INSTALLATION AND SERVICING MANUAL

SOLAR TWIN

Wall Mounted Combination Boiler providing Central Heating and Mains Fed Domestic Hot water

Solar Twin GC Appliance No. 4701503

For use with Natural Gas (G20) - Natural Gas model only
or Propane (G31) - Propane model only

EC Certificated for Safety and Performance

CE

0063

It is important that the boiler is installed and serviced
as described in these instructions

After installing the boiler leave these instructions with the User

LIST OF CONTENTS

IMPORTANT

For information specific to Propane (G31) boilers refer to section 15 at the end of these instructions.

HEALTH AND SAFETY INFORMATION

Under the Consumer Protection Act 1987 and Section 6 of the Health & Safety at Work Act 1974, we are required to provide information on substances hazardous to health (COSHH Regulations 1988).

Sealants and paints used in the manufacture of the product are cured and present no known hazards when used in the manner for which they are intended.

The following material is also present in the product:

Insulation material

Material Type:	Ceramic fibre board.
Description:	Rigid board.
Known Hazards:	May cause temporary irritation or rash to skin. High dust levels may irritate eyes and upper respiratory system.
Precautions:	Avoid unnecessary or rough handling, or harsh abrasion of boards. Normal handling and use of material should not produce high dust levels.
	Avoid inhalation, and contact with skin and eyes.
	After handling always follow normal good hygiene practices.
Protection:	Use disposable gloves, face mask and eye protection.
First Aid:	Eyes - If irritation occurs, wash eyes with copious amounts of water. If symptoms persist, seek immediate medical advice.
	Skin - If irritation occurs, wash under running water before washing with soap and water.
	Inhalation - Remove to fresh air, drink water to clear throat and blow nose to remove dust/fibres.
	Ingestion - Drink plenty of water.

1 TECHNICAL INFORMATION

1.1 TECHNICAL SPECIFICATIONS

CENTRAL HEATING

Maximum heating system water temperature	90°C + 0 - 5°C
Minimum heating system water temperature	30°C ± 2°C
Maximum heating system pressure	1.5 bar cold, 2.3 bar hot (set when cold)
Minimum heating system pressure (cold)	0.8 bar
Maximum heating system volume	90 litres (with expansion vessel provided)
Heating system expansion vessel size	8 litre pre-charged at 1.0 bar (max. 1.5 bar)
Safety valve setting	3.0 bar

DOMESTIC HOT WATER

Maximum hot water temperature	65°C ± 3°C
Maximum mains water inlet pressure (before pressure reducing valve)	6 bar
Minimum mains water inlet pressure	1.0 bar
	(remove flow restrictor if < 1.5 bar - section 9.26)
Minimum hot water flow rate	3.0 litre/min
Maximum pressure of hot water supplied to taps	3.5 bar
Dynamic hot water performance	13.6 litre/min raised 30°C
Amount of hot water at 30°C available in 10 minutes	162 litre
Time to raise stored water to maximum temperature	8 to 10 minutes (10°C inlet temp.)
Time to reheat 70% of stored water	3 to 4 minutes
Hot water expansion vessel size	3 litre pre-charged at 3.0 bar
Hot water storage capacity	45 litre
Temperature/pressure relief valve setting	90 - 95°C/7 bar
Expansion relief valve setting	6.0 bar
Mains water inlet pressure reducing valve setting	3.5 bar

GENERAL

Burner injector (Natural gas), marked 125 - No. off	15
Electrode gap	4 mm
Type of ignition	Direct burner ignition
Primary water content	3.0 litre
Weight (installed and including water)	130 kg
Lifting weight (installing)	80 kg
Case height (excludes flue elbow)	780 mm
Case width	580 mm
Case depth	480 mm
Clearances for installation and servicing	Top (includes space for flue elbow) .. 200 mm
	Bottom ..... 200 mm
	Front ..... 600 mm
	Sides ..... 5 mm
Central heating flow and return connections	22 mm compression
Cold water mains inlet connection	15 mm compression
Safety valve discharge connection	½ in. BSP Female
Domestic hot water outlet connection	15 mm open pipe
Gas supply	15 mm compression
Flue terminal size	88 mm diameter x 125 mm deep
Flue restrictor diameter	49 mm co-axial, 45.5 mm twin pipe
Electricity supply	230 V ~ 50 Hz 150 W Fused at 3 A
Fuses on main driver board	2 A and 0.3 A (0.3 A for external controls)
Built in frost protection control on main driver board	Operates if primary water falls below 5°C

The boiler meets the requirements of IP20 for degree of protection against moisture.
The data label is positioned inside the control panel cover.

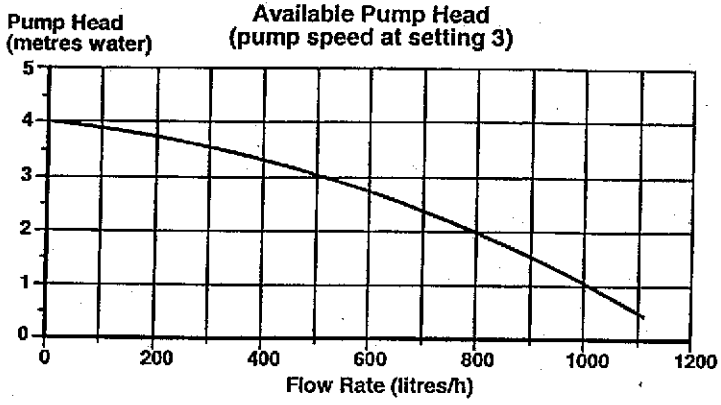
1.2 NOMINAL BOILER RATINGS - Natural gas (G20)

	Heat Output		Natural gas (G20) at 20 mbar				
			Heat Input (Gross)		Burner pressure		Gas rate
	kW	Btu/h	kW	Btu/h	mbar	in wg	m³/h
Min.	12.32	42 040	15.54	53 020	2.0	0.8	1.48
Factory set	18.09	61 700	22.81	77 830	4.9	2.0	2.17
Max.	27.90	95 200	34.33	117 130	11.6	4.7	3.27

Gas rate based on a gross calorific value of 37.78 MJ/m³ (G20) - EN437

1.3 PUMP PERFORMANCE

Output		Pump head		Flow rate		ΔT
kW	Btu/h	metres	feet	litres/h	gal/h	°C
12.32	42 040	1.70	5.58	864	190	11
18.09	61 700	1.50	4.92	921	203	14
27.90	95 200	1.00	3.28	1 002	221	20

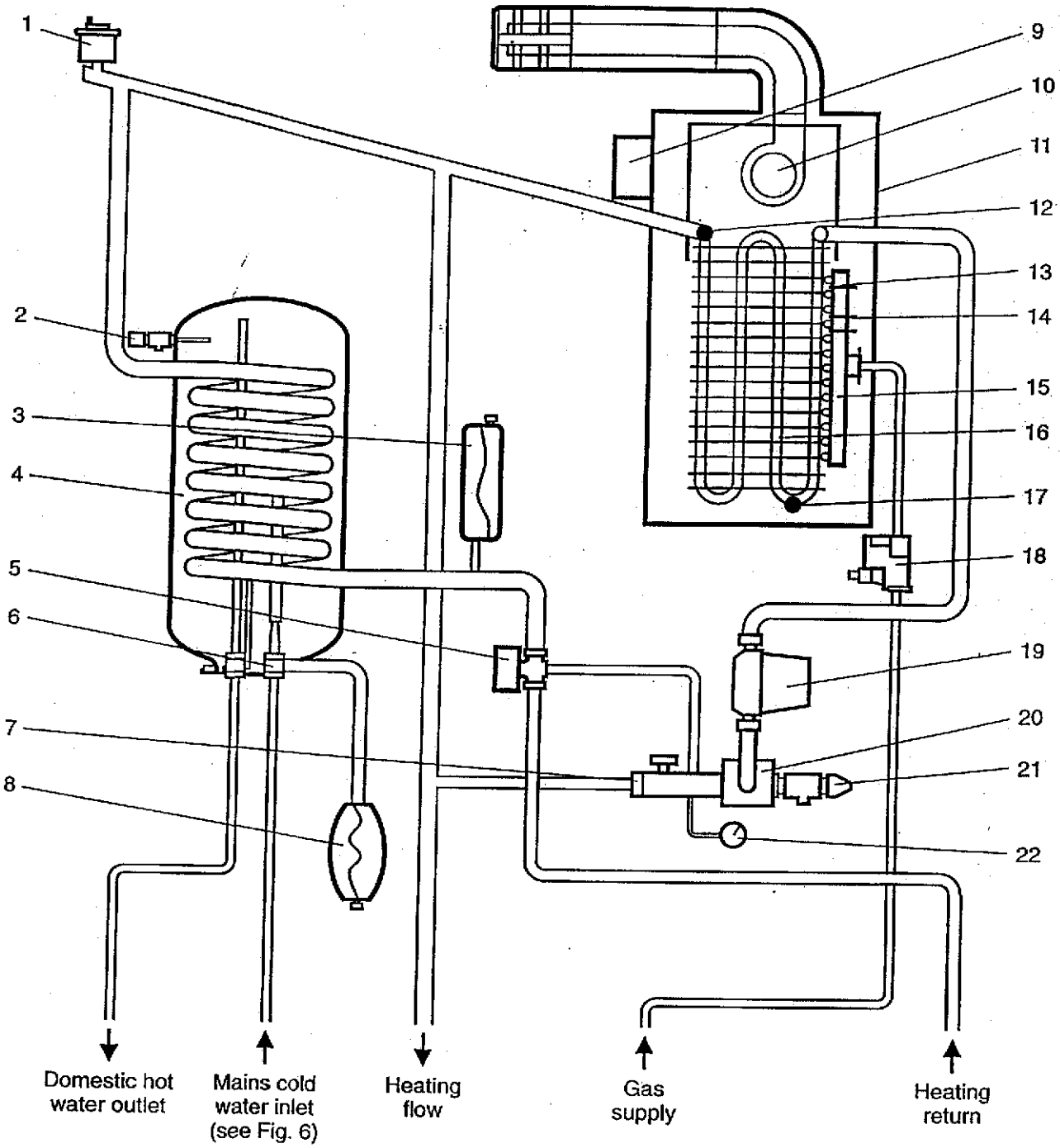


ΔT given above, is the temperature difference between the central heating flow and return connections.
The recommended range of ΔT across the boiler is between 11 and 20°C.
The pump head given above is the residual pump head available for the heating system.
Note: When designing the heating system, especially at the higher output (27.90 kW) the pump head, expansion vessel size, radiator mean temperature, etc. must all be taken into account.

1.4 FLUE LIMITATIONS

Co-axial flue size ..... 100/60 mm
Twin pipe flue size ..... 80/80 mm
Co-axial flue maximum length ..... 4 m (3 m with one elbow)
Reduction per elbow ..... 0.8 m (45° and 90°)
Twin pipe maximum length ..... 20 m (total air + fumes)
Reduction per 90° elbow (large radius) ..... 0.6 m
(small radius) ..... 3.0 m
Minimum pipe length ..... 0.5 m
Flow rate ..... 68 kg/h

1.5 BOILER SCHEMATIC



1	Automatic air vent
2	Temperature/pressure relief valve
3	Heating expansion vessel
4	Hot water storage cylinder
5	Diverter valve
6	Inlet water filter
7	Automatic by-pass valve
8	Hot water expansion vessel
9	Air pressure switch
10	Fan
11	Sealed chamber
12	Heating temperature sensor
13	Flame detection electrode
14	Ignition electrodes
15	Main burner
16	Heat exchanger
17	Overheat thermostat
18	Gas valve
19	Pump
20	Flow switch
21	Safety valve
22	Pressure gauge

2 GENERAL BOILER INFORMATION

2.1 BOILER DESCRIPTION

The Solar Twin is a room-sealed combination boiler using a small multi-directional fan-assisted balanced flue.

The boiler, providing central heating and domestic hot water at mains pressure, has been designed for use with a sealed water central heating system. See section 2.11.

Domestic hot water at mains pressure is supplied from an integral 45 litre unvented storage cylinder.

The pump, expansion vessel and safety devices are all fitted within the boiler.

The boiler will suit central heating systems requiring upto 27.90 kW (95 200 Btu/h).

The boiler is factory set to an output of 18.09 kW for central heating.

The maximum domestic hot water output is fixed at 27.90 kW (95 200 Btu/h) and is capable of providing 13.6 litres/min with a temperature rise of 30°C. See section 2.12.

The temperature of both the central heating water and domestic hot water are User controllable. Central heating from 30 to 90°C and hot water up to 65°C ± 3°C.

A built in timer allows the User to set the operating times for the central heating - domestic hot water is available continuously.

A 'Heating' switch is provided to allow the central heating to be turned off during the summer months, if required.

The boiler contains the following automatic safety features:-

An overheat safety thermostat which switches off the boiler if the heat exchanger exceeds 95°C.
A flow switch which switches the boiler off if the flow in the primary circuit is below 7.5 litres/min.
A safety valve which will automatically open at 3 bar to relieve excess pressure in the central heating system.
An overheat safety thermostat which switches off the boiler if the hot water store exceeds 65°C.
A temperature/pressure relief valve to vent the hot water store in the event of overheating (90 - 95°C/7 bar).
A built in frost protection control that will switch the boiler on if the primary water temperature falls below 5°C.

2.2 REGULATIONS TO COMPLY WITH

It is the law that all gas appliances are installed by competent persons such as British Gas or other CORGI registered personnel in accordance with the following recommendations:-

Gas Safety (Installation and Use) Regulations 1994 (as amended)
All relevant Building Regulations issued by the Department of the Environment
Building Standards (Scotland) (Consolidation) Regulations issued by the Scottish Development Department
Model and local Water Undertaking Byelaws
Current IEE Wiring Regulations and IEE Earthing Regulations
Health & Safety Document No. 635 'The Electricity At Work Regulations 1989'

The installation should also be in accordance with the following British Standard Codes of Practice:-

BS 5440:1:1990	Flues
BS 5440:2:1989	Air supply
BS 5449:1990	Forced circulation hot water systems
BS 5546:1990	Installation of hot water supplies for domestic purposes
BS 6700:1987	Design, installation, testing and maintenance of services supplying water
BS 6798:1987	Installation of gas fired hot water boilers
BS 6891:1989	Gas installation
BS 7593:1992	Code of Practice for treatment of water in heating systems
BS 7671:1992	Requirements for electrical installations, IEE Wiring Regulations

Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety to ensure that the law is complied with.

2.3 DELIVERY

The boiler is supplied in a two packs, containing the following:-

Pack 1 Cased boiler
Boiler fittings accessories - See section 14 for contents
Wall mounting bracket
Literature pack and Wall template
Flue restrictor

Pack 2 Standard flue assembly
Flue accessories - See section 14 for contents

If the boiler is not to be installed immediately, ensure the cartons are stored in a dry place where they will not be damaged.

2.4 NATURAL GAS (G20) SUPPLY - Refer to section 15 for Propane (G31)

The maximum natural gas requirement of the boiler is 3.27 m^3/h.
The meter and supply pipes must be capable of delivering this quantity of gas in addition to the demand from any other appliances in the house. A 22 mm supply pipe will be necessary for the majority of installations, but reference should be made to either BS 6891:1988 for detailed guidance on gas pipe sizing.
The meter and governor should ensure a dynamic pressure of 20 mbar (natural gas) at the inlet of the gas valve in the boiler.
The complete installation, including the meter, must be tested for gas soundness and purged as described in BS 6891.

2.5 ELECTRICITY SUPPLY

1 A 230 V ~ 50 Hz mains supply is required. **The boiler must be earthed.**
2 The supply must be fused at 3 A and there must only be one common isolator for the boiler and control system, and it must provide complete electrical isolation.
3 One of the following methods should be used for the connection. A fused double pole switch with a contact separation of at least 3 mm in both poles or a fused three pin plug and unswitched shuttered socket outlet (both complying with BS 1363).
4 The boiler is supplied with a pre-wired power supply cable with fitted 3 A fused plug.
5 All wiring external to the boiler must be in accordance with the current IEE Wiring Regulations.
6 Any room thermostat or frost thermostat used must have a 'volt free' control circuit.
7 The boiler requires a permanent mains supply, do not interrupt it with any external time control.
8 In the event of an electrical fault after installation of the boiler, the following electrical system checks must be carried out:- Short circuit, Polarity, Earth continuity and Resistance to earth.

2.6 AIR SUPPLY

1 As the boiler is room-sealed, it does not require any combustion air vents.
2 If installed in a cupboard or compartment, permanent ventilation vents are required - one at high level and one at low level. The vents may be either direct to the outside air or to a room. Both air vents must be into the same room or be on the same wall to the outside air.
The minimum free area for each vent is 306 cm^2, this may be halved if the ventilation is directly to the outside air.
3 If installed in a cupboard or compartment with a door, allow at least 75 mm clearance between the front of the boiler and the door for air movement. 5 mm should be allowed at each side of the boiler.

2.7 FLUE SYSTEM

1 The boiler is normally supplied with a 1 metre horizontal co-axial flue assembly with a 100 mm diameter outer pipe (air duct) and a 60 mm inner pipe (flue duct) and a 90° offtake elbow for the top of the boiler.
2 The assembly may be modified and extended using 1 metre extensions, 45°and 90° elbows and a vertical offtake to a maximum equivalent length of 4 metres.
Note: Each 45° and 90° bend has an equivalent flue length of 0.8 metres.
3 A vertical roof outlet kit is also available which may be combined with the components mentioned above to a maximum length of 4.3 metres (from the top of the boiler to the top of the roof outlet).
4 A flue restrictor is provided with the boiler and **must be used** if the flue length is less than 1.5 metres (see section 3.5).
5 It is possible to use a 'Two Pipe system' to increase the flue length. Refer to our seperate flue options brochure for further details. The diameter of the restrictor is different for this flue type (see section 1.1).
6 The flue must be installed in accordance with BS 5440:1.
7 During cold conditions there may be a tendency for steam to come from the terminal (this is quite normal for a high efficiency boiler). Do not position the terminal where this might cause a nuisance.
8 If the terminal is fitted within 850 mm of a plastic or painted gutter or within 450 mm of painted eaves, an aluminium shield at least 750 mm long should be fitted to the underside of the gutter or painted surface.
9 If the terminal is fitted less than 2 m above a surface to which people have access, the terminal must be protected by a guard. A suitable guard is available as an optional accessory.
The guard must be fitted centrally over the flue terminal and securely fixed to the wall.
10 The minimum dimensions for positioning the flue terminal are shown in Fig. 1.
11 Refer to section 1.4 for flue limitations.

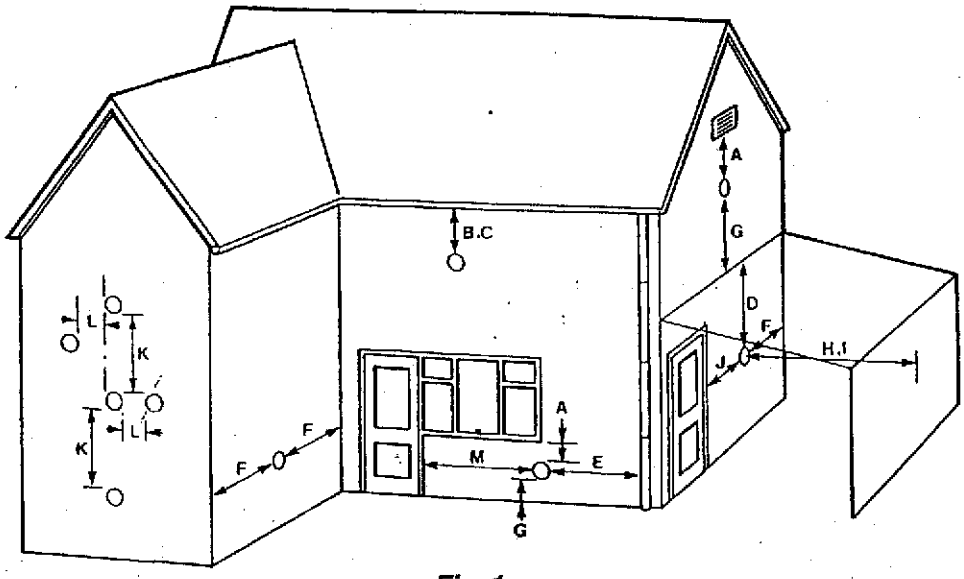


Fig. 1

	Terminal position	Min. distance
A	Directly below an opening, air brick, window, etc.	300 mm
B	Below gutters, soil pipes or drain pipes	75 mm
C	Below eaves	200 mm
D	Below balconies or car port roof	200 mm
E	From a vertical drain pipe or soil pipe	75 mm
F	From an internal or external corner	300 mm
G	Above ground, roof or balcony level	300 mm
H	From a surface facing the terminal	600 mm
I	From a terminal facing the terminal	1200 mm
J	From an opening in the car port (e.g. door, window) into dwelling	1200 mm
K	Vertically from a terminal on the same wall	1500 mm
L	Horizontally from a terminal on the same wall	300 mm
M	Horizontally from a door, window or air vent	150 mm

2.8 BOILER LOCATION

1 The boiler is not suitable for external installation.

2 The boiler must be mounted on a non-combustible flat wall sufficiently robust to take the weight of the boiler - see Technical Information, page 3. If the wall is of combustible material, it should be protected by a sheet of fireproof material.

3 If the boiler is to be installed in a timber framed building, refer to the British Gas publication 'Guide for Gas Installation in Timber Framed Housing' reference DM2.

4 Installation may be in any room, although particular attention is drawn to the requirements of the current IEE Wiring Regulations and, in Scotland, the electrical provision of the Building Regulations applicable in Scotland, with respect to the installation of a boiler in a room containing a bath or shower.
Where a room sealed boiler is installed in a room containing a bath or shower, it must not be possible for a person entering or using the bath or shower to touch any electrical switch or boiler control using mains electricity.

5 The boiler may be installed in a cupboard or compartment to be used for airing clothes, provided it is correctly designed and ventilated for that purpose and that the requirements of BS 6798 and BS 5440:2 are complied with. It is important that the boiler is separated from the airing space by a suitable non-combustible rigid mesh, refer to BS 6798:1987.
No combustible surface must be within 75 mm of the boiler case, this includes any cupboard door.
The clearances required for servicing, as given in the Technical Information section on page 3, also apply to a cupboard installation.

2.9 WATER AND GAS CONNECTIONS (See Fig. 2)

The fittings pack includes three isolating valves and a gas service cock, together with all the necessary pipework and fittings to connect them. A 15 mm pipe stub is also supplied for the hot water outlet connection. The isolating valves (22 mm for central heating flow/return, 15 mm for mains water inlet and 22 mm [15 mm outlet] for gas).

Also supplied are a pressure reducing valve, check valve, expansion relief valve and a tundish. See section 2.13.

All nuts and olives supplied with the fittings are suitable for use with copper tubing to BS 2871.

The water connections have been temporarily sealed with plastic caps to prevent any residual water (from factory testing) leaking from the boiler during transit. **All** the plastic caps must be removed before connecting any fittings. Take care when removing the caps as the boiler may still contain a small amount of water.

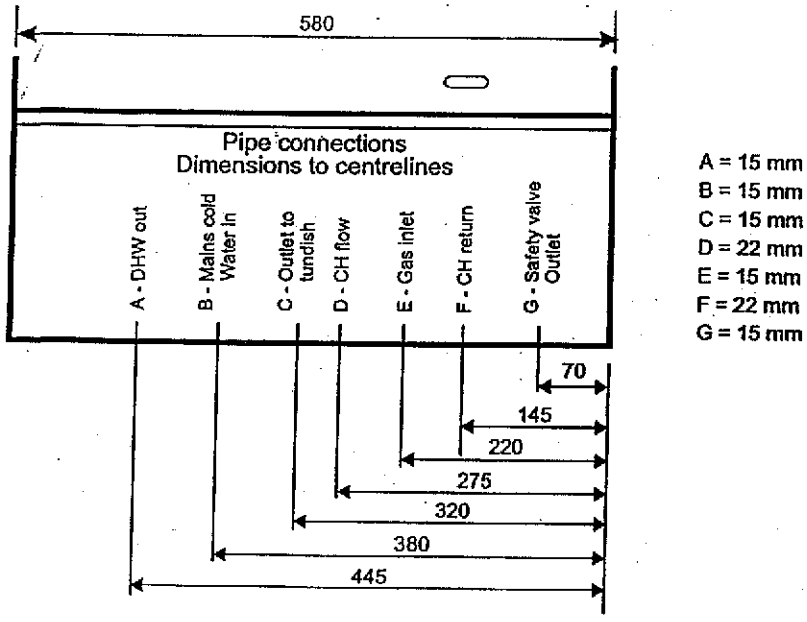


Fig. 2

2.10 BOILER DIMENSIONS (See Fig. 3)

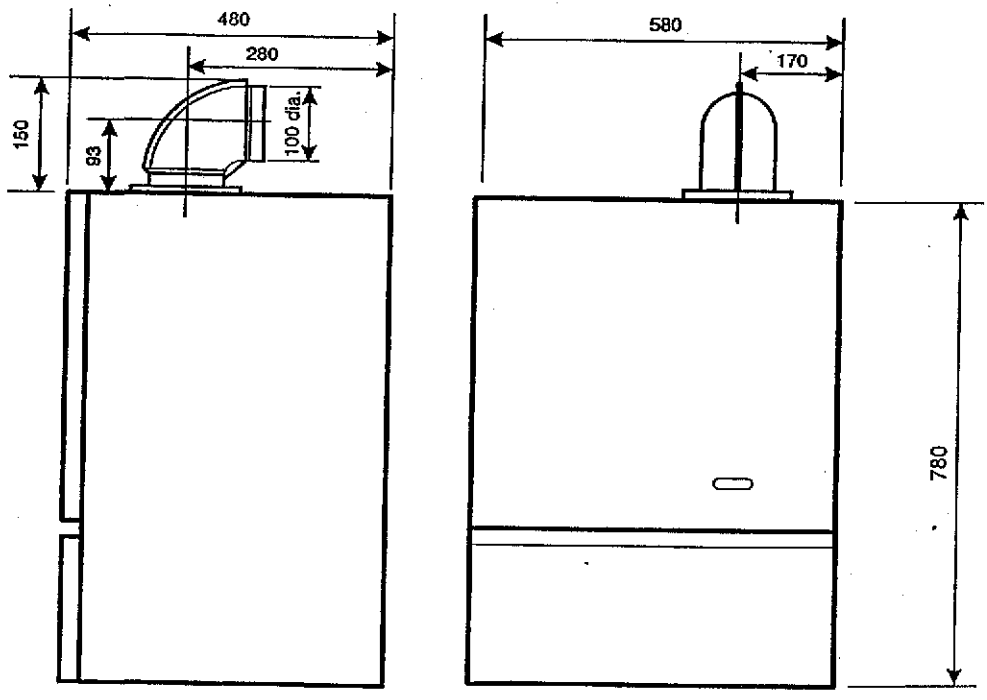


Fig. 3

2.11 CENTRAL HEATING SYSTEM - SEALED SYSTEMS ONLY (See Fig. 4)

1 The boiler is only suitable for use with a sealed system complying with the requirements of BS 5449 and BS 6798. The maximum temperature of the central heating water is 90 +0 - 5°C.
Design notes - when designing the system, especially at the maximum output (27.90 kW) the pump head, expansion vessel size, radiator mean temperature, etc. must all be taken into account. Refer to the pump performance graph and the table in section 1.3 for guidelines.

2 The boiler is supplied with the following components built in:-
Safety valve - complying with BS 6759 and set to operate at 3 bar. The discharge pipe must be routed clear of the boiler to a drain, in such a manner that it can be seen, but cannot cause injury to persons or property.
Pressure gauge - to indicate the system pressure to be maintained.
Expansion vessel - conforming to BS 4814 with a capacity of 8 litres and pre-charged to a pressure of 1.0 bar.
By-pass - an automatic built-in by-pass ensures that the minimum necessary flow rate is always available, thereby protecting the heat exchanger. If the boiler is used on a small system (below 12.32 kW) and thermostatic radiator valves are used throughout, then an external by-pass is required.
Automatic air vent - an automatic air vent, fitted externally, allows the boiler to be installed and vented without disturbing the room-sealed inner case.

3 Using the expansion vessel as supplied and an initial system pressure (cold) of between 0.8 and 1.5 bar, a heating system volume of approximately 90 litres can be used. For further guidance refer to BS 7074:1.
Refer to section 4.1 for further details of the expansion vessel.

4 The system design pressure (cold) should be between 0.8 and 1.5 bar. This pressure is equivalent to the maximum static head (see Fig. 4) in bar + 0.3 (1 bar = 10.2 metres of water).

5 Provision should be made to fill and replace water lost from the system. A double check valve assembly must be used, as shown in Fig. 5.

6 Filling of the system must be carried out in a manner approved by the local Water Undertaking. Where allowed, the system may be filled via a temporary connection as shown in Fig. 5.

7 All fittings used in the system must be able to withstand pressures up to 3 bar.

8 Radiator valves must comply with the requirements of BS 2767(10):1972.

9 One or more drain taps (to BS 2879) must be used to allow the system to be completely drained.

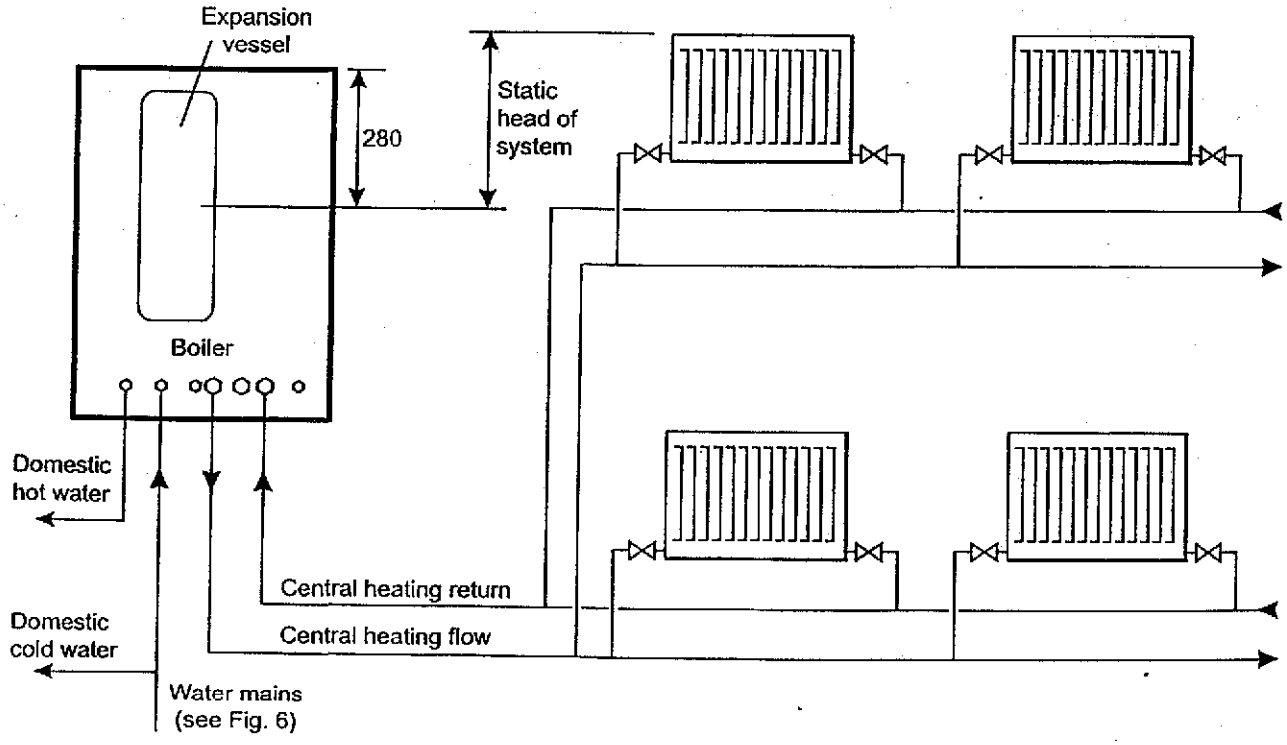
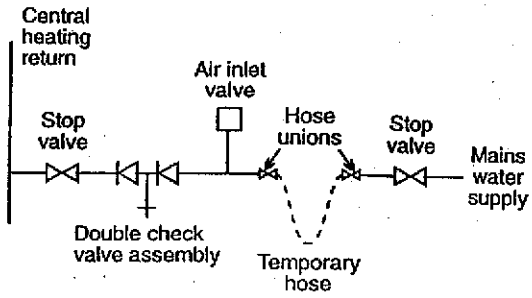


Fig. 4

10 To avoid the danger of dirt and foreign matter entering the boiler the complete heating system should be thoroughly cleaned in accordance with the procedure given in BS 7593. This involves the use of a cleanser, circulating it around the system for the required time before flushing out. It is important to select a cleanser appropriate to the situation, i.e. for new installations, or for an existing system when the boiler is being replaced. In the case of boiler replacement the system should be cleaned prior to the installation of the new boiler.

11 It is a condition of the manufacturers warranty that a suitable inhibitor is added to the system after the final (hot) flushing and is maintained in service.

For further information concerning inhibitors contact ICI Caldaie (UK) Limited.



Manual filling and make-up

Fig. 5

2.12 DOMESTIC HOT WATER SYSTEM

Refer to section 2.13 for unvented domestic hot water storage system

1 The boiler is set to provide a nominal output of 27.90 kW for domestic hot water.

2 The design hot water flow rate is 13.6 litres/min giving a temperature rise of 30°C. Higher flow rates will not damage the boiler but may lower the water temperature below an acceptable level.

3 The mains water supply pressure may be between 1 and 6 bar.

4 A flow restrictor is fitted between the incoming mains and the diverter valve. This should be removed if the mains pressure is less than 1.5 bar (see section 9.26).

5 Incorporated within the boiler is a 3 litre hot water expansion vessel.

6 To ensure economic use, the pipe runs between the boiler and taps should be in 15 mm copper pipe and be as short as possible. Where possible the pipework should be insulated to reduce heat loss.

7 All taps and mixing valves used with the hot water system must be suitable for operating at a mains pressure of up to 8 bar.

8 A shower may be used with the boilers if required. It is recommended that thermostatically controlled shower valves are used to protect against a flow of water at too high a temperature.
If a fixed head type shower is used, no anti-syphonage devices are required.
If a loose or flexible head type shower is used it must be arranged so that the head cannot fall closer than 25 mm above the top of the bath, thereby preventing immersion in the bath water. If this is not practicable, an anti-syphonage device must be fitted at the point of the flexible hose connection.

9 The supply of hot and cold mains water direct to a bidet is allowed (subject to local Water Undertaking requirements) provided that the bidet is of the over-rim flushing type. The outlets should be shrouded and unable to have a temporary hand held spray attached. Arrangements for anti-syphonage are not necessary.

10 The boiler has been designed to overcome the formation of scale, however, in hard water areas the fitting of an in-line scale inhibitor is recommended. Consult the local Water Undertaking if in doubt.

11 Before the mains water supply pipe is connected to the boiler, it should be thoroughly flushed out to avoid the danger of dirt or foreign matter entering the boiler.

12 The boiler can be used to provide domestic hot water **only**, where the heating system is to be installed, or connected, at a later date.
As water must be present in the primary (heating) circuit of the boiler for it to produce domestic hot water:-
i Connect the heating flow and return together below the boiler, and incorporate a filling point in the connecting pipe.
ii Fill and vent the heating circuit of the boiler - refer to section 4.2.
iii Set and leave the 'Heating' switch to **Hot Water Only**.
iv Set the room thermostat (if fitted) to its minimum setting.

2.13 UNVENTED DOMESTIC HOT WATER STORAGE

The local Authority must be notified of the intention to install an unvented hot water storage system, as the installation is subject to Building Regulations approval.

To comply with the Building Regulations the pressure reducing valve, check valve and expansion relief valve, supplied in the water fittings pack, must be fitted before the mains water connection point of the boiler and there must be no isolating valves between these and the boiler. Refer to Fig. 6.

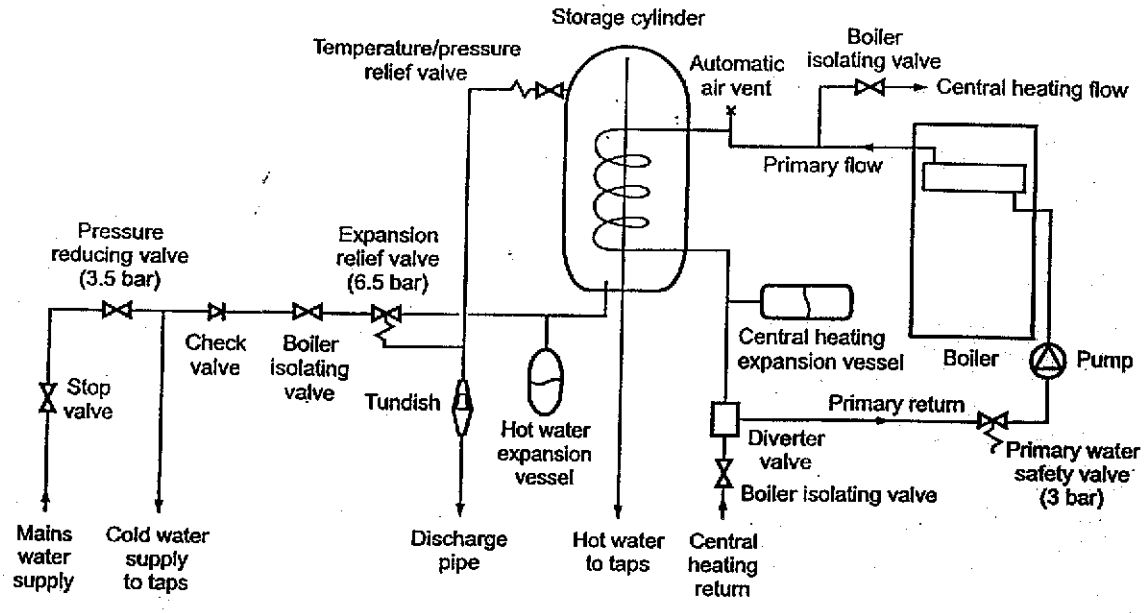


Fig. 6

The pipes discharging from both the expansion relief and temperature/pressure relief valves must be 15 mm diameter and must be connected to the tundish supplied. Both pipes should be connected together before joining to the tundish in 15 mm pipe. The discharge pipe from the tundish must be at least 22 mm pipe. Refer to the following table and Fig. 7.

Sizing of copper discharge pipe 'D2' - see Fig. 7

Valve outlet size	Minimum size of discharge pipe 'D1'	Minimum size of discharge pipe 'D2' from tundish	Maximum resistance allowed, expressed as a length of straight pipe (i.e. no elbows or bends)	Resistance created by each elbow or bend
G½	15 mm	22 mm	up to 9 m	0.8 m
		28 mm	up to 18 m	1.0 m
		35 mm	up to 27 m	1.4 m

The position of the tundish must be within 500 mm horizontally from the temperature/pressure relief valve and it must be away from any electrical connections and easily visible to the User.

The tundish discharge pipe should be of a heat resistant material (metal) and should comply with the following requirements:

i Terminate in a safe visible place where there is no risk to persons in the vicinity.
ii Have a vertical section of pipe at least 300 mm long, directly below the tundish before any bends or elbows in the pipe.
iii Be installed with a continuous fall.
iv Have no valves or taps.

Where a single pipe serves a number of discharges, such as in a block of flats, the number served should be limited to not more than six systems so that any installation can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe to be connected.

If the discharge from the safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

Ideally the discharge pipe should terminate below a fixed grating and above the water seal in a trapped gully. Alternatively it may discharge (up to 100 mm) above external surfaces such as car parks, hard standings, grassed areas etc. providing that where children may come into contact with discharges, a wire cage or similar guard must be positioned to prevent contact, whilst maintaining visibility. At a high level the discharge may be into a metal hopper and metal down pipe with the end of the discharge pipe clearly visible, or onto a roof capable of withstanding high temperature discharges of water and 3 m from any plastic guttering systems that would collect such discharges.

Note: The discharge will consist of scalding water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.

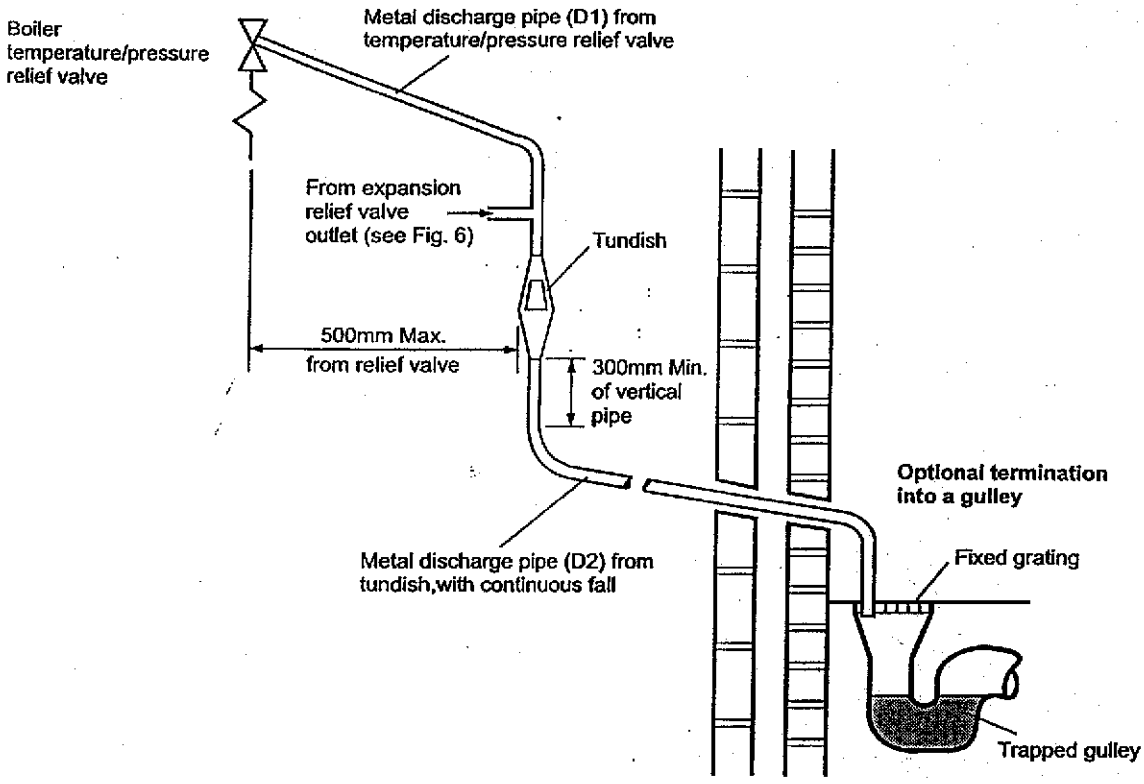


Fig. 7

2.14 METHOD OF OPERATION

The boiler operating mode is controlled by the 'Heating' switch on the control panel. When set to Hot Water Only, the boiler will only operate in the Domestic Hot Water mode. When set to Heating & Hot Water, it will operate in the Domestic Hot Water and Central Heating mode.
Note: The timer only controls the operating times of the central heating, not domestic hot water - this is available continuously.

Incorporated within the boiler case is an insulated unvented domestic hot storage cylinder containing 45 litres of domestic hot water maintained at the temperature set by the adjustable hot water temperature selector and (depending on incoming mains pressure) available to the User at a maximum pressure of 3.5 bar.

Domestic hot water supply always takes priority over central heating. If a demand for hot water occurs during a central heating period and reduces the store temperature to below that set by the hot water temperature selector, the boiler automatically switches to the hot water mode until the stored water is reheated to the temperature set by the hot water temperature selector. This interruption in the central heating should not be noticed by the User.

Central Heating Mode - If there is a call for heat, i.e. the timer and room thermostat (if fitted) are calling for heat, the pump will start to circulate the central heating water, activating the flow switch to start the ignition sequence. After a few seconds the burner will light, **remaining on minimum output for approximately 90 seconds** before gradually increasing to it's preset maximum.

The burner output is then automatically adjusted to match the system demand. When the temperature of the primary water exceeds 70°C, the burner output is automatically reduced. When the set water temperature is reached, the burner is turned off. The pump continues to run, circulating water around the system, for as long as both the timer and room thermostat (if fitted) are calling for heat. As the heating system water cools, the temperature drop is detected by the control system and the burner is automatically restarted for the cycle to continue until either the timer or room thermostat stops calling for heat. The burner is then turned off (if it is operating at the time) and the pump runs on for about 2½ minutes.

Domestic Hot Water Mode - When a demand for hot water reduces the temperature of the stored hot water below that set by the adjustable hot water selector, the pump starts and the burner lights, increasing to its maximum output. Water in the boiler is then diverted from the central heating system to reheat the stored hot water to the temperature set by the adjustable hot water temperature selector. Within two minutes the burner output modulates down to its minimum output and remains at this output until the stored water reaches the selected temperature, when the burner is turned off and the pump stops. The boiler then returns to the central heating mode.

In both modes the fan (single speed) starts before the burner lights and stops after the burner is turned off.

The temperature display (see Fig. 14) gives an indication of the temperature of the water in the primary circuit leaving the heat exchanger to either heat the store or the heating system. At temperatures upto 70°C the burner operates at maximum output, above this temperature the output automatically modulates down to suit the demand.

3 BOILER INSTALLATION

3.1 UNPACK THE BOILER (See Fig. 8)

1 Open the top of the boiler carton and remove the following loose items:-
- Boiler fittings and accessories pack
- Literature pack and Wall template
- Wall mounting bracket
- Flue restrictor

Check the contents of the pack against the packing list (see section 14).

2 Carefully break open the boiler carton.
Do **not** cut the carton open with a knife or you may damage the casing.
Ensure that the surface on which the carton is lying is suitably protected so as not to be scratched or otherwise damaged when unpacking the boiler.

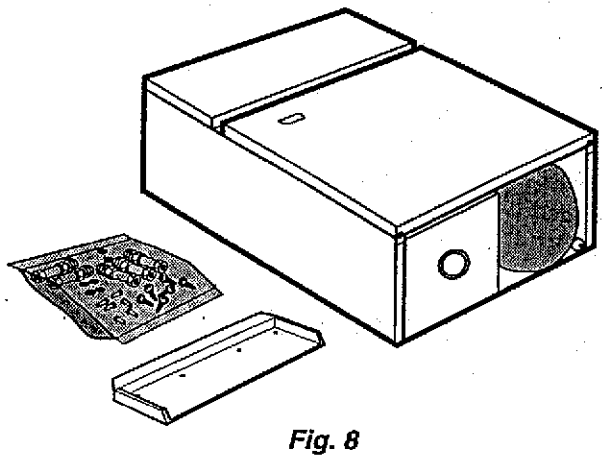


Fig. 8

3.2 PREPARE THE WALL (See Fig. 9)

1 Decide upon the position of the boiler using the template supplied.
The overall size of the template is the same size as the boiler plus the necessary clearances required around it.
Note: Take into account the flue terminal position when deciding on the boiler position. Refer to section 2.7.

2 Tape the template to the wall (ensure it is level) and mark the position of four holes for fixing the wall mounting bracket, two holes for the boiler top fixes and, if rear exit flue is used, the position of the hole for the flue.
If side exit flue is to be used, continue the horizontal centre line of the flue across the wall to the side wall, then along the side wall 280 mm. This will give the position of the centre of the hole for the flue.

3 Cut the 105 mm diameter hole in the wall for the flue - ensure it is horizontal.
Drill the six fixing holes to accept the wall plugs supplied (No.10 for the wall mounting bracket and No.8 for the boiler side fixings) and fit the plugs.

4 Secure the wall mounting bracket to the wall using four No.10 x 2½" countersunk head screws supplied.
Ensure it is level and the right way up.

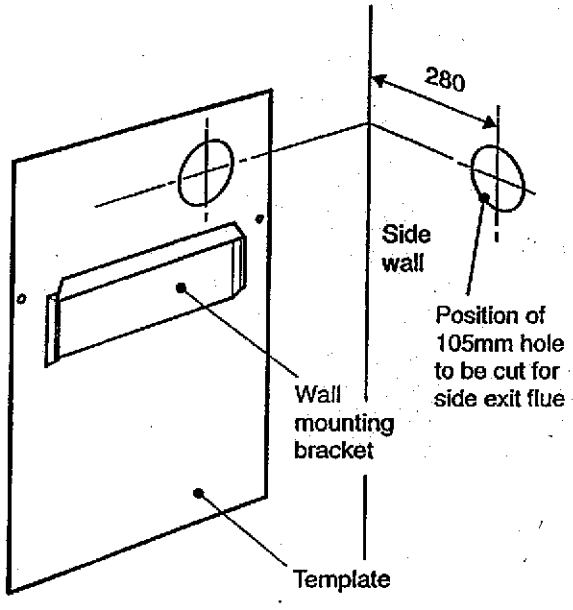


Fig. 9

3.3 FIT THE BOILER

1 Remove the six screws (three each side) securing the bottom panel to the bottom of the side panels and remove the bottom panel and controls cover assembly.

2 Remove the two screws at the top of the case front panel securing it to the side panels. Slide the panel up as far as possible (25 mm) and lift it away from the boiler.

3 Remove the one screw securing the bottom of a case side panel to the boiler back plate. Slide the panel towards the top of the boiler and lift it off. Repeat for the other side panel.

Note: Place all panels in a safe position so as not to damage them.

The boiler has a flange on the top of the back plate. This is to be hooked over the channel on the wall mounting bracket to take the weight of the boiler.

4 Lift the boiler and locate it on the wall mounting bracket.

5 Adjust the position of the boiler, as necessary, to align the two boiler side fixing holes (in the back plate flanges on each side) with the plugs previously fitted. Loosely fit the two No.8 x 2½" countersunk head screws supplied into the side fixes, but do not fully tighten.

6 When you are satisfied that the boiler is level, fully tighten the two side fixing screws to secure it to the wall.

3.4 CONNECT THE PIPEWORK (See Fig. 2 and section 14)

Having ensured that all the water pipework has been thoroughly flushed and that the gas supply is clear, the pipework can now be connected to the boiler - ensure that all the plastic caps are removed from the boiler connections first. Take care when removing the plastic caps as the boiler may still contain a small amount of water.

Notes: a Ensure no parts of the pipework protrude more than 100 mm from the wall, as when the bottom cover assembly is refitted there is only a gap of 105 mm between the back of the bottom panel and the wall.

b Do not connect the safety valve discharge pipe to the valve until after the bottom panel assembly has been replaced, (connect it in such a way to allow for easy disconnection/connection to permit removal of the bottom panel) remembering that the pipe must be routed clear of the boiler to a drain in such a manner that it may be seen, but cannot cause injury to persons or property.

1 Noting the pipe positions from the labels on the boiler, secure all the valves/fittings to the boiler with the operating spindles downward (accessible from beneath the boiler), then connect the pipework.

2 When tightening any fitting do not apply excessive force which might damage the pipework.

3 Connect the pressure reducing valve and expansion relief valve in the mains water supply to the boiler as described in section 2.13 and shown in Fig. 6. There **must be no** valves between the boiler and the expansion relief valve.

4 Connect the temperature/pressure relief valve and expansion relief valve discharge pipes to the tundish as described in section 2.13 and shown in Fig. 7.

5 Secure pipework to the wall as necessary.

6 Ensure that all the valves are **closed** and do not turn on the gas or water supplies at this stage. The valves are **closed** when the slot in the operating spindle is horizontal.

3.5 FIT THE STANDARD HORIZONTAL FLUE (See Figs. 10 and 11)

Alternative flue options are described in our seperate flue brochure.

Note: To avoid rain or possible condensation running into the boiler, the flue **must not** slope down towards the boiler. The following procedure applies to both rear or side exit flue. The only difference being the lengths to which the ducts are cut.

Rear flue Outer air duct length is finished wall thickness plus 206 mm.
Inner flue duct length is finished wall thickness plus 336 mm.

Side flue Outer air duct length is finished wall thickness plus the distance from the inside wall to the outer edge of the flange on the back panel plus 95 mm (right hand side) or 335 mm (left hand side).
Inner flue duct length is finished wall thickness plus the distance from the inside wall to the outer edge of the flange on the back panel plus 225 mm (right hand side) or 465 mm (left hand side).
If the overall length of the inner duct is greater than 1005 mm then a flue extension is required. To fit an extension refer to section 3.5.1.

1 Open the flue carton and check the contents of the pack against the packing list (see section 14).

2 Withdraw the inner flue duct from the outer air duct.

3 Mark the outer air duct to match the length given above, measure from the swaged 'outer' end of the tube. See Fig. 10.

4 Mark the inner flue duct to match the length given above, measure from the outermost edge of the terminal. See Fig. 10. Push the spacing clip towards the terminal so that it will be about in the middle of the duct when it is cut to length. The clip can be removed on short flues, below 500 mm.

5 Double check the dimensions then cut both the inner and outer ducts to length. Ensure that they are cut square and are burr free.

6 Fit the outer sealing collar over the swaged end of the outer duct, ensuring it locates in the swage. See Fig. 10.

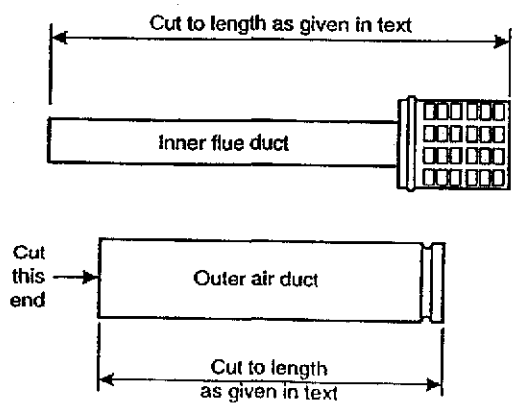


Fig. 10

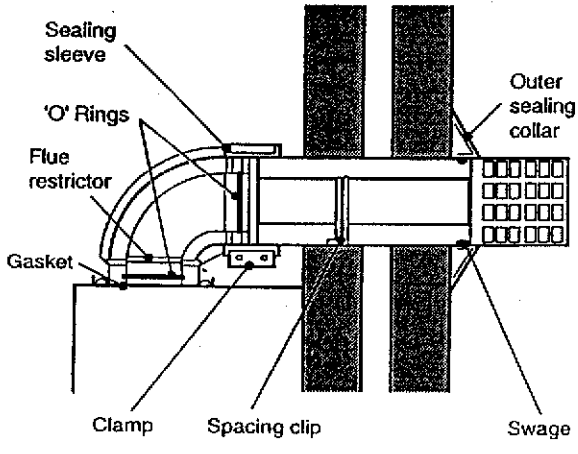


Fig. 11

7 Insert the terminal end of the inner duct into the end of the outer duct just cut and push it fully home. If there is sufficient space around the boiler to fit the inner duct from inside the building, then do this in paragraph 9.

8 From outside the building insert the assembly (or outer duct only) into the wall and carefully push it towards the boiler.

9 If the inner duct has already been positioned inside the outer duct, withdraw it into the building sufficiently to fit the flue elbow.

10 Locate the sealing collar over the outer duct with the larger internal diameter towards the wall.

11 Position the 'O' rings (supplied in the flue accessories pack) into the recesses at each end of the inner tube of the flue elbow. **Note: If the flue length is less than 1 m, fit the flue restrictor supplied into the inlet socket of the flue as shown in Fig. 11 - push the restrictor up into the socket as far as it will go.**

12 Position the gasket (supplied in the flue accessories pack) over the fan spigot on top of the boiler, lining it up with the screw holes.

13 Lubricate the 'O' rings in the flue elbow with a soap solution to aid assembly, then insert the inner duct into the end of the elbow without the flange. If the spacing clip is fitted over the inner duct, ensure that the legs are facing downwards.

14 Push the elbow and inner duct assembly into the outer duct, raising the elbow above the fan spigot then lowering it into position over the spigot. Secure the elbow to the boiler with the four M4 screws supplied in the flue accessories pack.

15 Locate the sealing sleeve over the elbow as far as possible, then carefully withdraw the outer duct from the wall entering it into the sleeve as far as possible.

16 Open the clamp (supplied in the flue accessories pack) and locate it over the sealing sleeve. Fit the two No.8 self tapping screws (supplied in the flue accessories pack) to the clamp and tighten to secure the outer duct to the elbow.

17 Make good the inside wall and also the outside wall behind the outer sealing collar.

18 Fit a terminal guard if necessary. See section 2.7.

3.5.1 FIT A FLUE EXTENSION TO A HORIZONTAL FLUE (See Fig. 12)

1 Withdraw the inner flue duct from the outer air duct of the standard flue supplied with the boiler.

2 Position the flared end of the extension inner duct over the standard duct. Drill through the two pilot holes in the flared end of the extension into the standard duct using a 2.8 mm dia. drill. Secure the two ducts together using two of the screws supplied with the extension.
Leave the spacing clip in position on the standard duct.

3 Position the connecting sleeve (supplied with the extension) over the plain end of the standard outer duct, then slide in the outer duct of the extension. Secure the two together using the clamp and screws supplied with the extension.

4 Repeat with another extension if necessary.

5 Cut to length and fit the flue as described in the previous section (3.5). It is necessary to support the flue with a suitable bracket(s) when flue lengths approaching the maximum are used.

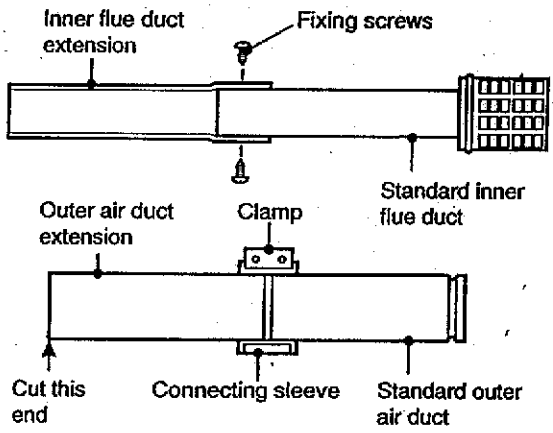


Fig. 12

3.6 CONNECT THE POWER SUPPLY (See Fig. 13)

The boiler is supplied with a factory fitted power supply cable and 3 A fused 3-pin plug. Connect the supply cable to a suitable power supply. **Ensure correct polarity.**

With the power supply **OFF**.

1 Remove the two screws securing the control panel fascia and hinge down to access the terminal block.

2 To connect a room thermostat proceed as follows:-
Pass the room thermostat leads through the cable support bush in the base of the control box (next to the power supply cable). Remove the yellow link between terminals 1 and 2 on the main terminal block and connect the thermostat in its place.

3 Carry out electrical system checks - Short circuit, Polarity, Earth continuity and Resistance to earth.

4 Leave the control panel fascia open until the boiler commissioning has been carried out.

Do not switch on the electricity supply at this stage.

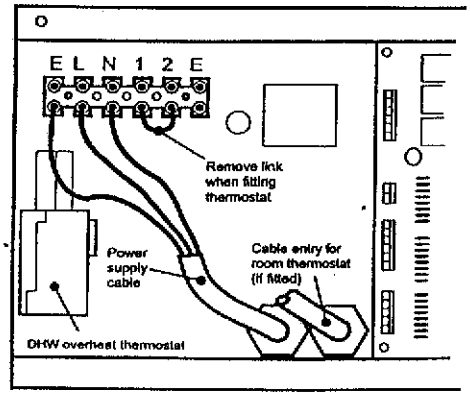


Fig. 13

4 FILL AND VENT THE SYSTEM

4.1 CENTRAL HEATING EXPANSION VESSEL PRESSURE

The expansion vessel fitted is supplied with a charge pressure of 1.0 bar (equivalent to a static head of 10.2 metres). The charge pressure must not be less than the static head at the point of connection (see Fig. 4). Do not pressurise the vessel above 1.5 bar.

The central heating system volume, using the expansion vessel as supplied, must not exceed 90 litres. If the system volume is greater than 90 litres, an extra expansion vessel (complying with BS 4841) must be fitted as close as possible to the central heating return connection on the boiler. The charge pressure of the extra vessel must be the same as the vessel fitted in the boiler. Refer to BS 7074:1 for further guidance.
A simple test to check if the expansion vessel size is adequate, is to fully heat the system and if the pressure rises to no more than 2.3 bar the vessel is adequate. A higher figure indicates that an extra vessel is required.

4.2 FILL THE SYSTEM

1 Check the pressure in the CH (red) expansion vessel is 1 bar or as required.

2 The boiler is fitted with an automatic air vent (see Fig. 18) positioned at the top of the boiler on the left hand side. Check that the small cap on the top of the air vent is screwed on fully, then unscrew it one complete turn - the cap remains in this position from now on.

3 Open the central heating flow and return valves. See Fig. 2.
Using a suitable screwdriver, turn the operating spindles fully anticlockwise (¼ of a turn). The valves are open when the slot in the operating spindle is in line with the valve body.
It is important that these valves are open before pressurising the system, the system could be over-pressurised as the safety valve is within the boiler and would not protect the system if the valves were closed.
Gradually open the fill point valve in the heating system until water is heard to flow.

4 Vent each radiator in turn, starting with the lowest in the system, to remove the air.

5 It is important that the pump is properly vented to avoid it running dry and damaging its bearings. Unscrew and remove the plug from the centre of the pump. Insert a flat bladed screwdriver into the exposed hole and rotate the pump spindle to and fro to ensure free movement (the pump may have dried out since factory testing), then replace the plug.

6 Check the operation of the pressure relief safety valve by turning the head anticlockwise until it clicks. The click is the safety valve lifting off its seat allowing excess primary water pressure to escape from the system - check that this is actually happening.

7 Continue to fill the system until the pressure gauge indicates between 0.8 and 1.5 bar. Close the fill point valve and check the system for water soundness, rectifying where necessary. Once soundness is confirmed, part drain the system and add the cleansing agent. Water may be released from the system by manually operating the safety valve until the system design pressure is obtained.

8 The system design pressure (cold) should be between 0.8 and 1.5 bar. This pressure is equivalent to the maximum permitted static head in bar + 0.3 (1 bar = 10.2 metres of water). See Fig. 4.

9 Open the mains cold water supply valve to fill the storage cylinder. Open all the hot water taps until all the air is vented from the pipework, then close the taps.

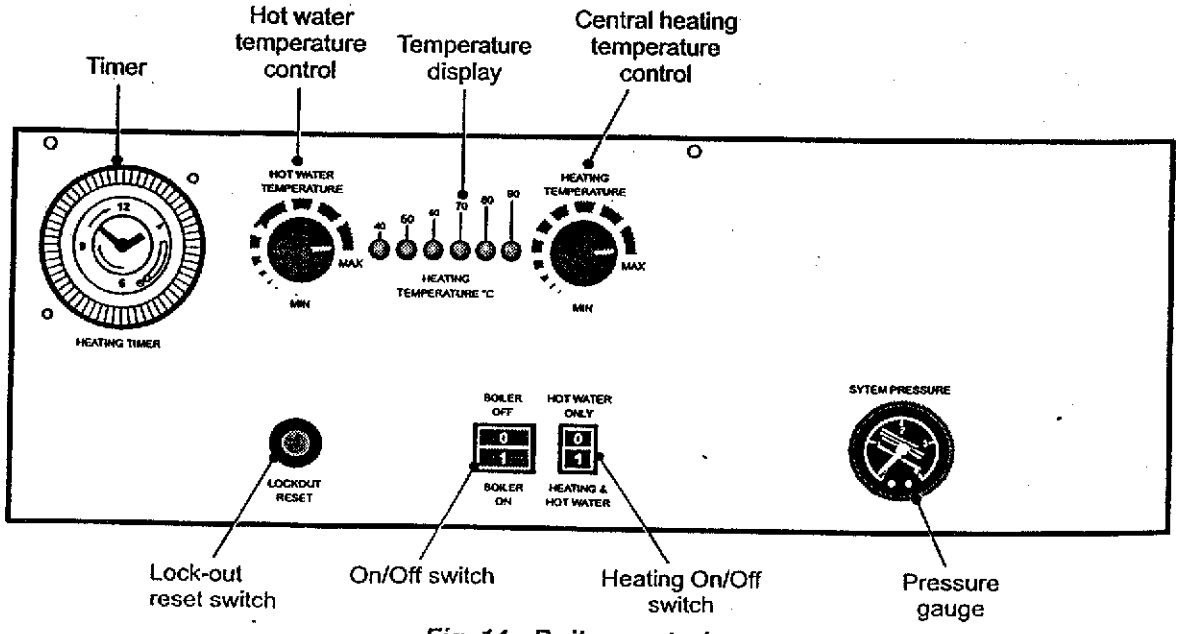


Fig. 14 - Boiler controls

5 COMMISSIONING

5.1 TEST FOR GAS SOUNDNESS AND PURGE THE SUPPLY

1 With the boiler gas service cock closed (slot in operating spindle at right angle to valve body), pressure test the gas supply and inlet pipework connection to the boiler service cock for soundness in accordance with BS 6891.

2 Remove the two screws securing the top of the control panel fascia and carefully hinge it down to gain access to the gas inlet pressure test point on the gas valve.

3 Unscrew the gas inlet pressure test point screw (see Fig. 19). Ensure the gas supply is on and open the boiler service cock (slot in operating spindle in line with valve body) to purge in accordance with BS 6891. Check that the static gas supply pressure is at least 20 mbar.

4 Tighten the test point screw and test for gas soundness. Close the boiler service cock.

5.2 FIRST LIGHTING

Ensure that the gas and electricity supplies to the boiler are off and that the central heating flow and return valves are open.

1 Temporarily replace the control panel fascia, secure it with one of its fixing screws.

2 Switch on the electricity supply to the boiler and set the timer for continuous operation - see Users Operating manual.

3 Set the hot water temperature selector to minimum and central heating temperature selector to maximum, and if a room thermostat is fitted, set it to maximum.

4 Set the boiler On/Off switch to On (the red light indicates the switch is set to On) and the 'Heating' switch to Hot Water Only.

5 The boiler will attempt to heat the cold water in the storage cylinder, but as the gas supply is not yet turned on the boiler will 'lock-out' and the red button on the control panel will light.
The boiler pump will still be working. Allow the pump to continue to run for a **few minutes** to vent the internal primary circuit.

6 Turn on the gas supply at the boiler service cock and press the lock-out reset button (press and release the button quickly - do not keep it pressed in).
After a few seconds the boiler should light - the burner flames can be seen through the inspection window in the inner case.
If the boiler does not light and goes to 'lock-out', set the On/Off switch to Off and check that the gas supply has been purged (section 5.1). If the boiler does not light after several attempts, contact ICI Caldaie UK Ltd.

7 Allow the boiler to run until the water in the storage cylinder has reached the set temperature (8 to 10 minutes), when the boiler will turn off. Set the 'Heating' switch to Heating & Hot Water, the boiler will light and operate in the heating central mode. Allow the boiler to run for a few moments to circulate and vent air from the system.

5.3 CHECK THE BURNER PRESSURES

The maximum and minimum burner pressures can only be checked with a cold boiler/system. When checking the maximum pressure you will only have **two minutes** before it modulates down.
The minimum and maximum pressures in the hot water mode (see section 1) must be established first, before the pressure in the central heating can be checked or adjusted. With a cold store the boiler will automatically be in the hot water mode, so there is no need to set the Heating switch to any particular setting.

1 Set the On/Off switch to Off to turn off the boiler. Isolated the gas supply at the service cock and set the On/Off switch to On. The boiler will attempt to start, but as the gas supply is not turned on the boiler will 'lock-out' and the red button on the control panel will light. The pump will still be working. Allow the pump to continue to run for a **few minutes** to cool the internal primary circuit.
Open a hot water tap to reduce the temperature of the stored water. Leave the tap running to remove heat from the primary circuit, thereby increasing the time available to check the maximum pressure.

2 Switch off the electricity supply and lower the control panel fascia. Loosen the burner setting pressure test point screw on the gas valve (see Fig. 19) and connect a pressure gauge. Disconnect one of the electrical leads to the modureg coil (see Fig. 19) and open the boiler gas service cock.

3 **Check minimum burner pressure**

Switch on the electricity supply and after a few moments the boiler will light at the minimum burner pressure. The minimum pressure has been factory set and should not require adjusting. Check that the burner pressure is 2.0 ± 0.1 mbar.
Refer to section 9.7.1, if any adjustment has to be made.
Switch off the electricity supply and reconnect the lead to the modureg coil.

4 **Check maximum burner pressure**

Switch on the electricity supply and after a moment or two the boiler will light at the maximum burner pressure. **Within two minutes** the burner will reduce to the minimum pressure. Check that the burner pressure is 11.6 ± 0.1 mbar.
Refer to section 9.7.1, if any adjustment has to be made.
Close the hot water tap.

5 **Maximum burner pressure in central heating mode**

Note: The maximum burner pressure in the central heating mode is adjusted by means of the potentiometer (see Fig. 15) on the main driver board, the pressures given in section 1.2 can only be achieved if the burner minimum and maximum pressures have been correctly set first on the gas valve.
Set the Heating switch to Heating and Hot Water, the Hot Water temperature control to minimum and allow the boiler to run, to fully heat the store. When the store is satisfied the boiler will change to the central heating mode and burner pressure will increase to its maximum value as set by the potentiometer.
If the heating load is between the factory set output of 18.09 kW and the maximum of 27.90 kW the burner pressure should be set to maximum.
If the heating load is between 12.32 kW and 18.09 kW set the burner pressure to the factory set pressure.
If the heating load is below 12.32 kW the burner pressure should be set to minimum.

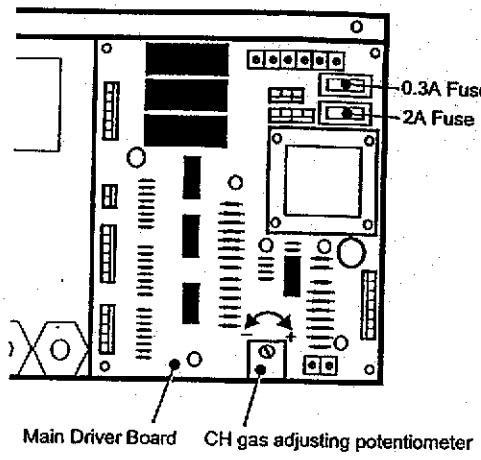


Fig. 15

6 Set the On/Off switch to Off to turn off the boiler. Disconnect the pressure gauge and tighten the test point screw. Set the On/Off switch to On to light the boiler and test for gas soundness around the test point screw.

7 Replace the control panel fascia and secure in position with two screws.

5.4 FINAL COMMISSIONING

1 Allow the heating system to heat up, then balance the system to achieve the necessary temperature difference across the heating flow and return pipes at the boiler - see section 1.2.

2 Set the On/Off switch to Off and turn off the electricity supply to the boiler.

3 Drain the heating system, while it is still hot, as described in section 8 in order to complete the flushing process.

4 Refill, vent and re-pressurise the system as described in section 4.2, adding a suitable inhibitor.
For further information concerning inhibitors contact ICI Caldale (UK) Limited.

5.5 FINAL ASSEMBLY

1 Replace the case side panels - locate the keyhole slot over the fixing on the back panel flange and slide the panel down, securing it at the bottom with the screw previously removed. Repeat for the other panel.

2 Replace the bottom panel assembly, securing it to the side panels with the six screws previously removed.

3 Position the outer case over the boiler with its fixings in line with the openings in the side panels, engage the fixings and lower the panel into position. Secure the top of the panel to the side panels using the two screws previously removed.

4 Connect the discharge pipe to the safety valve.

5 If the boiler is to be left in service with the User, set the controls, timer (see Users Operating manual) and room thermostat (if fitted) to the User's requirements then refer to section 6.

6 If the boiler is not to be handed over immediately, close the boiler gas service cock and switch off the electricity supply. If there is any possibility of the boiler being left during frost conditions, then the boiler and system should be drained, refer to section 8.

6 INFORMATION FOR THE USER

The User must be advised (and demonstrated if necessary) of the following important points:-

1 How to light and turn off the boiler and how to operate the system controls.

2 The precautions necessary to prevent damage to the central heating system and to the building, in the event of the boiler not being used during frost conditions.
Explain that the boiler has a built-in frost protection control and that the boiler must be left switched on for this to operate.

3 The importance of annual servicing of the boiler to ensure safe and efficient operation.

4 That any servicing or replacement of parts must only be carried out by CORGI registered personnel.

5 Ensure that the boiler controls and room thermostat (if fitted) are set to the User's requirements.

6 Tell the User the sealed system pressure.

7 Show the User the position of the safety valve discharge pipe and tundish.

8 Explain to the User that if the boiler should ever 'lock-out' the reset button should be pressed in and released quickly and that if it cannot be reset a Service Engineer is required.

9 The importance of maintaining the strength of the anti corrosion solution in the sealed primary system.

Hand the Users Operating manual to the User.

Leave this Installation and Servicing manual with the User for use on future calls.

IMPORTANT: It is a condition of the manufacturers guarantee that:

1 The boiler is protected by a suitable anti corrosion inhibitor.

2 The installation is checked on completion by a CORGI registered installer.

7 BOILER SERVICING

To ensure efficient operation of the boiler it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but in general once per year should be adequate. It is the law that any service work must be carried out by CORGI registered personnel.

7.1 IMPORTANT NOTES PRIOR TO SERVICING

1 Check the flue terminal outside and ensure it is not blocked.

2 Run the boiler and check the operation of its controls.

3 Ensure that all system connections and fittings are sound. Remake any joints and check the tightness of any fittings that may be leaking. Refill, vent and re-pressurise the system as necessary. See section 4.2.

4 If the boiler is in a cupboard or compartment, ensure that the ventilation openings are adequate and are clear. See section 2.6.

Warning: Before servicing the boiler set the On/Off switch to Off, isolate the electricity supply and close the boiler gas service cock (see Fig. 2). Allow the boiler to cool.

The data label is positioned inside the control panel cover.
Always test for gas soundness after servicing any gas carrying components.

7.2 DISMANTLING PRIOR TO SERVICING (See Fig. 16)

1 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

2 Remove the two screws at the top of the case front panel securing it to the boiler. Slide the panel up as far as possible (25 mm) and withdraw it forwards away from the boiler.

3 Remove the ten screws securing the sealed chamber front panel and remove the panel, take care not to damage the seal.

4 Remove the bottom and two side air deflector plates from the combustion chamber (two screws each).

5 Remove the three screws securing the burner front support bracket, remove the bracket (note that the two screws securing the bracket to the burner are slightly larger than the rest of the fixing screws) and the combustion chamber cover.

6 Undo the burner gas supply union (take care not to lose the sealing washer) and remove the sealing grommet (slide it down over the gas supply pipe).

7 Disconnect the electrode leads from the electrodes.

8 Withdraw the burner forwards slightly to disengage it from the rear locating bracket, the carefully tilt it down at the right hand side to withdraw the supply pipe from the case. Withdraw the burner.
Take care not to damage the insulation panels.

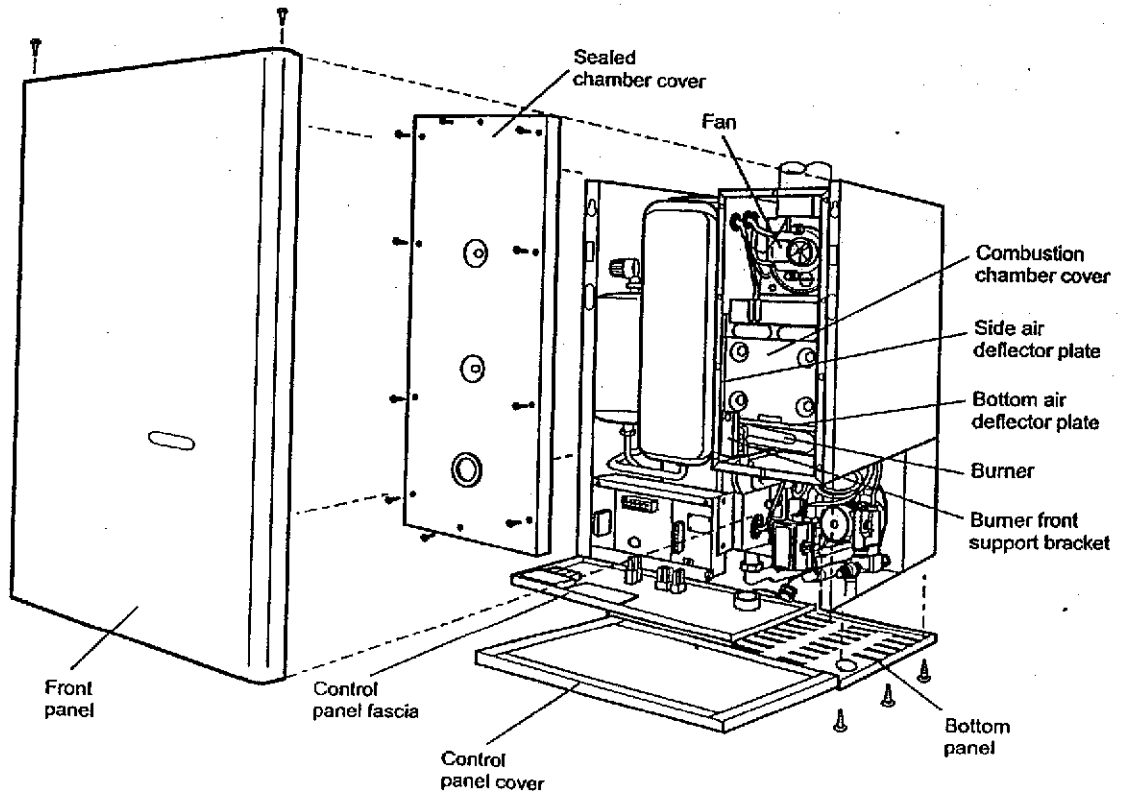


Fig. 16

7.3 CLEANING THE BOILER

1 Check the condition of the bottom of the heat exchanger, if it requires cleaning the flue hood should be removed as described in section 9.28, paragraphs 5 to 8. If the flue hood is removed, the condition of the fan impeller should be checked (clean carefully with a soft brush).
If the heat exchanger requires cleaning, clean it from above and below using a suitable soft brush. Brush sideways **NOT** front to back.

2 Check the condition of the combustion chamber insulation panels (see Health and Safety Information on page 2), dampen the panels before carrying out any work on them. Any damaged panels must be replaced - refer to section 9.30. Remove any fallen deposits from the base of the sealed chamber.

3 Remove the four screws securing the burner blade assembly to the injector bar and remove the blade assembly. Check the condition of the burner injectors on the manifold, carefully clean them with a soft brush if necessary. Do not use a wire brush as this might damage the injectors.
Unscrew and replace (using a new sealing washer) any injector that appears damaged.

4 Brush the top of the burner blades with a soft brush and check that the flame ports are clear. Any blockage may be removed with a stiffer brush.

5 Check the condition of the electrodes, clean with a soft brush if necessary.
Replace any cracked or damaged electrodes - refer to section 9.4.
Check the electrode gaps and positions (see Fig. 17) ensuring that the ignition electrode tips are:-
i Directly over a flame port.
ii 4 mm apart.
iii 5 mm above the burner blade.
Check that the flame sensing electrode tip is 6 mm above the burner blade.

6 Check the condition of the various sealing grommets and replace if necessary.

7 Turn the blade assembly open end down and gently tap to remove any debris from the venturis.

8 Refit the blade assembly to the injector bar and secure with the four screws previously removed. Use the outer set of holes.

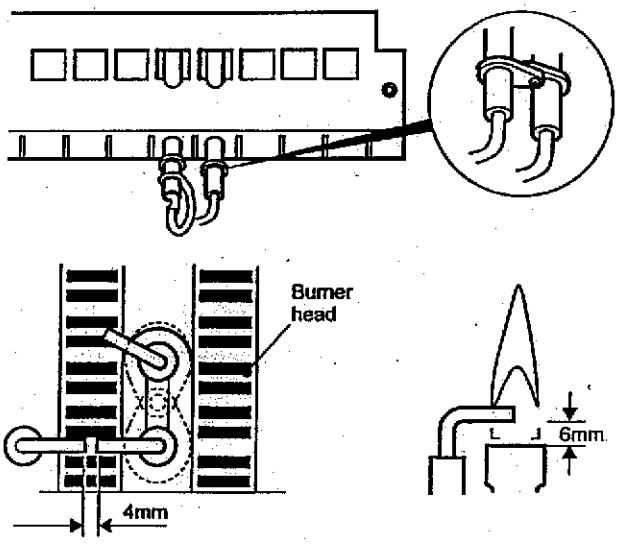


Fig. 17

7.4 RE-ASSEMBLE THE BOILER

1 Replace the burner assembly, ensuring that the blade retaining bar is located in the hole in the rear support bracket (take care not to damage the insulation panels). Tilt the burner slightly to the right and reconnect the electrode leads (Blue to the left hand flame sensing electrode and White to right hand ignition electrode). Ensure the insulation sleeves are in position over the connections and the sealing grommets are in position.

2 Replace the burner supply pipe sealing grommet and reconnect the gas supply pipe. Use a new sealing washer if necessary.

3 If the flue hood was removed, replace it, the fan, the sealed chamber top, flue elbow and reconnect the flue.
Note: When reconnecting the air pressure switch sensing tubes to the fan connect the front (transparent) sensing tube to the upper connector (nearest the fan outlet) and the rear (pink) tube to the lower connector.

4 Replace the combustion chamber cover and side restrictor plates, secure in position using the four screws previously removed.

5 Replace the burner front support bracket, secure in position using the three screws previously removed (note that the two screws securing the bracket to the burner are slightly larger).

6 Replace the bottom air restrictor plate, secure in position using the two screws previously removed.

7 Check that the gas supply pipe and electrode lead grommets are correctly fitted.

8 Replace the sealed chamber front panel (inspection window at the bottom) ensuring that seal is intact and in position. Secure it in position with the ten screws previously removed.

9 Raise the control panel fascia and secure in position using the two screws previously removed.

10 Light the boiler and test the burner supply pipe connection for gas soundness.

11 Position the outer case over the boiler with its fixings in line with the openings in the side panels, engage the fixings and lower the panel into position. Secure the top of the panel to the side panels using the two screws previously removed.

12 Turn on the electricity and gas supplies, set the On/Off switch to On and the boiler is ready to light when required. Check the operation of the boiler, refer to section 2.14, if necessary and ensure that all the controls are returned to their original settings.

8 DRAINING THE BOILER

Refer to Figs. 2 and 18

Set the On/Off switch to Off and isolate the electricity gas supplies.

Central heating circuit

1 Make a note of the system pressure, then close the central heating flow and return valves. See Fig. 2. Using a suitable screwdriver, turn the operating spindles fully clockwise (¼ of a turn).

2 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

3 Operate the safety valve (see Fig. 18) by turning the head anticlockwise until it clicks. This will release the pressure and allow water in the boiler to be drained direct to outside. Continue turning the valve head until water ceases to drain.

Note: When refilling the system ensure it is adequately protected by a suitable anti-corrosion inhibitor.

Hot water circuit

1 Close the mains water supply valve and ensure all hot taps are closed.

2 Open the control panel cover (hinges down), then from underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access to the bottom of the storage cylinder. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.

3 Remove the drain plug (item 36 in exploded view 13.4) from the bottom of the hot water storage tank and place a suitable container under the boiler.

4 Slowly open a hot tap below the level of the boiler to allow the storage tank to drain.

Note: Some water will remain in the boiler components and care must be taken when removing them.

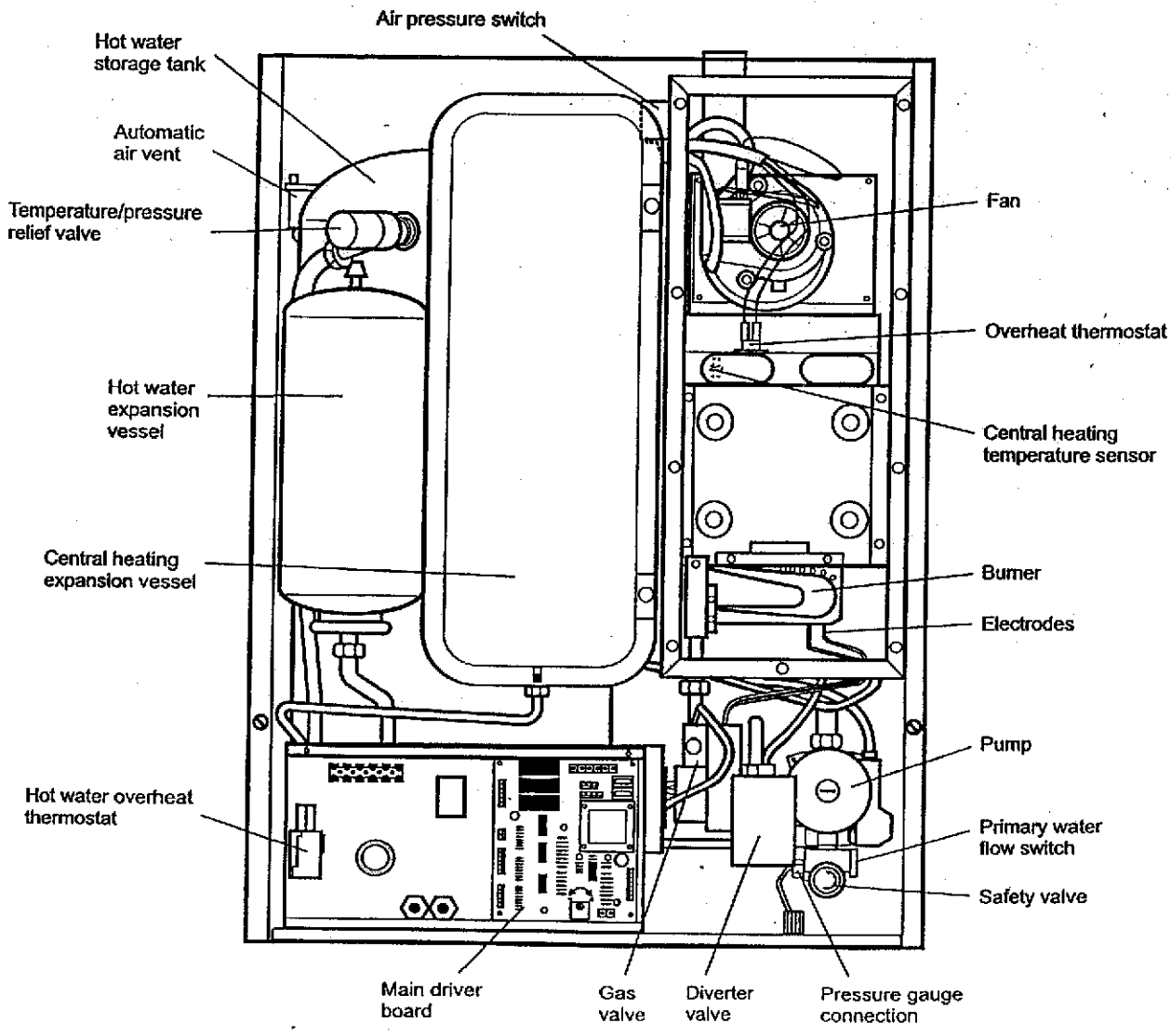


Fig. 18

9 REPLACEMENT OF COMPONENTS

It is the law that any service work must be carried out by CORGI registered personnel.

Warning: Before replacing any boiler components, set the On/Off switch to Off, isolate the electricity supply and close the boiler gas service cock (see Fig. 2). Allow the boiler to cool.

Important notes when removing or replacing components:-

1 Always test for gas soundness after replacing any gas carrying components or disturbing any gas connections.
2 Always check the condition of the sealed chamber seals when removing/replacing the top or front panels. Replace if necessary.
3 Always check the condition of sealing washers and 'O' rings. Replace if necessary.
4 Check the operation of the boiler, refer to section 2.14 if necessary.
5 Ensure that all the controls are returned to their original settings.

To replace any components in sections 9.1 to 9.15 does not require any draining of the boiler.

Refer to Fig. 18 for the position of the components.

9.1 BURNER

1 Ensure that the electricity supply has been isolated.
2 Remove the burner as described in section 7.2, paragraphs 1 to 8.
3 From underneath the burner, remove the screws securing the electrodes and withdraw them. Transfer them to the new burner. Ensure that the earth lead is connected and that the ignition electrodes are positioned before fitting the flame sensing electrode. Check the electrode gaps. See Fig. 17.
4 Fit the burner, re-assemble in reverse order and test the boiler as described in section 7.4.

9.2 BURNER INJECTORS

1 Ensure that the electricity supply has been isolated.
2 Remove the burner as described in section 7.2, paragraphs 1 to 8.
3 Remove the four screws securing the burner blade assembly to the injector bar and remove the blade assembly.
4 Unscrew the damaged injector and screw in a replacement using a new sealing washer.
5 Refit the blade assembly to the injector bar and secure with the four screws previously removed. Use the outer set of holes.
6 Replace the burner, re-assemble in reverse order and test the boiler as described in section 7.4.

9.3 FAN

1 Ensure that the electricity supply has been isolated.
2 Gain access to the fan as described in section 7.2, paragraphs 1 to 3.
3 Disconnect the flue elbow from the flue and remove it from the top of the boiler.
4 Remove the seven screws securing the sealed chamber top panel and remove the panel, take care not to damage the seal.
5 Disconnect the electrical leads and pressure switch sensing tubes from the fan noting their positions.
6 Remove the four screws securing the fan to the flue hood and remove the fan.
7 Re-assemble in reverse order and test the boiler as described in section 7.4, paragraphs 8 to 12.
Note: Ensure the seal on the sealed chamber top panel is intact and in position, and when reconnecting the air pressure switch sensing tubes to the fan connect the front (transparent) one to top connection and the rear (pink) one to bottom connection.

9.4 ELECTRODES

1 Ensure that the electricity supply has been isolated.
2 Remove the burner as described in section 7.2, paragraphs 1 to 8.
3 From underneath the burner, remove the screws securing the electrodes and remove from the burner.
4 When refitting the electrodes, the earth electrode is at the left and the ignition electrode/flame sensing electrodes are at the right, secure in position with the screws previously removed. See Fig. 17.
Ensure the earth lead is connected by the L/H electrode fixing screw, the R/H ignition electrode bracket is positioned first (white lead) then the flame sensing electrode (blue lead) bracket is positioned on top before securing in position (electrode positions are as viewed with the burner removed).
5 Check the electrode gaps and positions (see Fig. 17) ensuring that the ignition electrode tips are:-
a) Directly over a flame port, b) 4 mm apart, c) 5 mm above the burner blade.
Check that the flame sensing electrode tip is 6 mm above the burner blade.
6 Replace the burner, re-assemble in reverse order and test the boiler as described in section 7.4.

9.5 ELECTRODE LEAD(S)

1 Ensure that the electricity supply has been isolated.

2 Gain access to the electrode leads as described in section 7.2, paragraphs 1 to 3.

3 Disconnect the electrode lead from the electrode (White ignition R/H, Blue flame sensing L/H) and the ignition control unit. Withdraw the old lead and replace with a new one. Check the condition of the grommet (replace if necessary) and ensure it is correctly fitted in the base of the sealed chamber.

4 Re-assemble in reverse order. Light the boiler and check its operation as described in section 7.4, paragraphs 8 to 12.

9.6 PRIMARY WATER OVERHEAT THERMOSTAT

The overheat thermostat is positioned on the front of the heat exchanger. See Fig. 18.

1 Ensure that the electricity supply has been isolated.

2 Gain access to the overheat thermostat as described in section 7.2, paragraphs 1 to 3.

3 Disconnect the electrical leads from the thermostat and remove the two screws securing it to the heat exchanger.

4 Re-assemble in reverse order using a new thermostat. Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.7 GAS VALVE (See Fig. 19)

Refer to section 9.7.1 after replacing the gas valve.

1 Ensure that the electricity and gas supplies have been isolated.

2 Open the control panel cover (hinges down), then from underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access to the lower gas valve fittings. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.

3 Remove the two screws securing the control panel fascia and hinge down the fascia.

4 Undo the burner supply union above the gas valve, take care not to lose the sealing washer.

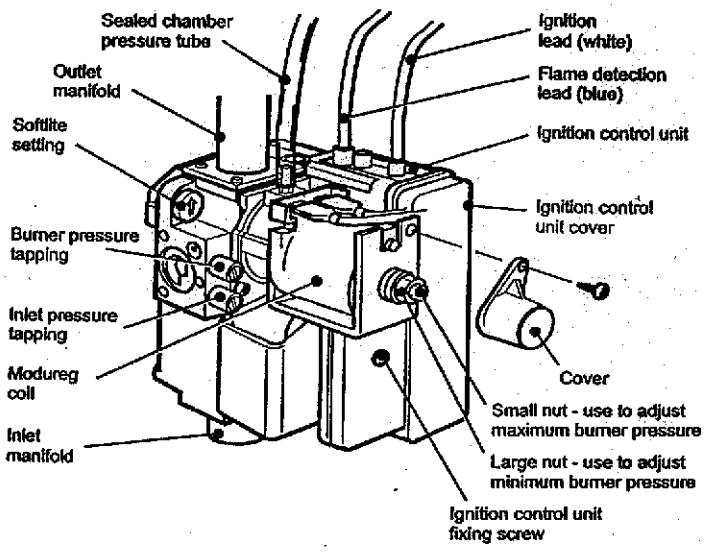


Fig. 19

5 Remove the diverter valve head - push in the locating pin on the right hand side of the head where it meets the brass body (see Fig. 20) and turn the head fully anticlockwise (about ¼ of a turn) and lift off the head.

6 Disconnect the Modureg coil leads and pressure tube, then remove the screw securing the ignition control unit to the gas valve. Carefully prise open the wiring cover clips on the top and right hand side of the cover and remove the cover. Disconnect the wiring connector and withdraw the ignition control unit away from the gas valve.

7 From underneath the boiler, undo the elbow union, taking care not to lose the sealing washer.

8 Remove the two screws (front R/H, rear L/H) securing the gas valve inlet manifold to the chassis and lift out the valve.

9 Remove the inlet and outlet manifolds and transfer them to the new valve, using new gaskets.

10 Re-assemble in reverse order, the polarity of the modureg leads is not important. **Note:** The 'earth' tag is not used. **Check the Softlite setting** (see Fig. 19) arrow up for Propane and Natural gas.
Note: Ensure the burner supply and inlet elbow union sealing washers are in good condition, replace if necessary. Also ensure that the ignition control unit is located correctly on the gas valve. When replacing the diverter valve head, position it with the leads in the 10 o'clock position and rotate fully clockwise until it locks into position.

11 Test the gas valve inlet union and manifold connections for soundness, light the boiler and test the outlet manifold and burner supply union connections for soundness.

9.7.1 SET THE BURNER PRESSURES

The minimum burner pressure is the same in both the central heating and hot water modes. The maximum burner pressure in the hot water mode is fixed, the maximum burner pressure in the central heating mode is adjustable to suit the heating load. Refer to section 5.3 for more detailed information.

Note: Always set the minimum pressure first.

1 **Check the minimum burner pressure** as described in section 5.3, paragraphs 1 to 3.
Wait until the pressure has stabilised.
Turn the minimum burner pressure adjustment nut (see Fig. 19) to obtain the required burner pressure (refer to section 1.2).
Turn the nut clockwise to increase the pressure and then anticlockwise until the correct pressure is reached.

2 **Check the maximum burner pressure** as described in section 5.3, paragraph 4.
Wait until the pressure has stabilised.
Turn the maximum burner pressure adjustment nut (see Fig. 19) to obtain the required burner pressure (refer to section 1.2).
Turn the nut clockwise to increase the pressure and then anticlockwise until required pressure is reached.
Note: Ensure that the minimum pressure adjustment nut does not turn when adjusting the maximum nut.

3 **Check the maximum burner pressure in the central heating mode** as described in section 5.3, paragraph 5.

4 Set the On/Off switch to Off, disconnect the pressure gauge, retighten the test point screw and replace the Modureg head cover.

5 Set the On/Off switch to On, light the boiler and test for gas soundness around the test point screw.

6 Ensure the control panel fascia is secured then replace the bottom panel (if removed).

7 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.8 IGNITION CONTROL UNIT

The ignition control unit is mounted on the right hand side of the gas valve (see Fig. 19) and is connected directly to the valve via a 5-way plug. There are no servicable parts inside the plastic enclosure.

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

3 Remove the diverter valve head - push in the locating pin on the right hand side of the head where it meets the brass body (see Fig. 20) and turn the head fully anticlockwise (about ¼ of a turn) and lift off the head.

4 Remove the screw securing the ignition control unit to the gas valve. Carefully prise open the wiring cover clips on the top and right hand side of the cover and remove the cover. Disconnect the wiring connector and withdraw the ignition control unit away from the gas valve.

5 Disconnect the ignition lead (white) and the flame detection lead (blue) from the ignition board.

6 Fit the replacement ignition board onto the gas valve and re-assemble in reverse order.
Note: Ensure that the ignition control unit is located correctly on the gas valve. When replacing the diverter valve head, position it with the leads in the 10 o'clock position and rotate fully clockwise until it locks into position.

7 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.9 TIMER

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

3 Remove the two screws and nuts securing the timer to the control panel fascia.

4 Lift the timer out of the back of the fascia and disconnect the electrical leads, noting their position.

5 Re-assemble in reverse order using a new timer - refer to the wiring diagram, page 34, for electrical connections.

6 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.10 INSPECTION WINDOW

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down).

3 Remove the two screws at the top of the case front panel securing it to the boiler. Slide the panel up as far as possible (25 mm) and withdraw it forwards away from the boiler.

4 Remove the ten screws securing the inner case front panel and remove the panel, take care not to damage the seal.

5 Cut away the silicone mounting with a sharp tool and remove the damaged window. Fit a new window using a suitable heatproof silicone and allow to dry as per the manufacturers instructions.

6 Re-assemble in reverse order with new items as necessary.

9 REPLACEMENT OF COMPONENTS

9.11 LOCK-OUT RESET SWITCH

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

3 Disconnect the electrical leads from the reset switch.

4 Squeeze together the locating tabs around the back and push it out of the fascia.

5 Push in a replacement switch from the front, ensuring it is located correctly in the fascia.

6 Connect the electrical leads to the new switch as below.
White - Terminal 1
Green - Terminal 2
Blue - Terminal 3

7 Re-assemble in reverse order. Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.12 TEMPERATURE CONTROL POTENTIOMETERS/TEMPERATURE DISPLAY PCB

The heating and hot water temperature control potentiometers form part of the temperature display board located on the back of the control panel fascia.

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down) and pull the control knobs off the potentiometer spindles.

3 Remove the two screws securing the control panel fascia and hinge down the fascia.

4 Compress the retaining clips on the mounting pillars, lift off the PCB and remove the wiring connectors.
Note: The new board is supplied with a set of mounting pins.

5 Fit the wiring connectors to the new PCB and locate it over the two mounting pins on the rear of the fascia. Replace the control knobs (the knobs can only be fitted in one position).

6 Close the control panel fascia and secure in position.

7 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.13 SWITCHES

The same procedure applies to both the On/Off and 'Heating' switches.

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

3 Disconnect the electrical leads from the back of the switch, noting their position.

4 Note which way round the switch is fitted, then squeeze together the locating tabs on the back and push it out of the fascia.

5 Push in a replacement switch from the front, ensuring it is the correct way round and connect the electrical leads - refer to the wiring diagram, page 34, for electrical connections.

6 Re-assemble in reverse order. Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.14 MAIN DRIVER BOARD

The main driver board is positioned in the right hand side of the control box.

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

3 Carefully lift the board off its mounting pillars (one each corner).

4 Remove the leads from the terminal blocks (noting their position) and unplug all the wiring connections from the circuit board.

5 Re-assemble in reverse order using a new board - refer to the wiring diagram, page 34, for electrical connections. Do not use excessive force when re-making the board connections and ensure all plugs and leads are correctly connected.
Note: The burner pressure (in the central heating mode) will have to be reset as described in section 5.2. Ensure the NG/LPG jumper on the main PCB is correctly set, that jumper JP2 is fitted and that the other jumpers JP3 (2 - 3) and JP6 (1 - 2) are correctly fitted (see wiring diagram in section 10.2).

6 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.15 HOT WATER STORAGE OVERHEAT THERMOSTAT

This overheat thermostat is positioned on the left inside the control box (see Fig. 13), with the thermostat phial located in the base of the storage cylinder.

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down), then from underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access to the bottom of the storage cylinder. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.

3 Remove the screw securing the bottom of the left hand case side panel. Slide the panel up and lift it off.

4 Remove the two screws securing the control panel fascia and hinge down the fascia.

5 Remove the two screws securing the thermostat to the control box and disconnect the wiring.

6 From underneath the boiler carefully remove the circlip from the thermostat pocket in the base of the cylinder, retaining the thermostat capillary, and withdraw the thermostat phial.

7 Remove the thermostat, carefully withdrawing the phial through the back of the control box.

8 Re-assemble in reverse order ensuring the thermostat phial is inserted as far as it will go into the storage cylinder pocket. The polarity of the red leads is not important.

9 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.16 AIR PRESSURE SWITCH

The air pressure switch is positioned at the top of the boiler at the left of the sealed chamber and is accessible after removing the central heating expansion vessel (red). See Fig. 18.

1 Ensure that the electricity supply has been isolated.

2 Drain the boiler central heating circuit as described in section 8.

3 Remove the two screws at the top of the case front panel securing it to the boiler. Slide the panel up as far as possible (25 mm) and withdraw it forwards away from the boiler.

4 Remove the one screw securing the expansion vessel retaining strap and lift it over to the left. Remove the two screws securing the expansion vessel, undo the union at the bottom (take care not to lose the sealing washer) and remove the vessel.

5 Disconnect the pressure sensing tubes and remove the two screws securing the mounting bracket to the sealed chamber. Remove the one screw securing the wiring cover and remove cover and disconnect the electrical leads. Check the condition of the grommets (replace if necessary).

6 Remove the mounting bracket from the switch and fit it to the new one in the same position.

7 Connect the electrical leads as follows:-

Blue - Terminal C, Black - Terminal Nc (1), Brown - Terminal No (2)

8 Fit the wiring cover, secure the mounting bracket to the sealed chamber and reconnect the sensing tubes. Connect the front (transparent) sensing tube to the connector marked - / L and the rear (pink) tube to the other connector marked + / H.

9 Re-assemble in reverse order ensuring the expansion vessel sealing washer is in good condition, replace if necessary. The bottom connection of the expansion vessel should be towards the back when fitting it.

10 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.

11 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.17 PRESSURE GAUGE

1 Ensure that the electricity supply has been isolated.
2 Drain the central heating circuit of the boiler as described in section 8.
3 From underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access to the pressure gauge sensor on the flow switch housing, just below the pump. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.
4 Remove the union nut securing the pressure gauge sensor (see Fig. 18) and withdraw the sensor.
5 Squeeze together the locating tabs on the back of the gauge and push the gauge out of the control panel fascia.
6 Push in a replacement gauge, ensuring it is the correct way round and secure the sensor in place with union.
7 Re-assemble in reverse order.
8 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.
9 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.18 SAFETY VALVE

1 Ensure that the electricity supply has been isolated.
2 Drain the central heating circuit of the boiler as described in section 8.
3 Disconnect the discharge pipe from the safety valve and remove the six screws securing the bottom panel.
4 Unscrew the safety valve from the flow switch housing.
5 Re-assemble in reverse order using a new valve.
6 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7. Turn the safety valve knob a couple of times to check that it re-seats properly without leaking. Re-pressurise the system if necessary.
7 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.19 PUMP - a replacement pump must be set at setting 3

1 Ensure that the electricity supply has been isolated.
2 Drain the central heating circuit of the boiler as described in section 8.
3 From underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access to the pump. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.
4 Remove the screw securing the bottom of the right hand case side panel. Slide the panel up and lift it off.
5 Remove the pump wiring cover and disconnect the electrical leads (make a note of their positions).
6 Undo the pipe unions from the pump and withdraw the pump.
7 Re-assemble in reverse order using a new pump with new seals. Ensure the pump is fitted the correct way up - the direction of flow is upwards.
8 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.
9 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.20 AUTOMATIC AIR VENT

The air vent is positioned at the back of the boiler on the upper left hand side and is accessible without removing the case.

1 Ensure that the electricity supply has been isolated.
2 Drain the central heating circuit of the boiler as described in section 8.
3 Unscrew the automatic air vent from the fitting and replace with a new one using a new 'O' ring.
Check that the small cap in the top of the air vent is screwed in fully, then unscrew it one complete turn - the cap remains in this position from now on.
4 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.
5 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.21 DIVERTER VALVE (See Fig. 20)

Diverter Valve Head

The diverter valve head can be replaced without draining the boiler.

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down). Remove the two screws securing the control panel fascia and hinge down the fascia.

3 Push in the locating pin on the right hand side of the head where it meets the brass body (see Fig. 20) and turn the head fully anticlockwise (about ¼ of a turn) and lift off the head.

4 Disconnect the wiring plug and connect it to the new head. Position the new head above the valve body with the leads in the 10 o'clock position and rotate fully clockwise until it locks into position.

5 Re-assemble in reverse order. Light the boiler and check its operation as described in section 7.4, paragraph 12.

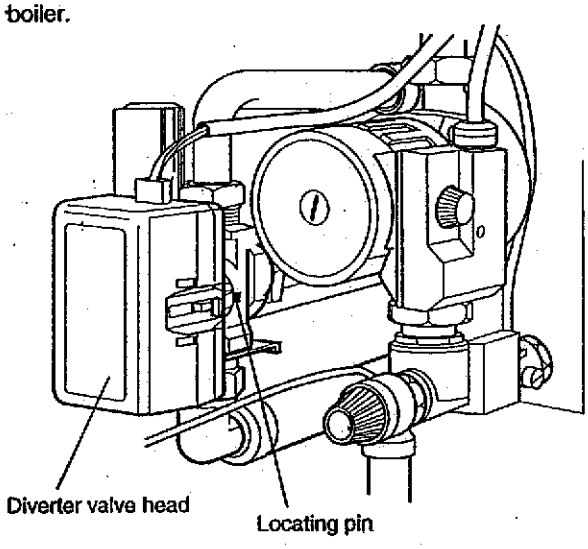


Fig. 20

Diverter Valve Body

1 Ensure that the electricity supply has been isolated.

2 Drain the central heating circuit of the boiler as described in section 8.

3 From underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access central heating return elbow. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.

4 Remove the valve head as described above in paragraph 3.

5 Undo the top and rear unions connecting the pipework to the valve body.

6 From underneath the boiler, undo the union securing the central heating return elbow the diverter valve body.

7 Remove the back nut securing the valve to the chassis and withdraw the valve. Take care as a small amount of water may be left in the boiler.

8 Re-assemble in reverse order using new sealing washers.
Ensure connection 'A' of the valve body is at the bottom.

9 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.

10 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.22 CENTRAL HEATING EXPANSION VESSEL (red)

1 Ensure that the electricity supply has been isolated.

2 Drain the boiler central heating circuit as described in section 8.

3 Remove the two screws at the top of the case front panel securing it to the boiler. Slide the panel up as far as possible (25 mm) and withdraw it forwards away from the boiler.

4 Remove the two screws securing the expansion vessel, undo the union at the bottom (take care not to lose the sealing washer) and remove the vessel.

5 Re-assemble in reverse order, using a new sealing washer on the expansion vessel connection. The bottom connection of the expansion vessel should be towards the back when fitting it.

6 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.

7 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.23 PRIMARY WATER FLOW SWITCH (see Fig. 21)

The primary water flow switch assembly is positioned below the pump.
The microswitch (on the right hand side of the assembly) can be replaced without draining the boiler.

Microswitch

1 Ensure that the electricity supply has been isolated.

2 Open the control panel cover (hinges down), then from underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.

3 Remove the screw securing the bottom of the right hand case side panel. Slide the panel up and lift it off.

4 Remove the plastic cover from the primary water flow switch and slide the microswitch from its housing pins. Disconnect the electrical leads and connect to the new switch (polarity is not important, but use only the two outer terminals).

5 Carefully move the operating lever away to allow the microswitch to locate on its housing pins.

6 Re-assemble in reverse order. Light the boiler and check its operation as described in section 7.4, paragraph 12.

Water Flow Switch

1 Ensure that the electricity supply has been isolated.

2 Drain the central heating circuit of the boiler as described in section 8.

3 From underneath the boiler remove the six screws securing the bottom panel.
Note: Depending upon the arrangement of the safety valve discharge pipe, it may be possible to lower the panel down over the pipe sufficiently to allow access. If this is not possible, the discharge pipe should be disconnected from the safety valve and the bottom panel assembly removed.

4 Remove the screw securing the bottom of the right hand case side panel. Slide the panel up and lift it off.

5 Remove the microswitch as described above in paragraph 4.

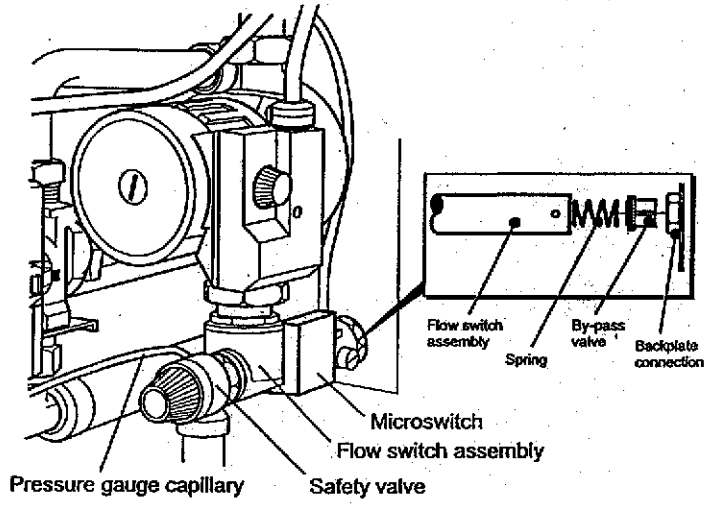


Fig. 21

6 Undo the bottom pump and pressure gauge sensor unions from the assembly.

7 From underneath the boiler remove the two screws securing the pipe flange to the top of the assembly. Loosen the screw securing the assembly to the back panel union, Carefully withdraw the assembly from the union. Take care as a small amount of water may be left in the boiler.
Important: Be careful not to lose the spring and by-pass valve from the end of the assembly (see Fig. 21).

8 Remove the safety valve and connect it to the new assembly

9 Re-assemble in reverse order using new sealing washers and 'O' ring.
Ensure the by-pass valve and spring are in position.

10 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.

11 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.24 MAINS WATER INLET FILTER

The mains water supply to the boiler has two filters, one is positioned in the bottom connection point to the hot water storage cylinder (item 5 in section 13.4), the other is in the pressure reducing valve in the supply external to the boiler (see Fig. 6).

To replace or clean the filter in the boiler.

1 Ensure that the electricity supply has been isolated.

2 Drain the hot water circuit as described in section 8.

3 Undo and remove the inlet water union from the base of the storage cylinder. Take care not to lose the 'O' ring.

3 Unscrew the filter assembly from the fitting and clean or replace. Re-assemble in reverse order.
Note: *The filter must be fitted with the closed end facing into the water inlet connecting nut (see Fig. 22).*

4 Open the mains water supply valve to refill the storage tank and vent the circuit by opening the hot taps.

5 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.25 MAINS WATER FLOW RESTRICTOR

A mains water flow restrictor is positioned in the bottom connection point to the hot water storage cylinder (item in section 13.4).

1 Ensure that the electricity supply has been isolated.
2 Drain the hot water circuit as described in section 8.
3 Undo and remove the inlet water union from the base of the storage cylinder. Take care not to lose the 'O' ring.
4 Note which way the restrictor is fitted, then **carefully** prise it out of the fitting. Clean or replace and re-assemble in reverse order.
Note: *The restrictor must be fitted with the inner section facing down towards the filter (see Fig. 22).*
5 Open the mains water supply valve to refill the storage tank and vent the circuit by opening the hot taps.
6 Light the boiler and check its operation as described in section 7.4, paragraph 12.

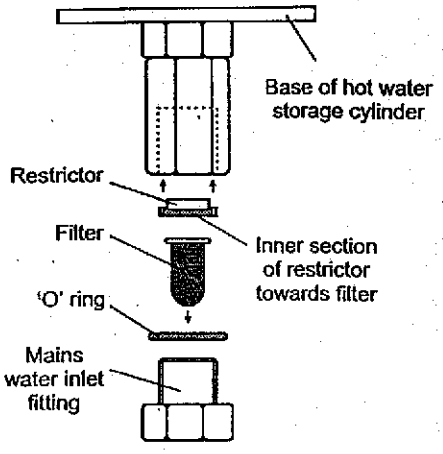


Fig. 22

9.26 DOMESTIC HOT WATER TEMPERATURE/PRESSURE RELIEF VALVE

The DHW temperature/pressure relief valve is positioned on the top left hand side of the hot water storage cylinder. See Fig. 18.

Note: If access is restricted on the left hand side of the boiler it may be necessary to remove the expansion vessels as described in sections 9.23 and 9.28.

1 Ensure that the electricity supply has been isolated.
2 Drain the hot water circuit as described in section 8. It is not necessary to drain completely, only to reduce the level below the point of connection of the valve.
3 Remove the two screws at the top of the case front panel securing it to the boiler. Slide the panel up as far as possible (25 mm) and withdraw it forwards away from the boiler.
4 Remove the screw securing the bottom of the left hand case side panel. Slide the panel up and lift it off.
5 Disconnect the valve outlet union and unscrew the valve from the hot water storage cylinder.
6 Re-assemble in reverse order using a new valve.
7 Open the mains water supply valve to refill the storage tank and vent the circuit by opening the hot taps.
8 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.27 DOMESTIC HOT WATER EXPANSION VESSEL (white)

1 Ensure that the electricity supply has been isolated.
2 Drain the hot water circuit as described in section 8.
3 Remove the two screws at the top of the case front panel securing it to the boiler. Slide the panel up as far as possible (25 mm) and withdraw it forwards away from the boiler.
4 Remove the screw securing the bottom of the left hand case side panel. Slide the panel up and lift it off.
5 Undo the union at the bottom (take care not to lose the sealing washer) and remove the vessel.
6 Re-assemble in reverse order, using a new sealing washer on the expansion vessel connection.
7 Open the mains water supply valve to refill the storage tank and vent the circuit by opening the hot taps.
8 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.28 CENTRAL HEATING TEMPERATURE SENSOR

The central heating temperature sensor is positioned on the rear of the heat exchanger at the left hand side. See Fig. 18.

1 Ensure that the electricity supply has been isolated.
2 Drain the central heating circuit of the boiler as described in section 8.
3 Remove the two screws at the top of the case front panel securing it to the boiler. Slide the panel up as far as possible (25 mm) and withdraw it forwards away from the boiler.
4 Remove the ten screws securing the sealed chamber front panel and remove the panel, take care not to damage the seal.
5 Disconnect the flue elbow from the flue and remove it from the top of the boiler.

6 Remove the seven screws securing the sealed chamber top panel and remove the panel, take care not to damage the seal.

7 Disconnect the electrical leads and pressure switch sensing tubes from the fan noting their positions.

8 Remove the four screws securing the flue hood and remove flue hood.

9 Disconnect the electrical leads from the sensor and unscrew the sensor.

10 Fit a replacement sensor, using a small amount of thread sealant.

11 Reconnect the electrical leads and re-assemble in reverse order.
Note: Ensure the seal on the sealed chamber top and front panels are intact and in position, and when reconnecting the air pressure switch sensing tubes to the fan connect the front (transparent) sensing tube to the upper connector (nearest the fan outlet) and the rear (pink) tube to the lower connector.

12 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.

13 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.29 MAIN HEAT EXCHANGER

Take care when handling the new heat exchanger not to damage the fins.

1 Ensure that the electricity supply has been isolated.

2 Remove the flue hood as described in section 9.28, paragraphs 2 to 8.

3 Disconnect the electrical leads from the overheat thermostat on the front of the heat exchanger and the central heating sensor at the back.

4 Remove the bottom and two side air deflector plates from the combustion chamber (two screws each).

5 Remove the three screws securing the burner front support bracket and remove the bracket (note that the two screws securing the bracket to the burner are slightly larger than the rest of the fixing screws) and remove the combustion chamber cover.

6 Undo the two screws securing the heat exchanger to the back plate fittings, by about 3 turns.

7 Carefully withdraw the heat exchanger, taking care not to damage the insulation panels.

8 Transfer the overheat thermostat and central heating sensor to the new heat exchanger, use a small amount of thread sealant on the sensor.

9 Re-assemble in reverse order using new 'O' rings on the heat exchanger connections, ensuring the retaining screws are correctly located and not over tightened.
Note: Ensure the seals on the sealed chamber top and front panels are intact and in position, and when reconnecting the air pressure switch sensing tubes to the fan connect the front (transparent) sensing tube to the upper connector (nearest the fan outlet) and the rear (pink) tube to the lower connector.

10 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.

11 Light the boiler and check its operation as described in section 7.4, paragraph 12.

9.30 COMBUSTION CHAMBER INSULATION PANELS

Refer to Health and Safety Information on page 2 and dampen the panels before carrying out any work on them.

1 Ensure that the electricity supply has been isolated.

2 Remove the main heat exchanger as described in section 9.29, paragraphs 2 to 7.

3 Remove the rear panel by carefully pulling it forward at the top and lifting out.
Remove the front and side panels in a similar way.

4 Insert the new panels bottom first then push back into position.

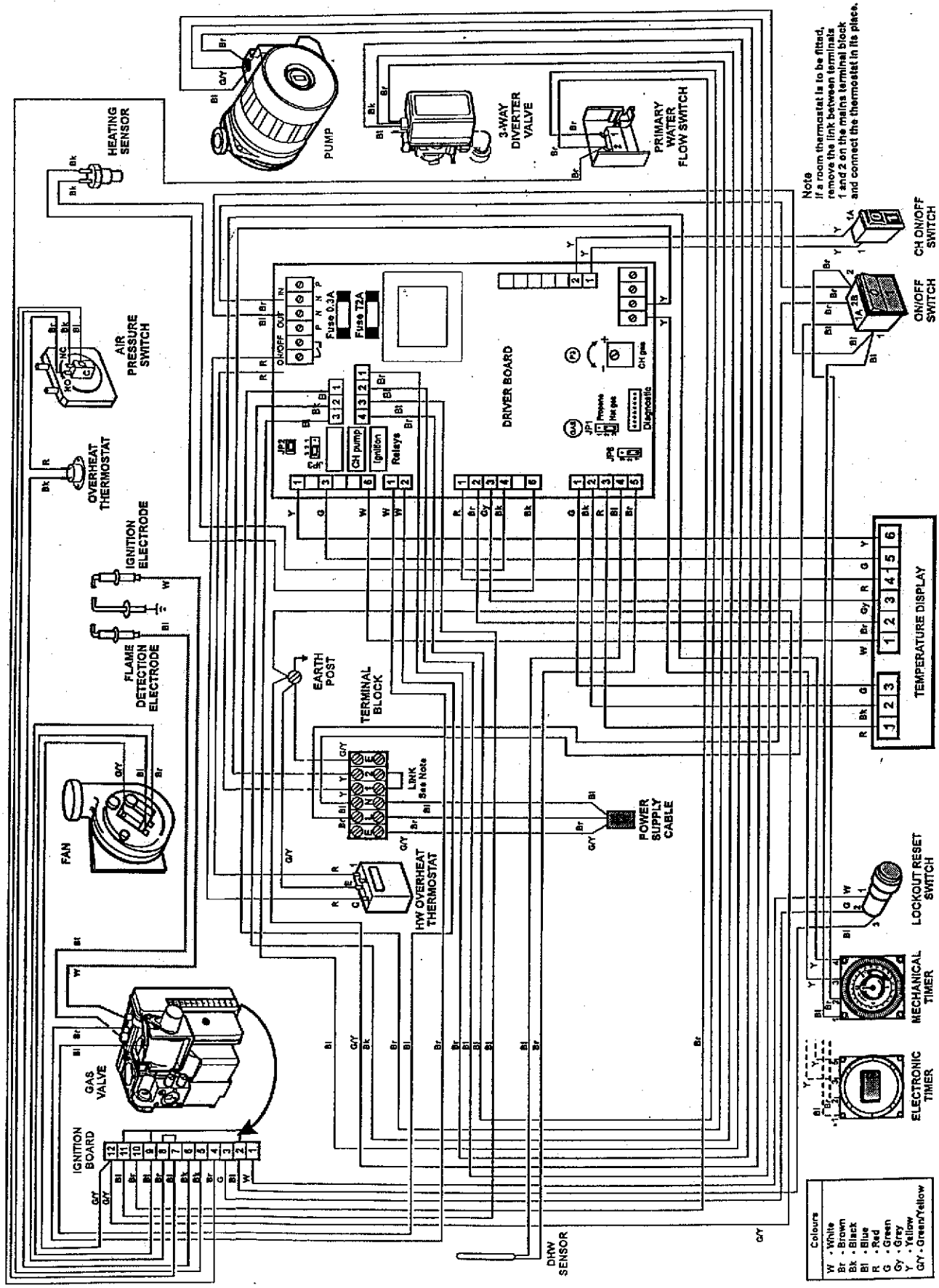
5 Re-assemble in reverse order, ensuring the heat exchanger retaining screws are correctly located and not over tightened.
Note: Ensure the seals on the sealed chamber top and front panels are intact and in position, and when reconnecting the air pressure switch sensing tubes to the fan connect the front (transparent) sensing tube to the upper connector (nearest the fan outlet) and the rear (pink) tube to the lower connector.

6 Fill the boiler and re-pressurise the system to between 0.8 and 1.5 bar (to match the original system pressure) as described in section 4.2, paragraphs 2 to 7.

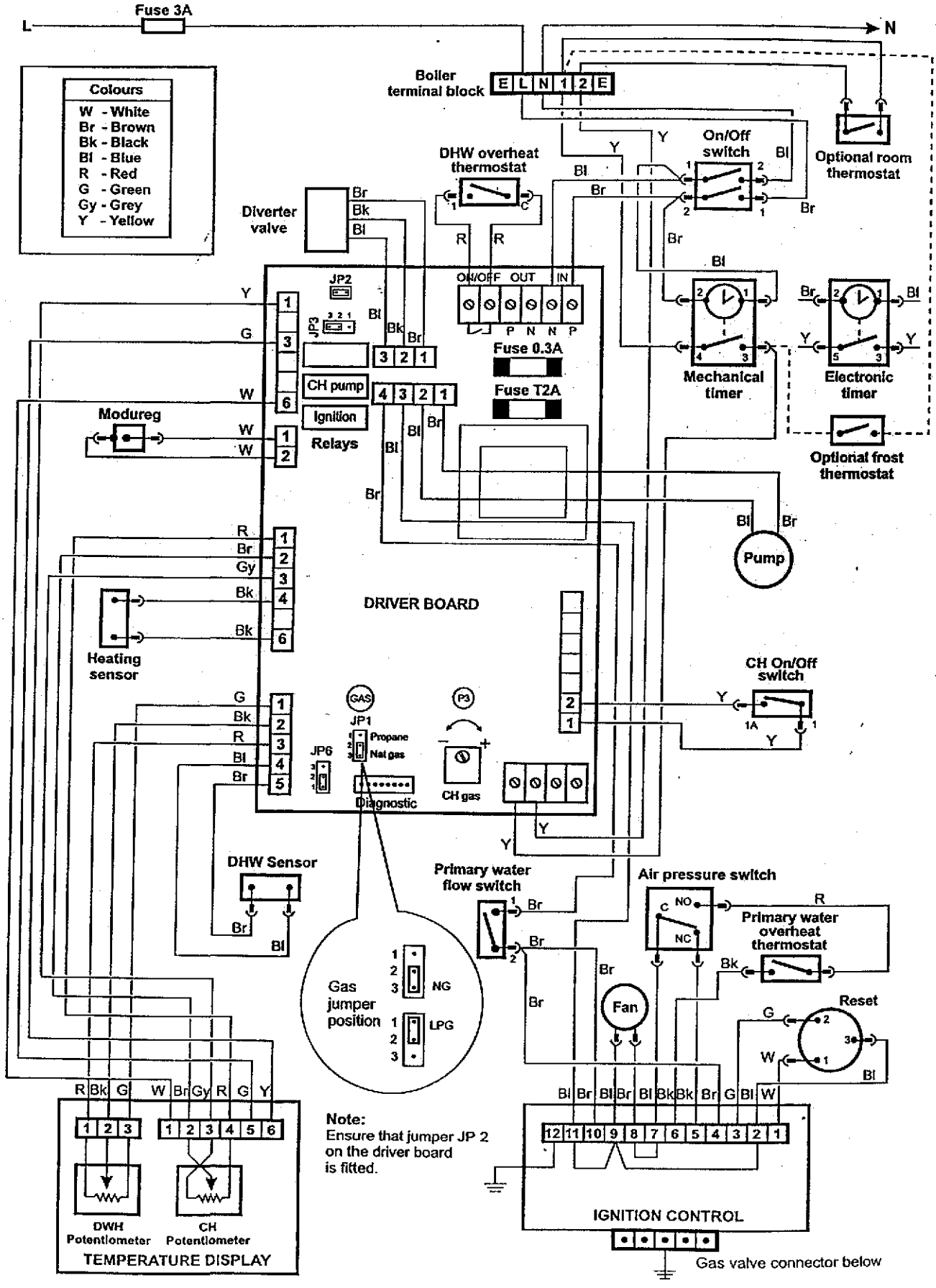
7 Light the boiler and check its operation as described in section 7.4, paragraph 12.

10 WIRING DIAGRAMS

10.1 ILLUSTRATED WIRING DIAGRAM

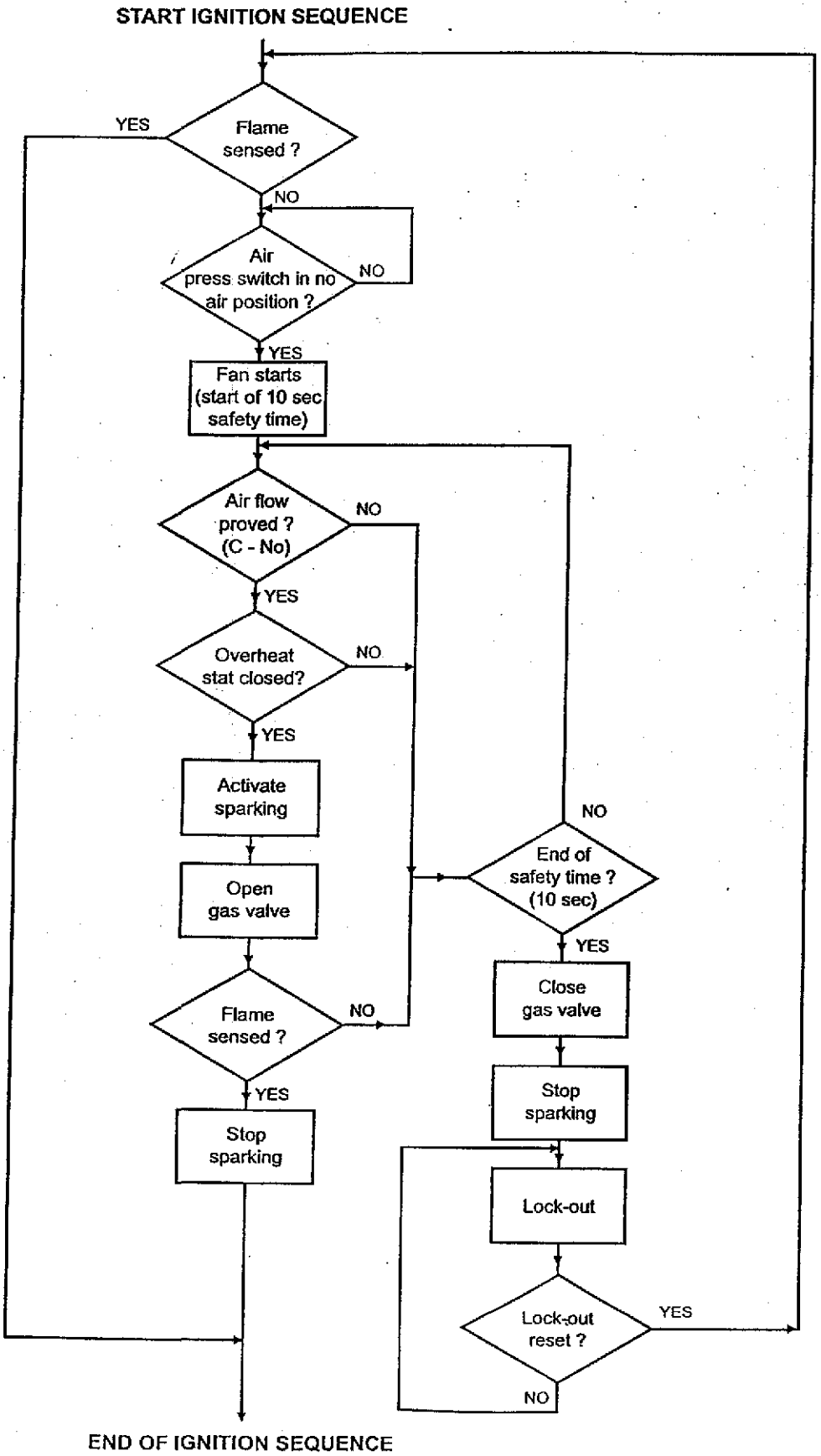


10.2 FUNCTIONAL FLOW WIRING DIAGRAM

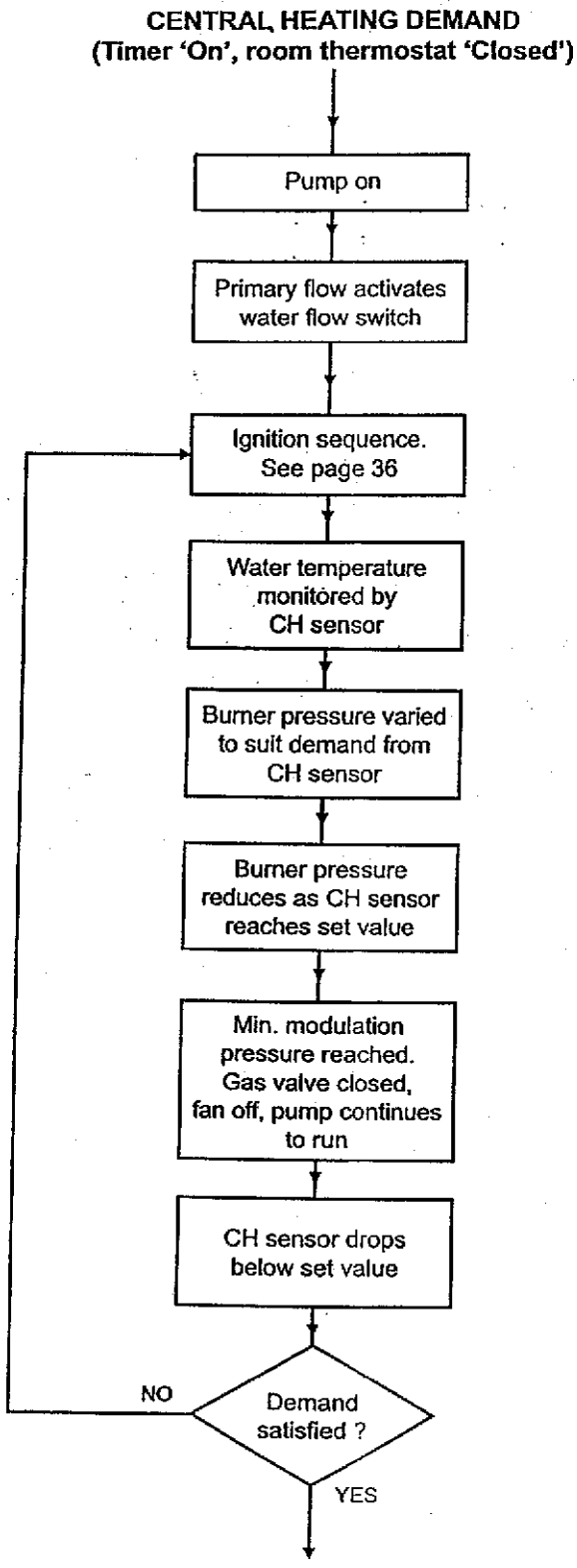


11 SEQUENCE OF OPERATION CHARTS

11.1 AUTOMATIC IGNITION SEQUENCE

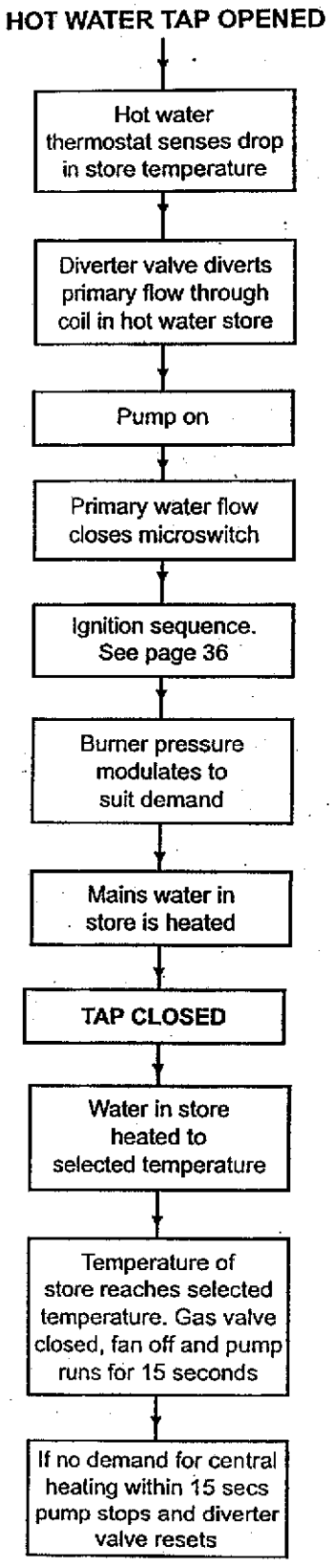


11.2 OPERATION IN CENTRAL HEATING MODE



Note: Pump overrun is 2.5 mins when heat demand is satisfied

11.3 OPERATION IN DOMESTIC HOT WATER MODE



12 FAULT FINDING

During the fault finding procedure the first electrical checks to be carried out are:- Short circuit, Polarity, Earth continuity and Resistance to earth. After completing a service or fault finding task which has required the breaking and remaking of electrical connections, the electrical checks must be repeated.

Preliminary check of mains voltage and switches - ensure timer is in an 'on' position and room thermostat (if fitted) is calling for heat.

BURNER WILL NOT LIGHT

Pump and fan not operating (but no lock-out)

Possible cause	Remedy
Blown fuse on driver board	Check fuse, replace if necessary (green 40° LED flashes if fuse OK)
Seized pump	Check pump, free rotor or replace if necessary
Airlock in pump/boiler	Vent pump and boiler
No power to pump	Check electrical connections
Faulty pump	Check 230V at pump, replace if necessary
Faulty driver board	Check 230V at board, replace if necessary

Pump operating, fan not operating (but no lock-out)

Possible cause	Remedy
No power to ignition control unit	Check 230V output from driver board (pins 3 & 4 to left of fuse) Check connections from driver board
Primary water flow switch not activated	Check operation of primary flow switch
Primary water flow switch faulty	Check switch continuity, replace if necessary
No power to fan	Check 230V output from ignition board (pins 8 & 9 on ignition PCB) Check electrical connections to fan Check continuity of wiring to fan
Fan faulty	Check 230V at fan, replace fan if necessary
Air pressure switch faulty	Check electrical connections to switch Check continuity (N/C contact), replace if necessary
Ignition control PCB faulty	Check control, replace if necessary

Pump and fan operating followed by boiler lock-out

Possible cause	Remedy
Air pressure switch faulty	Check electrical connections to switch Check continuity (N/O contact), replace if necessary
Blocked air pressure switch tubes	Check and rectify as necessary
Air switch tubes incorrectly connected	Check and rectify as necessary
Flue system blocked or obstructed	Check and rectify as necessary
Fan venturi blocked	Check and rectify as necessary
Overheat thermostat contacts open	If boiler is hot, allow to cool and re-check Check switch continuity, replace if necessary
No gas at burner	Check gas service cock is open Check cock at meter is open Check for gas pressure at burner test point
No electrical supply to gas valve	Check ignition control is correctly fitted on gas valve
Gas valve faulty	Check valve, replace if necessary
No spark at electrode (but gas valve heard to operate)	Check ignition lead connections, rectify as necessary Check ignition lead continuity, replace if necessary Check electrode setting and rectify as necessary Check earthing electrode and rectify as necessary
Ignition control PCB faulty	Check control, replace if necessary

BURNER LIGHTS AND THEN GOES TO LOCK-OUT

Possible cause	Remedy
Flame not detected	Check position of electrode and adjust as necessary
	Check sensing lead connections, rectify as necessary
	Check sensing lead continuity, replace if necessary
	Ignition module faulty - replace
Polarity of electrical supply reversed	Check and rectify as necessary

BURNER WILL NOT LIGHT FOR HOT WATER

Possible cause	Remedy
Heating on/off switch faulty	Check continuity (HW position), replace if necessary
Hot water sensor faulty	Check electrical connections, replace if necessary
Driver board faulty	Check board, replace if necessary

BURNER WILL NOT LIGHT FOR HEATING

Possible cause	Remedy
Heating on/off switch set to 'Hot water only'	Check switch and reset as necessary
Heating on/off switch faulty	Check electrical connections, rectify as necessary
	Check continuity, replace if necessary
Heating timer not set to 'On'	Check timer setting and reset as necessary
Heating timer faulty	Check electrical connections, rectify as necessary
	Check switch continuity, replace if necessary
Room thermostat not set to 'On'	Check setting of thermostat and reset as necessary
Room thermostat faulty	Check wiring and connections, rectify as necessary
	Check switch continuity, replace if necessary
Link 1-2 not fitted (when no stat fitted)	Check and rectify as necessary
Heating sensor faulty	Check electrical connections, rectify as necessary
	Check sensor (see note below), replace if necessary
Driver board faulty	Check board, replace if necessary

NOTE: Temperature sensor resistance - 10 kohms at 20°C
If sensor is short circuited - red temperature LED indicator on the control panel blinks continuously
If sensor is open circuit - green temperature LED indicator on the control panel blinks continuously
(green LED also blinks when water temperature is less than 40°C)

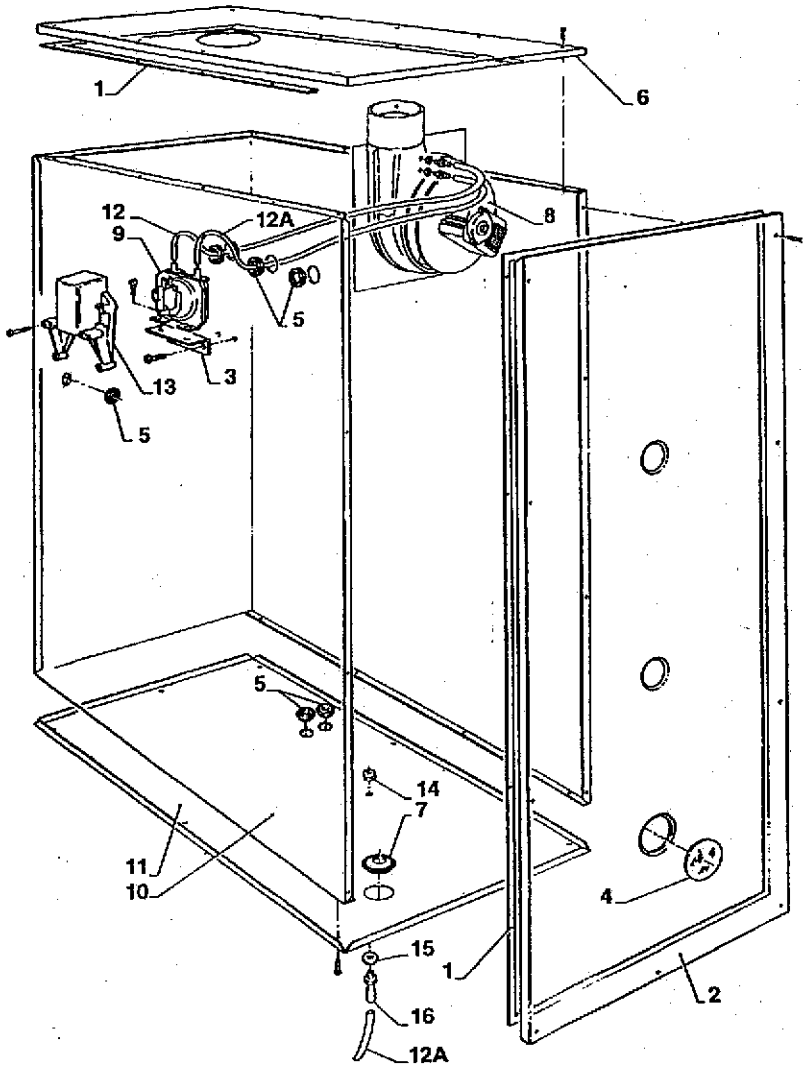
NO DOMESTIC HOT WATER OR HOT WATER NOT HOT ENOUGH

Possible cause	Remedy
Hot water sensor faulty	Check electrical connections, replace if necessary
Diverter valve faulty or jammed	Check valve, rectify or replace as necessary
Cold inlet filter block	Remove filter to check and clean as necessary
Hot water temperature control set too low.	Check control setting and adjust as necessary
Insufficient gas supply	Check inlet/outlet gas pressure with boiler running
	NB: Refer to section 1 for gas rates and pressures
	Check gas pipe size/length, rectify as necessary
	Check meter outlet pressure, rectify as necessary

WHEN BOILER SET TO HOT WATER ONLY, RADIATORS HEAT UP

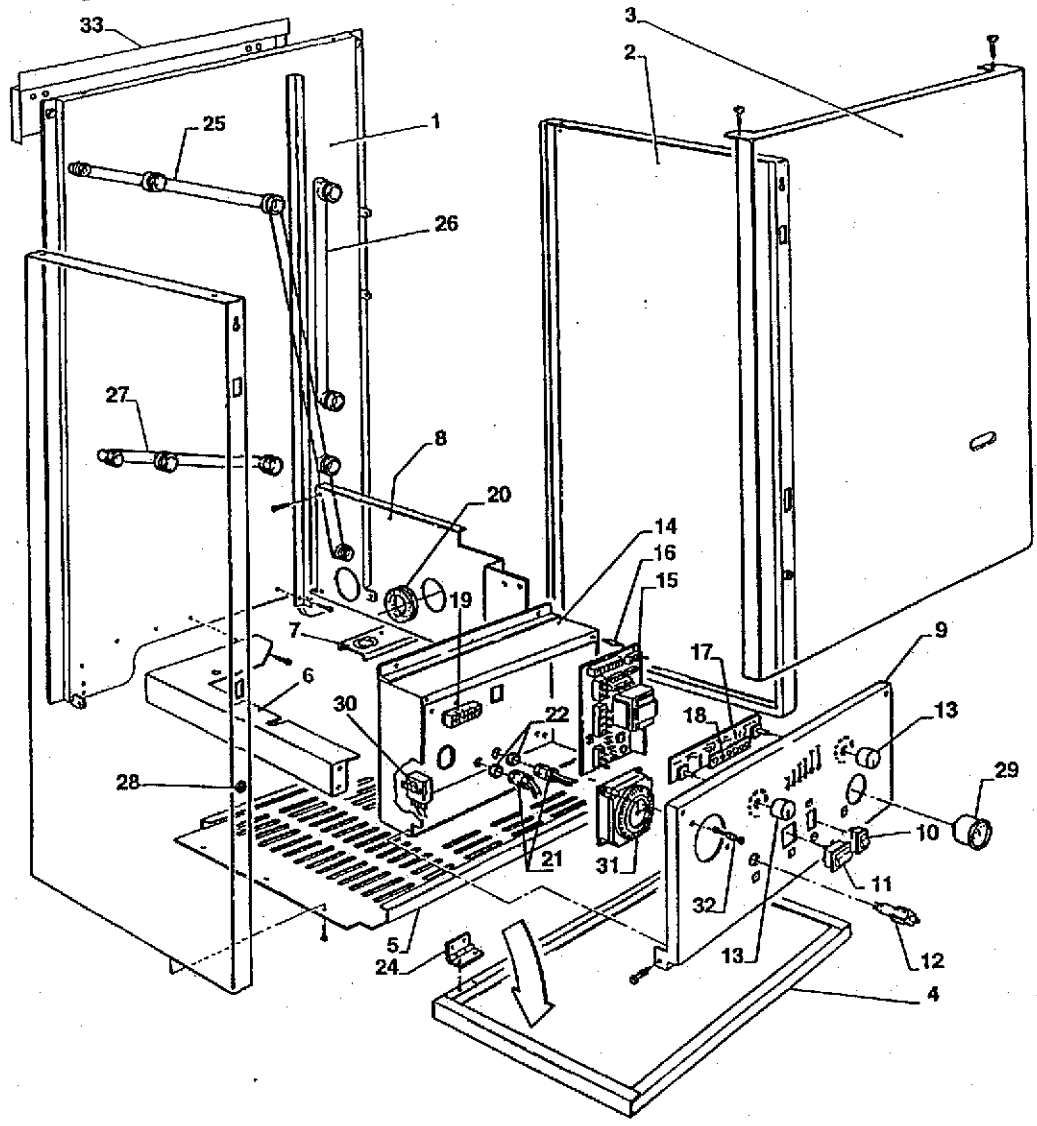
Possible cause	Remedy
Diverter valve faulty or jammed	Check valve, rectify or replace as necessary

13.1 Sealed combustion chamber



No.	Description	Qty.	Part No.
1	Seal 4 x 6 mm	mtr	18010225
2	Sealed chamber front cover	1	40000850
3	Pressure switch mounting bracket	1	40000675
4	Viewing window	1	18010712
5	Grommet	6	18052115
6	Sealed chamber top panel	1	41000856
7	Grommet	1	18052119
8	Fan	1	41000921
9	Pressure switch	1	41000926
10	Sealed chamber	1	41000866
11	Sealed chamber base	1	41000861
12	Pressure switch sensing tube (rear/pink)	1	
12A	Pressure switch sensing tube (front/clear)	2	40000960
13	Pressure switch cover	1	40000923
14	Nut M5	1	10031005
15	Seal 8 x 5 x 1 mm	1	40000975
16	Air intake	1	40000955

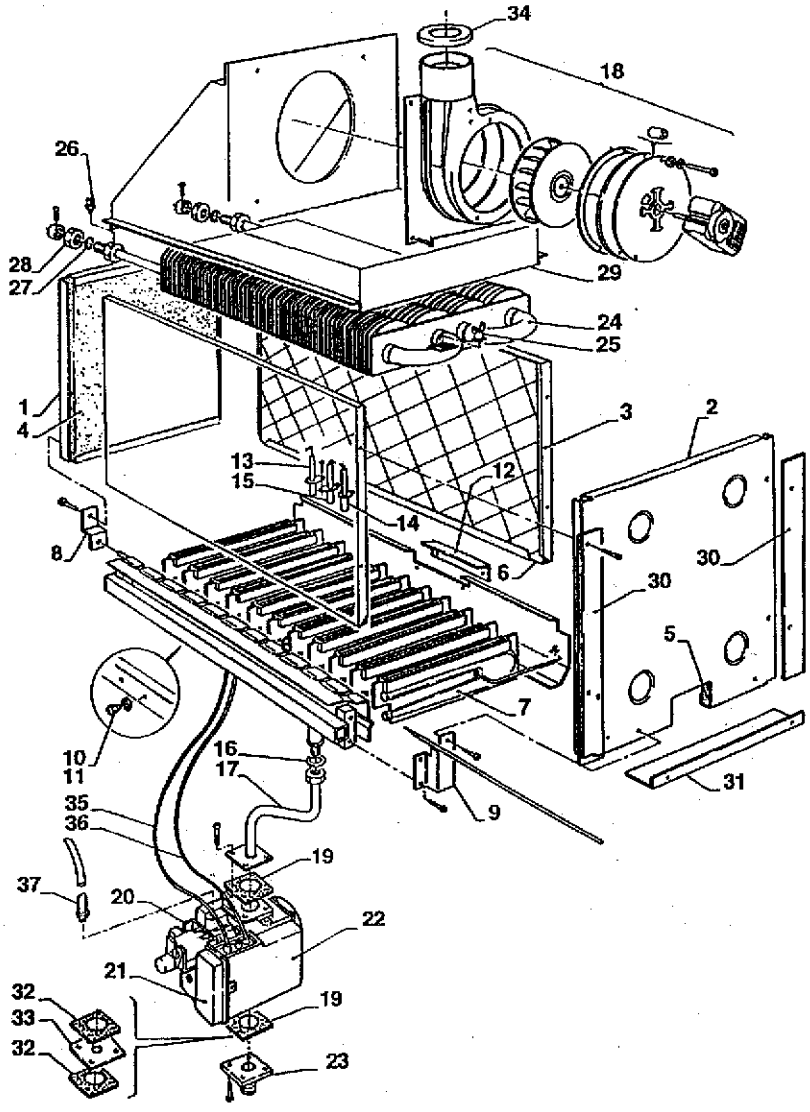
13.2 Casing and electrics



No.	Description	Qty.	Part No.
1	Back panel	1	40000120
2	Side panel	2	41000826
3	Front panel	1	40000830
4	Lower front panel	1	40000835
5	Bottom panel	1	41000141
6	Control box support bracket	1	41000891
7	Support plate	1	40000900
8	Gas valve support bracket	1	40000895
9	Fascia panel	1	41000230
10	Heating On/Off switch	1	14000501
11	On/Off switch	1	14000502
12	Lock-out reset switch	1	18022103
13	Control knob	2	50000915
14	Control box body	1	50000560
15	Main driver board	1	40000790
16	PCB mounting pillar	4	40000455
17	Control potentiometer board	1	50000920

No.	Description	Qty.	Part No.
18	LED display assy.	1	50000415
19	Terminal block	1	50000930
20	Grommet	1	20000210
21	Wiring bush	2	50000330
22	Nut for wiring bush	2	50000340
23	N/A		
24	Hinge	2	50000400
25	Primary flow pipe (out)	1	40000115
26	Primary flow pipe (in)	1	40000110
27	Return pipe	1	40000105
28	Magnetic catch	2	50000270
29	Pressure gauge	1	40000390
30	Hot water overheat thermostat	1	41000215
31	Timer (mechanical)	1	50000520
31A	Timer (electronic)	1	
32	Timer mounting pillar	2	50000805
33	Wall mounting bracket	1	41000283

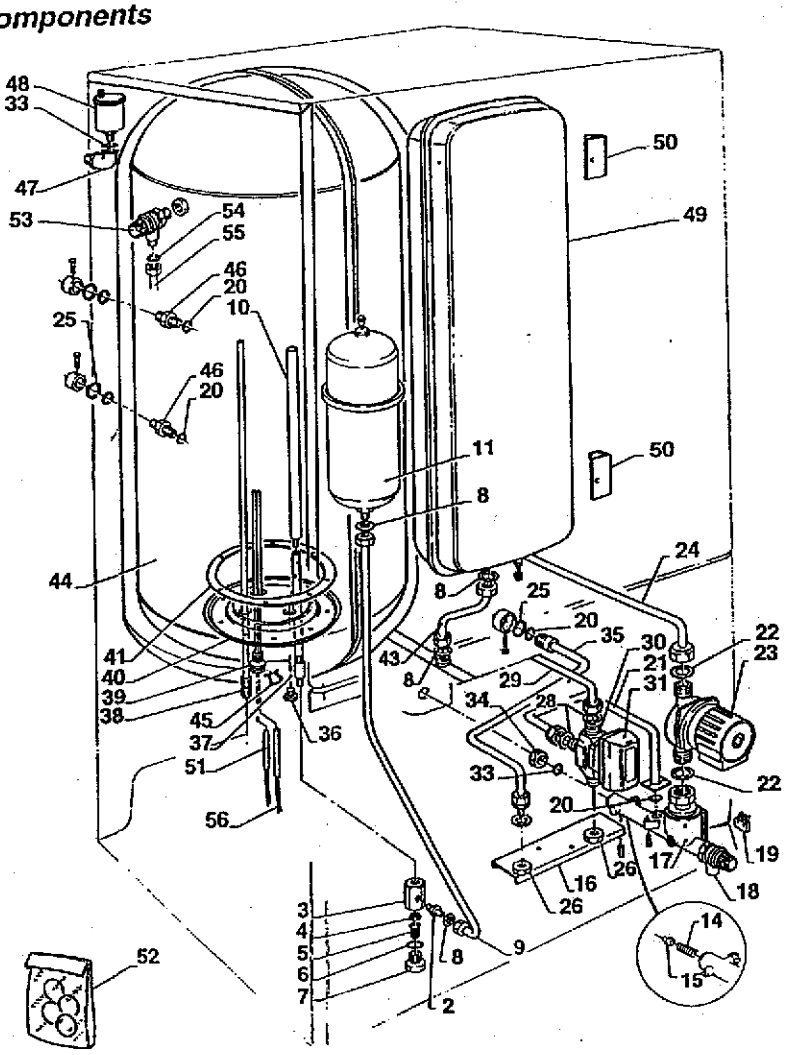
13.3 Gas components



No.	Description	Qty.	Part No.
1	Combustion chamber rear	1	40000145
2	Combustion chamber front	1	40000150
3	Combustion chamber side	2	41000841
4	Rear insulation panel	1	40000305
5	Front insulation panel	1	40000300
6	Side insulation panel	2	41000906
7	Burner	1	51000576
8	Rear burner support bracket	1	41000871
9	Front burner support bracket	1	41000876
10	Burner injector (NG) 125	15	18011216
11	Burner injector (LPG) 75	15	18011102
12	Support bracket	1	50000840
13	Flame detection electrode	1	18011510
14	Ignition spark electrode	1	18011511
15	Ignition earth electrode	1	18011515
16	Sealing washer Ø 18.5 x 11.5 x 2	1	18050045
17	Burner gas supply pipe	1	41000881
18	Fan	1	41000921
19	Gas valve gasket (NG)	2	50000630

No.	Description	Qty.	Part No.
20	Gas valve (NG/LPG)	1	50000730
21	Ignition control cover	1	50000940
22	Ignition control unit	1	50000870
23	Gas valve inlet flange	1	40000910
24	Heat exchanger	1	41000821
25	Primary water overheat thermostat	1	18040045
26	Heating sensor	1	40000915
27	'O' ring	2	40000095
28	Lock nut	2	40000025
29	Flue hood	1	41000846
30	Side air deflector plate	2	40000945
31	Bottom air deflector plate	1	40000940
32	Gas valve inlet gasket (LPG)	2	40000980
33	Diaphragm 7.75 mm (LPG)	1	41000966
34	Restrictor (49 mm) - coaxial flue	1	51000756
34A	Restrictor (45.5 mm) - two pipe flue	1	51000760
35	Ignition spark electrode lead	1	18022083
36	Flame detection electrode lead	1	18022082
37	Air intake	1	40000995

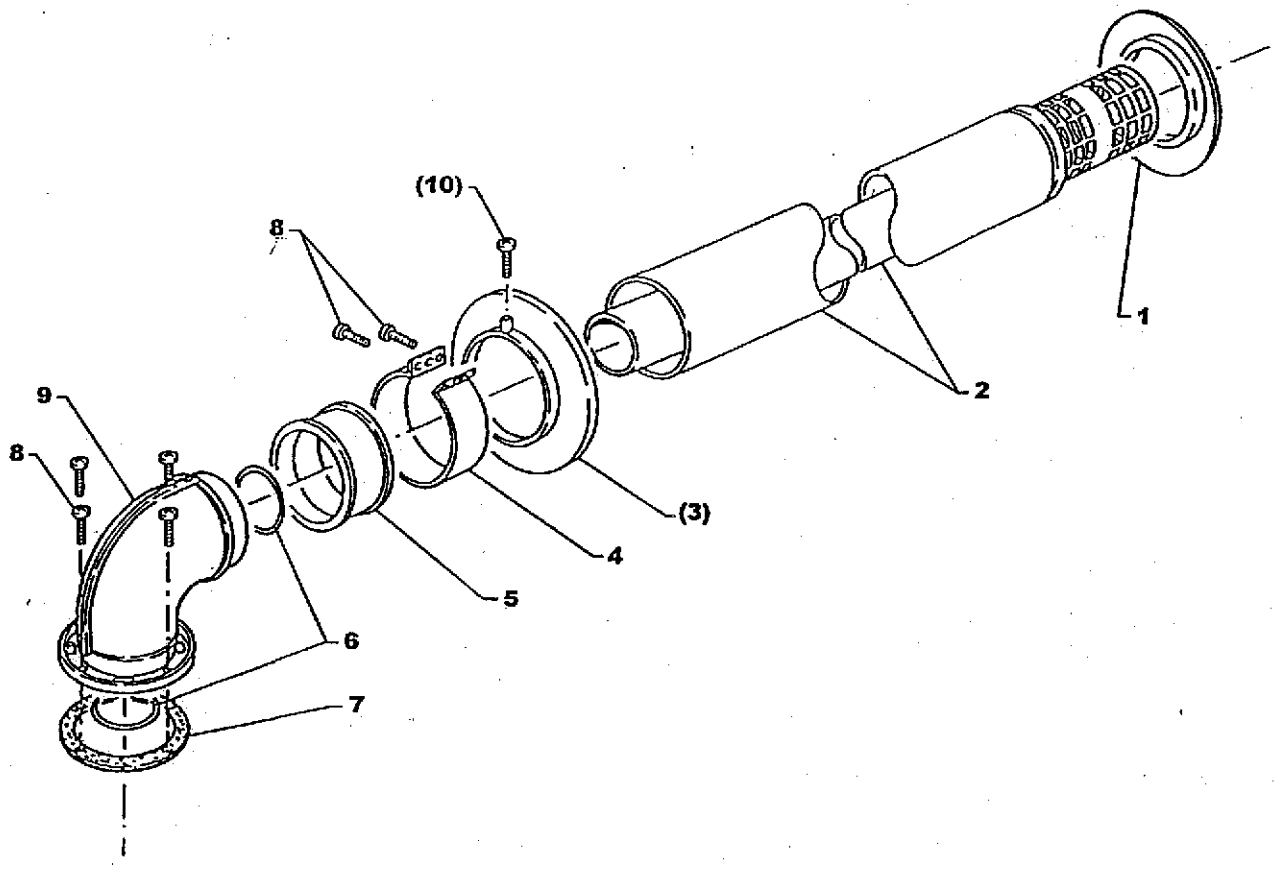
13.4 Water components



No.	Description	Qty.	Part No.
1	N/A		
2	Adaptor ½" x ⅜"	1	40000405
3	Water inlet fitting	1	40000060
4	Water inlet flow restrictor	1	18020500
5	Water inlet filter	1	40000400
6	'O' ring	1	40000100
7	Water inlet nut	1	40000065
8	Sealing washer Ø ½"	4	18050040
9	Hot water expansion vessel pipe	1	41000270
10	Anode	1	16010011
11	Hot water expansion vessel (3 ltr)	1	41000225
12	N/A		
13	N/A		
14	By-pass spring	1	10020010
15	By-pass with 'O' ring	1	18020120
16	Pipe support bracket	1	40000900
17	Flow switch assy.	1	41000210
18	Safety valve (3 bar)	1	18020200
19	Flow switch microswitch	1	18021033
20	'O' ring	6	40000095
21	Flow switch assy. to diverter valve pipe	1	40000700
22	Pump sealing washer	2	18050120
23	Pump	1	18040298
24	Pump to backplate pipe	1	40000113
25	Circlip	3	40000315
26	Lock nut	2	18030310
27	N/A		
28	Sealing washer Ø ¾"	2	18050020

No.	Description	Qty.	Part No.
29	Diverter valve to backplate pipe	1	40000108
30	Diverter valve body	1	40000750
31	Diverter valve head	1	40000760
32	Lock nut	1	40000025
33	'O' ring	2	40000090
34	Lock nut	1	18030320
35	Heating flow pipe to backplate	1	40000885
36	Drain plug	1	07070151
37	Cylinder inlet fitting	1	07120009
38	Cylinder outlet fitting	1	07120010
39	Thermostat pocket	1	14002045
40	Cylinder base flange	1	24060001
41	Cylinder base flange gasket	1	09050016
42	N/A		
43	Heating expansion vessel pipe	1	40000165
44	Cylinder	1	41000360
45	Circlip	1	16090951
46	Connector	2	40000055
47	Elbow	1	40000410
48	Automatic air vent	1	18020150
49	Heating expansion vessel (8 ltr)	1	18040800
50	Retaining bracket	2	40000640
51	Hot water sensor	1	40000917
52	'O' ring kit	1	90020019
53	Temperature/pressure relief valve	1	41000205
54	Sealing washer	1	18050045
55	Discharge pipe	1	41000265
56	Hot water overheat thermostat - see No. 30 in section 13.2		

13.5 Horizontal flue



No.	Description	Qty.	Part No.
1	Outer wall seal	1	FH004
2	Concentric flue pipe 100/80 mm	1	FH002
3	Inner wall seal (optional)	1	FHV005
4	Flue clamp - Elbow to pipe	1	FHV008
5	Stepped flue seal - elbow to pipe	1	FHV009
6	'O' ring 80 mm - inner flue seal	2	FHV007
7	Gasket - flue elbow to boiler	1	FHV006
8	Screw pan hd pozi No.8 x 11	6	FHV010
9	90° flue elbow	1	FH003
10	Screw pan hd pozi M3 x 10 (optional)	1	FHV031

14.1 BOILER PACK - containing:-

	Qty.	Part No.
Solar Twin boiler complete with timer	1	80080091
Installation and Servicing manual	1	18000055
Users Operating manual	1	18000065
Guarantee card	1	18000110
Wall mounting template	1	41000500
Wall mounting bracket	1	41000283
Flue restrictor (standard co-axial flue)	1	51000756

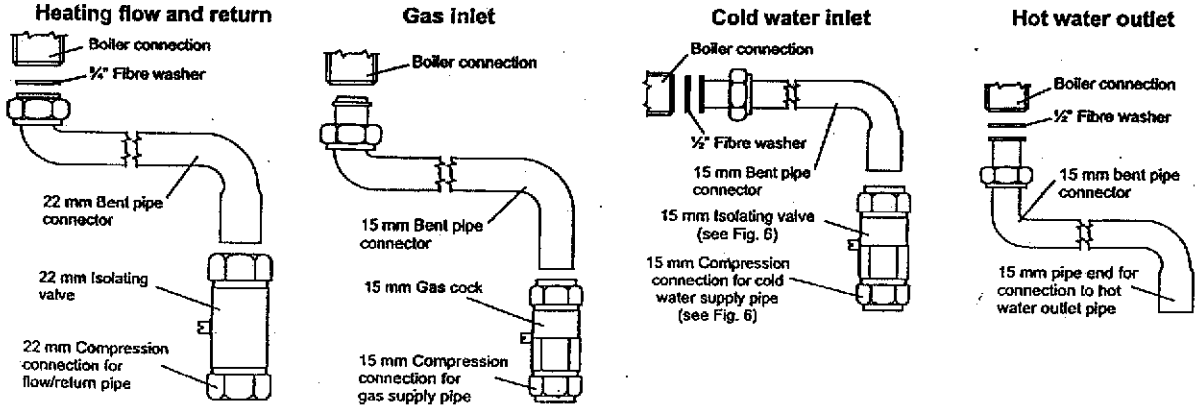
14.2 BOILER FITTINGS PACK - containing:-

Gas cock	1	50000955
Flow/return valve	2	50000935
Cold water inlet valve	1	50000945
22 mm bent pipe connector flow/return (see below)	2	90020089
15 mm bent pipe connector for cold water (see below)	1	90020084
15 mm bent pipe connector for hot water (see below)	1	90020095
15 mm bent pipe connector for gas (see below)	1	90020088
$^3/_4$ in. fibre washer (flow/return connections)	2	18050020
$^1/_2$ in. fibre washer (hot/cold water connections)	2	18050045
No.10 x $2^1/_2$ in. csk hd screw (wall bracket fixing)	4	10040910
No.10 wall plug	4	10040930
Metal washer for No.10 screw	4	10060025
No.8 x $2^1/_2$ in. csk hd screw (boiler side fixing)	2	10040940
No.8 wall plug	2	10040950
Metal washer for No.8 screw	2	10060030
Tundish	1	41000275
Check valve	1	41000245
Pressure reducing valve	1	41000235
Expansion relief valve	1	41000240

14.3 STANDARD FLUE KIT - containing:-

1 metre horizontal flue pipe assembly	1	FH002
90° flue elbow	1	FHV003
Gasket (elbow to boiler)	1	FHV006
Inner 'O' ring (red)	2	FHV007
Flue clamp	1	FHV008
Sealing sleeve (elbow to pipe)	1	FHV009
Outer wall sleeve	1	FH004
No.8 x $^1/_2$ in. pan hd pozi screw	6	FHV010

GAS AND WATER PIPE CONNECTIONS



15 INFORMATION FOR PROPANE (G31) BOILERS

The following instructions, specific to Propane boilers, **must** be read in conjunction with the standard Installation and Servicing instructions in this manual.

15.1 NOMINAL BOILER RATINGS - Propane (G31)

Model	Propane (G31) at 37 mbar						
	Heat Output		Heat Input		Burner pressure		Gas rate
	kW	Btu/h	kW	Btu/h	mbar	in wg	m³/h
Min.	12.32	42 040	15.26	52 070	7.8	3.1	0.57
Factory set	18.09	61 700	22.41	76 460	15.5	6.2	0.84
Max.	27.90	95 200	33.71	115 020	35.6	14.3	1.27

Gas rate based on a gross calorific value of 95.65 MJ/m³ (G31) - EN437

15.2 REGULATIONS TO COMPLY WITH

As section 2.2 with the following addition:-

BS 5482:1:1994 Domestic propane gas burning installations at permanent dwellings

15.3 GAS SUPPLY

The maximum propane requirement of the boiler is 1.27 m³/h.

The gas storage vessel and supply pipes must be capable of delivering this quantity of gas in addition to the demand from any other appliances in the house. A 22 mm supply pipe will be necessary for the majority of installations, but reference should be made to BS 5482:1994 for detailed guidance on gas pipe sizing.

The regulator should ensure a dynamic pressure of 37 mbar at the inlet of the gas valve in the boiler.

The complete installation must be tested for gas soundness and purged as described in BS 5482.

All screwed gas fittings **must** be made using an approved propane sealant.

15.4 BOILER LOCATION

Boilers using propane **must not** be installed in basements or cellars.

15.5 REPLACEMENT OF PARTS

When replacing the main driver board set the gas jumper (JP1) to position 1 and 2, see wiring diagram section 10.2.

The burner injectors are size 75, (15 off), part no.18011102.

ICI CALDAIE Ltd
The Works
5 Union Street
Arwick
Manchester
M12 4JD

Tel +44 (0) 161 277 7950
Fax +44 (0) 161 277 7954
salesuk@icicaldaie.com

www.icicaldaie.com
www.icicaldaie.co.uk