details of the allowable system capacity.

If the system volume is greater than that which can be accommodated by the expansion vessel on the appliance then an extra vessel must be fitted as close to the appliance as possible in the central heating return. It must be charged to the same pressure as the vessel in the appliance.

Connect a pressure gauge to the gas valve inlet pressure test point and open the gas tap. See Fig. 19.

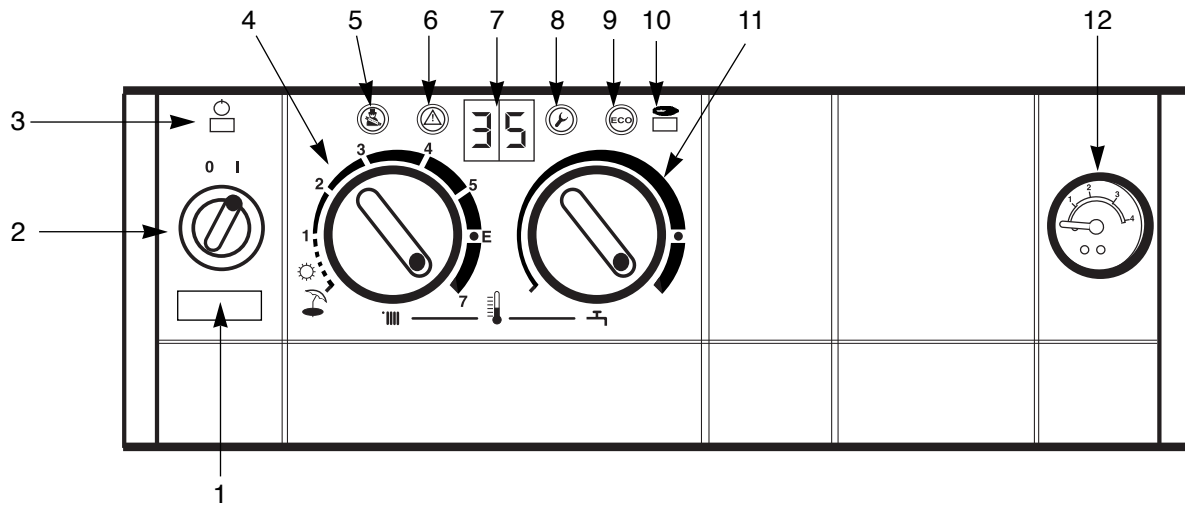
Set all the external system controls to on or maximum.

Set the central heating and domestic hot water control knobs to minimum. Check that the condensate trap and syphon are full (to prevent flue gas spillage).

The appliance must NOT be operated without the siphon being full.

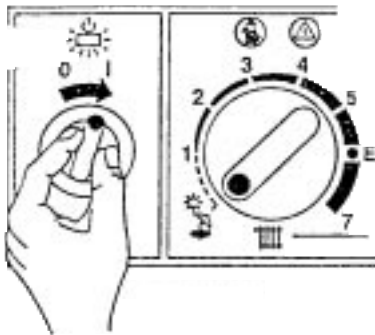
The instructions following describe the operation of the appliance.

Fig. 17. Facia.



- | | | | |
|---|---|----|-------------------------------------|
| 1 | Appliance identification sticker | 9 | 'ECO' button |
| 2 | Master switch | 10 | Indicator lamp for burner on |
| 3 | Indicator lamp for power on | 11 | Temperature control for DHW on ZWRB |
| 4 | Temperature control for CH flow | 12 | Pressure gauge |
| 5 | Setting button (also referred to as 'Chimney Sweep' button) | | |
| 6 | Reset button | | |
| 7 | Digital display | | |
| 8 | Service button | | |

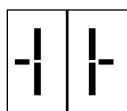
Switching on



Turn on the power switch to 'I'. The green LED will light.

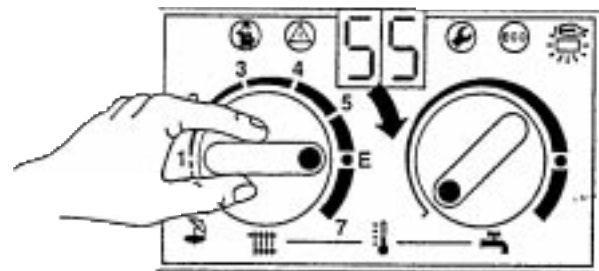
NOTE: The first time the appliance operates (and whenever the electricity supply is re-established) it will run at low rate for 15 minutes to check the siphon.

The display will show



The boiler will then revert to normal operation.

Switching on the Heating



Turn on the heating temperature control knob to E.

The burner and the red LED will light.

The temperature of the water leaving the boiler is shown on the display.

NOTE: Position 'E' can be set as the maximum adjustable temperature. Refer to 'Central Heating Flow Temperature'.

There should be a dynamic pressure of 20 mb (Natural Gas) at the inlet to the appliance equivalent to about 18.5-19.0 mb at the inlet to the gas valve.

Run the system in the heating mode and check that each radiator heats up evenly, venting as necessary.

Balance the system to achieve a differential across the system of 20°C. An external system bypass may be needed.

If, after conversion, the appliance is operating on LPG then a dynamic pressure of 37mbar at the inlet to the appliance equivalent to about 34.5-35mbar at the inlet to the gas valve.

Domestic Hot Water Temperature Control



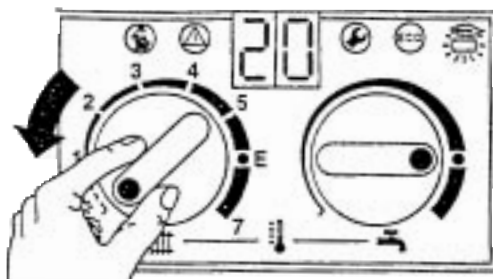
Turn the control knob to set the discharge temperature between 40°C (Min) and 60°C (Max) - this temperature does not appear on the display.

Open a tap and check that the hot water is available in a few seconds. Close the tap.

NOTE: It is recommended that the discharge temperature does not exceed 45°C where OAP's and children are to have access.

A Thermostatic mixing valve may be fitted outside the appliance.

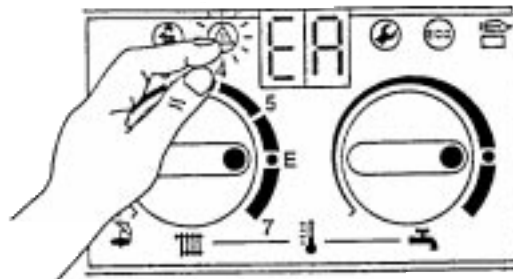
Domestic Hot Water Only (Summer Operation)



Turn the heating temperature control knob fully anti-clockwise.

The heating function is turned off but the control unit remains live for the dhw function.

Lock-Out Mode

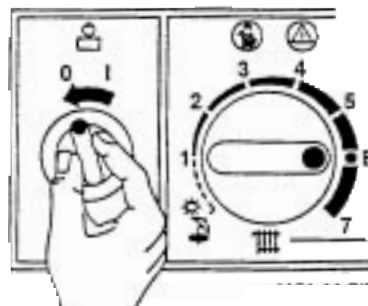


If a lock-out occurs the reset button lights and the display shows a fault code.

Press the reset button to restart the appliance (flow temperature appears on the display).

If the fault persists refer to Section 18 Fault Finding and call a Service Engineer.

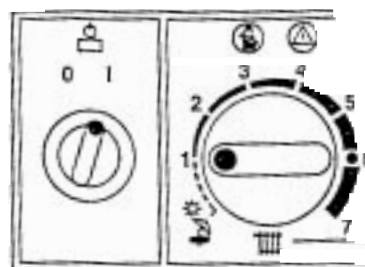
Switching Off



Turn the Power Switch to '0'. The green LED goes out.

Any time switch fitted will continue until the internal power source runs out.

Frost Protection



Short Periods

The heating system should be left on with the temperature control knob at, at least, setting 1.

Long Periods

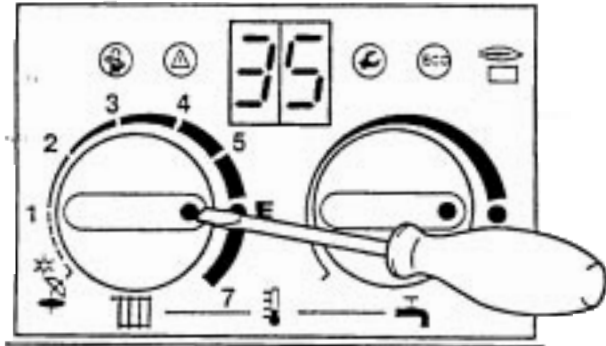
If the appliance is not to be operated for long periods of freezing weather then the power should be turned off and the appliance and system drained.

Full frost protection of the appliance and system is provided with the fitting of the outside temperature controller and control unit.

Pump Anti-Seizure Device

If the pump has not operated for 24 hours then it will be switched on for a period of 5 minutes to prevent seizure.

Central Heating Flow Temperature



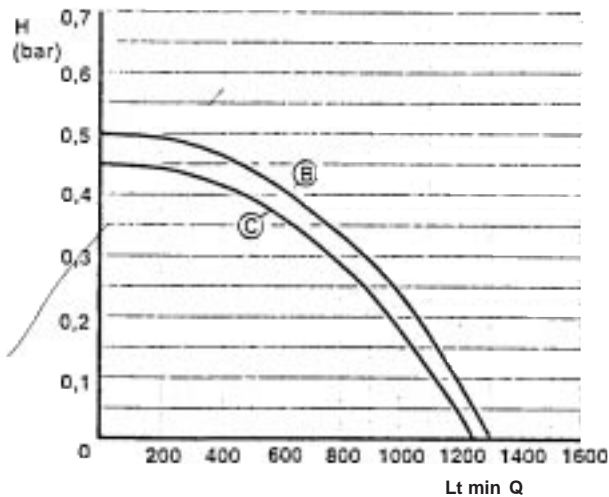
The central heating flow temperature can be adjusted between 35°C and 88°C.

It can be set to give a maximum of 75°C *i.e* setting 'E'.

Pry off the yellow button on the central heating temperature control and turn the button through 180° and replace. The knob will not go beyond 'E'.

NOTE: This should be done with the button at position 4 or 5.

Circulation Pump/System Head

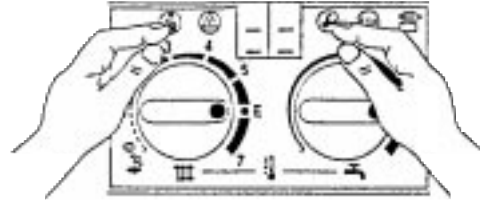


The pump is set to one of the two settings on the pump selector switch.

- Setting 1 Curve C
- Setting 2 Curve B

- H Available system head
- Q Water circulation rate

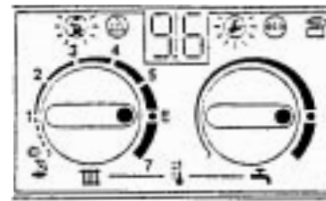
Changing the Maximum Heating Output



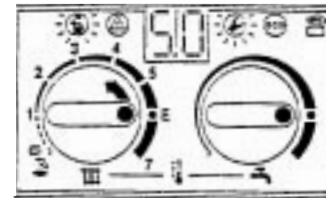
The heating output of the appliance can be reset, from the factory set maximum, if required, to match the maximum heating load.

The maximum heat output is automatically available for the domestic hot water.

Turn the heating temperature control knob to 'E'
Press the 'chimney sweep' and service buttons until '== ' appears on this display.

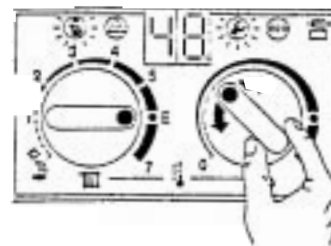


Release the buttons and '9.6', or similar, appears for 5 seconds followed by '00'. The buttons light.

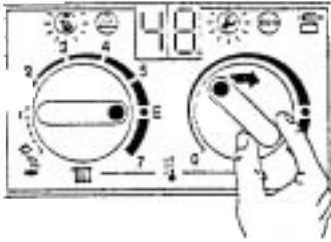


Turn the heating temperature control knob until '5.0' appears for 5 seconds followed by the heating output setting appears.

NOTE: This is a percentage of the maximum rate upto 99.



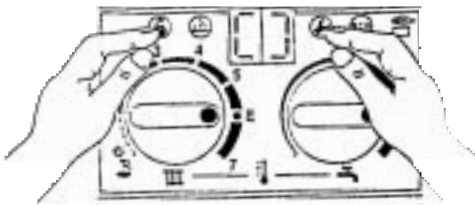
Turn the hot water temperature control knob fully anti-clockwise until the buttons flash.



Turn the hot water temperature control knob clockwise until the required output level is reached.

Display Output Level (MAX)	Heat Input kw (NET)	Central Heating Output kw (Non-condensing Mode)
99	24	23
85	20.6	19.6
65	15.8	15
55	13.5	12.7

NOTE: Net Input = 0.901 x Gross Input (NG)



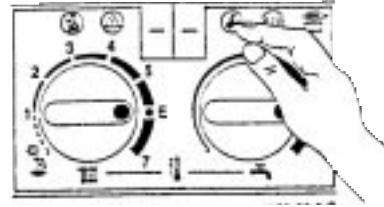
Press and hold the 'chimney sweep' and service buttons until '[]' appears.

The reset heating output is now stored.

Return the temperature control knobs to the original settings.

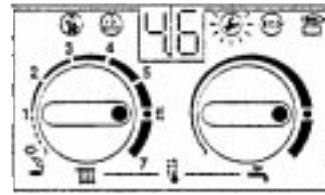
Record the change in the Commissioning Record.

Changing the Maximum Central Heating Flow Temperature



The maximum central heating flow temperature can be reset from the factory set maximum of 88°C to between 35°C and 88°C.

Turn the heating temperature control knob to 'E'.



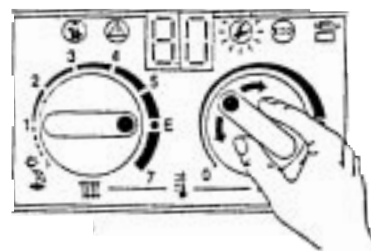
Press the 'service' button until '---' appears on the display.

Release the button and '4.6' appears for 5 seconds followed by '00' or '01'.

The button lights.



Turn the central heating temperature control knob until '2.5' appears for 5 seconds followed by '88'.



Turn the hot water temperature control knob to the required maximum heating flow temperature.

The 'service' button and the display will flash.

Press the 'service' button until '[]' appears.

The maximum central heating flow temperature is stored.

Return the temperature control knobs to the original settings.

Record the change in the Commissioning Record.

Changing the Control Mode for Heating Operation

NOTE: This controls the operation of the pump-it does not change the pump speed.

The factory setting is 2 for the boiler to operate with a room thermostat fitted.

It is not necessary to change the setting if an outside temperature compensator is fitted. The control will automatically adjust to Mode 3.

Control Mode 1

- Not recommended.
- No room thermostat or outside temperature control.
- Pump switched by central heating flow temperature.

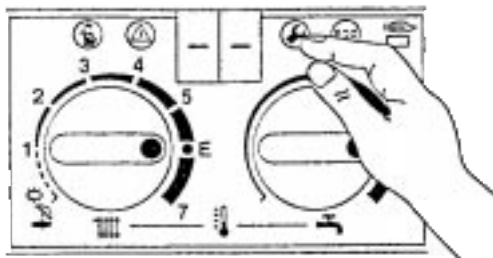
Factory Setting

Control Mode 2

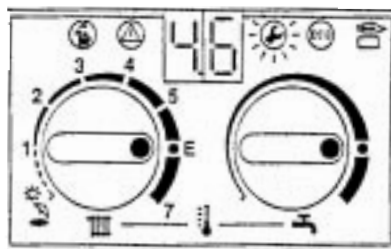
- Room thermostat fitted.
- Central heating flow temperature switches the gas, the pump continues to run.
- The room thermostat switches the gas and the pump.
- The pump and fan have overrun times of between 15 sec and 3 min.

Control Mode 3

- Outside temperature compensator fitted. The outside temperature compensator switches the pump.
- In Summer mode, the pump runs for the domestic hot water only.

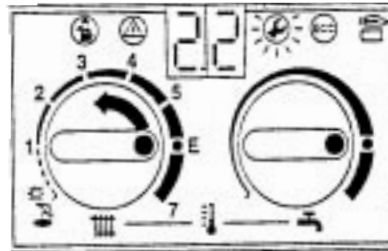


Turn the central heating temperature control knob to 'E'. Press the 'service' button until '---' appears on the display.

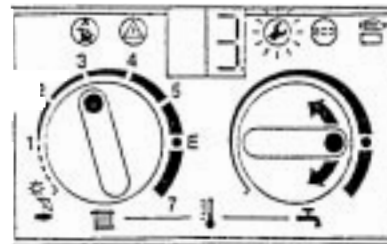


Release the button - '4.6' will appear for 5 seconds followed by '0.0' or '0.1'

The 'service' button will light.

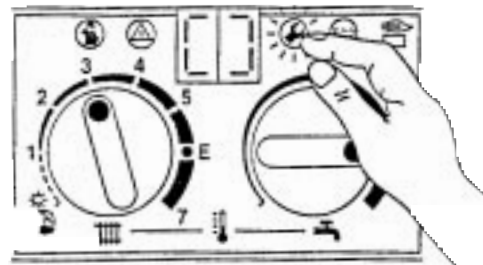


Turn the central heating temperature control anti-clockwise until 2.2 appears - after 5 seconds the mode setting of 2 (factory setting) appears.



Turn the domestic hot water temperature control knob until mode setting 3 appears.

The 'service' light will flash.



Press the 'service' button until '[]' appears.

The new control mode setting is stored and the central heating flow temperature is displayed.

Reset the central heating and domestic water control knobs to the user requirements.

Record the change in the Commissioning Record.

Anti-Cycle Time

This is Factory Set at 3-min.

It is not recommended that this is changed.

Switching Difference

This is Factory Set DHW at 8°
CH at 5°

It is not recommended that this is changed.

Completion of Commissioning

Note: Operating with a lower heating flow temperature will result in the appliance operating in the much more efficient condensing mode. To ensure that the rooms are properly heated the radiators must be sized accordingly.

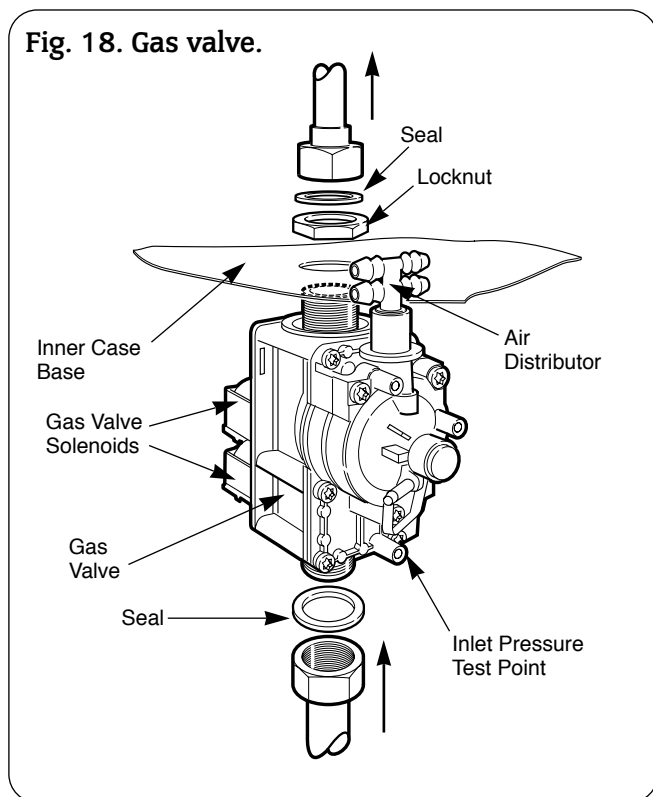
Switch off the appliance.

Disconnect the pressure gauge at the gas valve and tighten the test point screw. Check for gas soundness around the screw. See Fig. 18.

Refit the front cabinet.

If the appliance is to be passed over to the user immediately then refer to Section 14.

If there is any possibility of the appliance being left inoperative for very long periods in very frosty weather then drain the appliance and the system. Turn off the gas and electricity supplies.



14. Instructions For The User

Instruct the user in the efficient and safe operation of the appliance and hand over the user's leaflet.

Describe the operation and function of the controls. Set the appliance and external controls to the user's requirements.

Show the user how to vent the radiators.

Tell the user of the system pressure which must be maintained.

Tell the user what to do if the appliance is not to be used in frosty conditions.

Advise the user of the importance of regular (annual) servicing to maintain the efficiency and extend the life of the appliance. Worcester Heat Systems will be pleased to offer a service contract.

15. Inspection and Servicing

It is the law that any service work is carried-out by competent engineers such as British Gas or CORGI registered engineers.

Pre-Service Inspection

Check that the flue terminal (and terminal guard) are clear and undamaged.

If the appliance is in a cupboard/compartment check that the specified service spaces are clear. Refer to Fig.2 and 3.

Check the connections in the system and remake any which show signs of leakage. Refill, vent and repressurise the system after this work. Do not forget to refill the condensate trap and syphon.


Operate the appliance and system and take note of any action which needs to be taken.

NOTE: If the mains electricity is turned off then the siphon check procedure will take place when it is re-established. Refer to Section 13 Commissioning.

To disable the siphon check procedure follow the following instructions.

The siphon check programme will run automatically if:

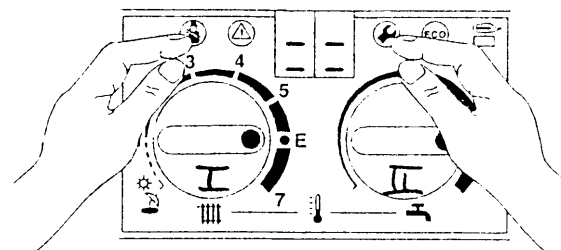
- Power is applied or re-applied to the boiler.
- The boiler has not run for a period of 48 hours.
- At a change from Summer to Winter operation and vice versa.


The siphon check is operating when there is  on the display. The check comprises operation for 15 minutes at minimum rate.

To Disable the Siphon Check:

- Set the CH temperature control to E. Refer to Fig.S1.

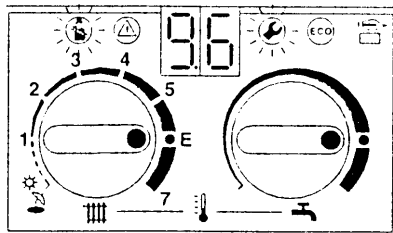
Fig. S1..



- Press the Setting and Service buttons and hold until  appears on the display. Refer to Fig.S1.

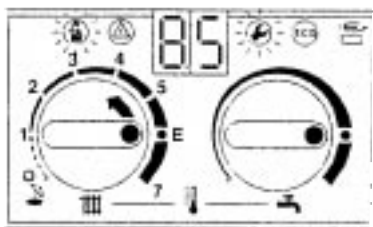
3. After 5 seconds a figure will appear on the display followed by 0.0 and the flashing of the buttons. Refer to Fig.S2.

Fig. S2..



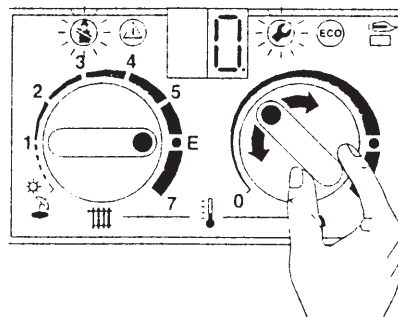
4. Turn the CH temperature control until 8.5 appears followed after 5 seconds, by 1. Refer to Fig.S3.

Fig. S3..



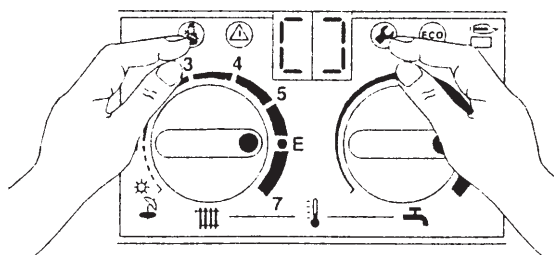
5. To disable the siphon check programme turn the DHW temperature control until O appears in the display. Refer to Fig.S4.

Fig. S4..



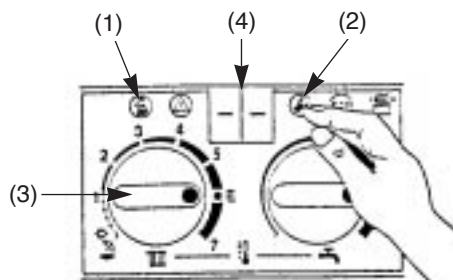
6. To enter the change press and hold both buttons until [] appears. Refer to Fig.S5.

Fig. S5..



The boiler will now operate as set by controls.
IMPORTANT : The siphon check programme must be reset after the service has been completed i.e enter 1 into the memory.

There is the facility to check the control settings of the appliance. Refer to the diagram and table below.



Service Function		How to read out		
Pump control mode	2.2	Press (2) until display (4) shows '---'. Wait until (4) shows '0.0' or '0.1'.	Turn (3) until display (4) shows '2.2'. Wait until (4) displays the setting.	Press (2) until display shows '---'. Return the temperature control knob (3) to its original setting.
Anti-Cycle time	2.4		Turn (3) until display (4) shows '2.4'. Wait until (4) displays the setting.	
Maximum heating flow temperature	2.5		Turn (3) until display (4) shows '2.5'. Wait until (4) displays the setting.	
Heating temperature switching differential	2.6		Turn (3) until display (4) shows '2.6'. Wait until (4) displays the setting.	
Maximum heating output	5.0	Press (1) and (2) until display (4) shows '=='. Wait until (4) shows '0'.	Turn (3) until display (4) shows '5.0'. Wait until (4) displays the setting.	Press (1) and (2) until display shows '== '.

Fig.19 . Burner body.

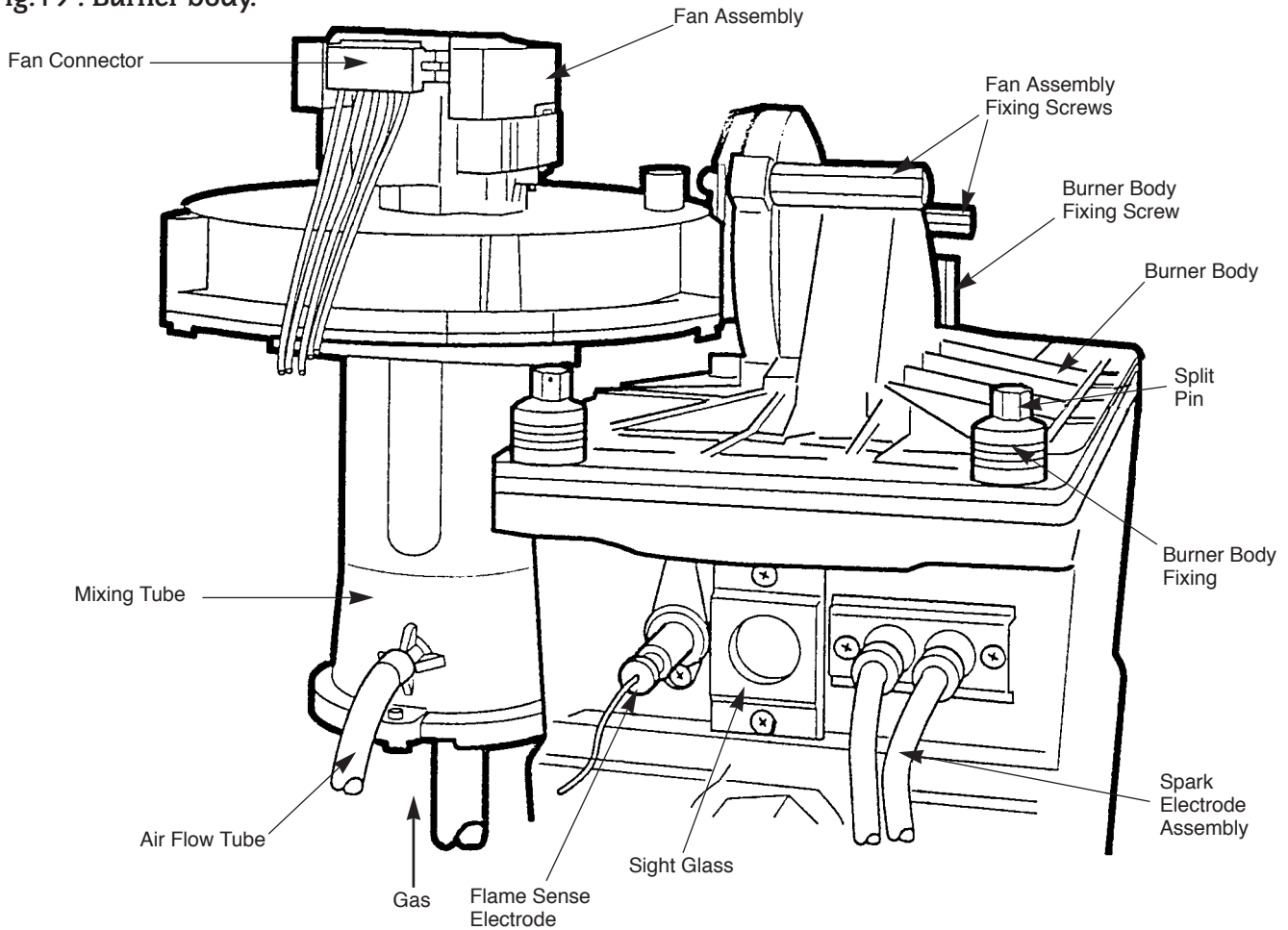
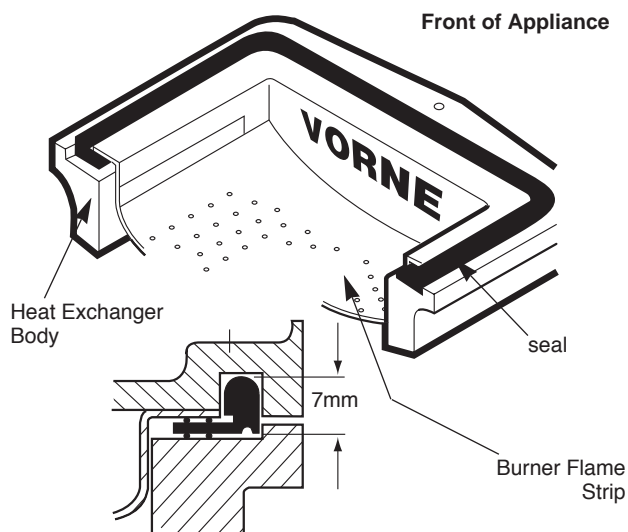


Fig. 20. Burner plate position.



Remove the cabinet . Refer to Fig. 12.

Check that the condensate trap and syphon are clear and clean, if necessary, by draining and refilling. Remove the yellow cap at the base of the syphon to drain. See Fig. 30.

Ensure that the system is full, vented and pressurised.

Check the inlet gas pressure and the maximum heat input. Refer to Table 1 and Section 7. If the gas rate has dropped by more than 5% from the specified figure then check the combustion performance of the appliance.

Connect a combustion test meter (to read CO₂ %) to the test point on the flue turret and operate the appliance at maximum input for 10 minutes. See Section 11. A CO₂ reading of about 9.5 ± 0.2% should be achieved.

If the figures for the gas rate and the CO₂ are not satisfactory then it will be necessary for the appliance flueways to be cleaned.

Turn off the gas and electricity supplies. Remove the inner casing cover. Release the fan assembly by unscrewing the two extended screws. Unscrew the rear fixing screw, remove the split pins and unscrew and remove the front fixings. Remove burner casing. Lift out the burner skin and seal. Refer to Fig.20.

Lightly brush the exposed flueways.

Remove the yellow siphon trap drain plug and the grey condensate drain cap. Refer to Fig.31. Pour clean water through the heat exchanger and into the condensate trap drain until the water coming from the heat exchanger is clear.

Replace the cap and plug.

Refill the siphon.

When replacing the burner flame strip do not forget the new gasket. Refit the fan assembly in the reverse order. Refer to Fig.20. Tighten the nuts evenly by hand plus sufficient extra force to allow the fitting of new split pins. Tighten the rear fixing - do not over tighten.

Brush any dust from the controls using a soft non-metallic brush and battery operated vacuum cleaner.

If any parts need replacing then refer to Section 16.

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

Refit the cabinet and check that the controls are set to the user's requirements.

16. Replacement of Parts

Important: Switch off the electricity and gas supplies before replacing any components.

After the replacement of any component check for gas soundness, where relevant, and carry out functional checks as described in Section 13.

Any gasket or seal which appears damaged must be replaced.

It will be necessary to drain the appliance to remove some components.

Drain the Appliance

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

When the mains electricity is re-established the appliance will go through the siphon check procedure. refer to Section 13 commissioning.

Close the central heating flow and return valves and the mains inlet to the hot water circuit at the manifold.

Place a container beneath the drain point adjacent to the relief valve and unsrew the plug. See Fig.15.

The appliance drainage can be completed through a drain point at the bottom of the DHW heat exchanger. Remove the plug in the base of the casing, place a container beneath the opening and unscrew the sealing nut.

To gain access to the components it is necessary to remove or reposition :

a) Facia Cover Panel

Lower to the 'horizontal' position and push firmly upwards at the side location points to release. Remove the panel.

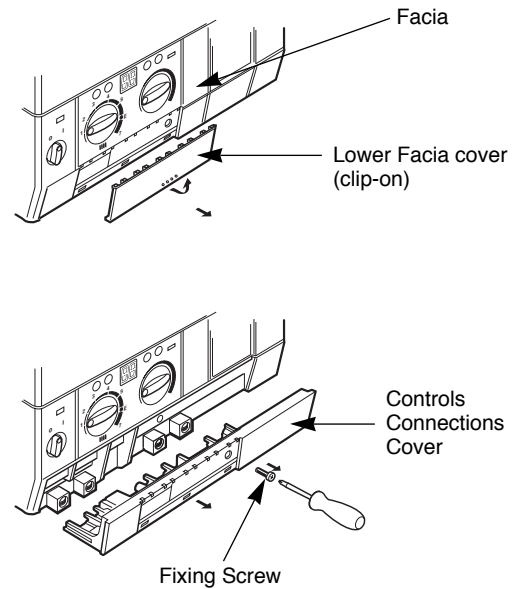
b) Cabinet

Release the clips at the rear of each side of the appliance and lift off. Refer to Fig.9.

c) Facia Assembly

Unplug the spark and electrode connection. Unscrew the screws at each end of the facia and lower assembly. Refer to Fig.15.

Fig. 21. Facia connections cover.



d) Inner Case Cover

Unscrew the four screws and remove the cover.

e) Facia Assembly - Removal.

Remove the facia cover panel. Unclip the lower facia cover, unscrew and remove the controls connection cover. Refer to Fig.20. Pull off the spark and sense electrode connection. Pull off the or disconnect the mains, multiway, fan/burner and pump leads. Unplug the appliance code plug - DO NOT REMOVE FROM THE APPLIANCE.

Disconnect all the earth connections including that from the rear of the assembly to the main body of the appliance.

Unscrew the two fixing screws to lower the facia and lift from the side supports.

Control Board

Disconnect all the leads described in (e). Unplug the ignition lead connections and lower the facia.

Unscrew the four screws securing the metal cover and carefully prise off the cover. Refer to Fig.22.

The TRANSFORMER can now be removed from the board.

Ease out the control board from the facia.

Fig. 22. Control Board and Transformer.

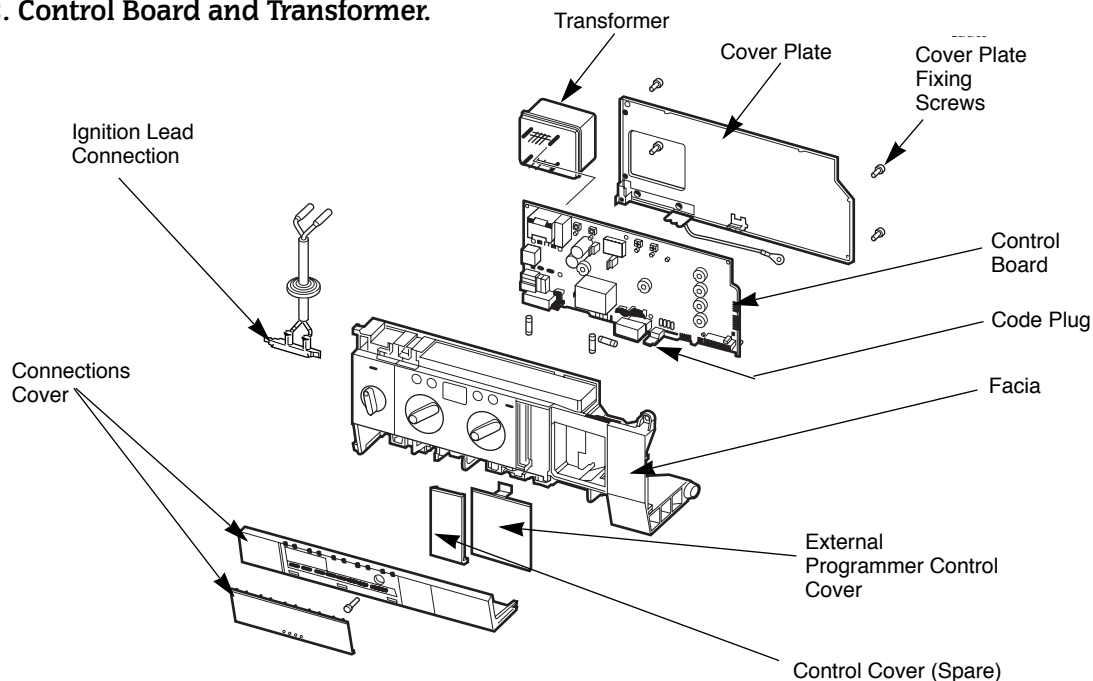


Fig. 23. Pressure gauge

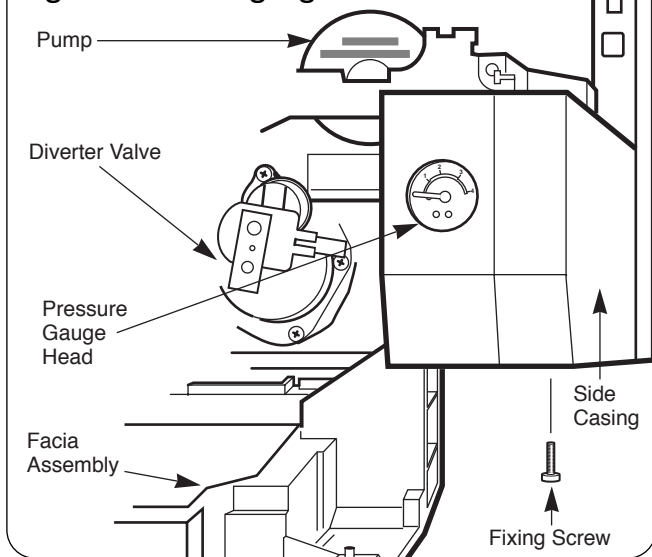
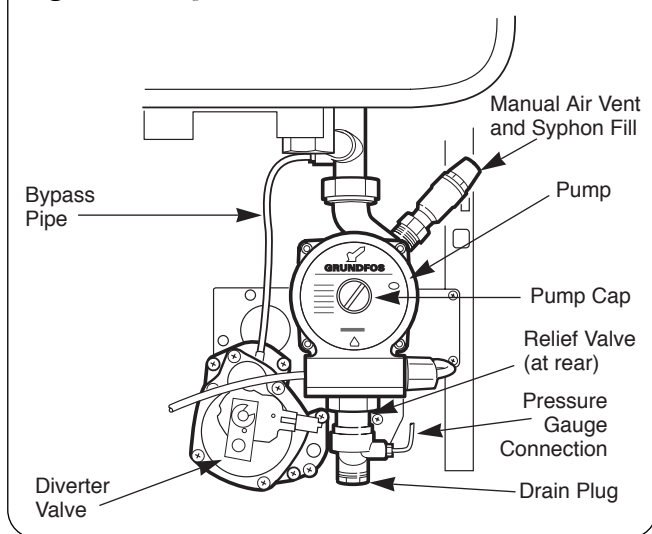


Fig. 24. Pump, manual air vent, diverter valve.



Pressure Gauge

Drain the appliance. Lower the fascia.
Twist the head of the pressure gauge anti-clockwise to release from the side casing. Refer to Fig.24.
Unscrew the hexagon nut securing the pressure gauge sensor and remove the gauge.
Refill, vent and re-pressurise. Prime the syphon.

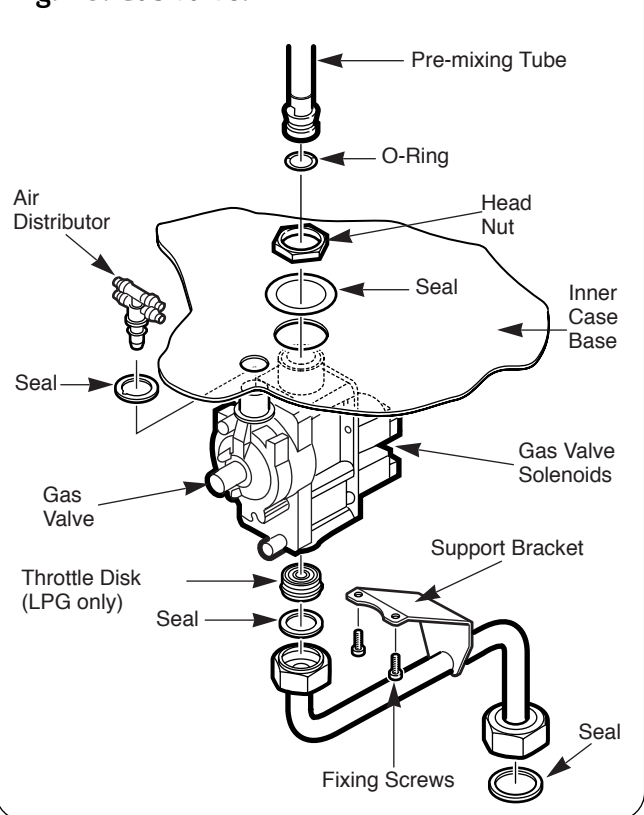
Gas Valve

Lower the fascia panel.
Remove the inner case cover.
Pull off the solenoid connections at the rear of the valve. Refer to Fig.25.
Pull out the plastic air distributor from the top of the valve.
Undo the union connecting the pipe to the pre-mix tube and separate from the gas valve - it can be carefully pushed into the pre-mix tube.
Carefully release the locknut at the gas valve outlet.
Unscrew the inlet union at the gas valve.
Remove the support bracket from beneath the gas valve by unscrewing the two pozi-head screws.

Control Module

Remove the inner case cover. Unscrew the locking screw and lift the rear of the module slightly to release and remove. Unplug the connections. The fuse, T2.5A, can be accessed by unscrewing the control module cover panel fixing screw.

Fig. 25. Gas valve.



To replace the control board and/or transformer remove the cover panel. Release the four clips to remove the control board and transformer. Refer to Fig.14.

Air Flow Switch

Remove the Control Module. Carefully pull off plastic tube to unclip the switch. Carefully remove the assembly and remove the connectors. Refer to Fig.14.

Spark Electrode

Remove the inner case cover. Pull off the leads to the electrodes. Unscrew the two screws and remove the electrode. Fit a new gasket when fitting the new electrode. Refer to Fig.26.

Flame Sense Electrode

Remove the inner case cover. Pull off the lead to the electrode. Unscrew the two screws and remove the electrode. Fit a new gasket when fitting the new electrode. Refer to Fig.26.

Fig. 26. Spark and flame sense electrodes.

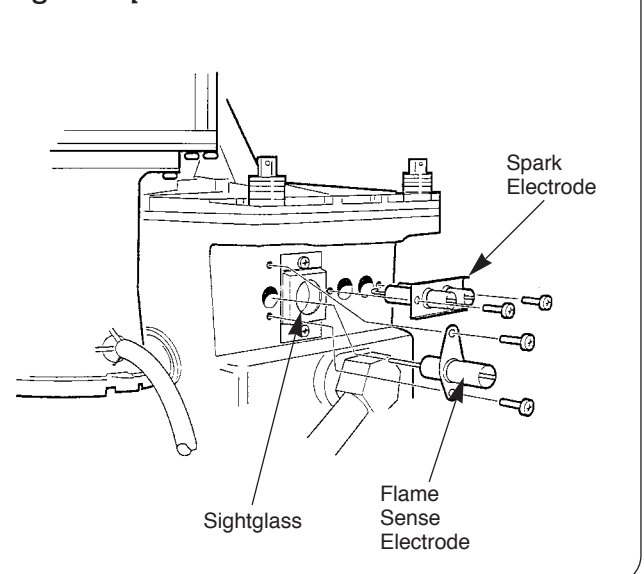
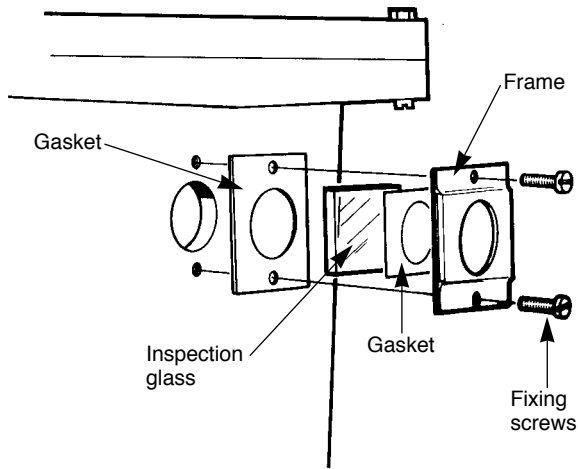


Fig. 27. Sightglass.



Sightglass

Remove the inner case cover. Unscrew the two screws and remove the assembly. Fit a new gasket when fitting the new assembly. Refer to Fig.26 and 27.

Central Heating Flow Temperature Sensor

Drain the appliance. Remove the inner case cover. Unplug the electrical connection, orange leads. Remove the clip and cable tie and pull-out the sensor. Refer to Fig.14.

Fit a new cable tie to secure the clip.

Refill, vent and re-pressurise the appliance. Prime the siphon.

Overheat Thermostat Sensor

Remove the inner case cover. Pull off the connections, red leads. Unscrew and remove the sensor. Refer to Fig.14.

Flue Temperature Limiter

Remove the inner case cover and the control module. Pull off the connections, red leads. Unscrew and remove the sensor. Refer to Fig.14.

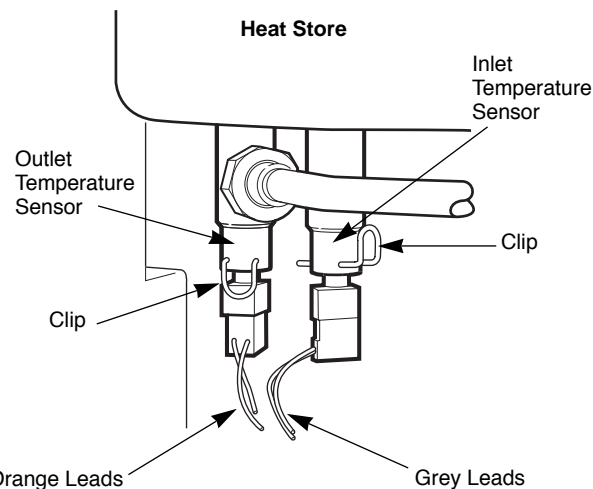
Domestic Hot Water Inlet Temperature Sensor

Lower the facia. Drain and remove the siphon.

Pull off the connections, grey leads. Remove the clip and pull out the sensor. Refer to Fig.14. NOTE: The sensor probe is approximately 150mm long. A small quantity of water will be released.

Prime the siphon.

Fig. 28. DHW Inlet and flow temperature sensor.



Domestic Hot Water Outlet Temperature Sensor

Lower the facia. Drain and remove the siphon.

Pull off the connections, orange leads. Remove the clip and pull out the sensor. Refer to Fig.14. A small quantity of water will be released.

Prime the siphon.

Manual Air Vent

Drain the appliance. Pull off the tube and unscrew the insert from the body. Refer to Fig.15.

Refill, vent and re-pressurise the appliance. Prime the siphon.

Expansion Vessel

Drain the appliance. Remove the inner case cover.

Remove the control module.

Release the union connection at the base of the expansion vessel. Unscrew the two screws fixing the vessel. Refer to Fig.14.

In the unlikely event of a failure of the expansion vessel, it is acceptable to fit a replacement vessel of a similar (10 litre) or greater capacity external to the appliance but as close as possible in the CH return pipe.

Flow Switch

Drain the dhw circuit by closing the mains water valve and opening adjacent tap below the level of the appliance. Lower the facia. Pull off the electrical connection from the flow switch.

From beneath the appliance undo the inlet and outlet water connections and remove the switch. Refer to Fig.29.

Transfer the Venturi to the new switch (if not already fitted) -push fully home.

NOTE: The inlet water filter is in the flow switch. Refer to Fig.30.

If there is insufficient access from beneath then it will be necessary to remove the pump, diverter valve and heating return pipe to gain access to the flow switch.

Refill, vent and re-pressurise the appliance. Prime the siphon.

Fig. 29. Flow switch.

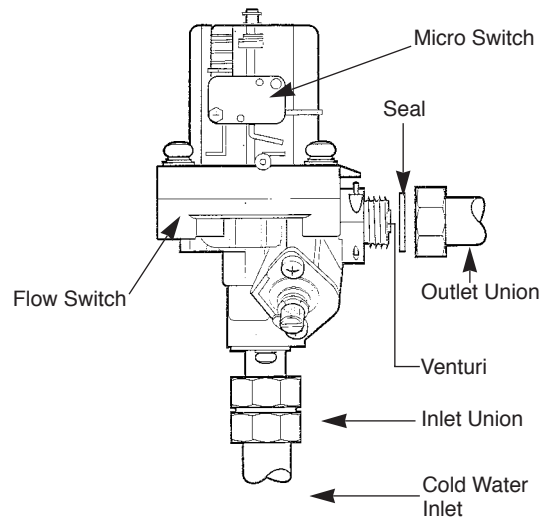
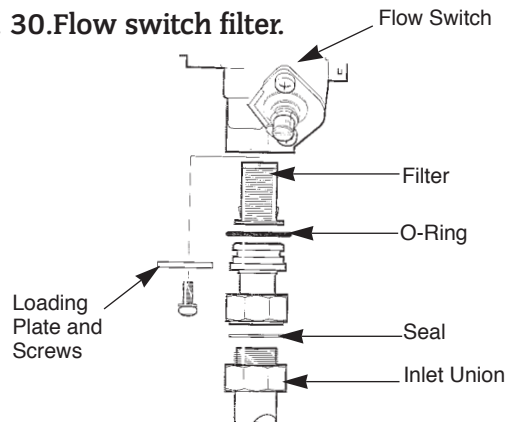


Fig. 30. Flow switch filter.



Burner Assembly

Remove the inner case cover.

Unscrew the fan assembly. Refer to Fig.19.

Remove the split pins from the front fixings of the burner assembly and unscrew and remove the fixings. Loosen the rear fixing nut, it is not necessary to remove this nut, and carefully remove burner assembly.

The perforated burner flame strip can be removed.

NOTE: The burner flame strip must be replaced as shown in Fig.20.

When replacing the burner assembly hand-tighten the front fixings before adding just sufficient extra force to allow the fitting of new split pins.

Do not overtighten the rear fixing.

Do not forget to refit the seal between the burner body and fan assembly.

Fan

Remove the inner casing cover.

Pull off the lead at the fan. Refer to Fig. 31 and 32.

Release the two extended screws securing the fan.

Lift the fan assembly off the gas inlet pipe. If necessary unscrew the gas pipe at the gas valve after pulling out the plastic air distributor from the valve to gain access to the nut.

Unscrew the three screws to separate the fan from the mixing tube.

Fig. 31. Fan assembly fixing screws.

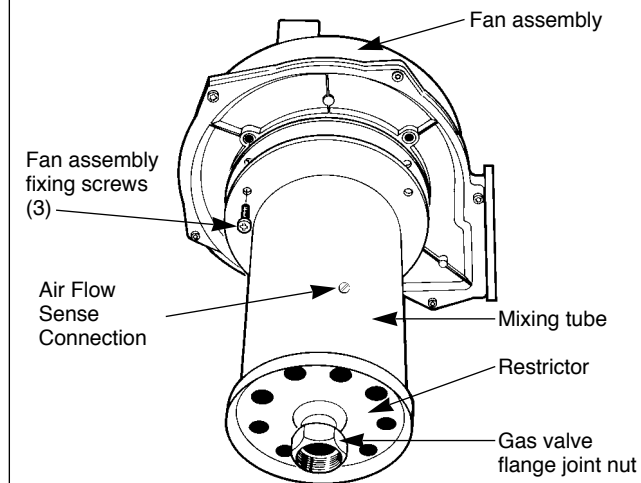
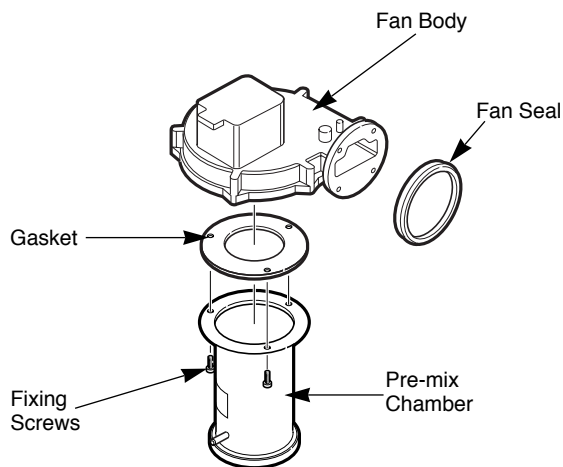


Fig. 32. Fan assembly.



Siphon

Disconnect the pipe to the siphon.

Remove the yellow plug to drain the siphon.

Unscrew the securing nut from beneath the the side facia and remove the siphon. Refer to Fig.33.

Refit and prime the siphon.

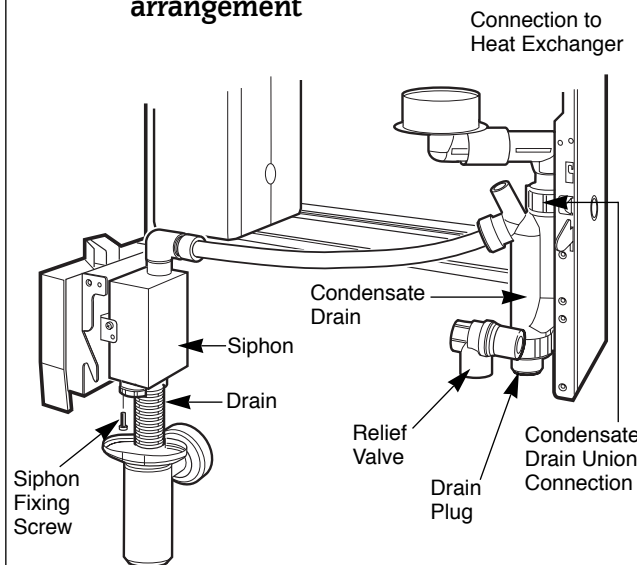
Relief Valve

Drain the appliance.

From beneath dis-connect the relief valve drain pipe and unscrew the valve. Refer to Fig.24 and 33.

Refill, vent and re-pressurise the appliance. Prime the siphon.

Fig. 33. Condensate drain/siphon arrangement



NOTE: Syphon tundish is not always necessary if a seperate drain is fitted.

Diverter Valve

Drain the appliance. Lower the facia and unplug the electrical connections at the valve.

Disconnect the union connections. Refer to Fig.24.

Unscrew the four screws securing the valve to the mounting plate and remove he valve by firmly pulling it from the connections.

Refill, vent and re-pressurise the appliance. Prime the siphon.

Pump

Drain the appliance. Unplug the electrical connections at the facia.

Lower the facia and remove the cross brace. Refer to Fig.15 and 24.

Remove the plastic side facia panel by unscrewing the fixing screw. Refer to Fig 23.

Undo the manual air vent union and the pump union connections to remove the pump.

Alternatively unscrew the four Allen screws and replace the pump head (model 15-33/50).

Refill, vent and re-pressurise the appliance. Prime the siphon.

Auto-Air Vent (Expansion Vessel and DHW Heat Store)

Drain the appliance. Unscrew the vents from the top of the appropriate vessel. Refer to Fig.14.

Refill, vent and re-pressurise the appliance. Prime the siphon.

Domestic Hot Water Heat Exchanger/Store

Drain the appliance. Lower the facia.

Remove the siphon and expansion vessel. Remove the automatic air vent and lock nut from the top of the DWH heat exchanger.

Unscrew the water connections at the bottom of the heat exchanger.

Unplug the connectors from the two sensors at the base and remove the heat exchanger. Refer to Fig.14.

Transfer the sensors. Refer to Fig.28.

Refill, vent and re-pressurise the appliance. Prime the siphon.

Primary Heat Exchanger

Refer to Figs. 14,15 and 33.

Drain the appliance. Lower the fascia and remove the inner casing cover.

Remove the control module, the air flow switch and the plastic air distributor from the gas valve.

Disconnect and remove the sensors and the flue thermostat from the bottom left-hand side of the heat exchanger.

Disconnect and remove the hot water flow pipe from the front of the heat exchanger.

Remove the gas supply pipe to the fan.

Release the clip at the base of the flue duct by unscrewing the single screw and push the duct upwards to release it from the elbow at the base of the heat exchanger.

To increase the access remove the pump completely and remove the pipe connection to the expansion vessel.

Unscrew the hexagon head screw on the outside of the rear right-hand side of the cabinet and remove the condensate drain bracket.

Unscrew the plastic nut securing the top of the condensate drain at the rear of the pump and put the drain assembly to one side releasing its connection to the condensate collector at the base of the heat exchanger.

Pull out the condensate collector from the base of the heat exchanger.

Unscrew the two screws at the top securing the heat exchanger backing plate to the top of the inner case back panel.

The heat exchanger can now be pulled forward and removed from the appliance with the fan and burner assembly. Take care, as some water will remain in the heat exchanger.

Transfer the relevant components to the new heat exchanger and fit to the appliance in the reverse order.

Important: Fit the circular rubber seal to the base of the heat exchanger AFTER the heat exchanger has been refitted to the appliance.

Use new gaskets or seals where any appear damaged.

Ensure that the flue duct is correctly connected.

Refill, vent and re-pressurise the system.

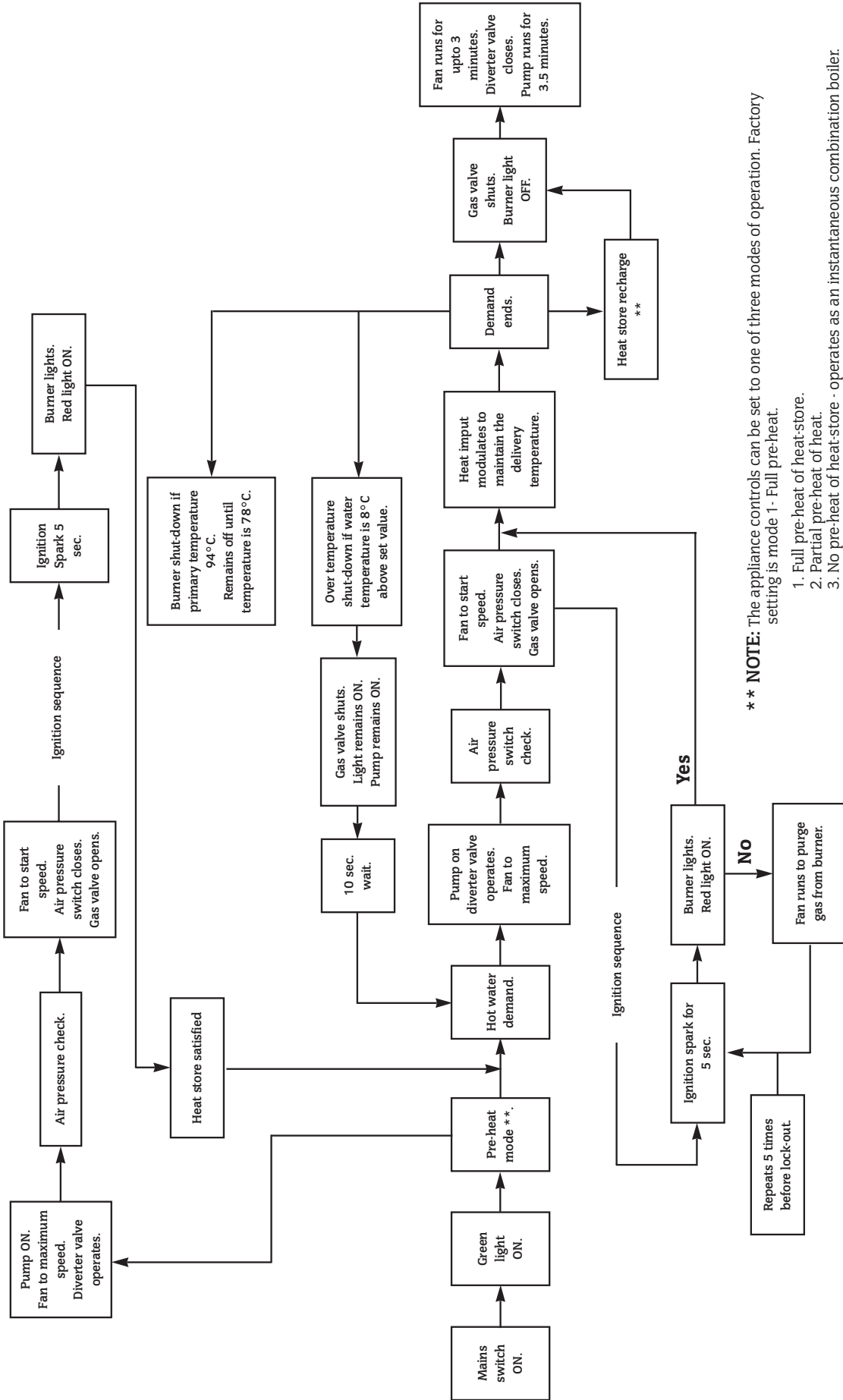
Check for the correct operation of the appliance by following the Commissioning procedure described in section 13.

17. Parts List

Key	Description	Qty GC	WHS/Bosch
1	Sensor – Flue gas temp.	1	8 729 000 144 0
2			
3	Sensor – CH flow temp.	1	8 714 500 054 0
4	Sensor – DHW inlet temp.	1	8 714 500 049 0
5	Control board	1	8 748 300 291 0
6	Control module	1	8 747 207 144 0
7			
8	Gas valve	1	8 747 003 508 0
9	Gasket pack – gas	1	
10	Gasket pack – water	1	
12	Gasket pack – heat exchanger	1	
13	Fan assembly	1	8 729 000 242 0
14	Expansion vessel	1	8 715 407 176 0
15	Relief valve	1	8 717 401 012 0
16	Spark electrode	1	8 718 107 064 0
17	Electrode lead	1	8 714 401 878 0
18	Flame Sense electrode	1	8 718 107 064 0
19	Pump	1	8 717 204 264 0
20	Pressure gauge	1	8 717 208 061 0
21	Inspection glass assembly	1	8 729 000 176 0
22	Sensor - DHW flow temp	1	8 714 500 054 0
23	Burner skin seal	1	8 711 004 168 0
24	Transformer - facia	1	8 747 201 358 0
25	Flow switch	1	8 717 002 110 0
26	Diverter valve	1	8 717 204 273 0
27	Air Flow Switch	1	8 717 406 058 0

18. Operational Flow Diagrams

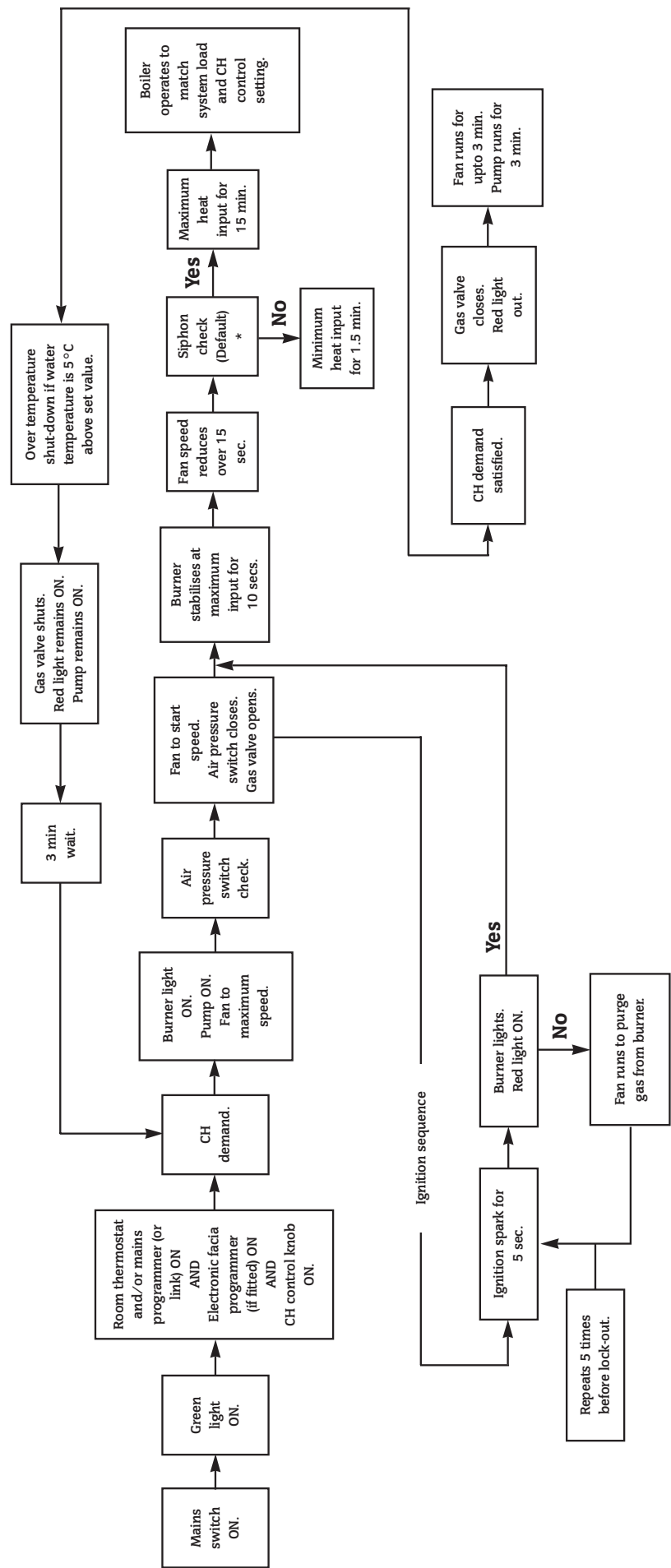
DOMESTIC HOT WATER FUNCTION



**** NOTE:** The appliance controls can be set to one of three modes of operation. Factory setting is mode 1 - Full pre-heat.

1. Full pre-heat of heat-store.
2. Partial pre-heat of heat.
3. No pre-heat of heat-store - operates as an instantaneous combination boiler.

CENTRAL HEATING FUNCTION



* **NOTE:** A control sequence checks that the condensate siphon is full.

19. Fault Finding

NOTE: This information is for guidance only. Worcester Heat Systems cannot be held responsible for costs incurred by persons not deemed to be competent.

Preliminary Checks:

Electrical system checks are the first actions to be carried out during a fault finding procedure. On completion of the service or a fault finding task which has necessitated the breaking and remaking of electrical connections, check (a) Earth Continuity, (b) Short Circuit, (c) Polarity, (d) Resistance to Earth.

The electronic control system for this appliance uses a facia display which shows, in normal operation, the central heating flow temperature. If a fault exists then the diagnostic system displays the appropriate fault code.

NOTE: Check that the appliance code plug is correctly fitted before starting any detailed examination.

State : 1 Waiting correction by external appliance 2 Boiler stopped until fault disappears 3 Boiler works with limited function
4 Lock-out does not reset

Display	State	Condition	Action
A5		Circuit break or short circuit in the constant hot water temperature sensor.	Check the sensor leads for continuity.
A7		Circuit break or short circuit in the dhw temperature sensor.	Check the sensor leads for continuity.
AC		No electrical connection between the controller (TA211E) and the control board.	Check the lead and connector from the controller for continuity.
b1		Code plug.	Insert code plug correctly or replace.
C1	2	Air pressure switch contacts open when appliance is operating or fan speed to slow.	Check fan, controller, air pressure switch and connector tube.
C4	2	Air pressure switch contacts do not open.	Check air supply, fan, control unit, air pressure switch. Check for correct flue length.
C6	2	Air pressure switch contacts remain open.	
CC	3	Circuit break between outside temperature sensor and control unit.	Check sensor and leads for continuity.
d3			
E0	4	Internal fault on control board.	Replace control board.
E2	2	Circuit break or short circuit on ch temperature sensor.	Check sensor and leads for continuity.
E9	4	Safety temperature limiter has tripped	Check ch temperature sensor, pump, fuses or control board, vent appliance.

Display	State	Condition	Action
EA	4	No ionisation (flame sense) current.	Check that the gas cock is open and for sufficient gas pressure. Check power to the gas valve. Check spark and flame sense electrodes and leads.
F7	4	Incorrect ionisation (flame sense) signal.	Check electrode and lead for splits or cracks.
FA	4	Ionisation (flame sense) current remains after normal shut down i.e burner does not go off.	Check gas valve wiring and solenoids.

NOTE: A comprehensive fault-finding booklet is supplied seperately .

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PUBLICATION 6 720 610 096 (99.07)