221460C.12.99

Glow-worm

Instructions for Use
Installation and Servicing

To be left with the user

Economy Plus C

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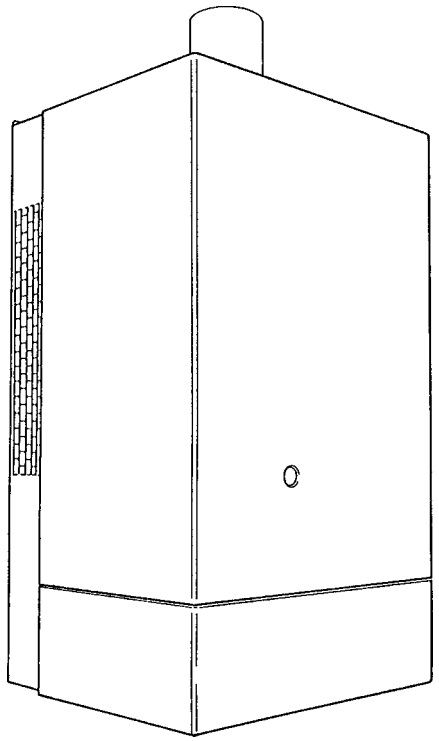
G.C. No. 41 319 37

Open Flue Boiler

CE benchmark™ BS 6332 BS 5258

This is a Cat I_{2H} Appliance

Reference in these instructions to British Standards and Statutory Regulations/Requirements apply only to the United Kingdom. For Ireland the rules in force must be used.



The instructions consist of three parts, User, Installation and Servicing Instructions, which includes the Guarantee Registration Card. The instructions are an integral part of the appliance and must, to comply with the current issue of the Gas Safety (Installation and Use) Regulations, be handed to the user on completion of the installation.

Guarantee Registration

Thank you for installing a new Glow-worm appliance in your home.

Glow-worm appliances' are manufactured to the very highest standard so we are pleased to offer our customers' a Comprehensive First Year Guarantee.

Attached to the center of these instructions is your Guarantee Registration Card, which we recommend you complete and return as soon as possible.

If this card is missing you can obtain a copy or record your registration by telephoning the Heatcall Customer Service number 01773 828100.

Our Guarantee gives you peace of mind plus valuable protection against breakdown by covering the cost of:

- ☑ ***All replacement parts***
- ☑ ***All labour charges***
- ☑ ***All call-out charges***

REGISTER YOUR GLOW-WORM APPLIANCE FOR 1ST YEAR GUARANTEE PROTECTION

CALL 0181 380 2555

HEATCALL *Customer Services:*
Tel: (01773) 828100
One Contact Local Service *Fax: (01773) 828070*

Hepworth Heating Ltd.,
Nottingham Road, Belper, Derbyshire. DE56 1JT
General/Sales enquiries:
Tel: (01773) 824141 Fax: (01773) 820569

Important Information

Testing and Certification

This boiler is tested and certificated for safety and performance. It is therefore important that no alteration is made to the boiler, without permission, in writing, from Hepworth Heating Ltd.

Any alteration not approved by Hepworth Heating Ltd., could invalidate the certification, boiler warranty and may also infringe the current issue of the Statutory Requirements, see Section 1.3.

CE Mark

This boiler meets the requirements of Statutory Instrument No. 3083 The boiler (Efficiency) Regulations, and therefore is deemed to meet the requirements of Directive 92/42/EEC on the efficiency requirements for new hot water boilers fired with liquid or gaseous fuels.

Type test for purposes of Regulation 5 certified by: Notified body 0086.

Product/productioncertifiedby: Notified body 0086.

The CE mark on this appliance shows compliance with:

1. Directive 90/396/EEC on the approximation of the laws of the Member States relating to appliances burning gaseous fuels.
2. Directive 73/23/EEC on the harmonization of the Laws of the Member States relating to the electrical equipment designed for use within certain voltage limits.
3. Directive 89/336/EEC on the approximation of the Laws of the Member States relating to electromagnetic compatibility.

INFORMATION FOR THE INSTALLER AND SERVICE ENGINEER.

Under Section 6 of The Health and Safety at Work Act 1974, we are required to provide information on substances hazardous to health.

CERAMIC FIBRE/INSULATION PADS, GLASSYARN.

These can cause irritation to skin, eyes and the respiratory tract. If you have a history of skin complaint you may be susceptible to irritation. High dust levels are usual only if the material is broken. Normal handling should not cause discomfort, but follow normal good hygiene and wash your hands before eating, drinking or going to the lavatory. If you do suffer irritation of the eyes or severe irritation to the skin seek medical attention.

THERMOSTATS

These contain very small amounts of xylene in the sealed phial and capillary. If broken, under normal circumstances the fluid does not cause a problem, but in case of skin contact, wash with cold water. If swallowed drink plenty of water and seek medical attention.

COMBUSTION PRODUCTS DISCHARGE SAFETY DEVICE

These contain very small amounts of ethylene glycol and methanol in the capillary. If broken, under normal circumstances the fluid does not cause a problem, but in cases of skin or eye contact, wash with cold water. If ingested, drink plenty of water and seek medical attention.

CONTENTS	DESCRIPTION	SECTION	PAGE No.
INSTRUCTIONS FOR USE	Introduction		3
	Lighting the Boiler		4
INSTALLATION INSTRUCTIONS	General Data	1	5
	Flue and Ventilation	2	7
	Water Systems	3	8
	Installation	4	10
	Electrical Wiring	5	11
	Commissioning	6	12
SERVICING INSTRUCTIONS	Servicing and Replacement Parts	7	14
	Fault Finding	8	19
	Spare Parts	9	24

Instructions for Use

General Notes and Information

Please read these instructions and follow them carefully for the safe and economical use of your boiler.

Important Notice

This boiler is for use only on G20 gas.

The convection air openings on the boiler must NEVER be obstructed.

The Gas Safety (Installation and Use) Regulations

In your interests and that of gas safety it is the Law that ALL gas appliances are installed by a competent person in accordance with the current issue of the above regulations.

Maintenance

To ensure the continued efficient and safe operation of the boiler it is recommended that it is checked and serviced at regular intervals. The frequency of servicing will depend upon the particular installation and usage, but in general once a year should be enough.

To obtain service, please call your installer, or Heatcall (Glow-worm's own service organisation) using the telephone number given on the controls tray.

If the appliance is installed in a rented property there is a duty of care imposed on the owner of the property by the current issue of the Gas Safety (Installation and Use) Regulations, Section 35.

It is the Law that servicing is carried out by a competent person.

Please be advised that the 'Benchmark' logbook should be completed by the installation engineer on completion of commissioning and servicing.

All CORGI Registered Installers carry a CORGI ID card, and have a registration number. Both should be recorded in your boiler Logbook. You can check your installer is CORGI registered by calling CORGI direct on :- 01256 372300.

Gas Leak or Fault

If a gas leak or fault exists or is suspected the boiler must be turned off also the electrical supply. Advice/help should be obtained from your installation/servicing company or the local gas company.

Protection Against Freezing

If the boiler is to be out of use for any long period of time during severe weather conditions we recommend that the whole of the system, including the boiler be drained off to avoid the risk of freezing up. If an immersion heater is fitted in the domestic hot water cylinder make sure that it is switched off.

If you have a sealed water system you should contact your installer/servicing company as a sealed water system should only be drained, refilled and pressurised by a competent person.

Boiler Clearance

The boiler must be positioned so that at least the minimum operational and servicing clearances are provided, see diagram 1.

If fixtures are positioned close to the boiler they should be made removable for access to pipework.

Enough space must be left in front of the boiler for servicing.

Boiler in a Compartment

If the boiler is fitted in a compartment or cupboard, purpose built ventilation must be provided and kept clear.

Do not use the enclosed space for storage.

Boiler Identification

The type of boiler and its output can be checked against the details inside the controls cover.

Overheat Cutoff Device

The boiler is fitted with a safety device to prevent damage through overheating. Should the boiler go out together with the pilot for no apparent reason, allow the system to cool down, then relight the boiler.

Should the problem persist, turn the boiler off and consult your installation/servicing company.

Electrical Supply

WARNING. The boiler must be earthed.

The boiler must only be connected to a 240V~50Hz supply, protected by a 3A fuse, maximum.

All wiring must be in accordance with the current issue of BS7671.

Heat resistant cable having a conductor size of 0.75mm^2, (24/0.20mm) to BS6500 Table 16 must be used.

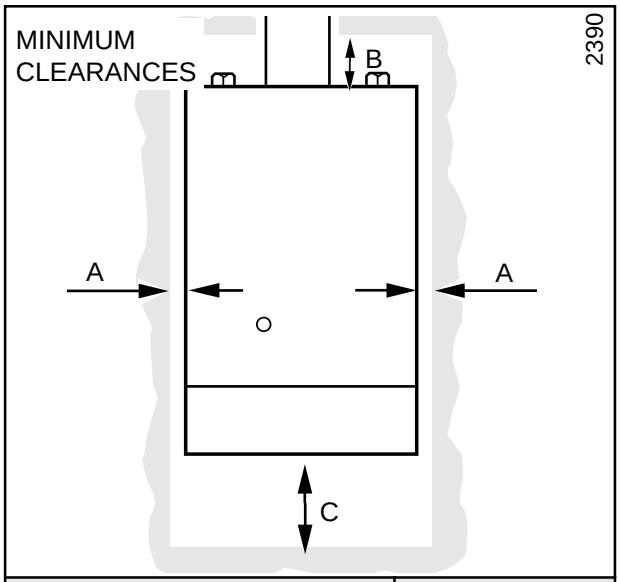
The colours of three core flexible cable are, Brown - live, Blue - neutral, Green and yellow - earth.

As the marking on your plug may not correspond with these colours continue as follows:

The wire coloured brown must be connected to the terminal marked "L" or "Red".

The wire coloured blue must be connected to the terminal marked "N" or "Black".

The wire coloured green and yellow must be connected to the terminal marked "E", Green or the earth symbol ⏚.



OPEN FLUE BOILERS Minimum Clearances from Walss, Ceiling, Floor, etc.	Model 30
A L.H. and R.H. side of casing	25
B Top of casing	75
C Bottom of casing	150
D Front of boiler (from a permanent surface	305

Diagram 1

Safety Device

This appliance is fitted with a flue blockage safety device which will shut down the appliance in the event of abnormal flue conditions. This device is NOT a substitute for an independently mounted Carbon Monoxide detector.

The safety device is reset, after three minutes by pushing in the button " F " shown in diagram 3.

Note: The pilot will stay alight but the device must be reset.

Shut down can occur during certain climate conditions, but if it recurs the chimney flue and air inlet into the room must be checked and any problems found corrected by a competent person, before the boiler is used again.

Lighting the Boiler

CAUTION

If the pilot flame goes out, either intentionally or by accident, no attempt should be made to relight for at least three minutes.

Slide the controls cover off and clear, see diagram 2.

Make sure that the electrical supply to the boiler is switched off.

Identify the controls by referring to diagram 3.

Turn the control thermostat knob "A" fully anticlockwise to the "OFF" position.

Push and hold in gas control knob "B". Push and release igniter button "C" until the pilot burner lights, look through window "D". When the pilot is alight keep gas control knob "B" pushed in for about 15 seconds and then release.

If the pilot does not light or fails to stay alight, wait three minutes and repeat the lighting operation, only this time keep knob "B" pushed on for a little longer.

The flue blockage safety device may also need resetting, refer to safety device instructions.

Make sure that the pilot is alight and stable.

Switch on the electrical supply to the boiler.

Check that all external controls are calling for heat.

Turn control thermostat knob "A" fully clockwise to "MAX" and the main burner will light fully in about three to five seconds, look through window "D".

If the main burner does not light, the flue blockage safety device may need resetting, refer to Safety Device instructions.

Adjust the control thermostat knob to the desired setting between "MIN" and "MAX". "MAX" is about 82°C (180°F).

Replace controls cover.

To Turn the Boiler Off

For short periods, turn control thermostat knob "A" anticlockwise until "O" is against the setting point. The pilot will stay alight, to relight the main burner turn control thermostat knob "A" clockwise to the desired setting between "MIN" and "MAX".

For longer periods, turn the control thermostat knob "A" anticlockwise until "O" is against the setting point. Slide gas control knob "B" to left and release, the control will automatically reset. Switch off the electrical supply.

To relight, follow the full lighting procedure given above.

Cleaning

WARNING. This appliance contains metal parts (components) and care should be taken when handling and cleaning, with particular regard to edges.

Clean the casing by wiping it over occasionally with a wet cloth or dry polishing duster.

Do not use abrasive cleaners.

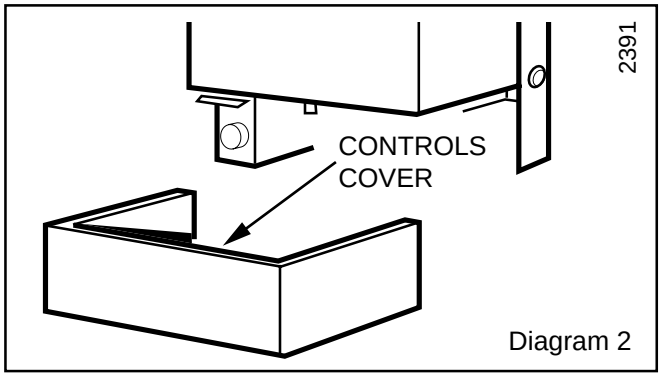


Diagram 2

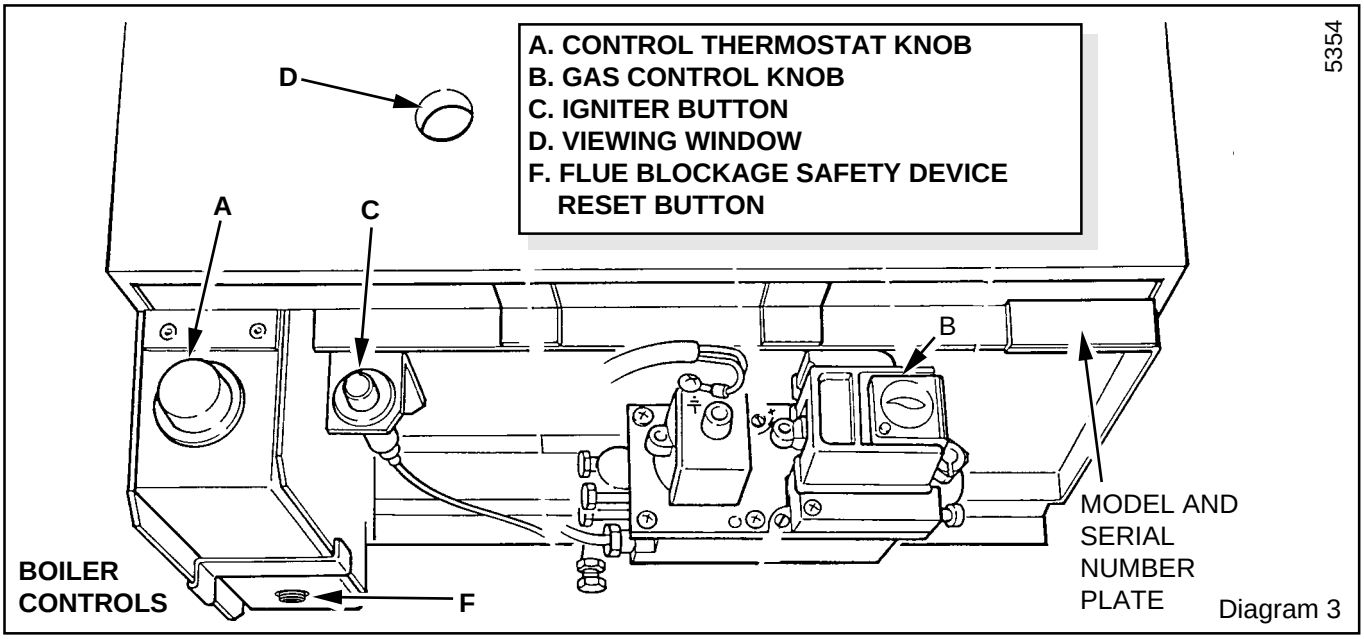
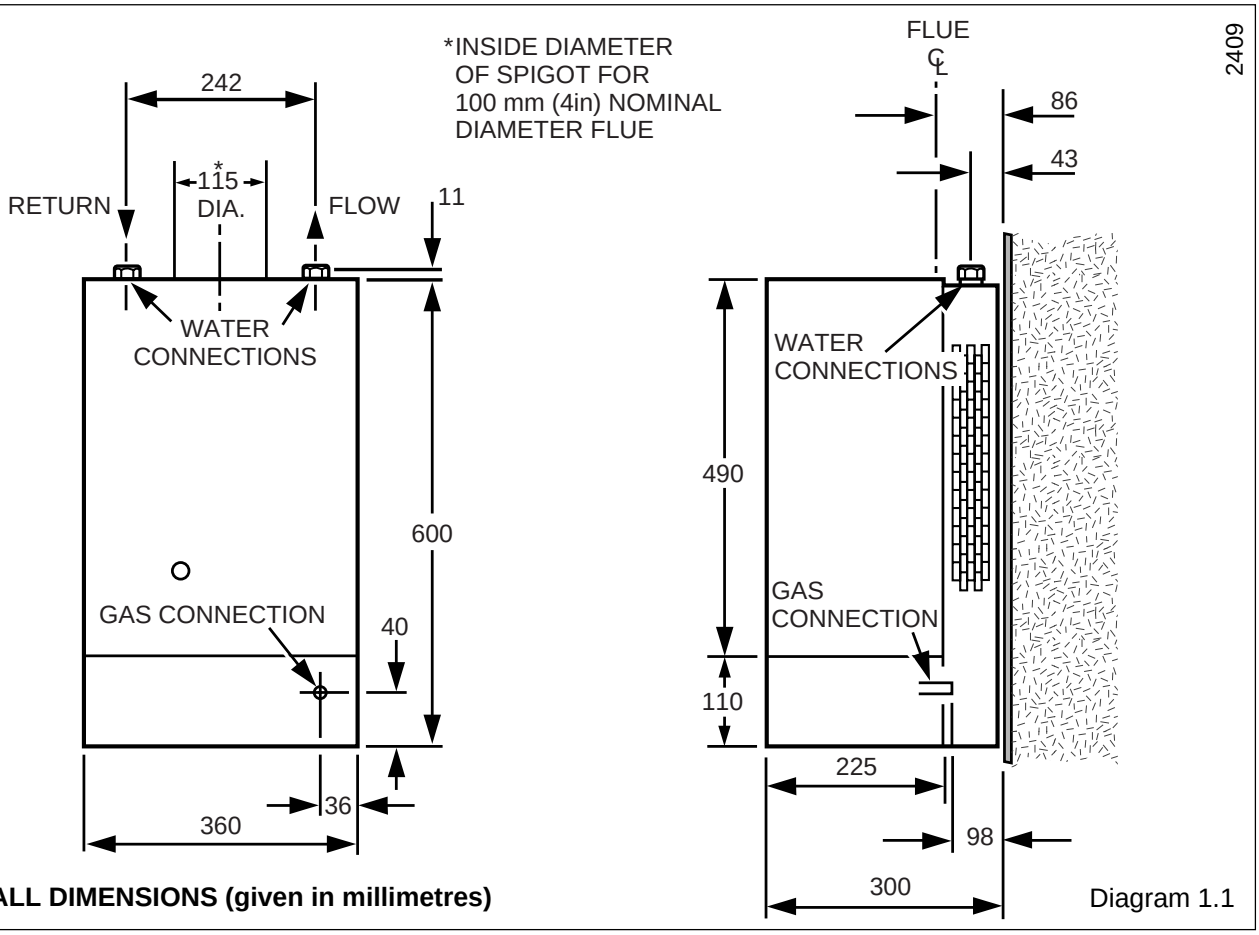


Diagram 3

1 General Data



OVERALL DIMENSIONS (given in millimetres) Diagram 1.1

1.1 Important Notice

This boiler is for use only on natural gas G20.

The boiler is delivered in one pack.

Wherever possible, all materials, appliances and components to be used shall comply with the requirements of applicable British Standards.

Where no British Standards exist, materials and equipment should be fit for their purpose and of suitable quality and workmanship.

This boiler must have fully pumped circuits, but is suitable for use with open vented or sealed water systems.

This boiler is not suitable for fitting out of doors.

The boiler must not be installed in a bedroom, bed sitting room or a room containing a bath or shower.

Open flue boilers must not be installed in private garages.

1.2 Sheet Metal Parts

WARNING. When installing or servicing the boiler care should be taken when handling sheet metal parts to avoid any possibility of personal injury.

1.3 Statutory Requirements

The installation of this boiler must be carried out by a competent person in accordance with the relevant requirements of the current issue of:

Manufacture's instructions, supplied.

The Gas Safety (Installation and Use) Regulations, The Building Regulations, The Building Standards (Scotland) Regulations (applicable in Scotland), local Water Company Byelaws, The Health and Safety at Work Act, Control of Substances Hazardous to Health, The Electricity at Work Regulations and any local applicable regulations.

Detailed recommendation are contained in the current issue of the following British Standards and Codes of Practice:

BS4814, BS5400 Part and 2, BS5449, BS5446, BS6700, BS6798, BS6891, BS7074 Part and 2, BS7478, BS7593, BS7671.

Manufacturers' instructions must not be taken as overriding statutory requirements.

1.4 Data

Weight of boiler:	30C - 18.8kg (41.4lb)
Water content:	30C - 0.45Litre (0.10gal)
Gas connection:	$Rc^1/_2$
Water connection:	22mm copper flow at right
Electrical supply:	240V - 50Hz fused at 3A
Data label:	Bottom of inner case door.
Injector:	30C - Cat 98 - 800

The Seasonal Efficiency Domestic Boilers UK (SEDBUK) is 72.4%.

The value is used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings. The test data from which it has been calculated have been certified by B.S.I.

1.5 Range Rating

The boiler is range rated and may be adjusted to suit individual system requirements.

The respective Table 1 gives the ratings and settings.

1.6 B.S.I. Certification

This boiler is certificated to the current issue of BS6332 Part 1, invoking the current issue of BS5258 Part for performance and safety. It is, therefore, important that no alteration is made to boiler without permission, in writing, from Hepworth Heating Ltd.

Any alteration that is not approved by Hepworth Heating Ltd., could invalidate the B.S.I., certification of the boiler, the warranty and could also infringe the current issue of the Statutory

1.7 Gas Supply

The gas installation must be in accordance with the current issue of BS6891.

The supply from the governed meter must be of adequate size to provide a steady inlet working pressure of 20mbar (8in wg) at the boiler.

On completion, test the gas installation for soundness using the pressure drop method and suitable leak detection fluid, purge in accordance with the current issue of BS6891.

1.8 Electrical Supply

WARNING. This boiler must be earthed.

All system components shall be of the approved type and be wired and connected in accordance with requirements the current issue of BS7671 and any applicable local regulations.

Connection of the boiler and system controls to the mains supply must be through a common isolator and must be fused 3A maximum. This method of connection should be by a fused double pole isolating switch, which has a minimum contact separation of 3mm on both poles. This switch should be readily accessible and preferably adjacent to the appliance. It should supply the appliance only and be easily identifiable as so doing.

Wiring to the boiler must be insulated PVC flexible type to the current issue of BS6500 Table 16, not less than 0.75mm^2 (24/0.20mm).

1.9 Draining Tap

A draining tap must be provided at the lowest points of the system which will allow the entire system, boiler and domestic hot water cylinder to be drained.

Draining taps shall be to the current issue of BS2879.

1.10 Safety Valve

A safety valve need not be fitted to an open vented system.

1.11 Clearances

The boiler position should be such that the clearances shown in diagram 1.2 are achieved.

Additional clearances may be required for installation.

If fixtures are positioned next to the boiler they should be made removable for access to pipework.

Sufficient clearance must be left in front of the boiler for servicing.

The casing side grilles must be kept clear at all times.

The boiler must be mounted on a flat wall which is sufficiently robust to take its weight.

1.12 Timber Frame Buildings

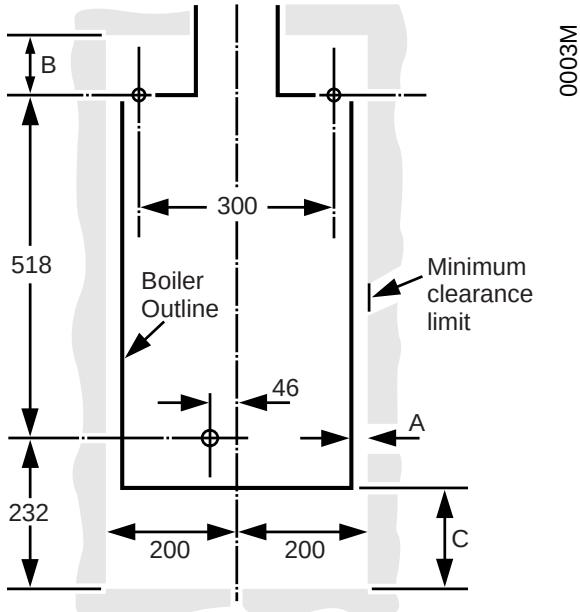
If the boiler is to be installed in a timber frame building it should be fitted in accordance with the Institute of Gas Engineers document IGE/UP/7/1998. If in doubt seek advice from the local gas undertaking or Hepworth Heating Ltd.

1.13 Heating System Controls

The heating system should have installed: a programmer and room thermostat controlling the boiler.

Thermostatic radiator valves may be installed in addition to the room thermostat.

Note: For further information, see The Building Regulations 1991 - Conservation of fuel and power, 1995 edition - Appendix G, table 4b.



Minimum Clearances from Walls, Ceiling, Floor, Cupboard, Worktops etc.		
A	L.H. and R.H. side of casing	25
B	Top of casing	75
C	Bottom of casing	150
D	Front of boiler (from a permanent surface)	305

BOILER FIXING DIMENSIONS AND MINIMUM CLEARANCES Diagram 1.2

2 Flue and Ventilation

Important note

The boiler is fitted with a Flue Blockage Safety Device, which will shut down the boiler if there is an unacceptable spillage of products at the draught diverter.

This safety device MUST NOT under any circumstances be interferred with or put out of action.

The safety device must only be replaced with the Glow-worm parts.

2 Flue Connection

The integral draught diverter on the boiler makes the combustion performance independent of the conditions in the secondary flue, but in common with other fuels an efficient flue is necessary to ensure a trouble free installation.

The flue outlet on the boiler is designed to take flue pipes to BS567. If a flue pipe to BS715 is to be used an adapter must be fitted to the boiler flue socket.

The flue must be in accordance with the current issue of BS5440 Part 1.

Give maximum possible vertical rise from the boiler, at least a minimum of 600mm, before any offset or bend. The use of 90° bends is not recommended.

An existing flue must be lined and end, at least above ridge height, with a certificated terminal.

A chimney previously used for solid fuel must be swept and any damper or register plate left in the locked open position or removed.

2.1 Boilers in a Compartment

Where the installation of the boiler will be in an unusual location, special procedures are necessary, the current issue of BS6798 gives detailed guidance on this aspect.

A compartment used to enclose the boiler must be designed and constructed specifically for this purpose.

An existing cupboard or compartment modified for the purpose may be used. Details of essential features of cupboard or compartment design are given in the current issue of BS6798.

The doorway opening should be of sufficient size to allow for easy removal of the boiler.

Where the boiler is fitted in a cupboard or compartment, permanent high and low level ventilation must be provided.

The minimum ventilation areas required are given in Table “A”.

2.2 Boiler Installed in a Room or Space

A purpose designed ventilation opening must be provided on an outside wall of the premises, refer to the current issue of BS5440 Part 2 for further information.

The opening may be either, directly into the room or space containing the boiler or into an adjacent room or space which has an internal permanent air vent of the same size as the room containing the boiler.

DO NOT ventilate through a private garage, bedroom, bedsitting room or a room containing a bath or shower.

Air vents through a cavity wall must be ducted.

When the boiler is installed in a space already containing a fuel burning appliance account must be taken of the TOTAL air requirement.

2.3 Extract Fans

If an extract fan is fitted in the premises there is a possibility that if adequate air openings are not provided spillage of products from the boiler may occur.

When openings are fitted in accordance with the recommendations of the current issue of BS5440 Part 1 and this Section, extract fans should not cause spillage, but where such an installation is found spillage tests as the current issue of BS5440 Part 1 must be carried out.

The necessary action should then be taken.

See also Section 6.6.

TABLE "A" COMPARTMENT AIR VENTS		
ECONOMY PLUS 30 C		
Ventilation Requirements	High Level Vent Area	Low Level Vent Area
Air from room or internal space	99cm^2	198cm^2
Air direct from outside	50cm^2	99cm^2

TABLE "B" ROOM/SPACE AIR VENTS	
ECONOMY PLUS 30C	
Effective area of vent	18cm^2

Table 1 ECONOMY PLUS 30C				
Range Rating		min	medium	max
Nominal Heat Input (GROSS)	kW	9.17		10.99
	Btu/h	31,300		37,500
Nominal Heat Output	kW	7.33		8.79
	Btu/h	25,000		30,000
Burner Setting Pressure	m bar	10.3		14.0
	in.w.g	4.1		5.6
Burner Injector Marking:		1.05		
Burner Injector Size:		1.05 X 7		
Pilot Injector Marking:		7218		

Notes:

PUMP

The pump with integral valves, if possible, should be fitted in the flow pipework from the boiler, to produce a temperature difference across the boiler of 11°C (20°F).

See diagram 3.1 for pressure loss across the boiler.

High resistance microbore systems may require a higher duty pump.

BYPASS

A bypass must be fitted, see diagram 3.2.

The flow through the boiler must not be allowed to fall below:

30C - 7.8L/min (1.7gall/min)

whilst the burner is alight.

3.1 Open (Vented) Water System

For an open (vented) water system the boiler must be supplied from an unrestricted water supply taken from a cold feed and expansion cistern situated at a maximum height of 27.5 metres (90ft) above the boiler.

The cold feed supply must be 15mm minimum size.

It is important that the relative position of the pump, cold feed and open vent are as shown in diagram 3.2.

3.2 Domestic Hot Water Cylinder

The domestic hot water cylinder must be of the double feed, fully indirect type. Single feed, self priming cylinders are not recommended.

3.3 Inhibitor

Attention is drawn to the current issue of BS5449 and BS7593 on the use of inhibitors in central heating systems.

If an inhibitor is to be used, contact a manufacturer for their recommendations for the best product to use.

When installing a boiler in an existing system, whether or not using an inhibitor, take special care to drain the entire system, including the radiators, then thoroughly cleaning out before fitting the boiler and adding the inhibitor.

3.4 Sealed Water Systems

The installation should comply with the appropriate requirements of the current issue of BS4814, BS5449, BS6759, BS6798 and BS7074 Part 1 and 2.

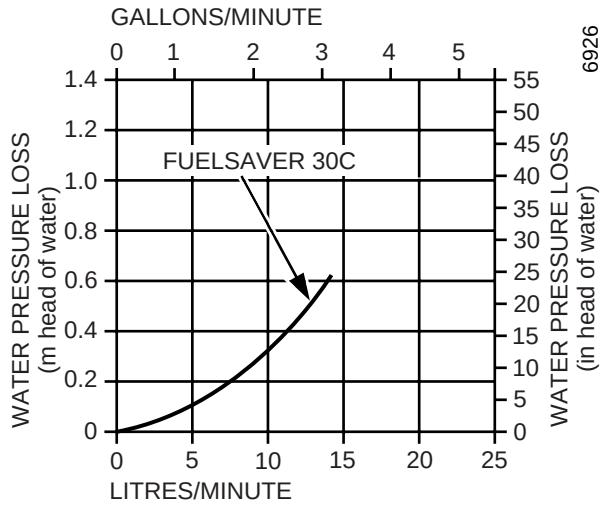
See diagram 3.3 for a diagrammatic layout.

3.5 Safety Valve

A safety valve must be fitted to a sealed water system.

It shall be preset, nonadjustable with a lift pressure of 3bar, incorporating seating of a resilient material, a test device and a connection for drain.

The drain from the safety valve must be routed clear of any electrical fittings and positioned so that any discharge can be seen.



PRESSURE LOSS OF BOILER Diagram 3.1

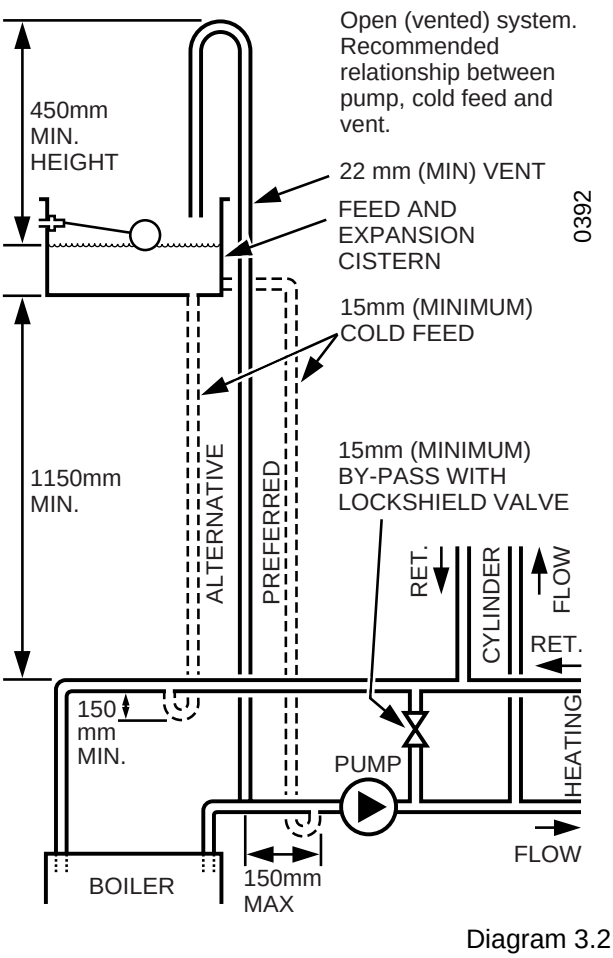
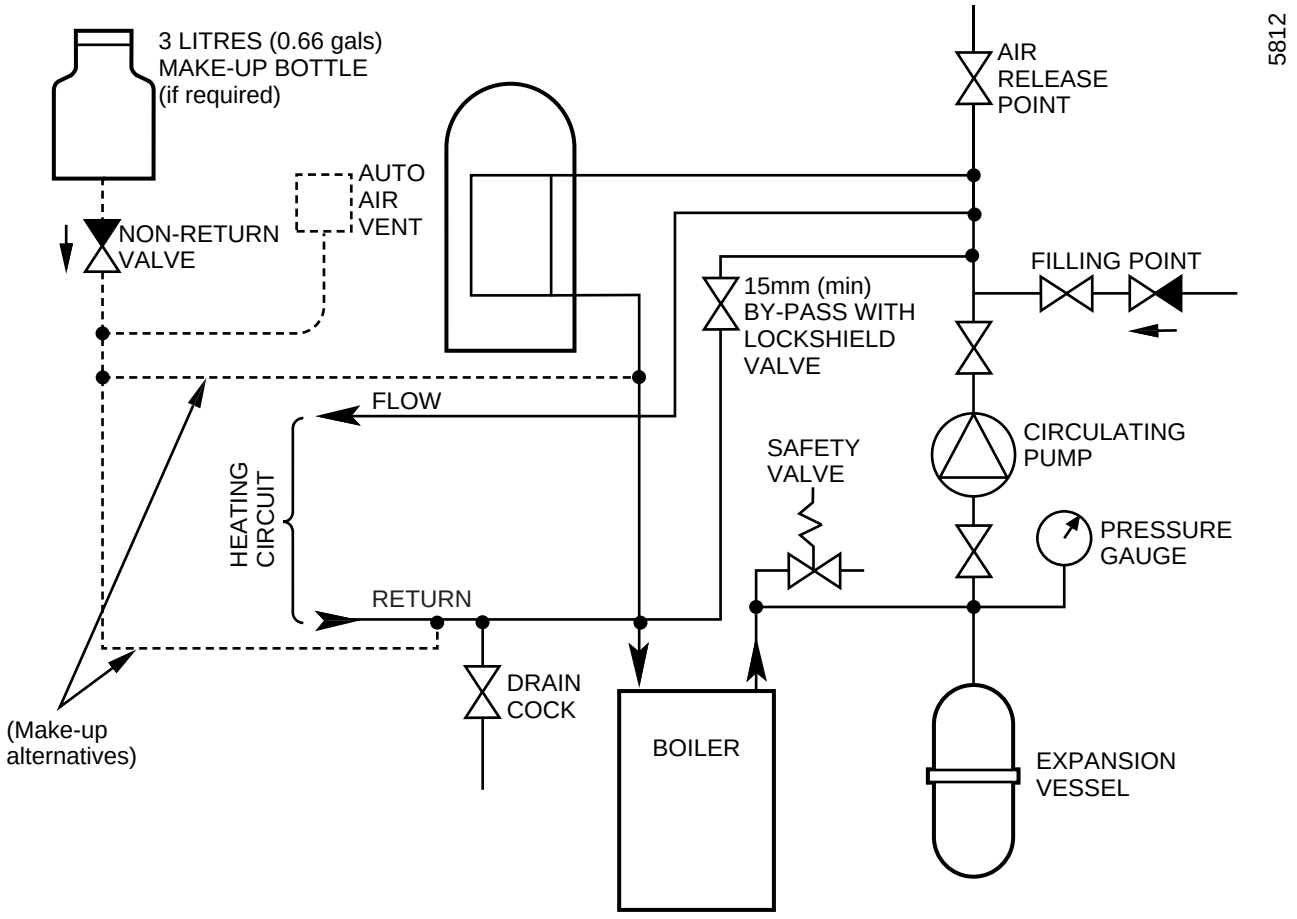


Diagram 3.2



SEALED WATER SYSTEM DIAGRAMMATIC LAYOUT Diagram 3.3

3.6 Expansion Vessel

A diaphragm type expansion vessel, conforming to the current issue of BS4814 (see also the current issue of BS7074 Part 1 and 2) must be connected at a point close to the inlet side of the circulating pump, see diagram 3.3, unless laid down differently by the manufacturer.

The expansion vessel volume depends on the total water system volume and the initial system design pressure. For any system an accurate calculation of vessel volume size is given in the current issue of BS7074 Part 1.

Example: For an initial system design pressure of 0.7bar the minimum total vessel volume required is 0.063xTotal System volume.

Guidance is also given in the current issue of BS5449.

The charge pressure must not be less than the static head of the system, that is, the height of the highest point of the system above the expansion vessel.

The water capacity of the boiler is given in Section 1.

EXPANSION VESSEL SYSTEM		
EXPANSION VESSEL PRESSURE (BAR)	0.5	
INTIAL SYSTEM PRESSURE (BAR)	0.5	1.0
EXPANSION VESSEL VOLUME (LITRES)	A X 0.075	A X 0.126
EXPANSION VESSEL PRESSURE (BAR)	1.0	
INTIAL SYSTEM PRESSURE (BAR)	1.0	1.5
EXPANSION VESSEL VOLUME (LITRES)	A X 0.098	A X 0.171
A = SYSTEM VOLUME		

Diagram 3.4

3.7 Pressure Gauge

A pressure gauge with a set pointer and covering at least the range of 0 to 4 bar (0 to 60lb/in^2) shall be permanently fitted to the system in a position where it can be seen when filling the system.

3 Water Systems

3.8 Domestic Hot Water Cylinder

SINGLE FEED INDIRECT CYLINDERS ARE NOT SUITABLE.

The domestic hot water cylinder must be of the indirect coil type. It must be suitable for working at a gauge pressure of 0.35bar above the safety valve setting.

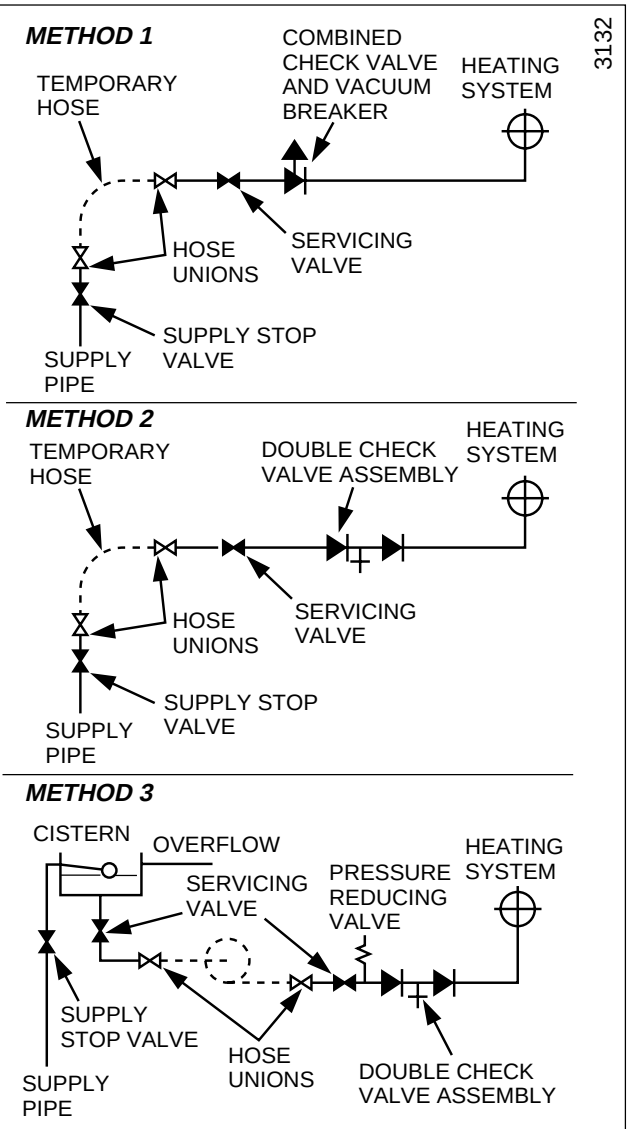
3.9 Water Make-up

Provision should be made for the replacing the water loss from the system using a make up bottle mounted in a position higher than the top point of the system, connected through a non-return valve to the return side of either the heating circuit of the domestic hot water cylinder.

Alternatively, provision for make up can be made by using a filling loop.

3.10 Filling a Sealed Water System

Provision for filling the system at low level must be made. Three methods are shown in diagram 3.5. There must be no permanent connection to the mains water supply, even through a non-return valve.



FILLING SEALED WATER SYSTEMS Diagram 3.5

4 Installation

4.1 Appliance Preparation

Remove the controls cover by pulling it forwards and off, see diagram 4.1.

Remove the boiler from the carton and lay it on its back.

The side grilles are packed in the bottom of the carton.

Remove the outer case by undoing the screws at the bottom and unhooking at the top, see diagram 4.1.

Remove the two screws and attach the side grilles by hooking over the top of the side panel and secure, see diagram 4.1.

4.2 Appliance Fitting

Refer to diagram 1.2 for fixing screw positions and minimum clearances.

Mark position of the three fixing screws.

Drill and plug the holes, suitable for No10x2in woodscrews.

Fit the screws, leave about 6mm proud.

Hook the boiler on to the lower screw and keyhole slots at the top, tighten all screws.

Connect the system pipework to the boiler.

Fix the flue to the flue hood in accordance with normal practice.

4 Installation

4.3 Gas and Water Connection

Connect the gas supply to the Rc$^{1}/_{2}$in gas cock.

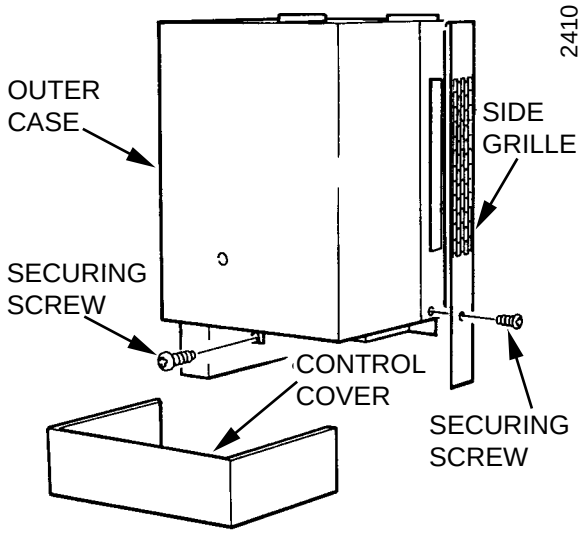
The whole of the gas installation, including the meter, should be inspected, tested for soundness and purged in accordance with the current issue of BS6891.

Connect the water to the boiler, using nuts and olives supplied, to BS2871 copper tube.

4.4 Casing

Refit the outer casing by hooking on at the top and securing with the screws previously removed, see diagram 4.1.

Make sure that the side grilles are kept clear.



APPLIANCE PREPARATION Diagram 4.1

5 Electrical Wiring

5.1 Electrical Connection

WARNING. The boiler must be earthed and have a permanent mains supply.

To remove the control box release the two screws at the front, see diagram 5.1, lower the box until it is clear then push backwards to disengage the hinge at the rear, see diagram 5.1. Take care not to damage the thermostat and capillaries.

Thread the mains lead through the clamp in the rear of the control box cover and connect to the terminal strip.

The mains cable outer insulation must not be cut back external to the cable clamp.

When making connections, make sure that the earth conductor is made of a greater length than the current carrying conductors, so that if the cable is strained the earth conductor would be the last to become disconnected.

5.2 Pump and External Controls Connections

The pump must be wired into the boiler control box as shown in diagram 5.2.

Any external controls must only be wired to interrupt the Red link between terminals 9 and SL.

Take the strain relief grommets from the loose items pack.

Place around the external controls and pump connection cables respectively.

Squeeze the sides of the grommets when pushing them into the obround holes in the rear of the control box, see diagram 5.1. Make sure the supply cable and all external cables are secured.

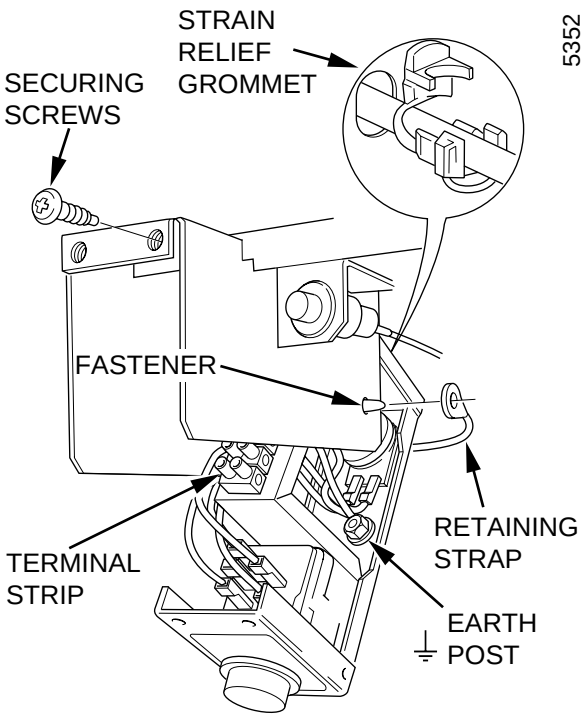
5.3 Testing - Electrical

Checks to ensure electrical safety should be carried out by a competent person.

After installation of the system, preliminary electrical system checks as below should be carried out.

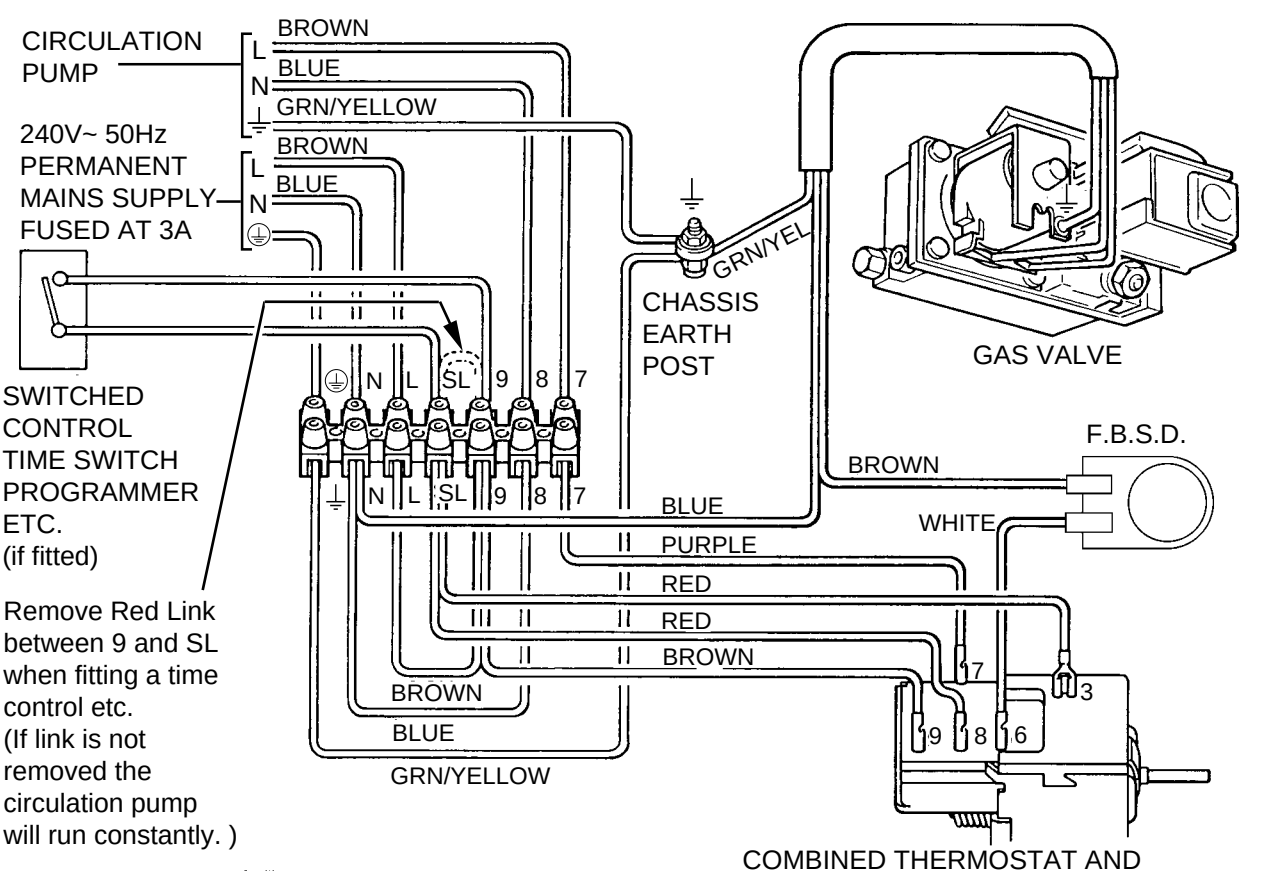
1. Test insulation resistance to earth of mains cables.
2. Test the earth continuity and short circuit of all cables.
3. Test the polarity of the mains.

The installer is requested to advise and give guidance to the user of the controls scheme used with the boiler.



CONTROL BOX Diagram 5.1

5 Electrical Wiring



WIRING DIAGRAM FOR CONTROL BOX. Diagram 5.2

6 Commissioning

6.1 All Systems

Make sure that the system has been thoroughly flushed out with cold water without the pump in place. Refit the pump, fill the system with water, making sure that all the air properly vented from the system and pump.

Before operating the boiler make sure that all external controls are calling for heat.

6.2 Sealed Water Systems Only

Flush the whole system with cold water without the pump in place. Refit the pump and fill until the pressure gauge registers 1.5bar (21.5lbf/in^2). Clear any airlocks and check for water soundness.

Check the operation of the safety valve, by allowing the water pressure to rise until the valve opens. The valve should open within +/-0.3bar (+/-4.3lbf/in^2) of the 3bar preset pressure. Where this is not possible conduct a manual check and test.

Release cold water to initial system design pressure.

The set pointer on the pressure gauge should be set to coincide with the indicating pointer.

6.3 Initial Lighting and Testing - All Systems

Refit the outer case, see diagram 4.1.

Identify the controls be reference to diagram 6.1.

Turn the control thermostat control knob “A” to “O” the Off position, see diagram 6.1.

Remove the pressure test point screw “K” and fit a suitable pressure gauge.

Turn the electrical supply on and check that the pump is working.

Open all windows and put out any naked lights, pipes, cigarettes and the like.

Turn on the main gas supply and purge in accordance with the current issue of BS6891.

Turn the boiler gas service cock “J” to On.

Note. Make sure that the flue blockage safety device reset button “M” is fully pushed in.

Push in control button “B”, keep pushed in and at the same time operate the piezo button “C” until the pilot burner lights. After the pilot burner lights keep the button “B” pushed in for about 15 seconds. If the pilot burner fails to light or stay alight a safety device prevents immediate relighting. Do not attempt to relight until the safety device has reset.

Note. Should the boiler fail to operate correctly refer to Fault Finding Section.

Check the length of the pilot flame, it should envelop the thermocouple tip as shown in diagram 7.7. The pilot rate can be adjusted by turning screw “H”, having first removed the gas valve cover by releasing the screws, see diagram 6.1.

Test pilot supply connections for soundness with a suitable leak detection fluid.

Fit the outer case, secure with the screws previously removed.

Make sure that the pilot is alight and stable, view through window “G”.

Set the control thermostat knob “A” between “MIN” and “MAX” (“MAX” is about 82°C (180°F) and check that the burner lights smoothly. Check all gas connections for soundness with a suitable leak detection fluid.

Note. Should the boiler fail to operate correctly refer to Fault Finding Section.

To set the burner pressure operate the boiler for 10 minutes, remove the gas valve cover, if not already removed, adjust the gas pressure by screw “H” until the required pressure is obtained, see the relevant Table 1 for setting pressures.

Stick the self adhesive arrow, from the loose items pack, in the appropriate space beneath “MIN” and “MAX” column on the data label.

Should any doubt exist about the gas rate this should be checked at the meter, using a stop watch to time at least one cubic foot of gas consumption.

Replace the gas valve cover.

Remove the pressure gauge and refit the screw, make sure that a gas tight seal is made.

6.4 Testing

Check the operation of the flame failure device on the boiler to make sure that the gas valve shuts down within 60 seconds, indicated by a “click” from the valve.

6.5 Flushing

Allow the system to reach maximum working temperature and examine for water leaks.

The boiler should then be turned off and the system drained as rapidly as possible whilst still hot.

Refill the system and vent and check for water soundness as before.

6.6 Adjustment - All Systems

When commissioning the system the boiler should first be fired on full service, that is, central heating and domestic hot water. The system should then be balanced, adjusting the pump and lockshield valve as necessary. Having achieved a satisfactory condition operate the boiler with the bypass fully closed on minimum load, normally this will be central heating with one radiator, in the main living area working. The valve should then be gradually opened to achieve a flow rate of 7.8L/min (1.7gal/min).

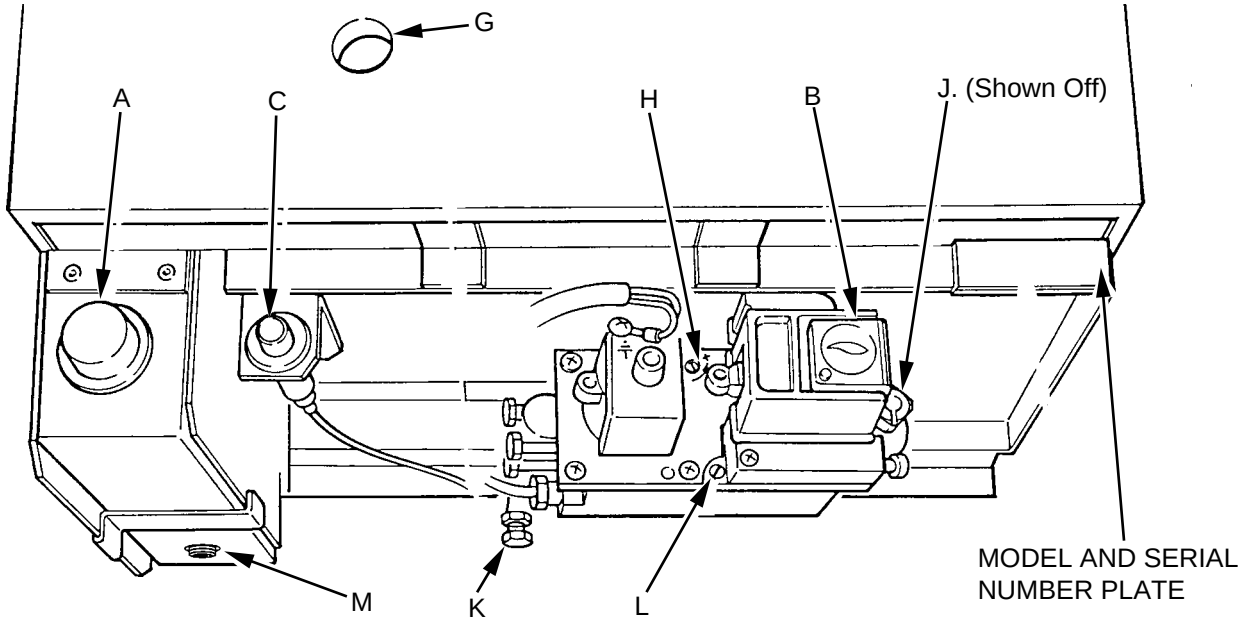
Under no circumstances should this valve be left in the fully closed position.

Operate the boiler again on full service and check the balancing, making further adjustments as necessary.

If thermostatic radiator valves are fitted care must be taken to make sure adequate flow through the boiler when they close, refer to the current issue of BS7478.

Do not attempt to adjust the thermostat calibration screw.

Test the boiler for spillage of the flue products at the draught diverter as detailed in the current issue of BS5440 Part 1. See also Section 2.3.



A. CONTROL THERMOSTAT KNOB	**J.** GAS SERVICE COCK
B. GAS CONTROL KNOB	**K.** PRESSURE TEST POINT
C. IGNITER BUTTON	**L.** PILOT BURNER ADJUSTMENT SCREW
G. VIEWING WINDOW	
H. GAS RATE ADJUSTMENT SCREW (UNDER COVER SCREW)	**M.** FLUE BLOCKAGE SAFETY DEVICE RESET SWITCH

Diagram 6.1

6 Commissioning

6.7 Adjustment - Sealed Water Systems

Sealed water systems should be adjusted to the initial design pressure and the set pointer repositioned.

6.8 Instruct the User in the Correct Operation of the Boiler

Hand the User Instructions to the user for their use.

Instruct and demonstrate the safe and efficient operation of the boiler, heating system and domestic hot water system.

Advise the user, that to ensure the continued efficient and safe operation of the boiler it is recommended that it is checked and serviced at regular intervals. The frequency of servicing will depend upon the particular installation and usage, but in general once a year should be enough.

It is the Law that servicing is carried out by a competent person.

Draw attention, if applicable, to the current issue of the Gas Safety (Installation and Use) Regulations section 35, which imposes a duty of care on all persons who let out any property containing a gas appliance.

Advise that the boiler is fitted with a safety device and refer to the instructions for use.

Advise the user of the precautions necessary to prevent damage to the system and building in the event of the heating system being out of use during frost and freezing conditions.

Reminder. Leave these instructions with the user.

Advise the user that the 'Benchmark' logbook should be completed by the installation engineer on completion of commissioning or servicing.

7 Servicing and Replacement of Parts

For the continued efficient and safe operation of the boiler it is recommended that it is checked and serviced at regular intervals. The frequency will depend upon the particular installation and usage, but in general once a year should be enough.

It is the Law that any servicing be carried out by a competent person.

Replacement of parts must be carried out by a competent person.

Before starting a service or replacing parts isolate the gas and electrical supplies.

Unless stated otherwise all parts are replaced in the reverse order to removal.

7.1 Heating Body - Service

Remove the controls cover by pulling it forwards and off.

Remove the outer casing by releasing the screw at the bottom and unhooking at the top.

Remove the inner casing by releasing the wing nuts at the top and the screws at the bottom, see diagram 7.1.

Remove the combustion chamber front by unscrewing the wing nut at the bottom front and the four screws, see diagram 7.2.

Disconnect the ignition lead from the electrode and unscrew thermocouple nut to release, see diagram 7.3.

Support the main burner and release pilot tubing nut at the base of burner, release pilot tube. The pilot injector can now be removed by unscrewing, see diagram 7.3.

Disengage the main burner from the main injector. Raise the burner up through the combustion chamber to remove. Take care not to damage the side insulation.

Place the burner to one side.

Cover the combustion chamber and injector with a sheet of paper.

Remove the flue cleaning door, see diagram 7.1.

Remove the screws securing the draught diverter baffle and lower out as shown in diagram 7.4.

Brush away any deposits from the heat exchanger paying particular attention to the gap between the fins.

Remove the paper together with any debris.

When replacing parts make sure that the draught diverter is refitted correctly.

7.2 Main Burner - Service

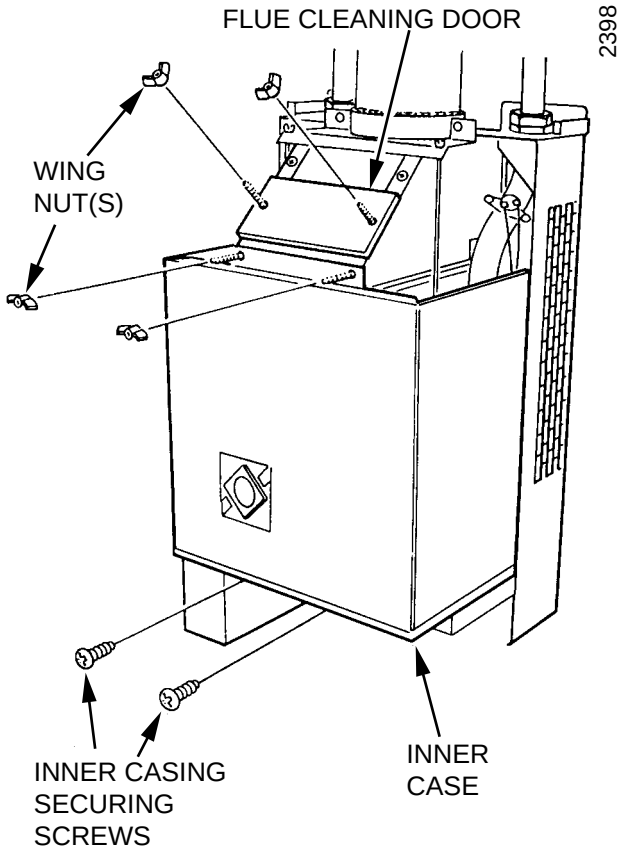
Generally follow the instructions given in Section 7.1.

With the main burner removed brush or vacuum any deposits away, make sure that the flame ports are clear.

Do not use a brush with metallic bristles.

Note. Alternative type of burner are fitted to some models.

Remove lint arrester from main burner and clean it thoroughly by brushing or vacuuming, see diagram 7.5 for Bray burner and diagram 7.6 for Furigas burner.



ACCESS FOR SERVICING Diagram 7.1

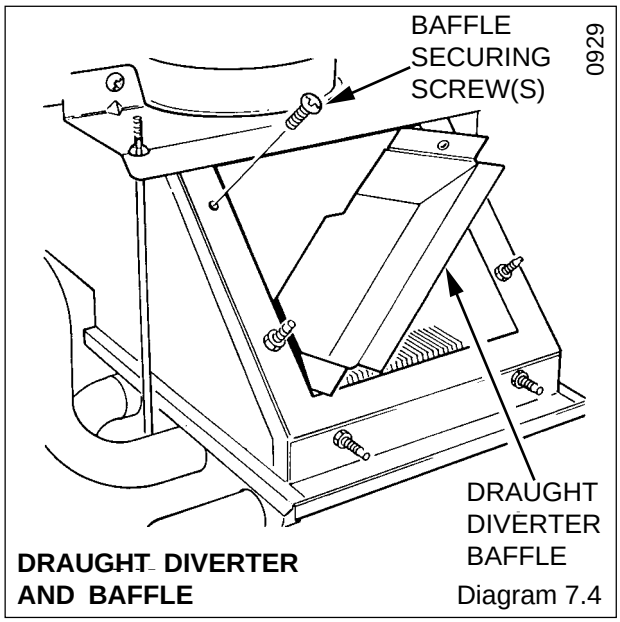
7.3 Main Injector

Generally follow the instructions given in Section 7.1.

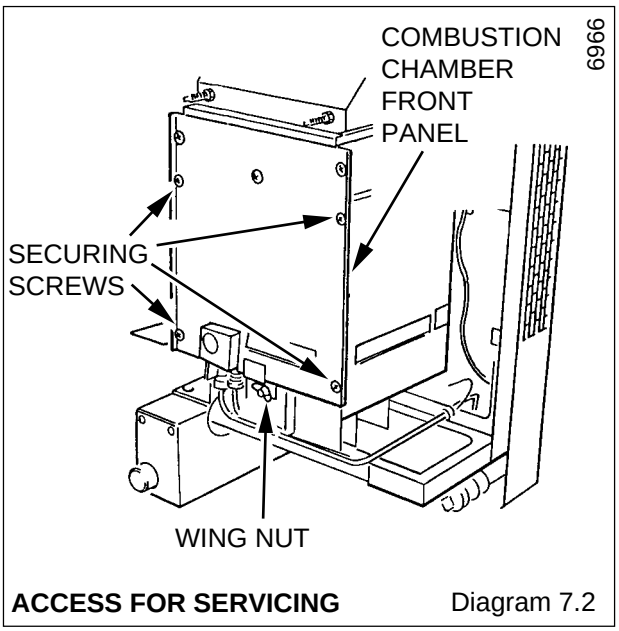
With the main burner removed the injector can be unscrewed and replaced as necessary, using a new sealing washer.

If cleaning do not use a wire or sharp instrument on the hole.

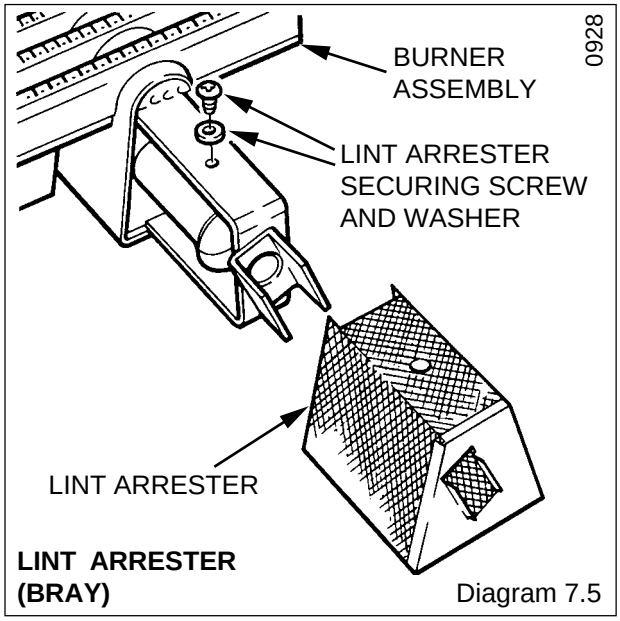
When replacing the main burner make sure that it is pushed fully home onto the injector and that the guides are engaged on the injector manifold.



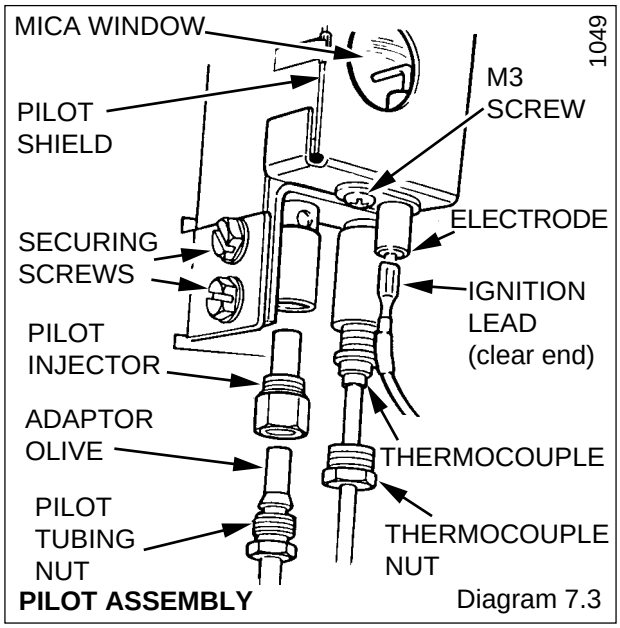
DRAUGHT DIVERTER AND BAFFLE Diagram 7.4



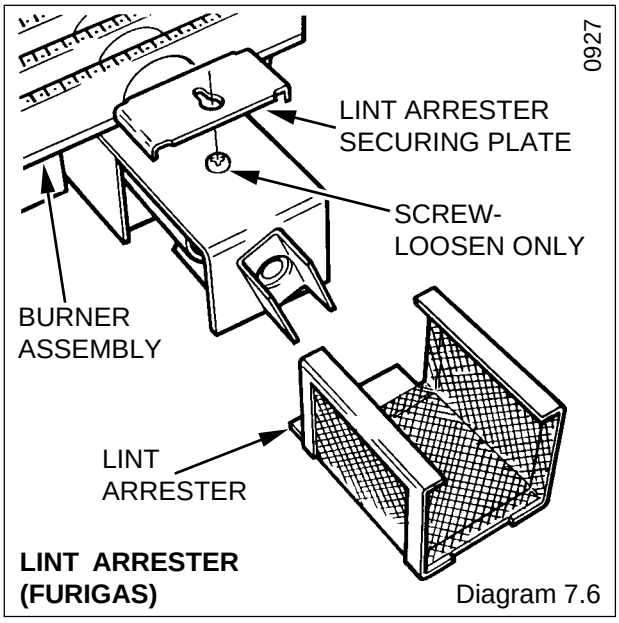
ACCESS FOR SERVICING Diagram 7.2



LINT ARRESTER (BRAY) Diagram 7.5



PILOT ASSEMBLY Diagram 7.3



LINT ARRESTER (FURIGAS) Diagram 7.6

7.4 Pilot Burner and Injector - Service

Generally follow the instructions given in Section 7.1.

With the main case, inner case and controls cover etc., removed as above, pull off ignition lead from the electrode.

Unscrew the tubing nut at the base of the pilot burner, releasing the pilot pipe. Remove the pilot injector by unscrewing from the pilot burner.

Unscrew the thermocouple nut to release the thermocouple from the pilot burner.

Support the main burner and remove the two screws and washers securing the pilot burner and shield to burner.

Remove the complete assembly.

Lift the pilot burner off.

Take care not to damage the electrode.

When replacing make sure the spark gap is as shown in diagram 7.7.

Check the pilot burner flame lengths are as shown in diagram 7.7.

7.5 Thermocouple

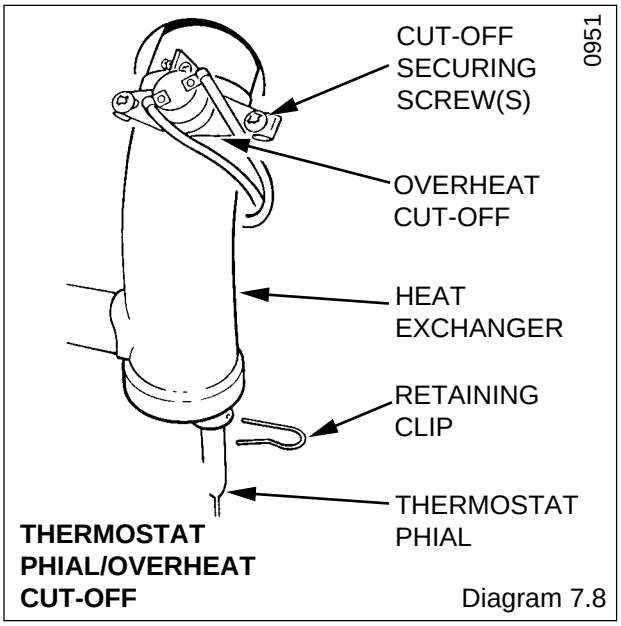
Generally follow the instructions given in Section 7.1.

Unscrew the thermocouple nut to release from the pilot burner, see diagram 7.3.

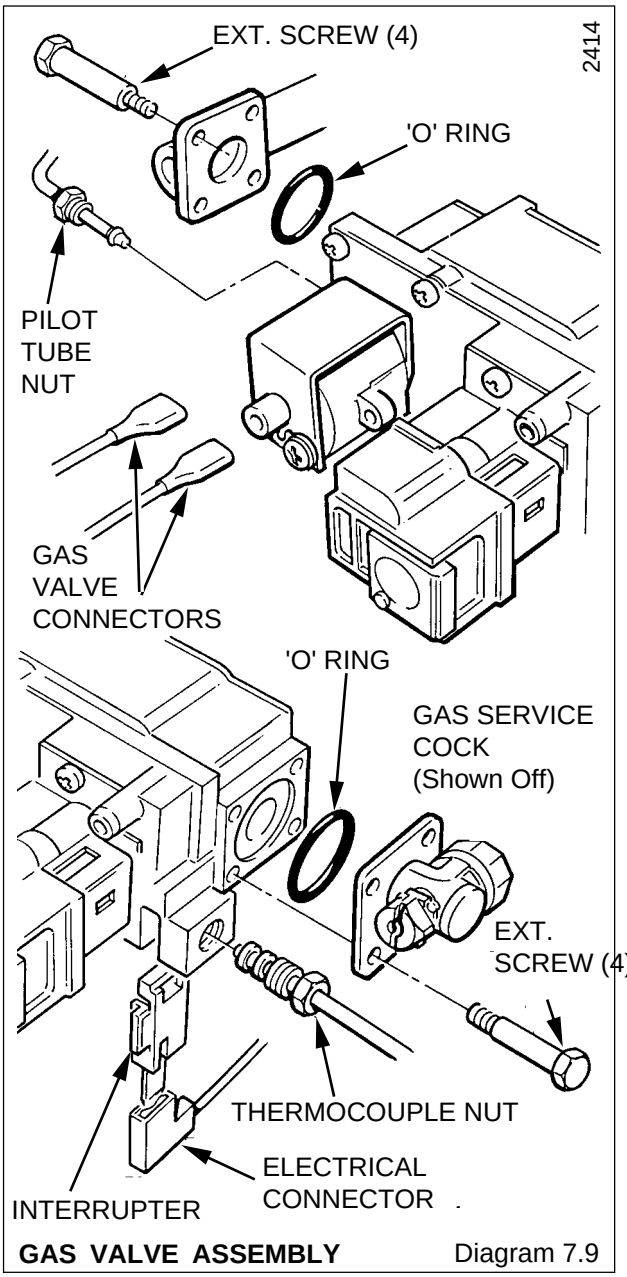
Disconnect the thermocouple from the gas valve, see diagram 7.9.

Use the old thermocouple as a pattern when fitting the new one. Do not tighten more than a quarter turn beyond finger tight at the gas valve.

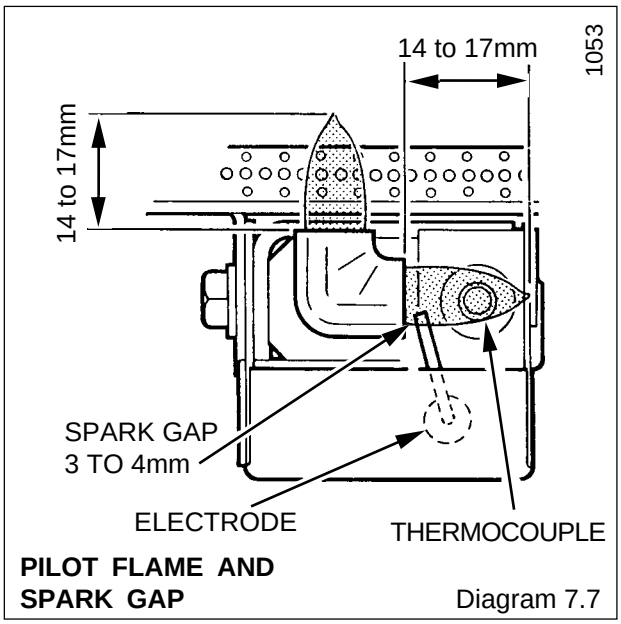
Check the electrode spark gap, see diagram 7.7.



THERMOSTAT PHIAL/OVERHEAT CUT-OFF Diagram 7.8



GAS VALVE ASSEMBLY Diagram 7.9



PILOT FLAME AND SPARK GAP Diagram 7.7

7.6 Electrode

Generally follow the instructions given in Section 7.1.

Unscrew the electrode from the pilot shield.

When refitting check that the spark gap is as diagram 7.7.

7.7 Over Heat Cutoff Device

Generally follow the instructions given in Section 7.1.

Remove the screws securing the over heat cutoff device to the clamp, see diagram 7.8.

Release the cutoff connectors at the gas valve, see diagram 7.9.

Remove the screw retaining the grommet plate to the rear panel to release plate, see diagram 7.10.

Carefully remove, one at a time, the cables of the cutoff through the grommet.

When reassembling use a little of the heat sink compound, supplied, on the face of the cutoff to make sure of a good contact with the pipe also make sure it is correctly located.

7.8 Gas Valve

Generally follow the instructions given in Section 7.1.

Remove screw to release gas valve cover.

Disconnect all leads and pipes at valve.

Undo the four screws each side of the valve to release the service cock and burner supply tube, take care not to damage the “O” rings.

Remake all connections.

Do not tighten the thermocouple nut more than a quarter turn beyond finger tight.

It will be necessary to purge pipework and gas valve before relighting, refer to Commissioning.

7.9 Electrical Control Box

Remove controls cover and outer casing as above.

Remove retaining clip from boiler thermostat phial pocket and withdraw the phial, see diagram 7.8.

Remove the control box by undoing the two fixing screws at the front and lower the front of the box until it is clear of the cover. Push the box towards the rear of the boiler to disengage the hinge and lower, see diagram 5.1.

Withdraw the control thermostat capillary through the bottom of the air duct.

Disconnect cables (a) mains, L. N and E (b) pump at terminal 8, 7 and earth stud, (c) cables at gas valve, (d) disconnect any remote controls at terminals 9 and SL.

When replacing refer to diagram 5.2 for electrical connections. Smear the control thermostat phial with heat sink compound and make sure it is secured with the retainer, in the pocket.

7.10 Piezo Unit

Gain access generally as Section 7.1.

Disconnect ignition lead and remove backing nut from piezo unit.

7.11 Ignition Lead

Gain access generally as Section 7.1.

Disconnect the ignition lead at both ends.

When replacing the clear end fits to the electrode.

7.12 Control Thermostat

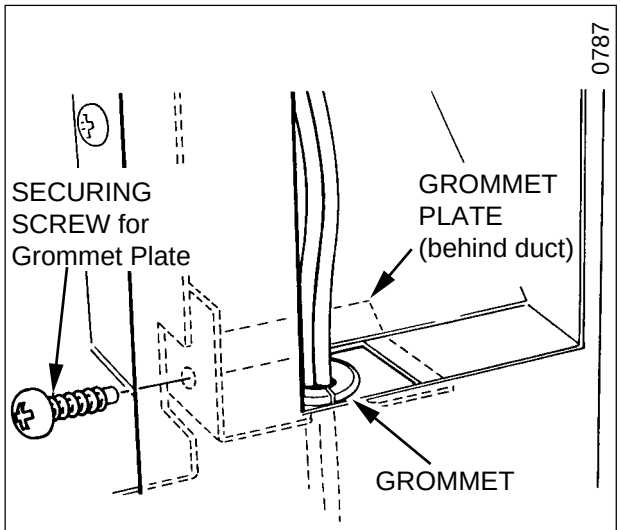
Gain access generally as Section 7.1.

Remove and support the control box.

Remove the control knob and electrical connections from the control thermostat body.

Pull off the connectors from the control thermostat terminals. Remove the two screws securing the control thermostat to the control box. The control thermostat can now be removed.

When replacing smear the control thermostat phial with a little heat sink compound, supplied, before fitting into the pocket.



OVERHEAT CUT-OFF REMOVAl Diagram 7.10

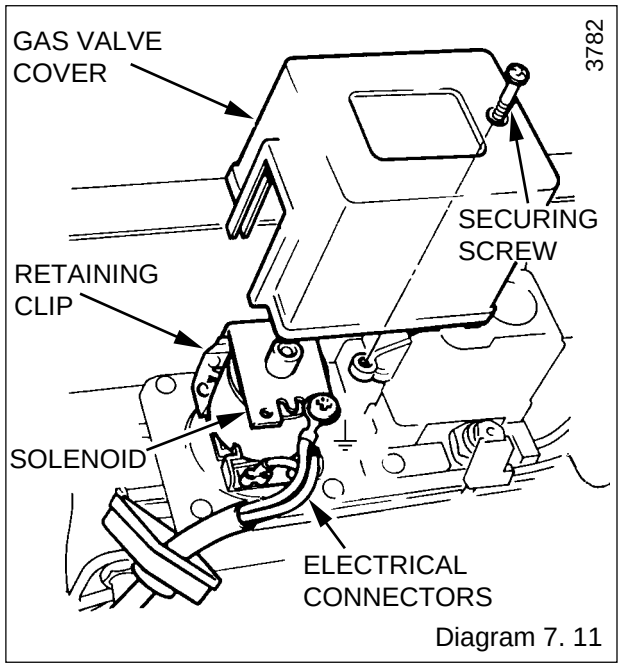


Diagram 7. 11

7.13 Replacement of Flue Blockage Safety Device

Gain access generally as section 7.1 and Diagram 7.12

Inset A. Remove phial assembly by removing the brass knurled screw(s).

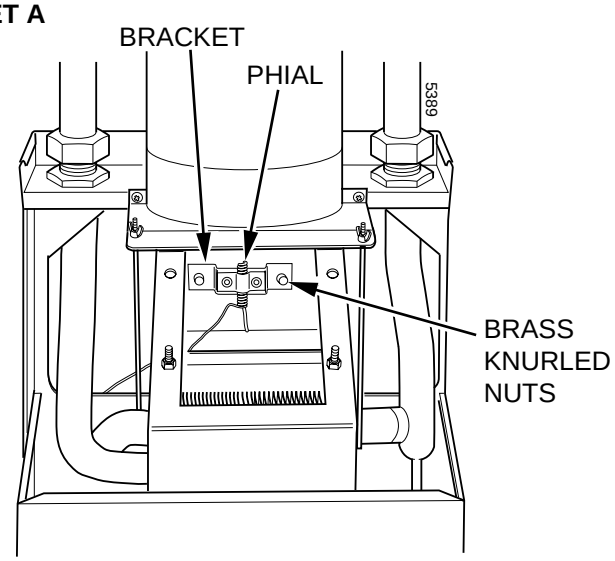
Inset B. Carefully remove phial and capillary through back of boiler.

Inset C. Having opened control box remove the electrical connections from the flue blockage safety device, the locknut and capillary retaining clip. Fit new flue blockage safety device in reverse order, making sure that the capillary is secure and there is sufficient slack at the control box to allow the box to be opened and closed without damaging the capillary.

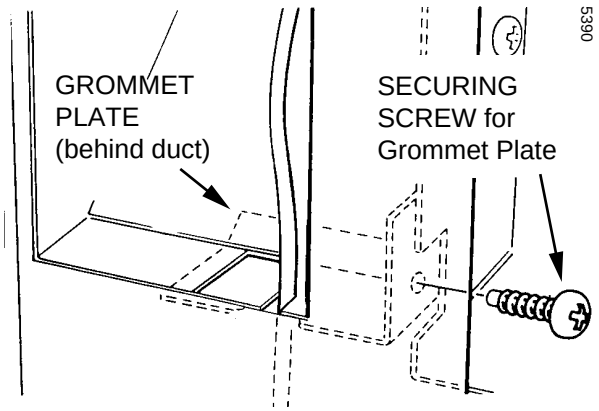
Important. Make sure the phial assembly is correctly located on the two locating studs.

When refitting make sure that the capillary is clear of hot surfaces, to avoid nuisance shut down of boiler.

INSET A



INSET B



INSET C

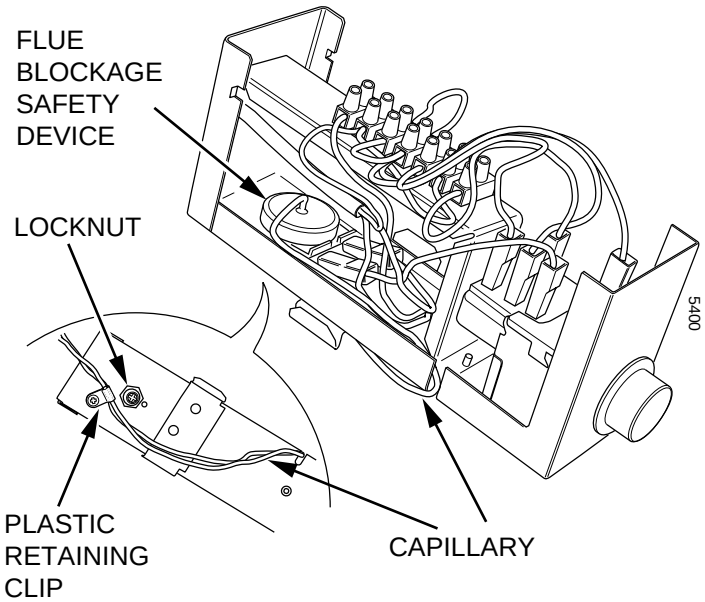


Diagram 7.12

8 Fault Finding

Fault and Cause	Remedy
8.1 Pilot Goes Out after a Period of Remaining Alight	
Front cover not correctly fitted.	Fit parts correctly.
Flue parts not fitted or sealed properly.	Seal cavity or fit flue parts correctly as described in Installation Instructions.
Electrical supply failure causing over heat device to operate.	Relight pilot.
Pump incorrectly wired.	Connect pump in accordance with diagram 5.2.
Overheat cutoff operating.	Refer to Section 8.3.
8.2 Main Burner Will Not Light	
External, remote controls not "On."	Check that any remote controls are calling for heat.
Control thermostat not on.	Check control thermostat is in an "On" position, see also Section 8.9.
Flue Blockage Safety Device tripped.	Reset, refer to section 6
If Flue Blockage Safety Device repeatedly requires resetting, call a service engineer	
8.3 Control Thermostat Will Not Cut Out	
Control thermostat phial not fitted in pocket.	Fit phial in pocket.
Faulty control thermostat.	Replace control thermostat.
8.4 Overheat Cutoff Device Cuts Out Prematurely	
Air in heating body.	Vent system. Alter system layout if necessary.
Water circulation low or stopped.	Pump not functioning correctly. Check pump is wire directly to the boiler. Alter system if necessary.
Overheat cutoff device operates before boiler cycles on maximum control thermostat setting.	Change faulty overheat cutoff device.
The correctly set overheat cutoff device operates prematurely. There is no air in the heating body and water circulation satisfactory.	Change faulty heating body.
Pump not functioning correctly.	Check pump is wire directly to the boiler. Alter system if necessary.
8.5 Insufficient Heat	
Control thermostat set too low.	Increase setting.
Inlet gas pressure inadequate.	Increase gas pressure.
Governor setting incorrect. (make sure control thermostat is on maximum setting).	Check burner pressure against data label. Reset only if more than 10% away from required figure.
8.6 Appliance Noisy in Operation*	
Overgassed.	Check burner pressure against data label and adjust only if more than 10% away from stated required figure.
Complete lack of water.	Check system controls for correct installation or correct type of controls.
Air in system.	Remove air from system. When system is first commissioned the air dissolved may take some time to boil out, therefore attempts should be made to vent air during the first weeks of the installation. Check venting of system, as air bubbles can remain suspended in the water if system is not well vented.
Water flow rate.	Check that flow rate is correct. Check that pump is correct size and is correctly adjusted. Bypass not fitted or set correctly.

* There remains on most boilers a residual noise more noticeable at high temperatures. Normal operation of the boiler over a period should remove most noise.

8.7 Thermocouple and Overheat Cutoff Device

To test the thermocouple, a meter with a range of 0 to 30 mV is required.

Symptom: The pilot burner fails to stay alight. Test the thermocouple, overheat cutoff and thermocouple connectors, as described in fault finding chart 8.2, see also diagram 8.1.

Check the millivoltage of the thermocouple closed circuit at points “A” and “E”, see diagram 8.1. This should be within the range of 6 to 13mV.

8.8 Electrical

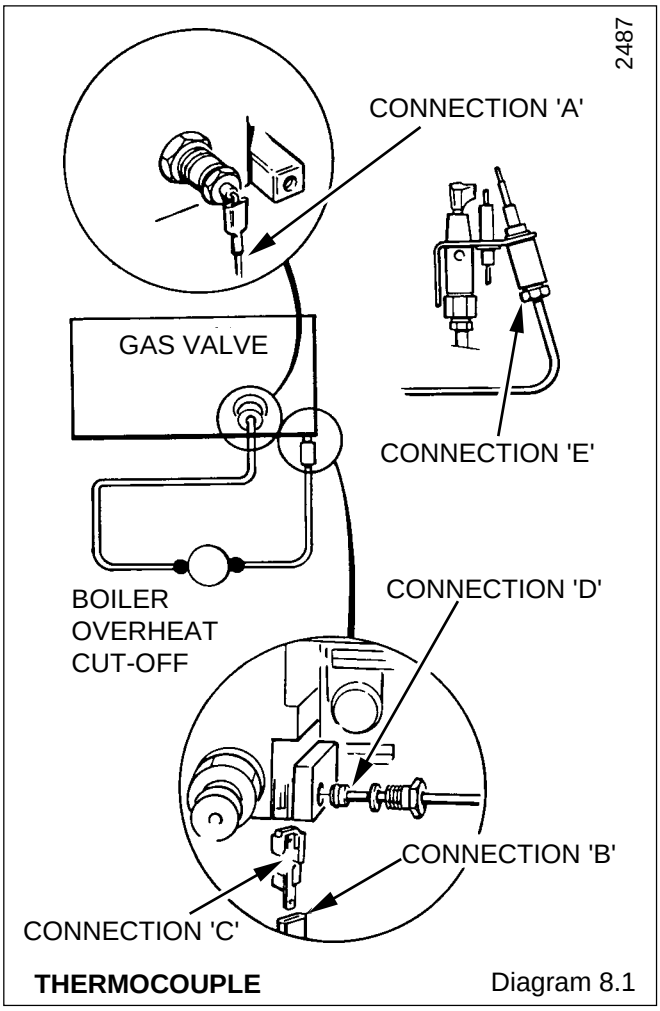
Important: The preliminary electrical systems checks in a multimeter instruction book are the first checks to be carried out during a fault finding procedure. On completion of the servicing/ fault finding task which has required the breaking and remaking of electrical connections then checks, earth continuity, polarity and resistance to earth must be repeated.

To check the control thermostat and gas valve, see diagram 8.3 and functional flow wiring diagram 8.4.

To check control thermostat pump over run cutoff device circuit see diagram 8.3 and functional flow wiring diagram 8.5.

8.9 Pilot

Refer to fault finding for pilot, see diagram 8.5.



THERMOCOUPLE Diagram 8.1

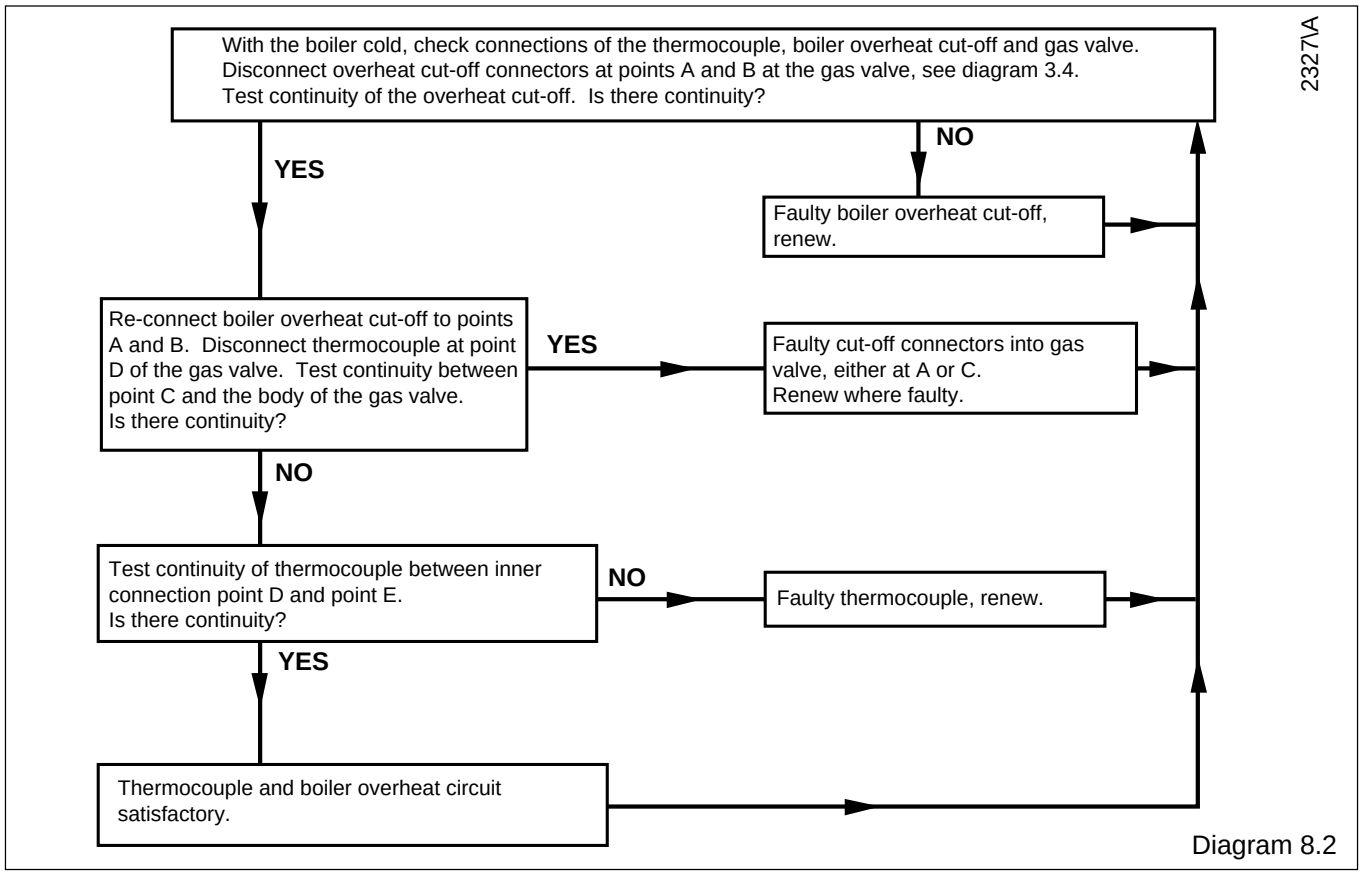


Diagram 8.2

ELECTRICAL FAULT FINDING

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Ensure that all services are available at the appliance, that is Gas, Electricity, Water.
With Pilot Lit. Reset Flue Blockage Safety Device.

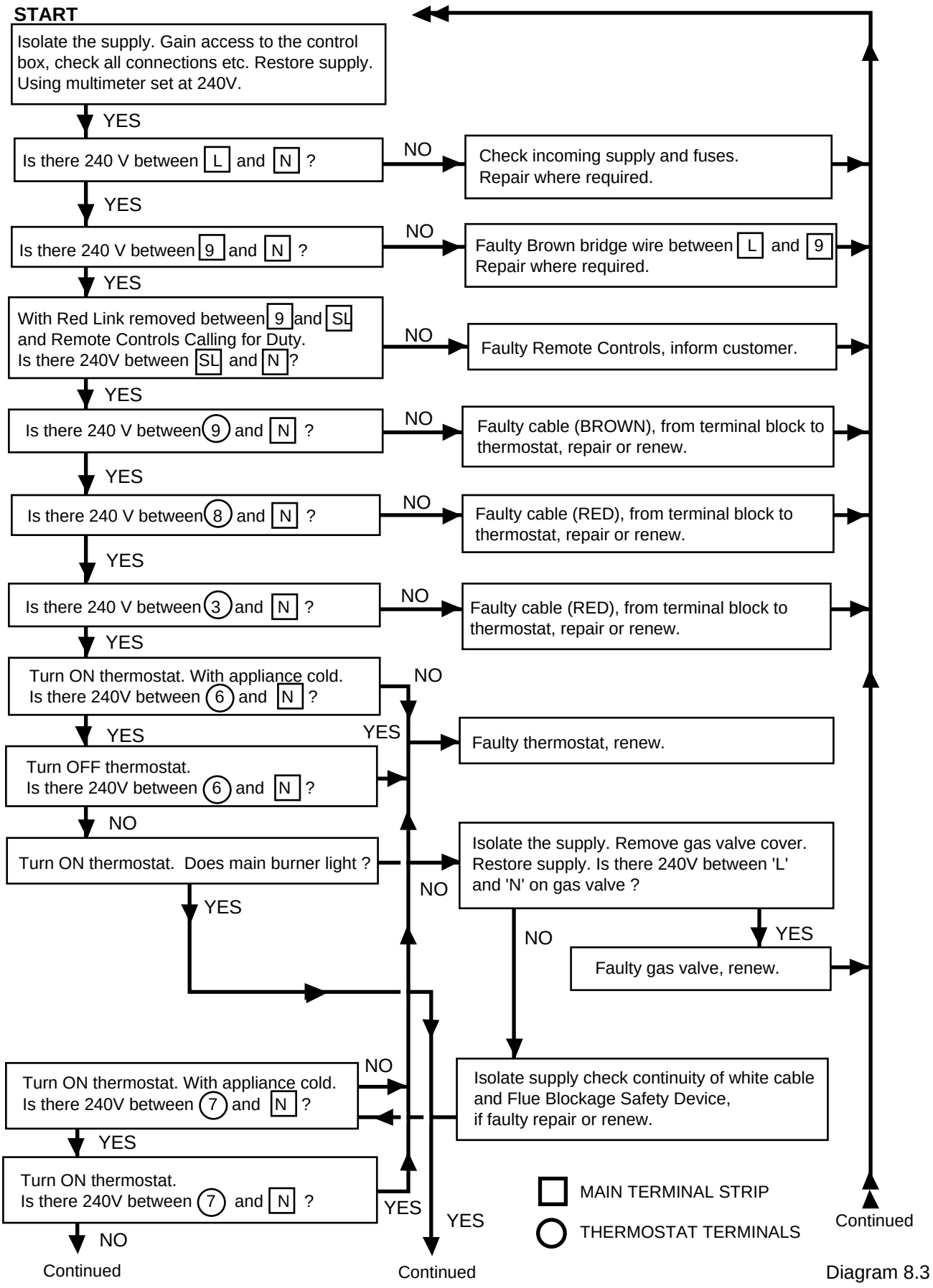


Diagram 8.3

Electrical Fault Finding Continued.

4403A

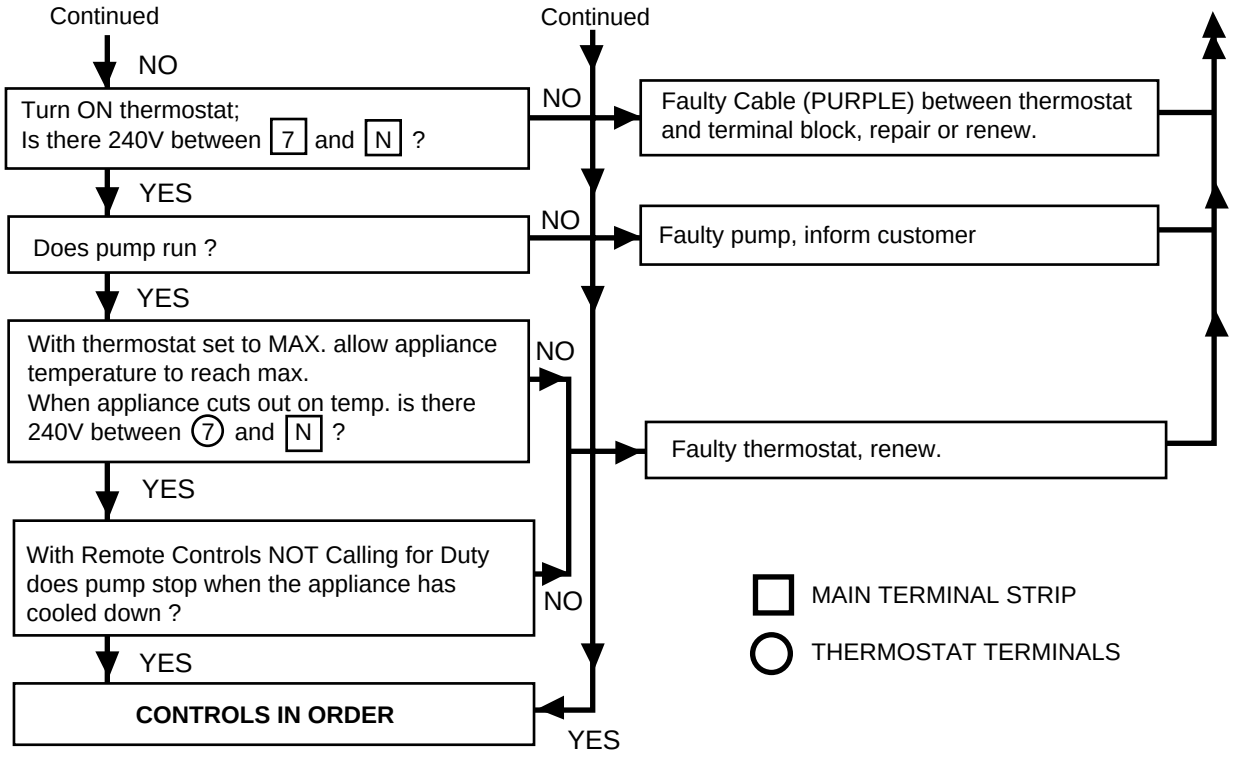
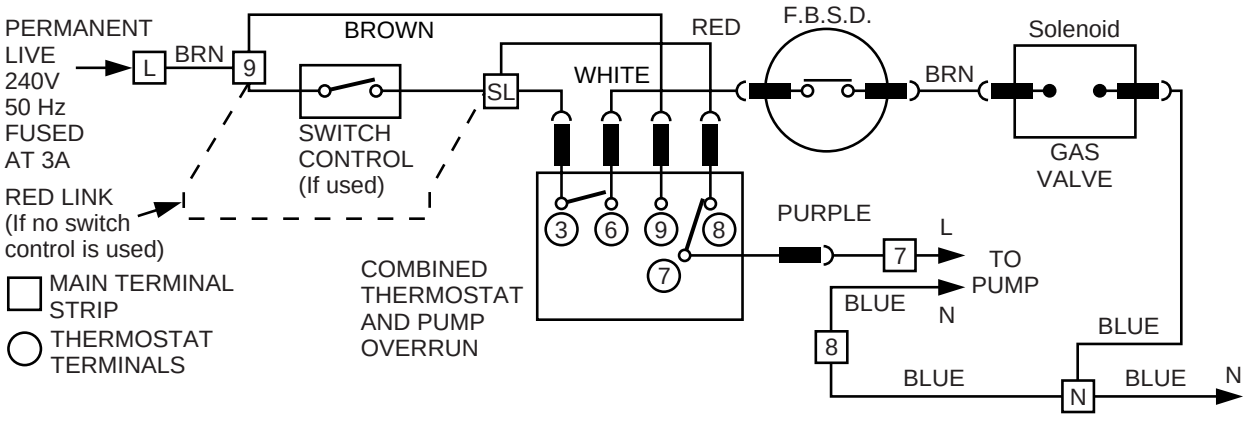


Diagram 8.3 Continued

5393



FUNCTIONAL FLOW

Diagram 8.4

5950

PILOT WILL NOT LIGHT
START HERE

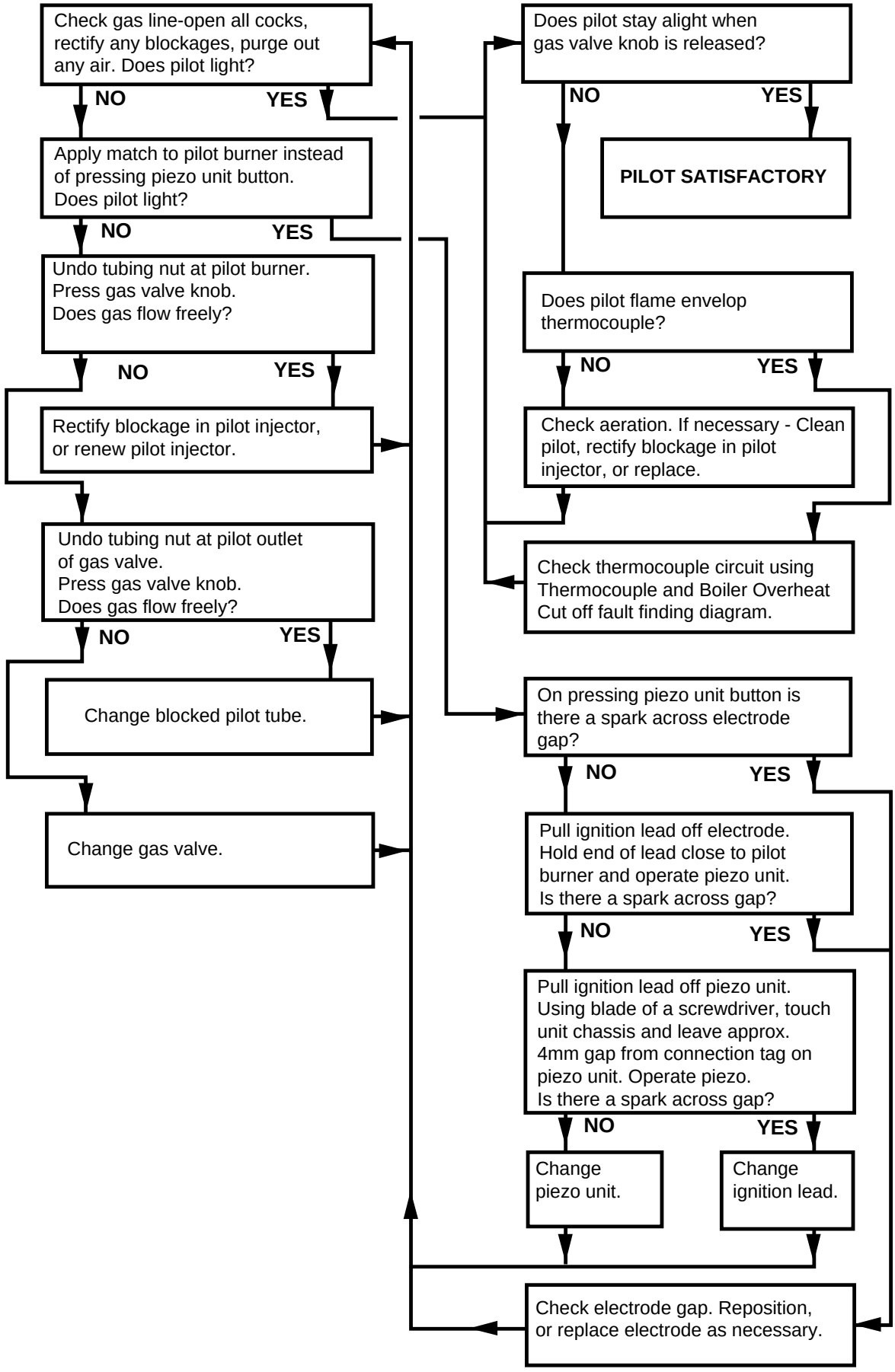


Diagram 8.5

9 Spare Parts

9.1 Ordering

When ordering spare parts, quote the part number,

description, serial number and model name from the data label on the boiler, see diagram 6.1.

Key No	Part No	Description	GC No
2	900501	Piezo unit	384 146
3	416189	Control thermostat assembly	355 501
4	800014	Overheat cutoff device	313 064
5	800015	Gas valve assembly inc 14	313 067
6	900000	Thermocouple	394 162
7	203415	Pilot burner inc 12	394 161
8	202600	Electrode	384 149
9	416144	Control thermostat knob	355 401
10	WW4612	Ignition lead	355 500
11	203042	Injector - 30C	398 674
12	203509	Pilot injector	394 163
13	411194	Sight glass	355 153
14	208040	“O” ring - gas valve	334 592
15	203350	Solenoid	313 226
16	800785	Safety Device and bracket assy. 30C	278 501

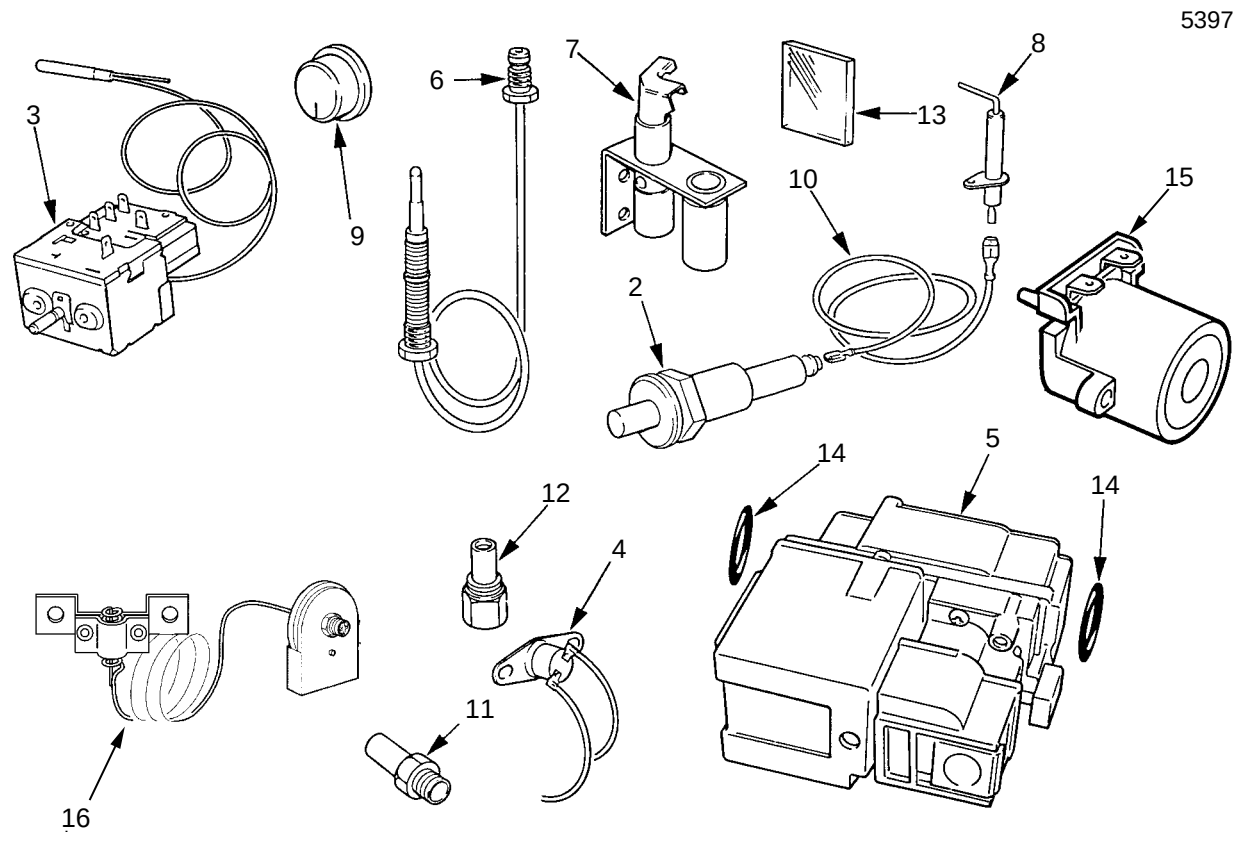


Diagram 9.1

Because of our constant endeavour for improvement, details may vary slightly from those shown in these instructions.