

Installation & maintenance manual for

Camray 5 Combi External Boilers



By Appointment to
H.M. Queen Elizabeth II
Boulter Boilers Limited
Boiler Manufacturers

Heat is our Element



Health & Safety

INFORMATION FOR THE INSTALLER AND SERVICE ENGINEER.

Under the Consumer Protection Act 1987 and the Health and Safety at Work Act 1974, it is a requirement to provide information on substances hazardous to health (COSHH Regulations 1988).

The Company takes every reasonable care to ensure that these products are designed and constructed to meet these general safety requirements, when properly used and installed.

To fulfil this requirement products are comprehensively tested and examined before dispatch.

This appliance may contain some of the materials below.

When working on the appliance it is the Users/Engineers responsibility to ensure that any necessary personal protective clothing or equipment is worn appropriate to parts that could be considered as being hazardous to health and safety.

INSULATION &SEALS

Glass Rope, Mineral Wool, Insulation Pads, Ceramic Fibre, Fibre Glass Insulation.

May be harmful if inhaled. May be irritating to the skin, eyes, nose or throat. When handling avoid inhalation and contact with the skin or eyes. Use (disposable) gloves, face masks and eye protection.

After handling wash hands and other exposed parts. When disposing, reduce dust with water spray, ensure parts are securely wrapped.

GLUES, SEALANTS & PAINT

Glues, Sealants and Paint are used in the product and present no known hazards when used in the manner for which they are intended.

KEROSENE & GAS OIL FUELS (MINERAL OILS)

1. The effect of mineral oils on the skin vary according to the duration of exposure.
2. The lighter fractions also remove the protective grease normally present on the surface of the skin rendering the skin dry, liable to crack and more prone to damage caused by cuts and abrasions.
3. Skin rashes (oil Acne). Seek immediate medical attention for any rash, wart or sore developing on any part of the body, particularly the scrotum.
4. Avoid as far as possible any skin contact with mineral oil or with clothing contaminated with mineral oil.
5. Never breath any mineral oil vapours. Do not fire the Burner in the open i.e. out of the Boiler as a miss fire will cause unburnt oil vapours.

Barrier cream containing lanolin such as Rosalex Antisolv, is highly recommended together with a strict routine of personal cleansing.

Under no circumstances should mineral oils be taken internally.

OFTEC Code of Practice OCP/1: 1995 For the Safe Installation, Commissioning, Maintenance and Fault Rectification of Oil Firing Equipment should be consulted.

Boulter Buderus Limited
Magnet House, 30 White House Road, Ipswich IP1 5JA
Telephone: (01473) 241555
Fax: (01473) 241321

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Section 1- Users Guide

1:1 INTRODUCTION

Thank you for choosing the Camray Combi manufactured in the UK by Boulter Buderus who are renowned oil-firing specialists.

To obtain the best possible performance and trouble free operation from your Boiler, it is important that you read section 1 of this manual carefully.

All Camray appliances are the result of many years of research, development and experience. Whilst our Boilers are designed with simplicity of operation in mind, there are certain features and benefits which only become obvious when you thoroughly understand how best to use your Camray product.

We trust that you will enjoy many years of reliable service from your new Camray Boiler and, once again thank you for choosing Camray.

1:1.1 Manual

This manual covers safety, User Instructions, Installation, Commissioning and Maintenance of the Camray Combi External Boiler.

1:2 USEFUL INFORMATION

Your installer will help you complete this where necessary.

Information can be found on appliance data label located inside the left-hand side panel of the casing. Also on the front cover of your installation manual.

Boiler Model
 Serial Number
 Burner Type
 Fuel Type Kerosene C2
 System Pressure Dynamicbar
 Staticbar
 Installer

 Installation Date
 Service Engineer

 Oil Tank Capacity litres
 Oil Supplier 1 Tel
 Oil Supplier 2 Tel

1:3 IMPORTANT SAFETY NOTES

To obtain the best possible performance and trouble free operation from your Boiler, it is important that you read these instructions carefully. Your Camray Boiler has built-in safety features, which are detailed in the relevant section of this manual.

1:3:1 Please Note

The heating system must comply with the latest editions of British Standard 5410 and The Building Regulations.

(England and Wales only): Please note: This oil fired appliance must be installed by either an OFTEC Registered Installer or by way of a Local Building Control License. An OFTEC CD10 document or Building Control Completion Certificate must be obtained prior to commissioning of this appliance.

The first commissioning of this appliance, and the system that it is connected to, must be undertaken by an O.F.T.E.C.* registered engineer. It is the responsibility of the installer to ensure the Boiler can be and is commissioned.

If an engineer is not known, Boulter Buderus will be pleased to provide details of a commissioning and servicing engineer from their register.

*The Oil Firing Technical Association for the Petroleum Industry. Telephone 0845 6585080

IMPORTANT

- If it is known or suspected that a fault exists on the Boiler, it MUST NOT be used until the fault has been corrected by a competent engineer (see [Failure to Start](#)).
- It is essential that the instructions in this manual are strictly followed for safe and economic operation of the Boiler Failure to observe these instructions may invalidate your right to free breakdown cover during the guarantee period.

We recommend that you keep these instructions in a place near your appliance for easy reference.

1:4 CONNECTIONS

Your Camray External Boiler should be connected to an electrical supply complying with the Electrical Wiring Regulations (BS7671): as well as an oil supply complying with BS5410; and an appropriate flue system.

- ALWAYS SWITCH OFF THE ELECTRICAL SUPPLY before removing any of the covers for cleaning.
- If any part of the Boiler or its flue is modified, then the guarantee/warranty will be invalidated.

1:5 INSTALLATION & COMMISSIONING

After your Camray Boiler has been installed it MUST be commissioned by an O.F.T.E.C. Registered Engineer. Commissioning involves testing the Boiler to ensure that it is working correctly, and also setting the Burner correctly to ensure the most efficient operation and use of fuel. If the Boiler has not been commissioned, it may not be operating at the maximum efficiency possible for your heating system, and may also invalidate the guarantee.

READ HEALTH AND SAFETY INFORMATION ON INSIDE FRONT COVER OF THIS MANUAL.

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On no account should any part of the Boiler or its Flue be modified with the exception of flues which require adjusting to length to suit site conditions, as detailed in this manual.

The wiring of the control panel should be as the wiring diagrams included in this manual. Wiring should not be tampered with, modified or changed for any reason.

Only use Boulter Buderus replacement parts.

Non-compliance with the above will invalidate the Guarantee.

NOTE

Due to the high efficiency of DHW production in certain circumstance i.e. very low rates, the temperature of the hot water at the tap can be high. If this temperature is likely to cause nuisance or discomfort your installer will advise that you fit thermostatic mixer valves at the appropriate draw off points.

1:6 BOILER CONTROL PANEL

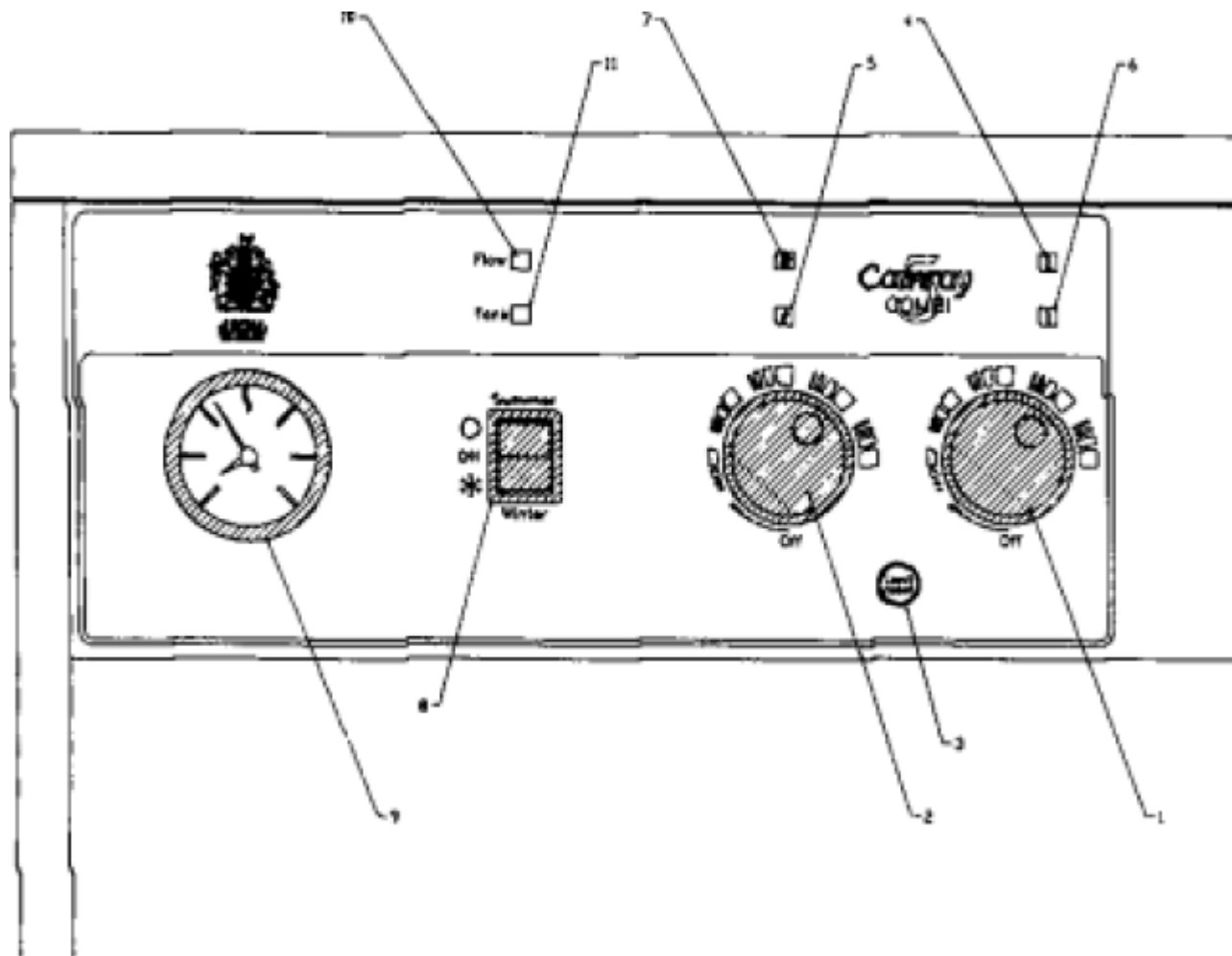


Fig 1 a

Boiler Control Panel (see Fig 1a)

1. Boiler control thermostat
2. Hot water thermostat
3. Boiler overheat/limit thermostat
4. Lockout indicator light - red
5. Mains indicator light - green
6. Limit indicator light - red
7. Heating ON indicator light - green
8. Summer/winter switch
9. System pressure indicator dial
10. Domestic water flow indicator light - green
11. Tank heating indicator light - green

1:6.1 Boiler Control Thermostat

The Boiler Control Thermostat controls the water temperature in the boiler. The recommended setting is shown in Fig 1a.

This thermostat automatically switches the burner ON & OFF to maintain the selected temperature. The burner is lit by an automatic ignition system and therefore there is no pilot flame.

The Boiler should not be operated below 60°C, as this will cause corrosion which will reduce the life of the boiler.

1:6.2 Hot Water Tank Thermostat

This thermostat controls the water temperature in the tank. Guidance on its use is given in [Section 1:7](#) of this manual.

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1:6.3 Summer/Winter/Off Switch

Use this 3 position switch to select the required mode:

SUMMER For domestic hot water only.
WINTER For domestic hot water & heating.
OFF To switch the boiler off.

1:6.4 Boiler Overheat/Limit Thermostat

This thermostat will interrupt the power supply to the burner and shut it down completely in the unlikely event of overheating.

Should this occur, the green indicator light on the control panel will illuminate. Wait for the boiler to cool, and reset the thermostat by depressing the limit thermostat reset button located on the control panel - [see Fig 1 a](#).

If this problem recurs, turn the boiler off and consult your installer.

1:6.5 Lockout Lamp

In the unlikely event of a burner malfunction or you run out of oil it will automatically shutdown, and the red lockout indicator on the control panel and the lamp on the burner will illuminate.

Wait 45 seconds before attempting to restart the burner. To restart the burner, remove the front boiler panel and repress the lockout reset button on the front burner control box ([see Fig 1 b](#)). If the burner lockout again wait 3 minutes and repeat the operation again.

If the problem occurs again, turn the boiler off and consult your installer.

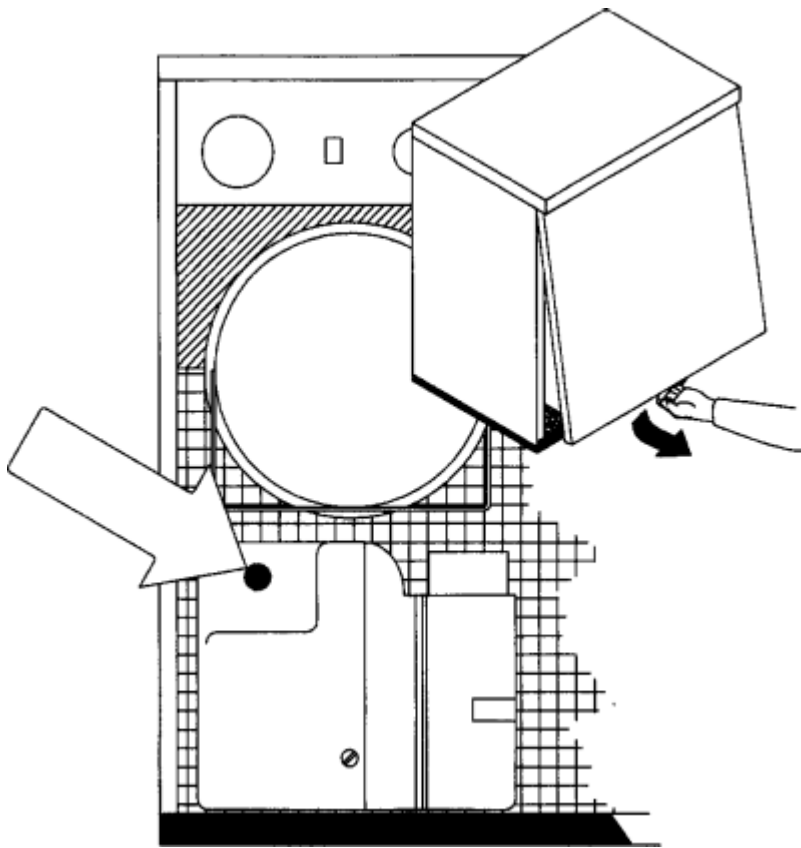


Fig 1 b

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1:7 OPERATING FEATURES AND INSTRUCTION

1:7.1 How does your Boiler work?

Hot Water

If the Programme is set for Hot Water only or Summer/Winter switch is set to Summer: -

a) The Boiler will operate until the hot water tank reaches the temperature you have set on the Hot Water Tank Thermostat. From cold, this will take approximately 18 minutes. To obtain the maximum temperature and quantity of hot water (i.e. for a bath) set this to maximum.

b) When any hot water tap is turned ON to give a flow rate in excess of 2.5 litres/minute, the Boiler will operate during the draw of hot water. When the tap is turned OFF the Boiler will continue to operate until the hot water tank reaches the temperature set on the Hot Water Tank Thermostat. The period of operation to replenish the energy used depends on the quantity of hot water drawn.

c) As the rate of water is increased by opening the hot water tap, the water temperature reduces and the tap should be adjusted to give the desired temperature.

d) If the Programme is OFF (i.e. during the night period) hot water may be drawn but is limited to the energy stored in the tank. During the period of draw of the circulating water pump will operate but not the Boiler. Providing the tank has not discharged just prior to the Programme switching off these is normally adequate hot water for occasional use of wash basins.

e) For daytime use of hot water, set the Programme (if fitted) to give Hot Water ON at least 18 minutes prior to

normal anticipated use.

Heating and Hot Water

If the Programme is set for Heating and Hot Water or the Summer/Winter switch is set to Winter: -

a) The Boiler will operate until the temperature in the boiler reaches the temperature you have set on the Boiler Control Thermostat or until your Room Thermostat is satisfied.

b) Provision of Domestic Hot Water takes priority over Central Heating, so that during the period when the hot water tap is turned on or when the hot water tank is being recharged (only a matter of minutes) the central heating is automatically but only temporarily turned off. Central Heating is restored when the hot water tank has fully recharged and when the hot water tap is turned off.

1:7.2 Switching the Boiler Off - temporarily

The Boiler may be stopped by switching the Summer/Winter switch to the OFF position on the standard Control Panel or the programmer switch to the OFF position on the operational programmer.

1:7.3 Sealed System Central Heating

Your Camray 5 COMBI Boiler may only be used on a SEALED SYSTEM.

It is important that the correct operating system pressure is maintained. If the System Pressure Gauge, in the Control Panel, should indicate low pressure i.e. below the marker, contact your installer.

1:7.4 Frost Protection

A frost thermostat is fitted to the Boiler. However if there is any danger that your Boiler may freeze up during very severe weather conditions, it is recommended that you consult your installer who will be able to advise you on an appropriate course of action, possibly the addition of system anti-freeze.

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1:7.5 Oil Delivery

Where possible, it is advisable to temporarily switch the Boiler off when your oil supply is being replenished. This is to allow any sediment to settle and not be drawn into the Boiler. If not this could result in an inconvenient break down. We advise that you keep your Boiler on for one hour after the oil is delivered to your tank. Please ask your supplier, or driver to notify you before the oil is discharged.

1:8 MAINTENANCE

For normal cleaning of the outside casing, simply wipe with a dry cloth. To remove stubborn marks and stains, wipe with a damp cloth and finish off with a dry cloth. DO NOT use abrasive cleaning materials.

The Boiler must be serviced at regular intervals by a qualified service engineer. Failure to comply will invalidate the guarantee/warranty.

THE BOILER MUST BE SERVICED AT TWELVE MONTHLY INTERVALS.

Your Boiler has a conventional flue. Make sure that air intake entries on the casing panels are never obstructed. This could lead to premature failure.

1:9 FAILURE TO START

If the Burner fails to start, adopt the following procedure: -

- 1) Check that there is oil in the tank and that the supply valve is open.
- 2) Check the programmer on Summer/Winter switch to ensure that it is operating and set to the correct time to be "ON".
- 3) Check that the Boiler Control Thermostat is set high enough to be "ON" or calling for heat.
- 4) Check whether the limit light on the control fascia is glowing, if so it indicates an overheat situation. Press the reset button once the temperature has dropped sufficiently.
- 5) Check whether the red LOCKOUT lamp on the Control Panel and Burner Control Box are glowing. This indicates that the Burner has attempted to start but has not fired successfully. Press the reset button on the Burner Control box, when released, the lights will go out and the Burner will again attempt to start. If the Burner does not run and again goes to lockout with red indicators glowing: -

Wait three minutes.

- Repeat the procedure by pressing the button.
- Failure to start on second attempt indicates a fault requiring attention.
- Switch off the mains supply and call your service engineer.

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Section 2 - Introduction

2:1 INTRODUCTION

The Camray 5 Combi External is:

- 1) Designed for producing Hot water and Central Heating.
- 2) Suitable for sealed Central Heating systems which are within the maximum permitted working pressure. All Boilers are supplied with a manual reset limit thermostat.
- 3) Suitable for new installations and for replacing existing sealed system Boilers.

CAMRAY Boilers offer greater freedom to select the most suitable position for siting. All models are supplied for connection to an integral flue supplied with the boiler.

IMPORTANT

To achieve the high flow rates specified there must be dynamic working pressures as specified in the performance graph* at the cold feed to the boiler. If this is not achievable DO NOT INSTALL THE BOILER.

(see [section 3.8](#))

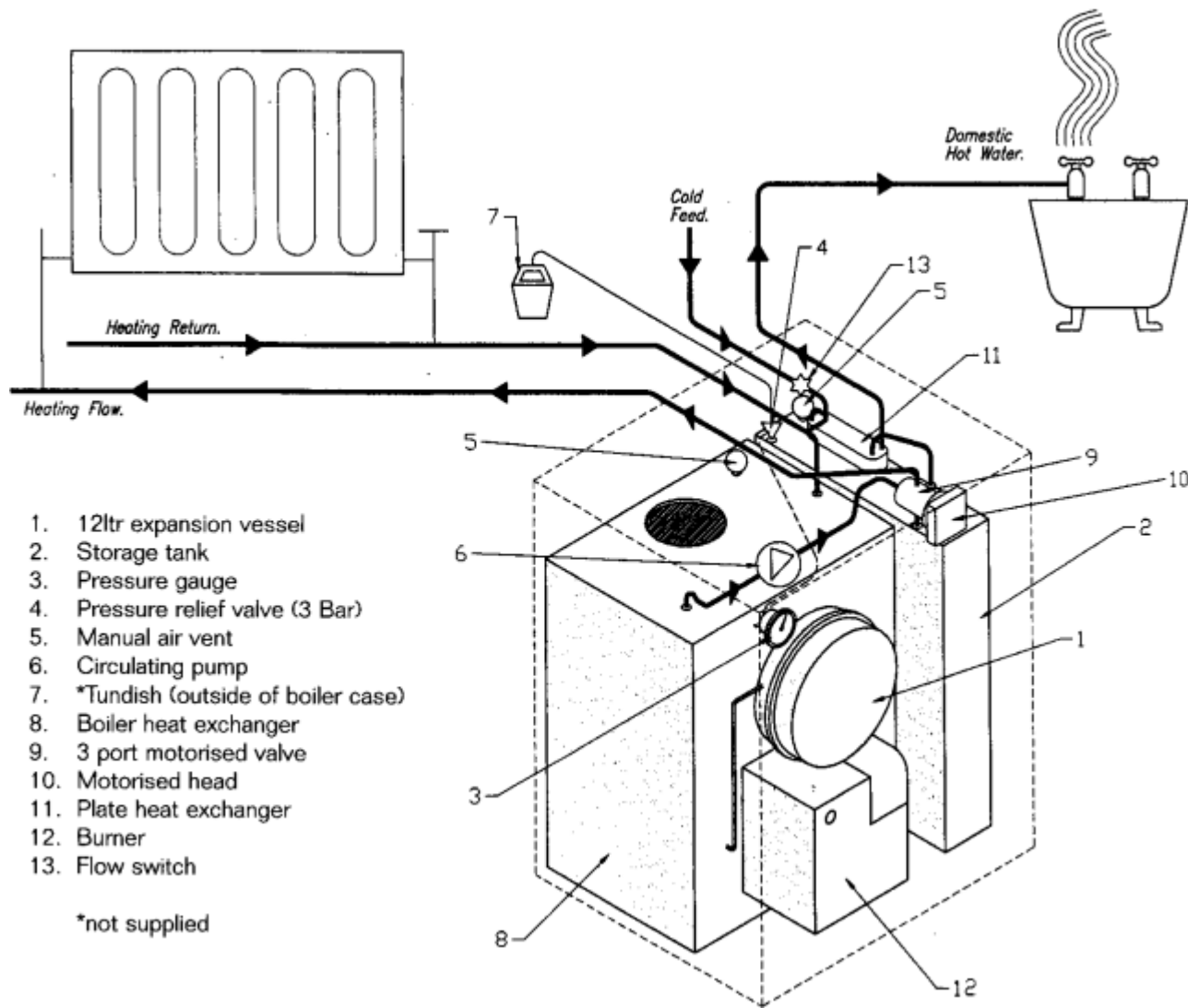


Fig 2a

2:2 HYDRAULIC CIRCUITS

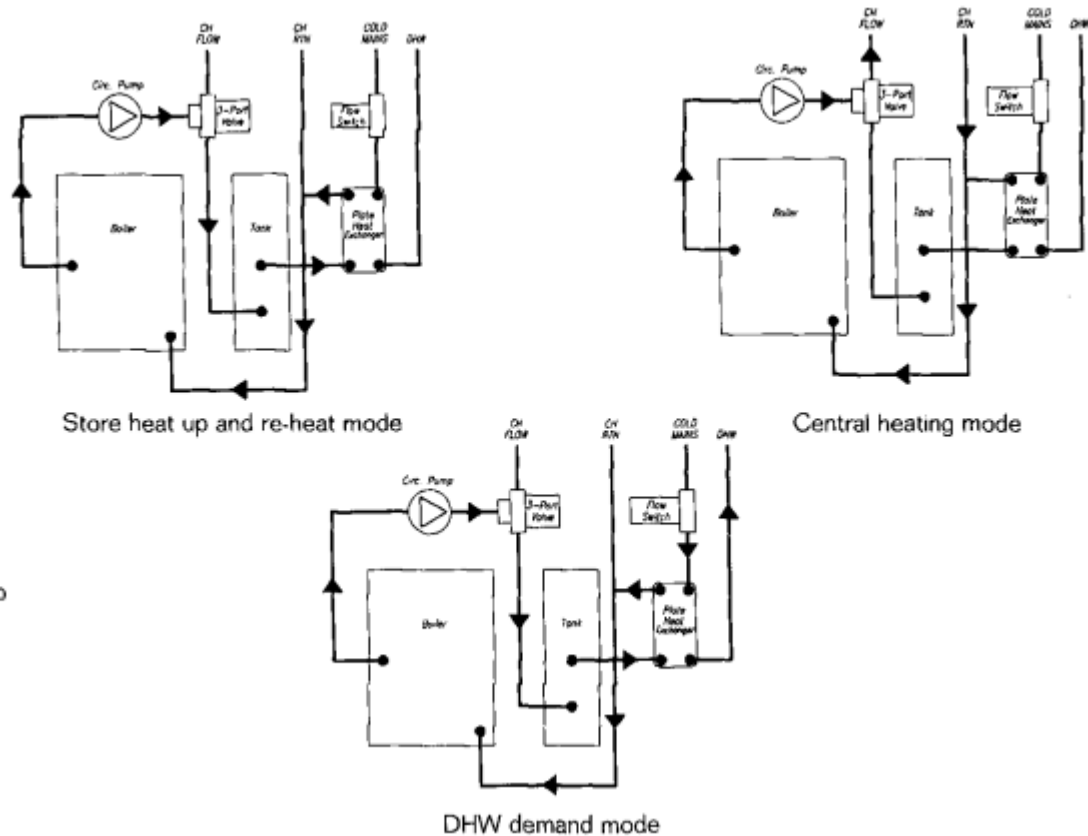


Fig. 2b

2:3 COMMISSIONING

The heating system must comply with the latest editions of British Standard 5410 and The Building Regulations.

Please note: It is essential in the interest of the Boiler efficiency and reliable performance that once the Boiler has been installed it is first commissioned by a competent O.F.T.E.C.* registered engineer. It is the responsibility of the installer to ensure that the Boiler is commissioned.

If an engineer is not known, Boulter Buderus will be pleased to provide details of commissioning and servicing engineers from their register.

*The Oil Firing Technical Association for the Petroleum Industry.

2:4 SAFETY

READ HEALTH AND SAFETY INFORMATION ON INSIDE FRONT COVER OF THIS MANUAL.

IMPORTANT

Should you wish to remove or dismantle any covers or parts of the boiler for cleaning or maintenance ALWAYS FIRST SWITCH OFF THE ELECTRICITY SUPPLY.

- 1) On no account should any part of the Boiler or its Flue be modified except as specified in this manual.
- 2) The wiring of the Control Panel should be as the wiring diagrams included in this manual. Wiring should not be tampered with, modified or changed for any reason.
- 3) Only use Boulter Buderus replacement parts.

Non compliance with the above will invalidate the Guarantee.

Section 3 - Technical data

3:1 LIQUID FUELS

The Camray 5 COMBI Boiler will burn liquid fuels complying with BS2869 Part 2 1998 Class C2 specified in the Code of Practice for Oil Firing BS5410 Part 1.

Class C2 (Kerosene)

This fuel is suitable for Camray 5 COMBI. Burners are supplied with the appropriate nozzle and pump pressure as standard for this fuel.

3:2 TECHNICAL DATA

Heat Input (Full load based on NET efficiency of 91 %)	29kW
Heat Output (Full load)	26.4kW
Maximum Boiler working pressure	3 bar Class 2
Minimum return water temperature	60°C
Maximum side panel temperature	<35°C above ambient
Range of Boiler Control Thermostat	65-85°C
Maximum Temperature of Boiler Control Thermostat	85°C +/-2°C
Boiler Limit Thermostat Setting	110°C +/-2°C
Maximum Emissions Limit (Class 1)	NOx 250mg/kWh - CO 125mg/kWh
Exit Flue Gas Mass Flow	13.5Kg/secx10-3
Mean DHW temperature @ 20 l/min (flow) to provide 90 litres capacity (10°C Cold Water inlet)	50°C
Store Capacity	40 litres
Storage recovery time (between draw offs)	approx. 5 mins.
Boiler weight empty	175 kg
Boiler and store water content	63.5 litres
Water resistance (Heating)	295 mbar with 15°C boiler temperature rise.

3:3 BURNER DETAILS

Pressure Jet - Riello RDB supplied as standard. Burner type - 483T50

For further details of the burner, refer to the burner data sheet supplied in the literature envelope.

As the burner has been specifically matched to this Boiler, the information in the Boiler manual takes precedence.

3:4 ELECTRICS

IMPORTANT

The electrical installation of this appliance must be performed by a suitably qualified electrical engineer/installer.

Electrical Supply 230v., 1 Ph., 50 Hz.

All wiring to supply and all system components external to boiler must comply with the latest edition of BS7671: 2001 formerly IEE Wiring Regulations.

This appliance must be effectively earthed and connection to the supply must be through a double pole isolating switch fused 5 amp.

The isolating switch must have all pole contact separators at least 3mm.

3:5 DIMENSIONS

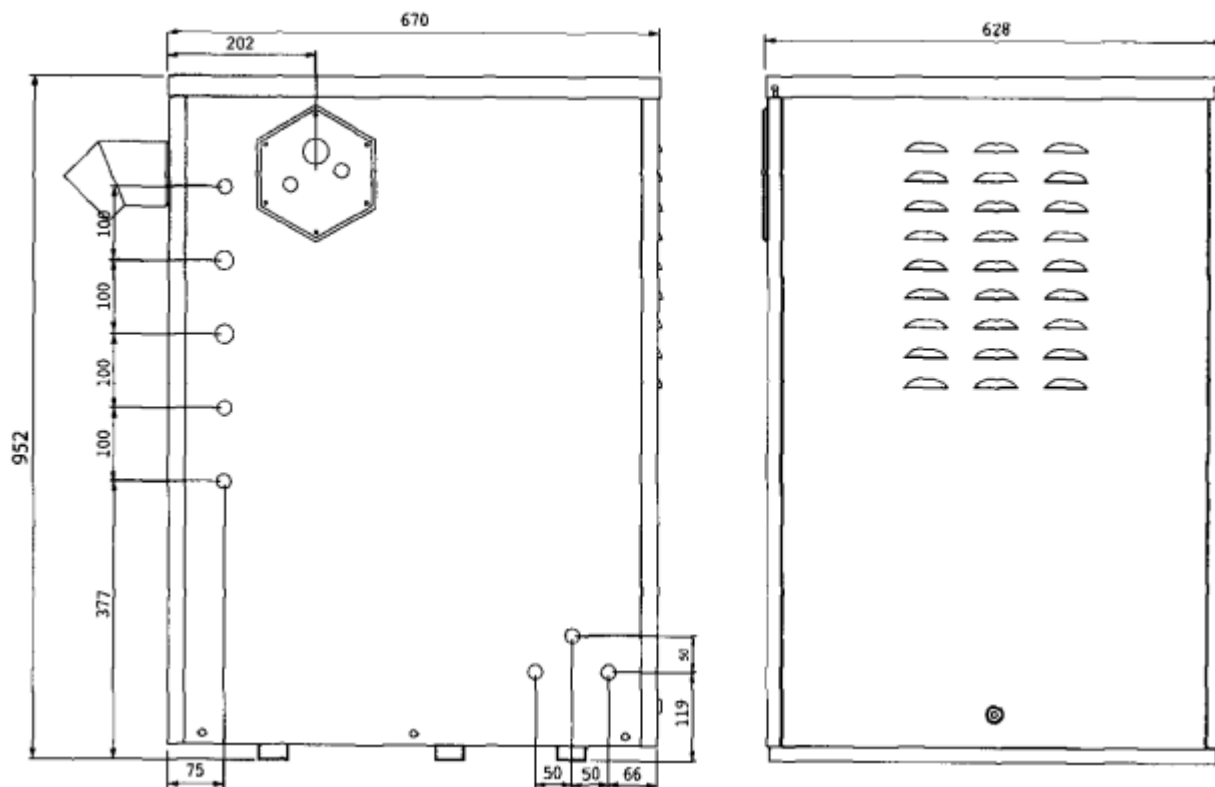


Fig 3a

3:6 TUNDISH POSITION

A Tundish (not supplied) must be fitted to provide a visual indication of water flowing from the Pressure Relief Valve of the Boiler.

Installation of the Tundish must be located in a position clearly visible to the householder i.e. to comply with Part G of the Building Regulations - typically as Fig 3.b.

Pipe to Tundish	Min. size of discharge pipe from Tundish	Max. length of straight pipe - no elbows or bends	Reduce length for each elbow bend by
15mm	22mm	up to 9m	0.8m
	28mm	up to 18m	1.0m
	35mm	up to 27m	1.4m

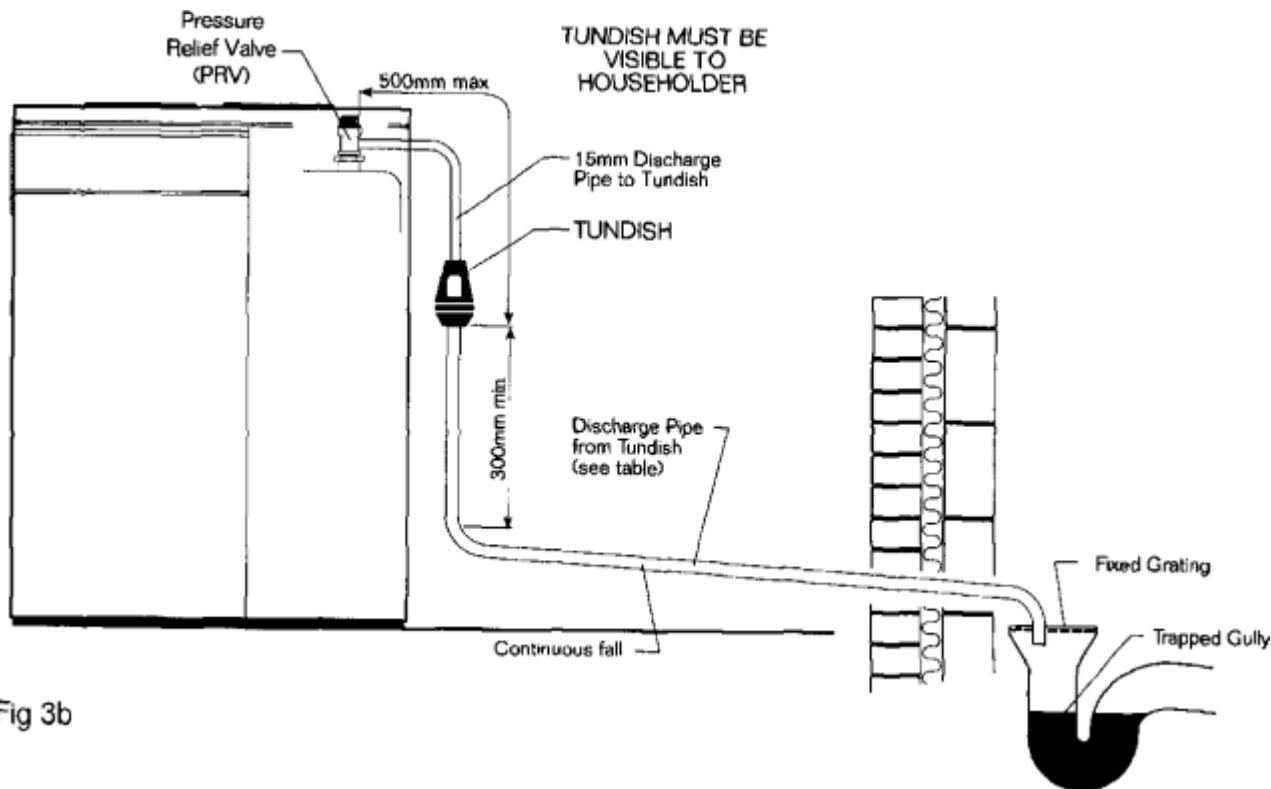


Fig 3b

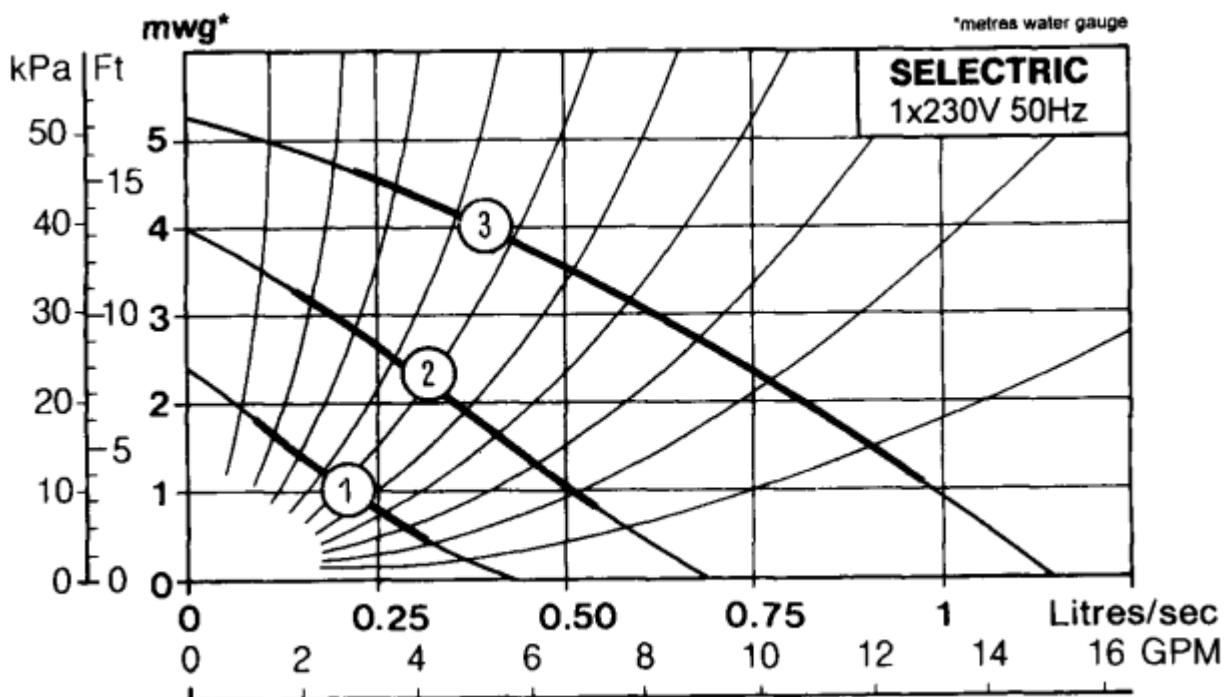
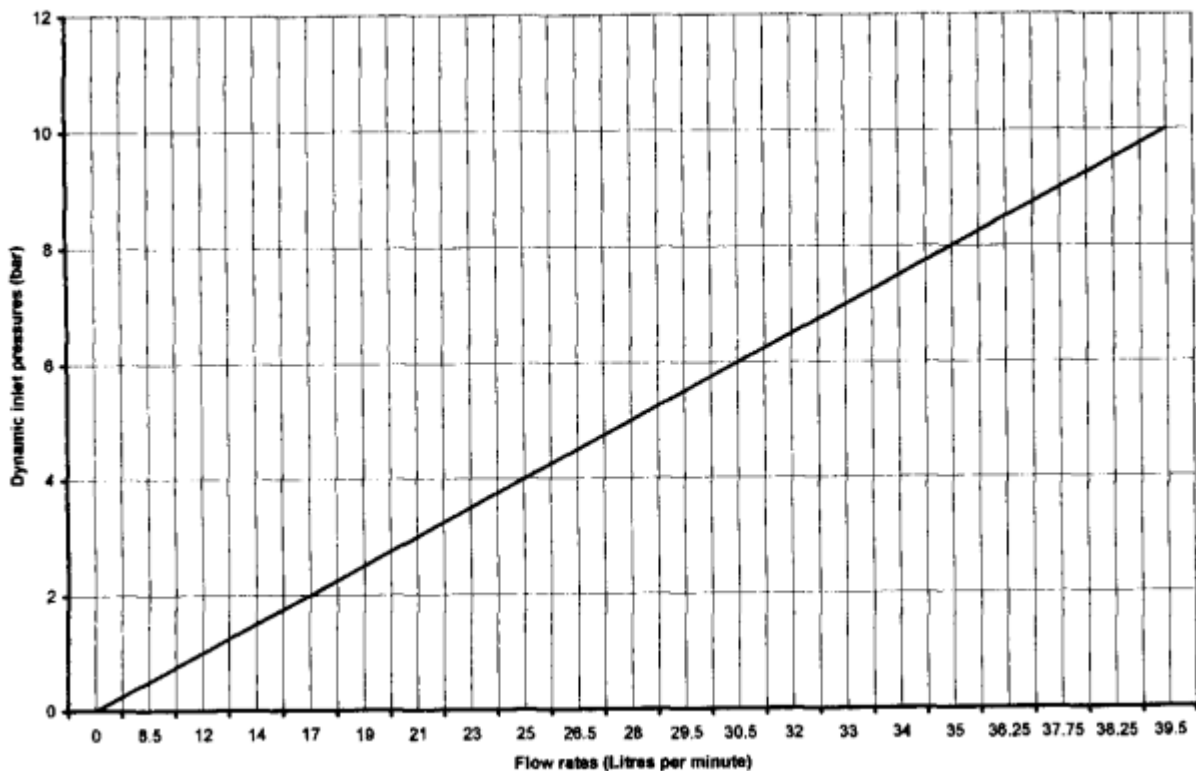
3:7 COMMISSIONING DATA

3:7.1 Class C2 Kerosene Oil

Model	Output		Riello R00 type	Nozzle Danfoss Delevan US/GPH	Pump pressure		fuel rate Kg/h	CO2%	Smoke no.	Flue exit temp. °C
	kW	Btu/hx1000			bar	psi				
90A	26.4	90	483T50	0,85x60°W	8.0	115	2.57	12	0-1	204

3:8 PERFORMANCE DATA

Dynamic Inlet pressures / flow rates



Figs 3c & 3d

Section 4 - Installation

4:1 STANDARDS & REGULATIONS

The installation of the Boiler must comply with latest edition of: -

BS5410 Oil installations Part 1: under 44kW.
BS5449 Forced circulation hot water central heating system for domestic premises.
BS7074 Part 7: Codes of Practice for Sealed Systems.
BS7671 Electrical Wiring Regulations.

BUILDING REGULATIONS.
Part J England and Wales
Part F Section III Scotland
Part G Section III
Part L Northern Ireland
The Control of Pollution (Oil) Regulations

OFTEC
Oil boilers should be installed in accordance with good practice as recommended by OFTEC
(Ref. 2:4 COMMISSIONING).

4:2 THE HEATING SYSTEM

This should be installed in accordance with current good practice as advised by HVCA. It is not the purpose of the manual, nor is it possible, to adequately deal with the subject in this manual.

On existing heating systems where a Boiler is replaced, ensure that the system is chemically cleaned, consult a reputable manufacturer.

The system should contain clean water and be free from leaks. Suitable inhibitors against limescale and corrosion should be added to the system.

Kettling and system noises can be avoided by suitable pre-treatment at the onset.

4:3 SITING & POSITIONING

The noise level from Camray Boilers is quite low and other installations have not given rise to complaints. Consideration must be given however, to the following points.

1) Noise may be accentuated by the installation in recesses with hard or hollow stud wall surfaces. Due consideration to the siting of Boilers should be given.
Further advice from Boulter Buderus should be sought where any doubt exists.

2) Some individuals may be particularly sensitive to even low noise levels and this should be discussed before installation.

3) The Camray Combi Boiler model is serviced from the front and top. A space of 450mm (18") in front and above the Boiler should be available.

The top casing panel can be raised at one end or side to prevent water gathering on the top of the appliance. The use of the additional plate, supplied when screwed to the wall will help prevent water or debris falling between the boiler and the wall of the building, as shown in Fig 4.3.

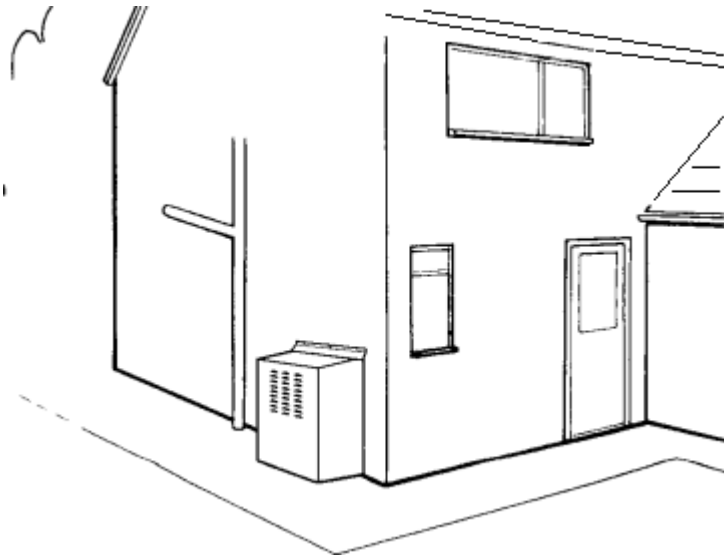


Fig 4.3

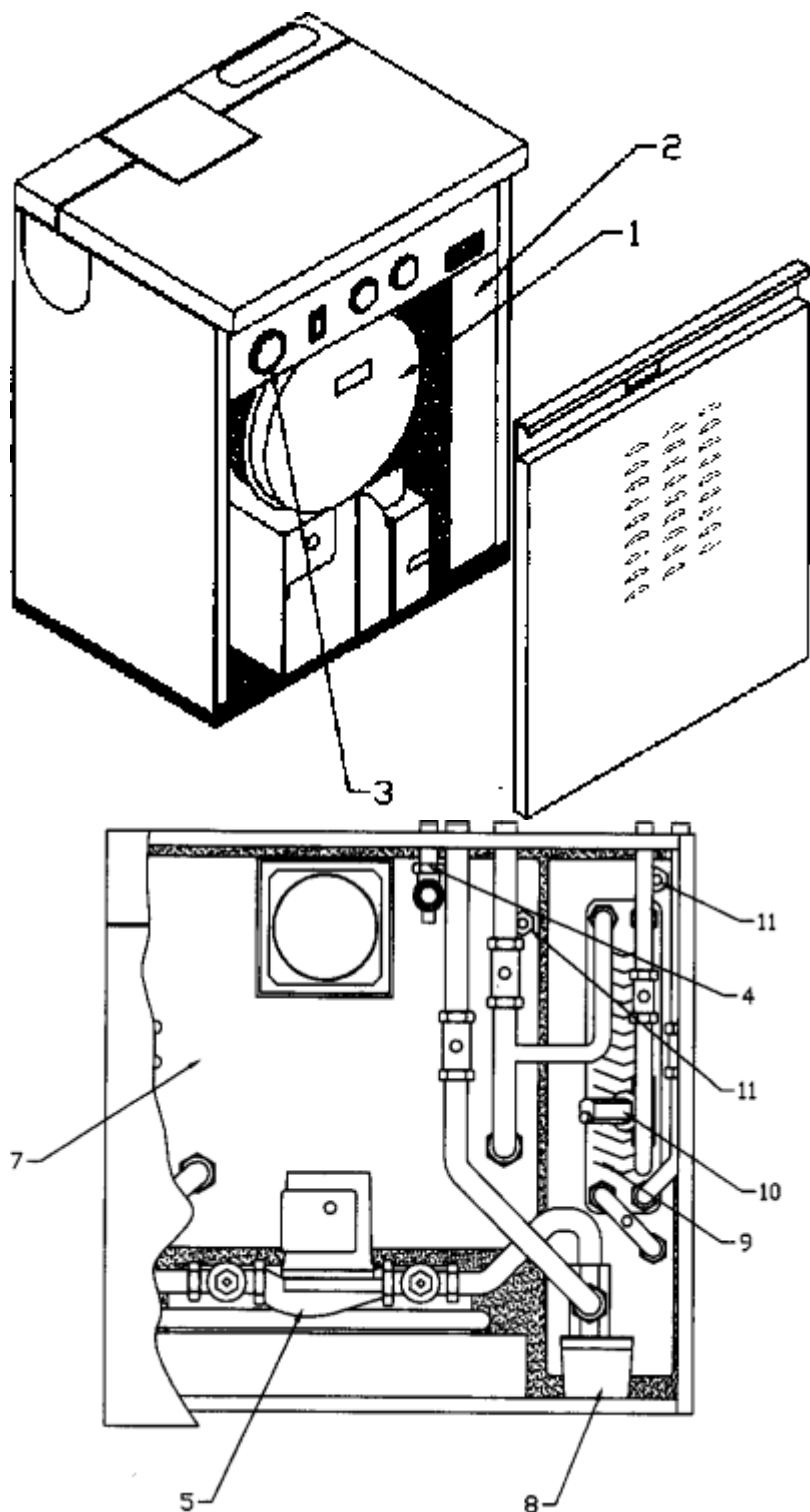
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4:4 THE HEARTH

The Camray 5 Combi has a Hearth Temperature of less than 85°C. The Boiler requires a level hearth on which to stand which should comply with the Building Regulations. Pre-cast concrete slabs satisfies this requirement. If the Boiler is to stand on a base made of combustible material then protection between the Boiler and the floor should be provided by means on non-combustible material.

Consideration must be given to the weight of the Boiler.

4:5 BOILER ARRANGEMENT



- | | |
|---------------------------|---------------------------|
| 1. 12Ltr expansion vessel | 7. Boiler heat exchanger |
| 2. Storage tank | 8. 3 port motorised valve |
| 3. Pressure gauge | 9. Plate heat exchanger |
| 4. Pressure relief valve | 10. Flow switch |
| 5. Circulating pump | 11. Manual vent |
| 6. Tundish (not shown) | |

4:6 SEALED SYSTEM DETAILS

12 litre Expansion Vessel

The Expansion Vessel is suitable for systems with a static head of up to 5 metres (16.5ft) i.e. the vertical distance between Expansion Vessel and highest point of system, usually the top of bedroom radiators. If the static head is greater than 5 metres, then the charge in the vessel must be increased to equal this higher static pressure. The pressure can be increased if required by simply pumping up the vessel with a standard air type pump and checking the pressure with a tyre gauge with the system at zero pressure. A Schrader type valve is provided on the vessel for this purpose (see note below).

NOTE:

The air charge should not exceed a pressure of 1.5 Bar (22 p.s.i.).

1) Expansion Vessel Requirements

Vessel Charge and Initial System Pressure	bar	0.5	1.0	1.5
	psi	7.3	14.5	21.8
Expansion Vessel size	Total water content of system including 40 litre tank using expansion vessel supplied			
12 litres	litres	150	110	75
	gallons	33	24	16.5
For systems having a larger capacity multiply the total system capacity by the factor to obtain the total minimum expansion vessel capacity		0.08	0.11	0.16

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2) Storage Tank

An insulated tank providing storage for heated water that is used via the Plate Heat Exchanger for domestic hot water production.

3) Pressure Gauge

The Gauge (0-6 Bar) (mounted on the Control Panel) is provided as a visual indication on the water pressure within the system.

A pressure below the set Cold Fill Pressure indicates the system requires "topping up".

4) Pressure Relief Valve (3 bar)

Supplied fitted on the Storage Tank.

5) Manual Air Vent

A Manual Air Vent is supplied on the Boiler Primary Heat Exchanger and the storage tank. Routine venting of radiators is still advised.

6) Circulating Pump

The pump is fitted to the Flow Pipe as a circulating pump for the Heating System and the Domestic Hot Water Heat exchanger.

7) Tundish (not supplied)

Provides a visual indication of water flowing from the Pressure Relief Valve.

8) Boiler Primary Heat Exchanger

Insulated steel Heat Exchanger with combustion chamber and access cover at front for servicing.

9) Three Port Motorised Valve

Normally open to Storage Tank.

When heating is in demanding the valve diverts hot water to the radiators.

When hot water is demanded the supply to the radiators is closed.

10) Flow Switch

When a hot water tap is opened to discharge at least 2.5 litres/min, the flow switch energises other controls to divert stored hot water to the plate heat exchanger.

11) Plate Heat Exchanger

Uses the stored heated water to quickly produce domestic hot water.

12) Filling Loop

The filling loop is supplied for filling and topping up the system.

THE FILLING LOOP MUST BE DISCONNECTED FROM ONE OF THE FITTINGS WHEN NOT IN USE

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4:7 THE DOMESTIC HOT WATER SYSTEM

The mains supply pressure should be between 1.0 and 10 bar, however reference should be made to Fig 3c in section 3:8 to obtain the correct working pressure. This may require an approved pressure-reducing regulator to be fitted before the inlet valve.

The final 600mm of mains water supply pipe to the Boiler must be copper.

All combination Boilers suffer performance degradation due to the effects of hard water (limescale build up on heat exchanger surfaces).

Boulter Buderus have taken particular care in the design of this Boiler to minimise this (hard water) effect but, strongly recommend that in areas where water temporary hardness (alkalinity) in excess of 150mg/l is likely to be encountered, a water conditioner of the chemical dosing type is fitted. Your local water supply authority should be able to advise on hardness.

To achieve the flow rates specified at water outlets (taps), pipework over 3m in length from the Boiler must be dia. 22mm.

For specific information relating to fittings e.g. showers, dishwashers, washing machines etc. suitable for connection to the Domestic Hot Water circuit, consult the local Water Authority if in doubt.

Domestic hot/cold water supply : All equipment designed for use at mains water pressure are suitable. The temperature of DHW depends on the water flow from the tap. To obtain a more even temperature a mixing valve can be fitted.

Bidets : Subject to local Water Company regulations the supply of hot and cold mains water direct to a bidet is permitted if it is of 'over-rim flushing' type. The outlets should be shrouded and it should not be possible to temporarily attach a hand held spray. An anti-syphon device is unnecessary.

Fixed head showers : Thermostatically controlled showers are recommended for greater comfort and prevention of high temperature. An anti-syphon device is unnecessary.

Flexible head showers : It must not be possible for head to fall closer than 25mm above the top edge of the bath to prevent immersion in it, or the shower must be fitted with an anti-syphon device at the connection to the flexible hose.

4:8 CONNECTIONS TO THE BOILER

Connection to the Boilers 15mm and 22mm pipes should be made using compression fittings, either elbow or straight couplings can be used dependent on installation.

4:8.1 Cold Mains In

To achieve optimum flow rates the incoming cold should be 22mm pipe reduced to 15mm to suit the Boilers pipe.

4:8.2 Domestic Hot Water

To achieve optimum flow rates the 15mm domestic hot water flow from the Boiler should be increased to 22mm.

4:8.3 Heating Connection

The Boilers heating flow and return pipes are 22mm.

4:8.4 Pressure Relief Valve Connection

The Boilers Pressure Relief outlet pipe is 15mm. The installations connecting pipe work to a suitable Tundish must be in accordance with G3 Building Regulations (see Fig. 3b).

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4:9 FLUE EXHAUST

The flue exhaust pipe is supplied with the boiler- see Fig 4.9

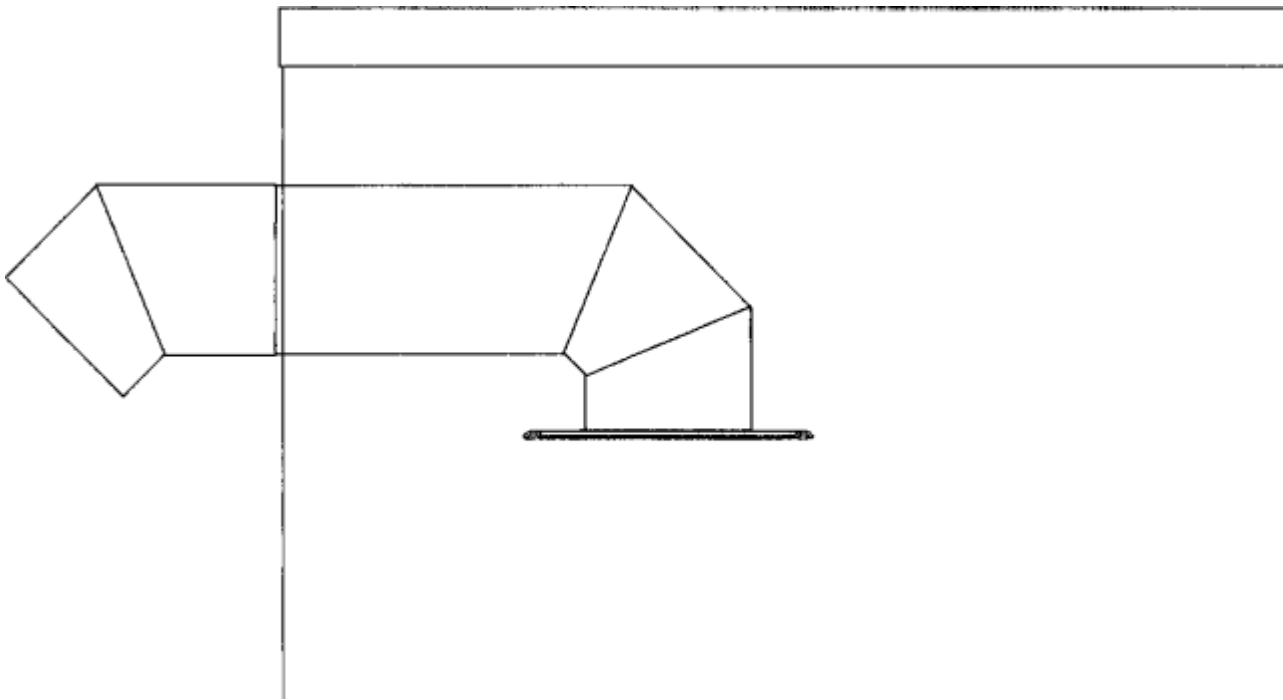


Fig 4.9

4:10 AIR SUPPLY

The air supply to the boiler is through the grilles on the casing panel door.

4:11 OIL STORAGE

4:11.1 Oil Tank

Consideration to the access by fuel delivery lorries should be given when positioning the oil tank. Tank positioning should be in accordance with BS 5410 Part 1 and OFTEC Technical Book 3.

In the interest of most economical deliveries the Oil Tank should be of 3,000 litres (600 gallons) capacity. It should be complete with the following:

- 1) Sludge Cock - on steel tanks.
- 2) Outlet Valve.
- 3) Contents Indicator.
- 4) Screw fill connection and independent vent. The Fill and Vent should be suitably capped to prevent ingress of water or fitted with return bends.

4:11.2 Steel Tanks

Tanks should be mounted on suitable supports, if these are brick or blocks, a damp proof membrane should be inserted between the tank and its supports.

Tanks should slope 20mm per 1 m of length downward from the Oil Outlet to the Sludge Cock situated at the opposite end.

4:11.3 Plastic Oil Tanks

Tanks made from plastic are now available. These should be UV stabilised for protection against sunlight, and coloured green. Plastic tanks do not need to stand on piers, but should be supported across the entire base area, ideally on 50mm thick garden slabs or a concrete base. As there is only one tapped outlet they are more suited to single pipe feed as gravity supply or with a Boulter Buderus 3K Oil Loop Deaerator where suction lift is required. (Part No. BS 03060).

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4:12 OIL SUPPLY

The oil entry holes in the boiler casing are shown in the diagram in [Section 3.5](#) of this manual. Flexible Hoses supplied with Boiler MUST NOT pass through these holes.

All joints in the Oil Lines must be oil tight and the Oil Line should be flushed clean before connecting to the burner. Note that no soldered joints are permissible in the oil line.

4:12.1 Oil Filter

An Oil Filter is supplied with the Boiler. Connections are BSP male, [see Fig. 4.12](#).

It is essential for reliable operation that the Oil Filter is fitted in the Oil Pipe supplying Oil from the Tank to the Burner. It should be fitted as close to the Boiler as practicable, but NOT inside the Boiler casing.

It is a condition of the guarantees that the Filter is fitted correctly.

4:12.2 Fire Check Valve (Not supplied).

A Remote acting FIRE VALVE' must be fitted in the suction line at the time of installation - see BS 5410 Part 1. The valve must be fitted external to the Boiler, preferably at point where the Oil Pipe enters the boiler. The sensor should be located above the Burner in the clip provided, [see Figs 4.12a, 4.12c & 4.12e](#).

The entry point for the Fire Valve Sensor should be through any of the 20mm T knockouts located at the top of the rear casing, or side panels.

To prevent damage to the capillary always pass the sensor through the blind grommet (supplied), it will be necessary to cut across the diaphragm.

'Remote Acting Fire Valves are available from Boulter Buderus, through your merchant or installer e.g.

Ref:	Operating Temperature	Capillary Length
RAF9015C	90°C	1.5m
RAF9030C	90°C	3.0m
RAF9060C	90°C	6.0m
RAF9090C	90°C	9.0m

Note: For the purposes of this manual, diagrams [4.12a](#), [4.12b](#), [4.12c](#) and [4.12e](#) show a cavity wall. Please disregard the wall section.

4.12.3 Single Pipe System

Fig 4.12a

If the bottom of the Oil Tank is above the Oil Burner, install a 10 mm copper supply pipe to the Burner incorporating the correct Filter, Shut Off Valve and Fire Check Valve.

Ensure that the Burner Oil Pump is correctly set for 'Single Pipe' operation. (See 4:13.2).

4:12.4 Two Pipe System

Fig 4.12c

When the bottom of the Oil Tank is below the level of the Oil Pump on the Burner it is necessary to install an additional 10mm return pipe.

The Oil Filter, Shut Off Valve, spring loaded Non-Return Valve and Fire Check Valve are always in the suction line supplying oil from the Tank to the Burner.

The Non-Return Valve must be fitted to allow the flow in the correct direction and prevent drain back to the Tank, see Fig 4.12c.

Ensure that Valves are NOT fitted in the Return Line. The Return Line must be unobstructed at all times.

Ensure that the Burner Oil Pump is correctly set for 'two pipe' operation. (See 4:13.1).

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4:12.5 Deaerator Oil Pipe System

Fig 4.12e

An alternative two pipe arrangement can be achieved using a 3K-Oil Loop Deaerator which removes the air from the oil feed on a single pipe lift. The Burner Pump is piped to the deaerator, which should be positioned close to the burner, but NOT inside the Boiler Case. **A Non-Return Valve is not required in the return line as the deaerator is fitted with one as standard.**

The advantage of this system is gained where a two pipe run from the oil supply tank is long or difficult to achieve. Boulter Buderus 3K Deaerators are available as an optional extra from your merchant (Part NO. BS03060).

NB: CARE MUST BE EXERCISED WHEN USING A TOP EXIT OIL TANK AS A NON-RETURN VALVE (FOOT VALVE) MAY ALREADY BE FITTED. The use of two non-return valves will cause damage to the fuel pump and will invalidate the warranty.

4:12.6 Water Separator Oil Filter

For changeover applications, the use of a Water Separator Oil Filter, available from Boulter Buderus is recommended (BS03052).

4:12.7 Flexible Oil Pipes

Camray 5 Boilers and 3K Deaerator Fitting Kits are supplied with long life Flexible Oil Pipes.

The Flexible Oil Pipes are fitted inside the Boiler casing and are of adequate length to ensure the Burner to be removed without disconnecting. When fitted correctly the pipes should be curved round the Burner as shown in Fig 4:12.

Oil pipe systems

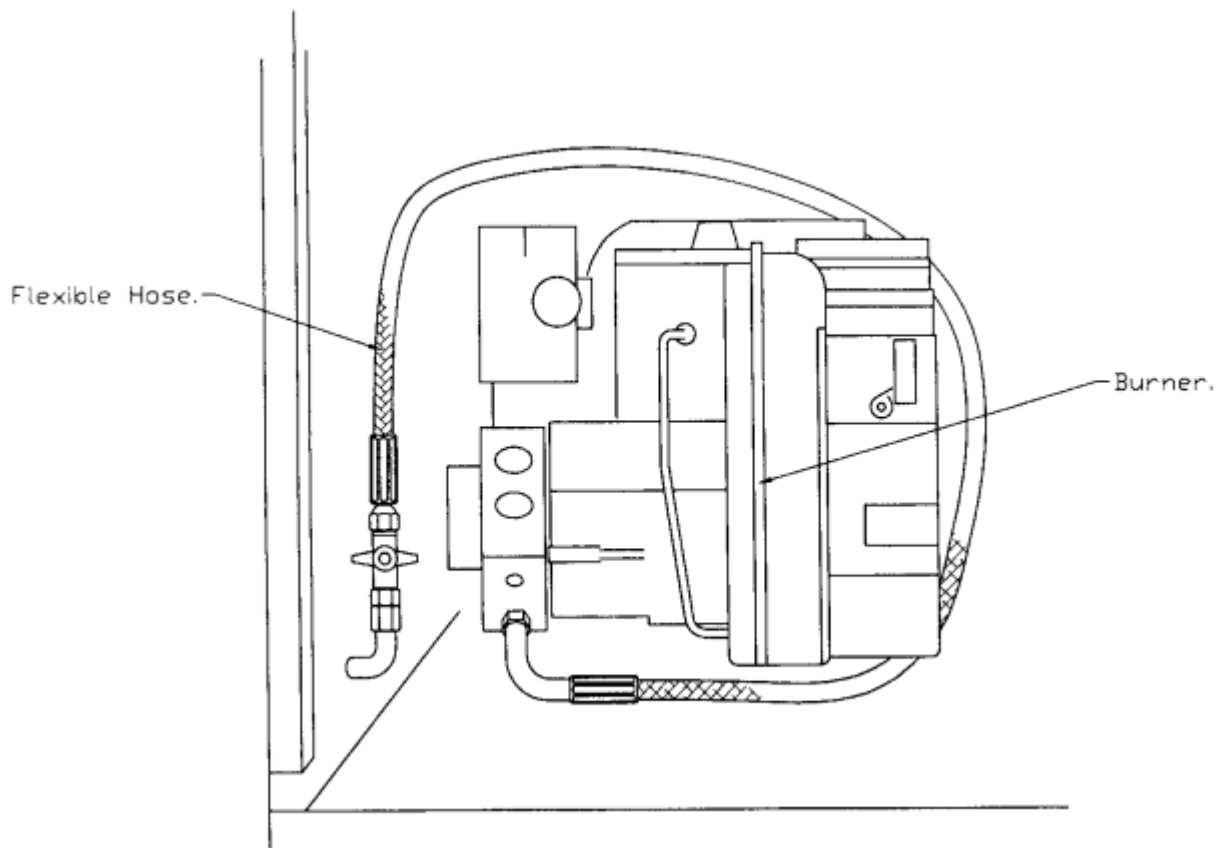


Fig 4.12

Single pipe oil system - Tank outlet above burner

Do not fit pump bypass to burner- see 4.9.2

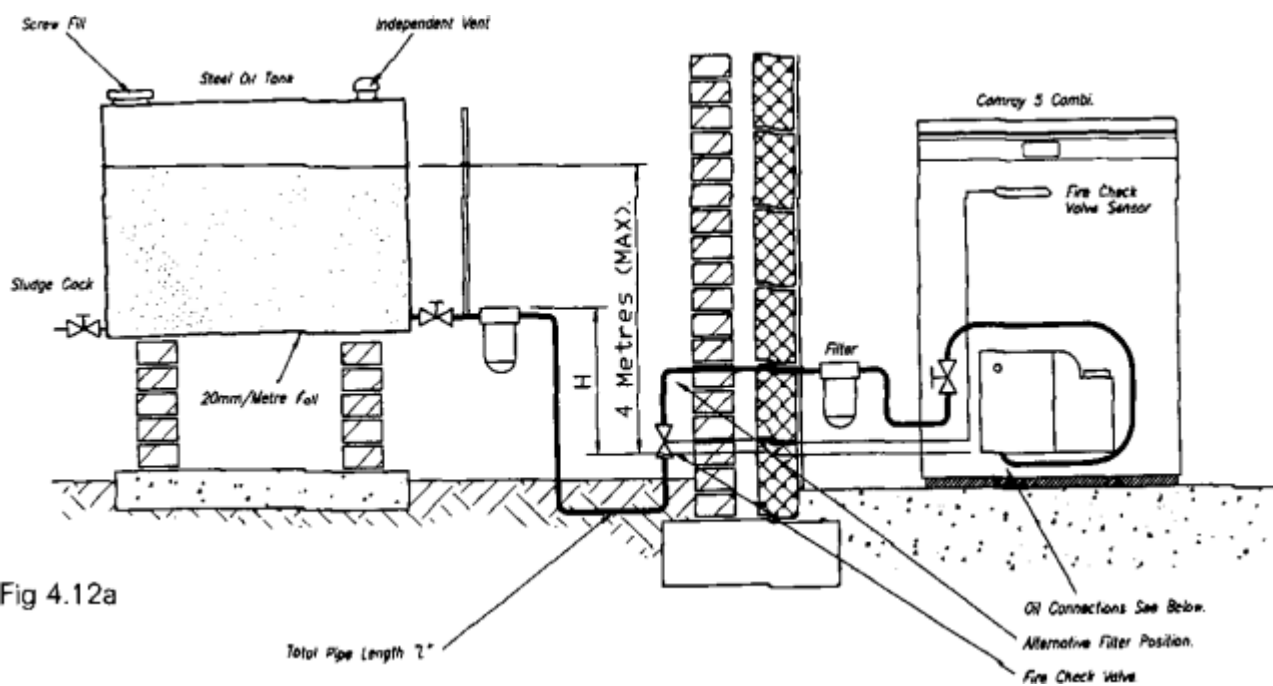


Fig 4.12a

Table giving maximum pipe length in metres

Item	H metres	0.5	1.0	1.5	2.0
Kerosene 10mm OD Pipe	Burner to supply	20	40	80	100

Single pipe oil system - oil connections

Items 1-5 supplied with boiler

Item	Part	QTY	Code
1	Filter 251	1	BS00496
2	Ball valve	1	BS03041
3	1/4 " BSP x10mm coupling	1	FS00151
4	Longlife hose 900mm	1	BS03101
5	Grommet	3	RP00610

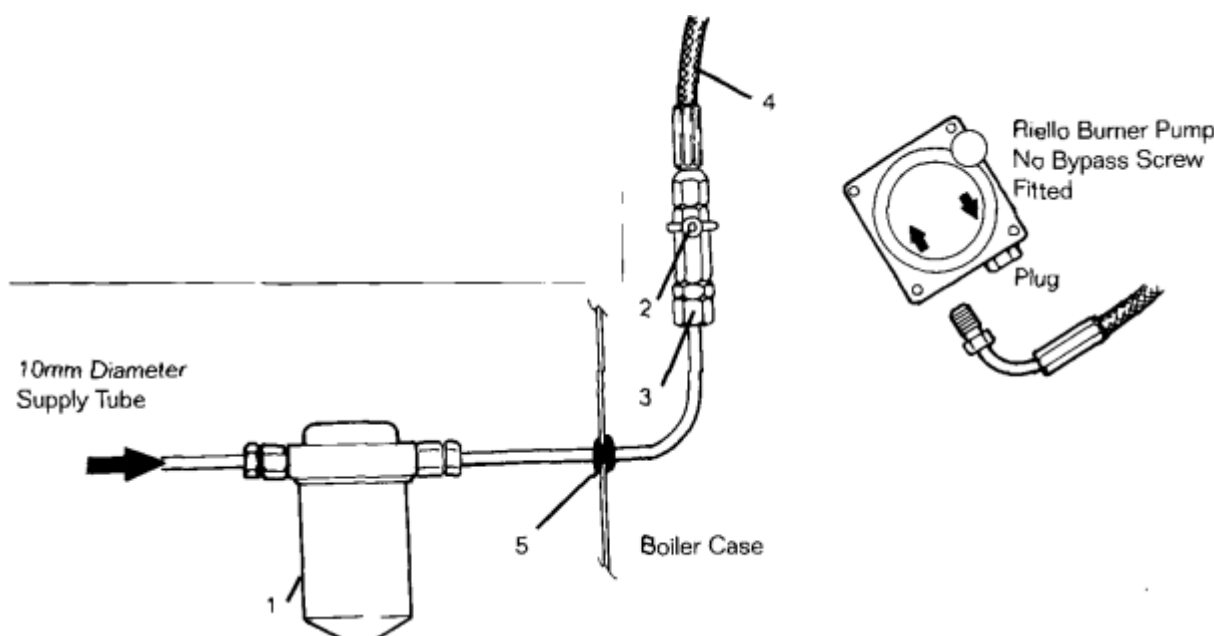


Fig.4.12b

LH Fuel entry available

Schematic diagram fit hose as shown in Fig 4.8a

Two pipe oil system - Tank outlet above burner

Fit pump bypass screw to burner

Table giving maximum pipe length in 'L' metres

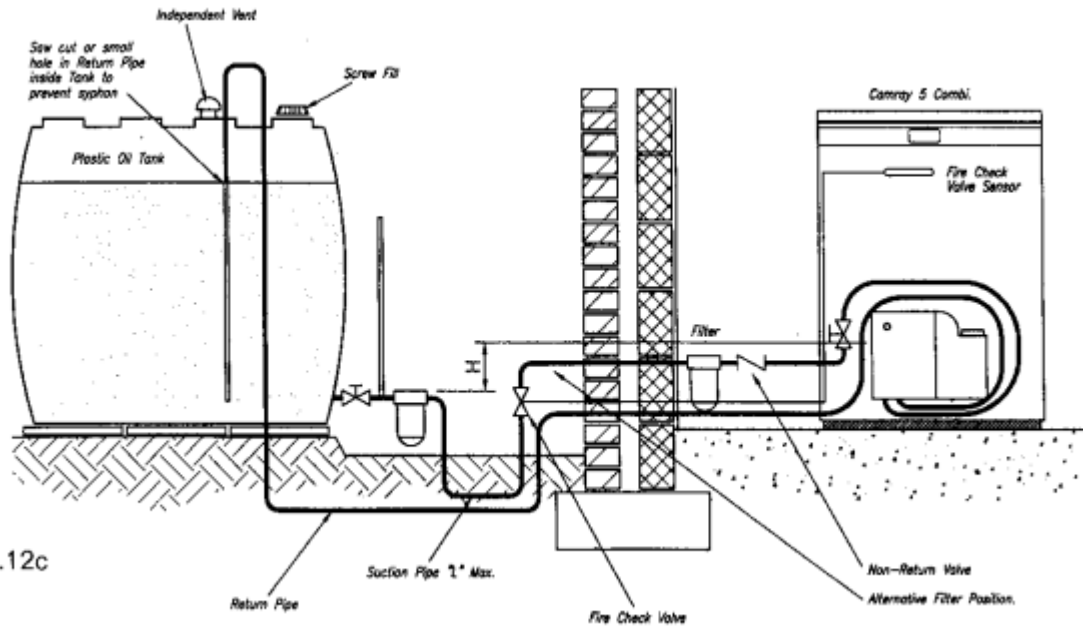


Fig 4.12c

	Part	0	0.5	1.0	1.5	2.0
Kerosene 10mm OD Pipe	Burner to supply	100	100	100	90	70

Two pipe oil system - oil connections

Items 1-5 supplied with boiler- see fig 4.12d

Item	Part	QTY	Code
8	Longlife hose 900mm	1	BS03106
9	Washers	2	FS00159
10	1/4"BSPx10mm coupling	3	FS00151

Items 6-10 not supplied with boiler

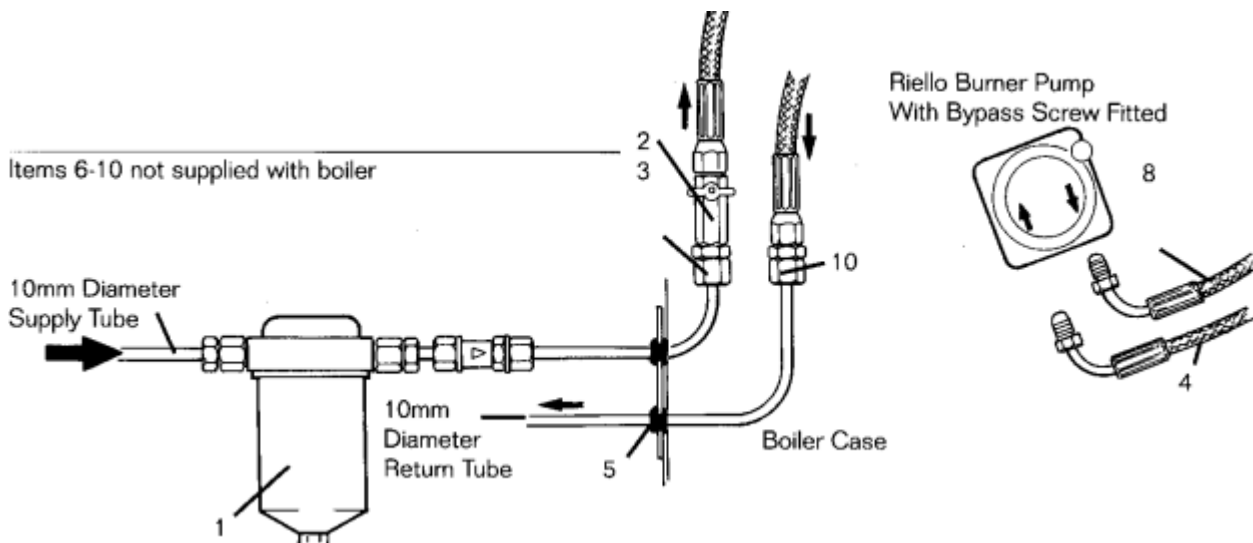


Fig.4.12d

LH Fuel entry available (LH Shown)

Schematic diagram fit both hose as shown in Fig 4.12c

Deaerator oil system - Tank outlet below burner

Fit pump bypass screw to burner

Deaerator oil system - Tank outlet below burner
Fit pump bypass screw to burner

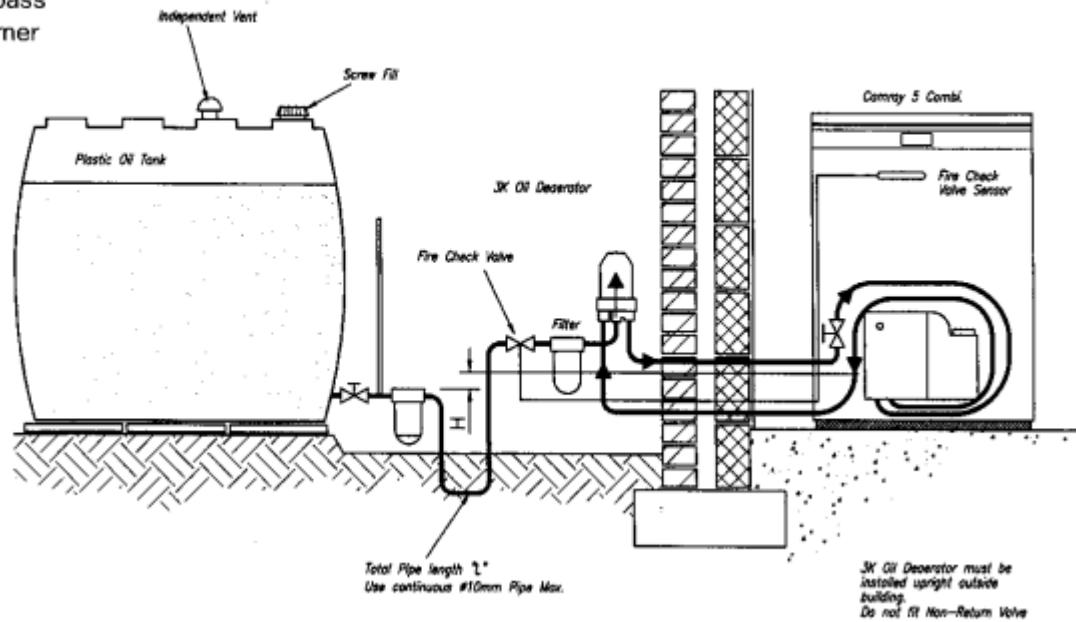


Fig 4.12e

Fig 4.12e

Pipe Size [mm]	Lift - H metres 13.5m Mall							
OD	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5
6	24	21	19	16	13	11	6	6
8	100	100	93	84	71	59	46	33
10	100	100	100	100	100	100	100	100

3K Oil deaerator must be installed upright outside building

Do not fit non-return valve

Deaerator pipe oil system - oil connections

Items 1-5 supplied with boiler - see fig 4.12f

Item	Part	QTY	Code
6	3K oil loop	1	BS03060
7	1/4 " BSP x10mm coupling	3	FS00151
8	Longlife hose 900mm	1	BS03106

10	1/4 "x10mm coupling	1	FS00151
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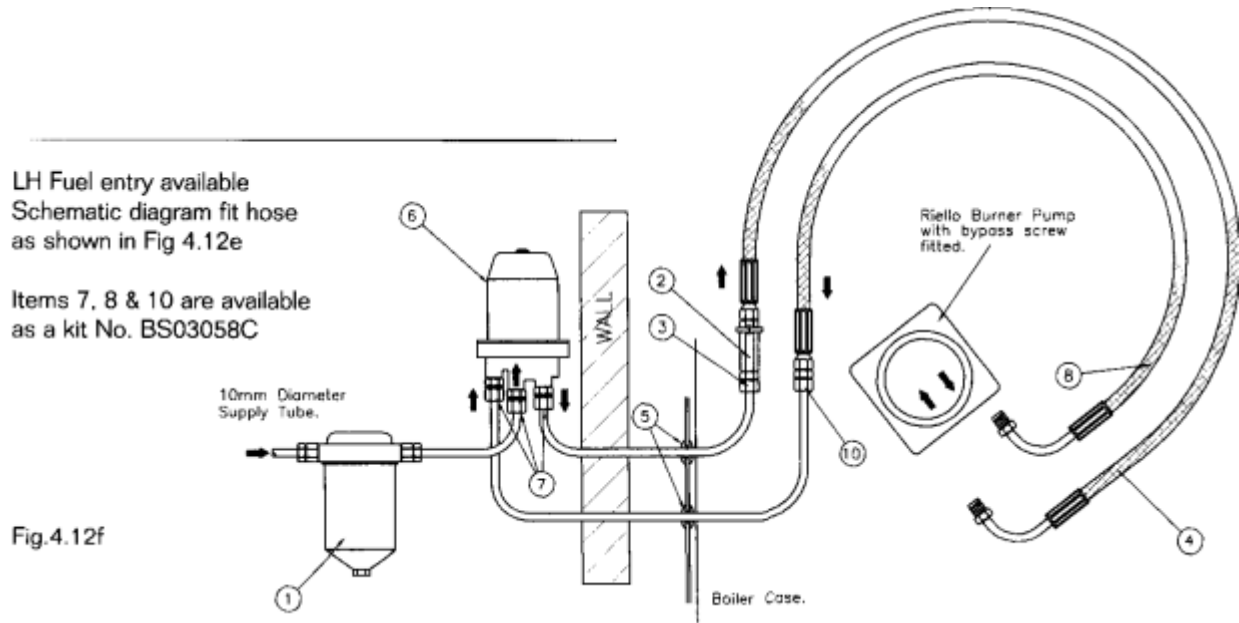


Fig 4.12f

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4:13 OIL BURNER

The Burner makers' technical leaflet is supplied with this manual and provides supplementary information not included in this manual.

4:13.1 Burner Pump for Two Pipe and Deaerator System

For two-pipe oil systems the Burner Oil Pump has to be fitted with the Bypass Screw supplied. Boilers are dispatched with the Bypass Screw in a labeled envelope attached to the Burner. **This SOCKET SCREW IS INSERTED INTO THE RETURN PORT AS shown in Fig. 4.13a.**

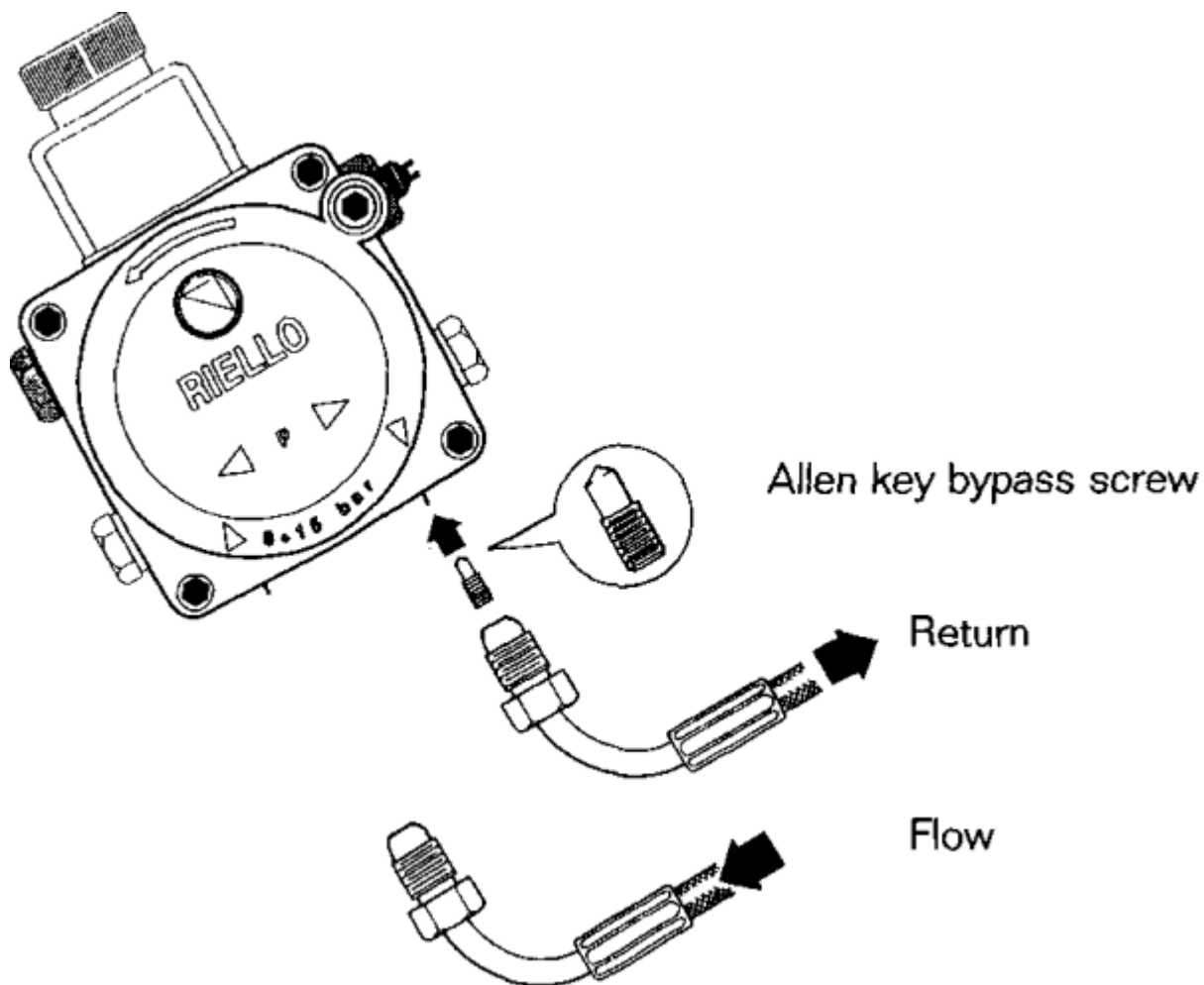


Fig 4.13a

ONLY USE BYPASS SCREW FOR ALLEN KEY (2.5MM). DO NOT USE SLOTTED SCREW

4:13.2 Burner Pump for Single Pump System

The burner is supplied set for single pipe operation. The return port is plugged and the Bypass Screw is not fitted. See Fig. 4.13b.

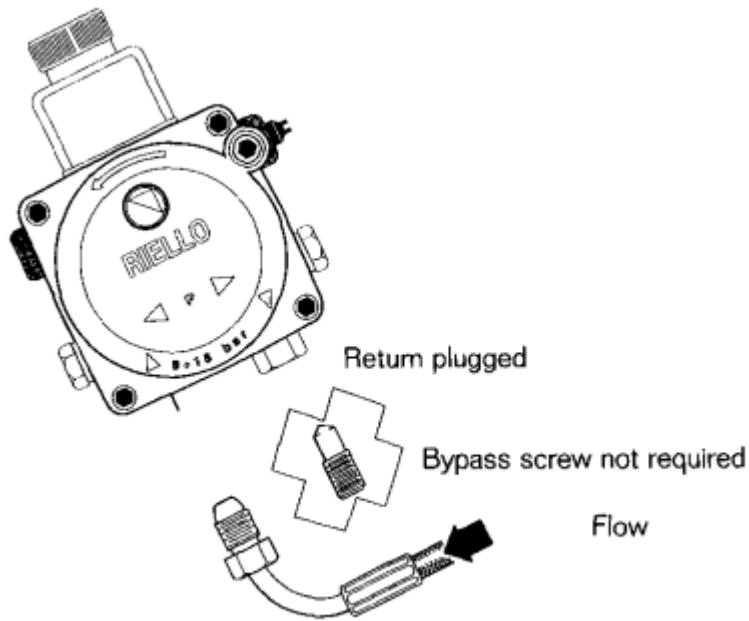


Fig 4.13b

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4:14 CONTROL PANEL

The Control Panel is pre-wired and fitted to the Boiler ready for connection to the system wiring. For operation of the Control Panel see [Section 1 - User Guide](#).

4:14.1 Connecting Control Panel

Connect the mains electric supply to the terminals L, N & E.

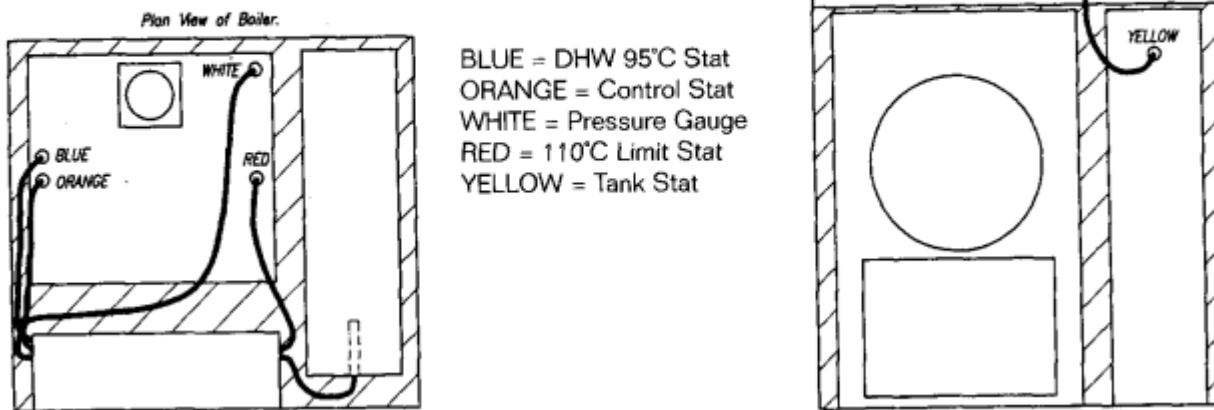
4:14.2 Boiler Tank Phial Positions

The Thermostat Phials are inserted into the relevant pockets as shown in [Fig. 4.14](#).

4:14.3 Room and Frost Thermostats

Connections for the room thermostat are made through ET knockouts in the bottom of the control panel.

Fig 4.14



4:15 FUNCTIONAL FLOW DIAGRAMS

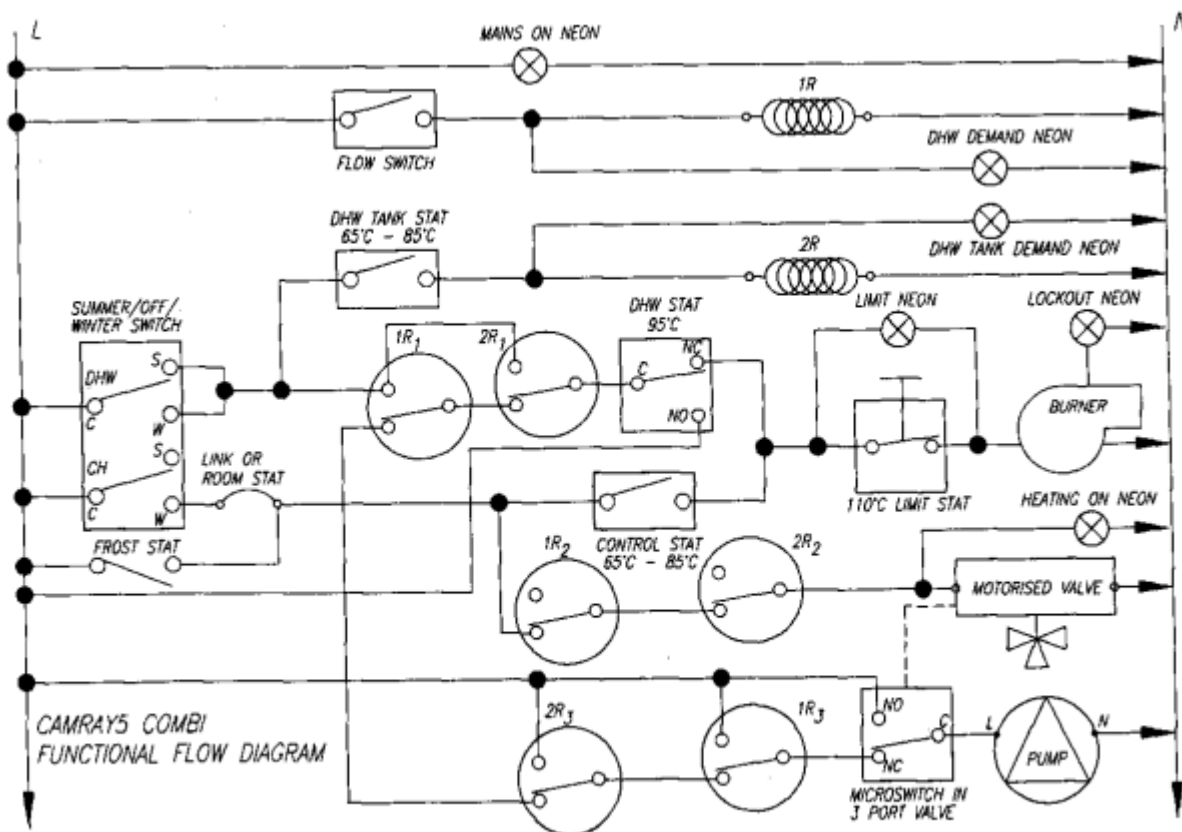
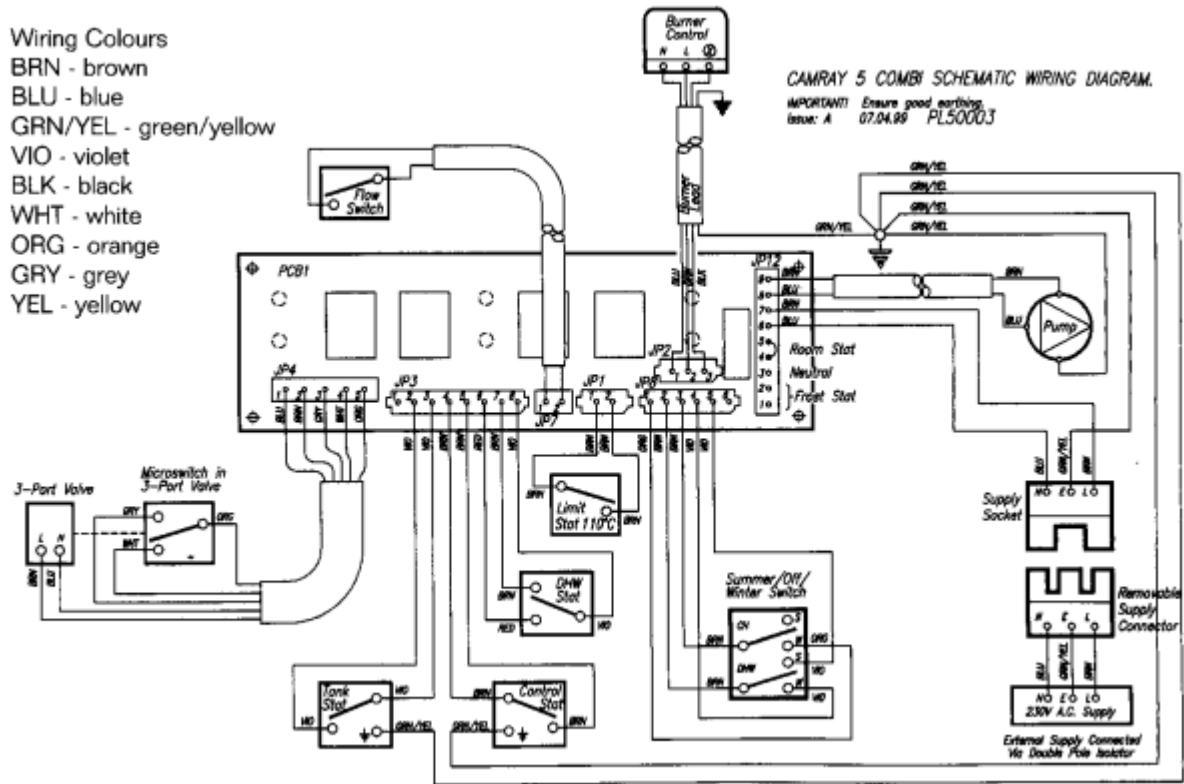


Fig 4.15a

4:16 FITTING PROGRAMMER

Wiring Colours

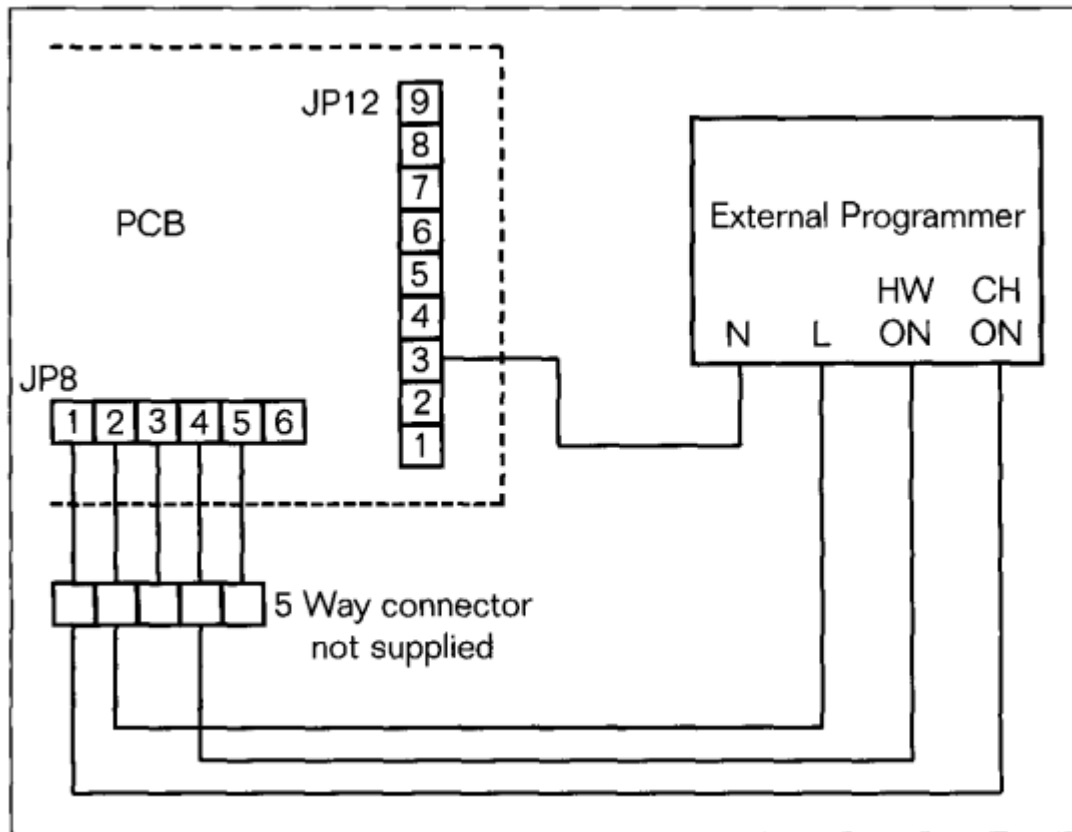
- BRN - brown
- BLU - blue
- GRN/YEL - green/yellow
- VIO - violet
- BLK - black
- WHT - white
- ORG - orange
- GRY - grey
- YEL - yellow



IMPORTANT

The electrical installation of the programmer must be carried out by a suitably qualified electrical engineer/installer.

It is not recommended that a programmer be fitted to the fascia of this boiler. Boulter Buderus recommends that an external programmer is fitted and connected as shown on the next page.



- 1) These instructions are ONLY for suitably qualified personnel.
- 2) When selecting a Programmer make sure that it is suitable for combi boiler applications.
- 3) Isolate electric supply.
- 4) Remove control panel cover.
- 5) Snip all 5 wires from the Summer/Winter switch, remove and discard tags from the Summer/Winter switch.
- 6) Connect the 5 loose tails from JP8 on the PCB to a 5 way connector (not supplied) inside the control panel.
- 7) Bring the cable from the programmer through a spare knockout using a strain relief bush. Cable to have 4 wires and earth.
- 8) Connect as shown in the diagram, ie:
 - Programmer L to JP8-2
 - Programmer N to JP 12-3
 - Programmer CH ON to JP8-1
 - Programmer HW ON to JP8-4
 - Connect earth wire (if supplied) to the control panel earth post, (not shown in the diagram).
- 9) Leave connections 3, 5 & 6 of JP8 unconnected.
- 10) Replace control panel cover.
- 11) Reinststate electric supply.

Note-

Advise the customer that the Summer/Winter switch is inoperative. Alternatively remove the switch

completely, but the vacated hole must be blanked off.

Section 5 - Flues

5:1 POSITIONING THE BOILER

Read Sections 5:2 & 5:3

Some combustion noise occurs at the Exhaust Terminal of Balanced Flues and care should be exercised to ensure that the position of the exhaust is not near doors or opening windows of the house it serves, or doors or windows of any neighbouring house.

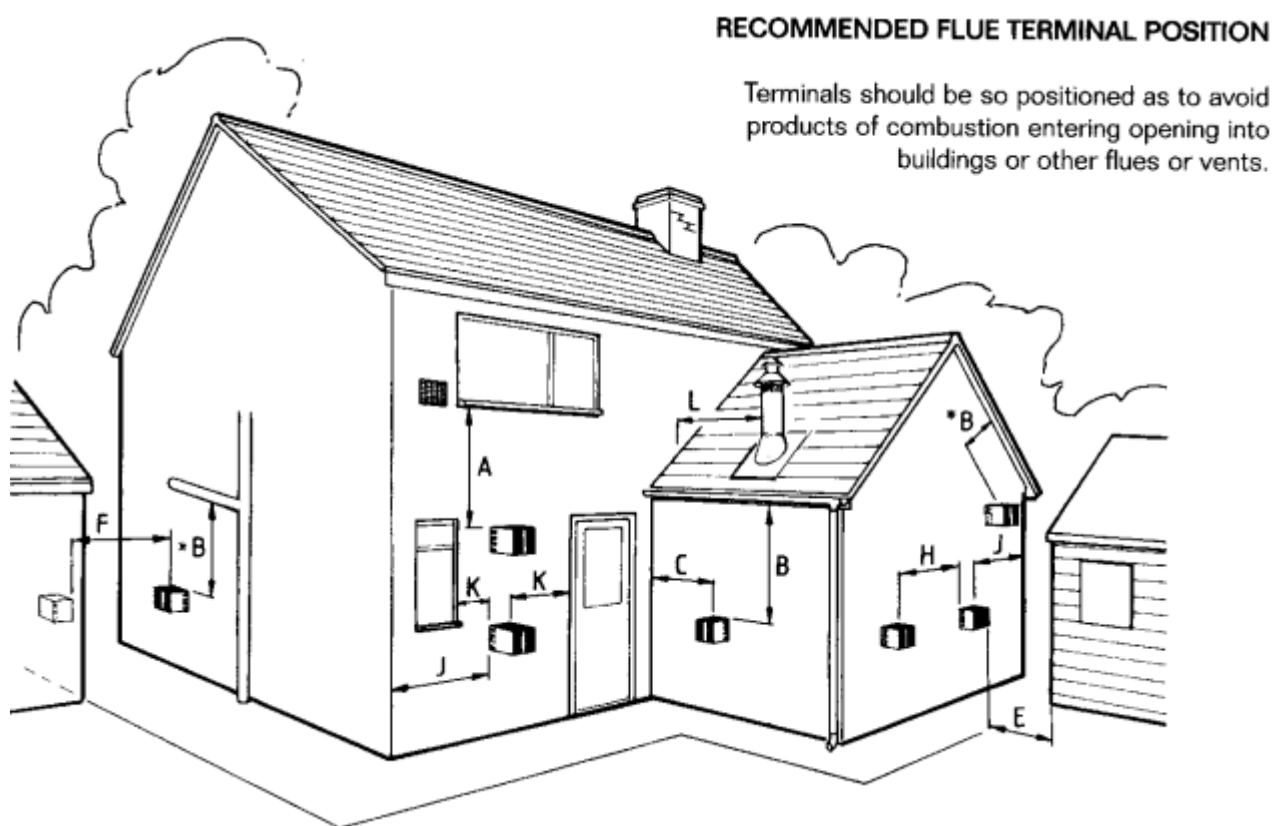


Fig 5.1

Table to above Flue Terminal Positions - MINIMUM dimensions

REF	DESCRIPTION	DISTANCE IN MM
A	Directly below an Opening, Air Brick or Window	600
B	Below a Gutter, Sanitary Pipework or Eaves	75 (600')
C	From any Internal Corner	300 (900)
E	From a surface facing the Terminal	600 (1200)
F	From a Terminal facing a Terminal	1200
J	From any External Corner	300 (600)

K	Horizontally from any Opening, Air Brick, Window or Door	600
---	----------------------------------------------------------	-----

'Where the terminal is within 1m of any plastic material, such material should be shielded from the effects of the combustion products of the flues

NOTE:- Whilst the dimensions in BS 5410 are shown in the table, it is stressed that possible variances in local site conditions may not always be obvious and that if in any doubt the dimensions in brackets should be observed.

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5.2 TERMINAL GUARD

The guard supplied should be fitted to the boiler casing as shown in fig 5.2

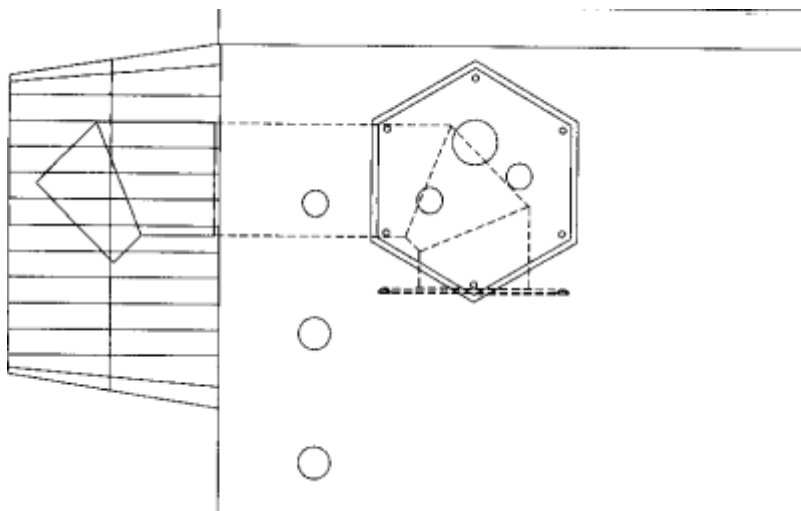


Fig 5.2

Section 6 - Balanced Flues

NOT APPLICABLE

Section 7 - Commissioning

7:1 COMMISSIONING BOILER

It is essential in the interest of boiler efficiency and reliable performance that once the Boiler has been installed it is first commissioned by a qualified engineer.

If an engineer is not known Boulter Buderus will be please to provide details of a commissioning and servicing engineer from their register.

7:2 RESPONSIBILITY

It is the responsibility of the installer to ensure that the boiler is properly commissioned. It is essential that the commissioning procedures detailed in this manual are carried out preferably by a qualified OFTEC engineer using recognised test equipment.

It is recommended that the relevant section of BS 5410 Part 1: latest edition is carefully read.

7:3 REPORTING

It is recommended that you use a report sheet and checklist. Make comments on the report where necessary and give a copy to whoever has engaged your services, and retain and file your own copy. A suggested layout is shown over.

7:4 COMMISSIONING SEALED SYSTEM

IMPORTANT

It is the responsibility of the installer to ensure that the boiler is commissioned by a competent OFTEC Registered Commissioning Engineer

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7:5 FILLING THE SYSTEM

- 1) Check that the manual Air Vents on the boiler and tank are loosened.
- 2) Check both drain cocks are turned off (closed).
- 3) Connect the Filling Loop Hose from the incoming mains supply to the Double Check Valve and open the Double Check Valve fully.
- 4) Open the Mains Isolating Valve part way to fill the system SLOWLY.
- 5) Flush system thoroughly and refill.
- 6) Vent radiator and any other manual Air Release Vents.
- 7) Check for leaks particularly on older systems which may operate on a lower pressure system.
- 8) When the system is completely full and vented, close both Mains Isolating Valve and Double Check Valve and disconnect flexible Filling Loop Hose, catching water.
- 9) A suitable inhibitor against limescale and corrosion should be added to the system.

THE FILLING LOOP MUST BE DISCONNECTED WHEN NOT IN USE.

IMPORTANT

Do not allow water in filling loop to spill over the burner or other electrical components.

- 10) Set the red pointer of the Pressure Gauge to Cold Fill pressure. [Refer to 4:6.](#)

7:6 CHECK PRESSURE RELIEF VALVE OPERATION

This is checked by allowing the water pressure to increase until the valve operates - this should be between 2.7 and 3.3 bar.

Reduce the system pressure to achieve the initial cold fill pressure.

Ensure that the Tundish is fitted according to the latest edition of the Building Regulations.

7:7 EXPANSION VESSEL PRESSURE

When the system water is heated, the pressure will rise above the Cold Fill setting. If the pressure reaches 2.5 bar when the Boiler is operated at its highest temperature with all radiators in circulation, then an additional expansion vessel must be fitted in the system. Refer to Section 4:6 and BS: 7074 Part 1 for information on sizing of the additional expansion vessel.

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7:8 BOULTER RECOMMENDED COMMISSIONING CHECK LIST

Customer

Site Address

Appliance Model

Serial No.

Fuel

Tick off each item

OIL TANK

- Is there sufficient oil, and of the correct grade for the appliance?
- Is the tank adequately supported?
- Is a damp-proof membrane inserted between the tank and support? (Non plastic tanks).
- Does the tank slope at least 20mm per meter of length downwards the sludge cock? (Non plastic tanks)
- Is the tank painted or suitably protected externally?

Is the tank fitted with the following:

- Contents gauges.
- Screw fill and independent vent cover or capped fill and vent pipes.
- Outer valve.
- Filter.
- Sludge cock (Non plastic tanks).

HEIGHT OF TANK

- Is the bottom of the tank above the oil pump if a single pipe system is installed?

OIL SUPPLY LINE

- Ensure that galvanised iron has not been used.
- If black iron has been used, is it protected against corrosion?

- Ensure that soldered connections on copper pipes have not been used.
- Is the size of the pipe adequate for the boiler rating?
- Are all joints leak proof?
- Is a fire valve fitted?
- Is a filter fitted?
- Is the oil line connected to the correct inlet connection of the pump?
- Is the oil supply clean and free of water or other contamination?
- Disconnect the oil supply as close to the burner as possible and drain approximately a gallon of oil into a very clear container. Inspect the oil for impurities and repeat the process if necessary.

Do not re-connect the oil line until water and all impurities have been removed from the oil supply. IF NOT THIS MAY DAMAGE THE PUMP.

- Clear oil filters and de-sludge the tank if necessary.

TWO PIPE OIL SYSTEMS

- Is a spring-loaded non-return oil valve fitted in the suction line? (or 3K Oil Deaerator).
- Does the return oil line terminate in the tank at the same level as the suction outlet?
- Has an anti-syphon cut been made in the return oil line (inside the tank)?

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BOILER

- Is the boiler standing on a level incombustible hearth?
- Are the thermostat phials inserted in the correct pockets? Are the baffles correctly located?
- Is the boiler set for the fuel being supplied?
- Has the system and boiler been filled with water and inhibitor as required?
- Is the boiler flueway inspection cover screwed down sufficiently firmly to form a seal?

CASING PANELS

- Have grommets been fitted to relevant oil supply entry points (knockouts)?
- Does electrical cabling pass through a grommet to prevent chaffing?

BURNER

- Is the oil pump by-pass screw fitted, if applicable?
- Remove the burner. Is the correct nozzle fitted?

NOTE: -

Burner operating instructions can conflict because they are intended for general guidance. Since the burner has been specifically matched to the particular boiler, the information in the Boiler manual takes precedence.

FLUE

Is the flue connected and properly located?

VENTILATION

Are the air grilles in the casing panel door clear from obstruction?

Is the flue adapter fitted correctly to the boiler with all nuts and gaskets?

ELECTRICAL POWER SUPPLY

Is the electrical supply to the appliance appropriate?

Are the electrical input connections to the control panel correct?

Is the supply fuse correct?

Does the wiring comply with the latest IEE regulations?

Does the power supply cable enter the casing through a grommet?

GENERAL

Has the boiler been installed in accordance with manufacturer instructions?

WATER SUPPLY

Is there sufficient water pressure for the appliance to operate in Domestic Hot Water mode? - minimum 1 bar.

Is there sufficient system pressure?
- Record initial system pressure cold.

STATIC bar

DYNAMICbar

Has a chemical dosing type water conditioner been fitted to the water supply to the boiler?

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7:9 BOULTER BUDERUS RECOMMENDED COMMISSIONING TESTS

Have the manufacturers on-site assembly instructions been followed?

CARRY OUT COMBUSTION CHECKS BY INSERTING PROBES INTO SAMPLING.

7:9.1 COMMISSIONING TESTS - BOILER

BEFORE ATTEMPTING TO START THE BOILER PLEASE THOROUGHLY CHECK ALL ITEMS ON THE COMMISSIONING CHECKLIST. THIS WILL HELP TO AVOID ANY UNNECESSARY CALLBACKS.

ENSURE THAT THE BOILER IS MATCHED MOST CLOSELY TO THE HEATING SYSTEM REQUIREMENTS BY FITTING THE CORRECTLY SIZED NOZZLE AND/OR CHOOSING THE CORRECT OIL PRESSURE.

Fit combined air bleed manifold and 0-300psi (0-20 bar) pressure gauge to the appropriate oil pump

connection, and replace burner.

- Set the boiler thermostat to between Summer and Winter positions, see Fig 1.
- Switch on the electric supply to the boiler, checking that programmes are switched to the 'ON' position, and that room thermostats are calling for heat.
- Check the Smoke No., if clean wait 10 minutes and measure CO₂.
- Adjust the air shutter if necessary, open to reduce CO₂, close to increase CO₂.
- If the shutter is adjusted, re-check the Smoke No.
- Check the flue gas temperature. The figures should agree with the Boiler Commissioning Data.
- Check lockout function, either cover the photocell or remove solenoid coil, to simulate flame failure. Reinstall components and press lockout button.
- Check the operation of the limit thermostat.
- Complete commissioning report and enter the details on to the guarantee form which should be returned to BOULTER BUDERUS in the envelope provided.
- Instruct the user on the operation of the appliance and leave this manual with the customer.

When the burner motor starts, on one pipe systems it may be necessary to temporarily open the air bleed screw on the test manifold.

If the burner locks out during the ignition attempt, wait 45 seconds before pressing the reset button on the control box. Several attempts on first firing may be necessary.

Once the burner is firing check and if necessary adjust the oil pressure.

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7:9.2 COMMISSIONING TEST - SYSTEM

- Isolate boiler electricity.
- Check cold mains static and dynamic water pressures and record in spaces provided on page 2.
- Open largest HOT water tap (Usually the Bath tap) and check flow rate using a flow measuring device such as a Combi cup or a stop watch and measuring container.
- Locate farthest HOT tap from appliance and check the flow has not dropped below the pre-set flow rate of 16 l /min.
- Reinstall electrical supply, test boiler in summer mode.
- Adjust hot water control thermostat to maximum position, the tank heat up indicator should be illuminated until it reaches temperature.
- Turn bath hot tap on to demand HOT water (draw a normal bath full : 15-20 gallons), the flow indicator should be illuminated (providing the flow switch) this is extinguished once demand ceases. Check the bath water temperature at end of demand, (approximate temperature rise should be forty Degrees Centigrade above cold mains supply temperature - normally approximately 10°C).
- Allow boiler and tank to reach temperature again and switch to winter mode, adjust boiler control thermostat to maximum and repeat the last instruction.
- Continue with normal system checks.

Section 8 - Maintenance

8:1 GENERAL

A boiler fired with Class C2 Oil should only require attention once a year.

8:1.1 General Inspection

With the Boiler operating, inspect for signs of unsatisfactory operation, i.e. leakage of combustion products, leakage of oil, or unusual noises from the pump or motor.

Check the commissioning list if it is your first attendance to the appliance. Is there a reason why the Boiler might fail after you leave?

It is useful to measure the combustion data, i.e. CO₂; Smoke No; the flue gas temperature and a check on the oil pressure prior to carrying out any maintenance work.

8:1.2 Maintenance Procedure

Switch off electrical supply at the MAINS ISOLATING SWITCH.

OIL TANK

De-sludge oil tank (if necessary), and draw off any accumulated water. Check the correct grade of oil is being used.

FILTERS

Inspect and clean all oil filters. Change paper elements for new.

BURNERS

Turn off the oil cock and disconnect the flexible oil hose from the oil cock.

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Remove burner and clean thoroughly, the burner draught tube, the electrodes and generally the head assembly. CHANGE the nozzle for one with the specified make, oil rate, spray pattern and angle.

Inspect the ignition electrodes for crazing in the porcelain. Replace if there are signs of deterioration.

A dirty fan impeller can impair the performance of a burner, inspect and clean if necessary.

Inspect photocell, if badly discoloured, change it.

Inspect the flexible oil hose for leaks or discoloration. Use only replacement flexible oil hoses that are detailed in the spare parts section of this manual.

BOILER

This boiler is serviced from the front.

Remove flue inspection cover, and baffles, and clean all heat transfer surfaces and baffles. Replace any damaged or unserviceable parts with manufacturers proprietary parts.

Inspect flue location on boiler, and seal on boiler casing. Replace if required.

COMBUSTION TESTS

Fit combined air bleed manifold and 0-300psi (0-20 bar) pressure gauge to the appropriate oil pump connection, and replace burner.

Switch on the electric supply to the boiler.

When the burner motor starts, on one pipe systems, it may be necessary to temporarily open the air bleed screw on the test manifold.

Once the burner is firing check and if necessary adjust the oil pressure.

Carry out combustion checks by inserting probes into sampling points provided or at the flue outlet.

Check Smoke No., if clean wait 10 minutes and measure CO₂.

Adjust the air shutter (see Fig 8.2a), if necessary, open to reduce CO₂, close to increase CO₂.

If the air shutter is adjusted, re-check the Smoke No.

Check the flue gas temperature.

The figures should agree with data in Boiler Commissioning Data, Section 3.

FINAL CHECKS

Check lockout function, either remove photocell and cover it, or remove solenoid coil, to simulate flame failure. Reinstall components and press lockout reset button.

Check that the control thermostat is operating when the set temperature is reached. Check the operation of the limit thermostat if possible.

Reset Limit Thermostat once appliance temperature has dropped sufficiently.

Complete a maintenance report and give the customer a copy, retaining a copy for your records.

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8:2 AIR SHUTTER ADJUSTMENT

The Burner has a fixed Air Shutter with manual adjustment.

To adjust to CO₂ at the Air Shutter use a 3mm Allen key as shown. To increase the setting turn the air shutter clockwise and to decrease turn anti-clockwise.

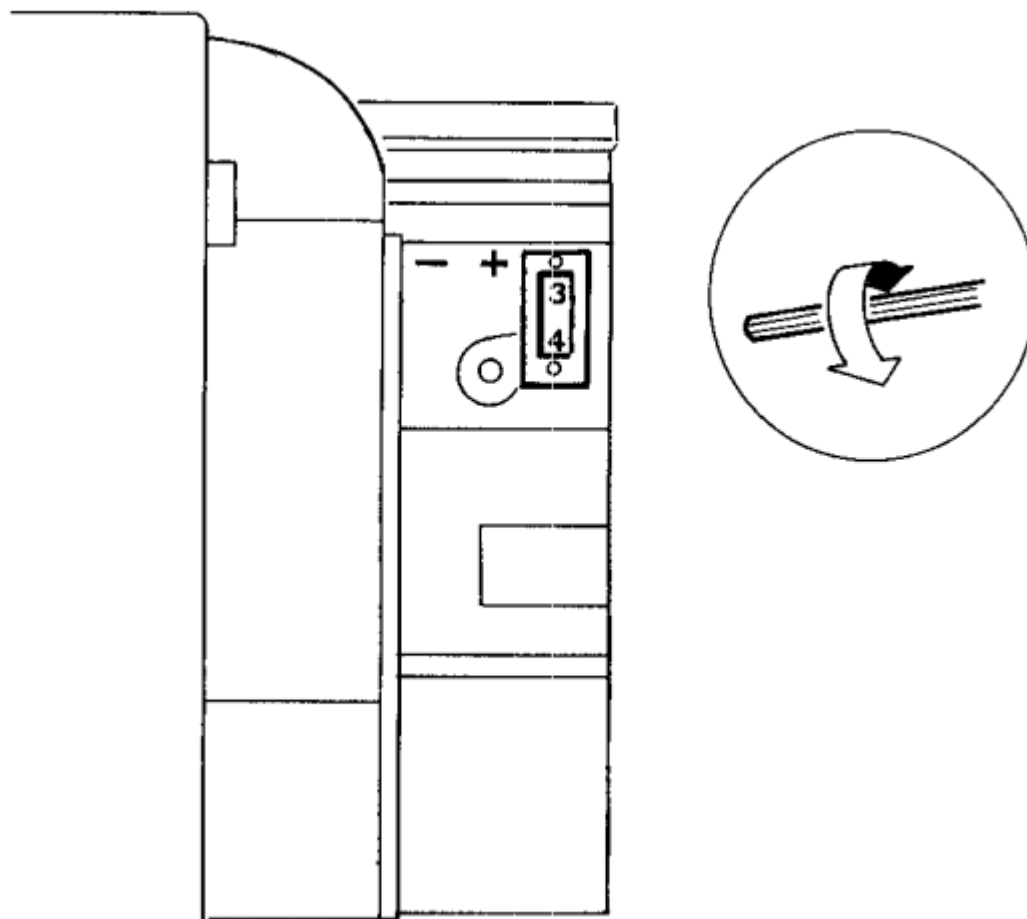


Fig 8.2a

8:3 BAFFLE ARRANGEMENT

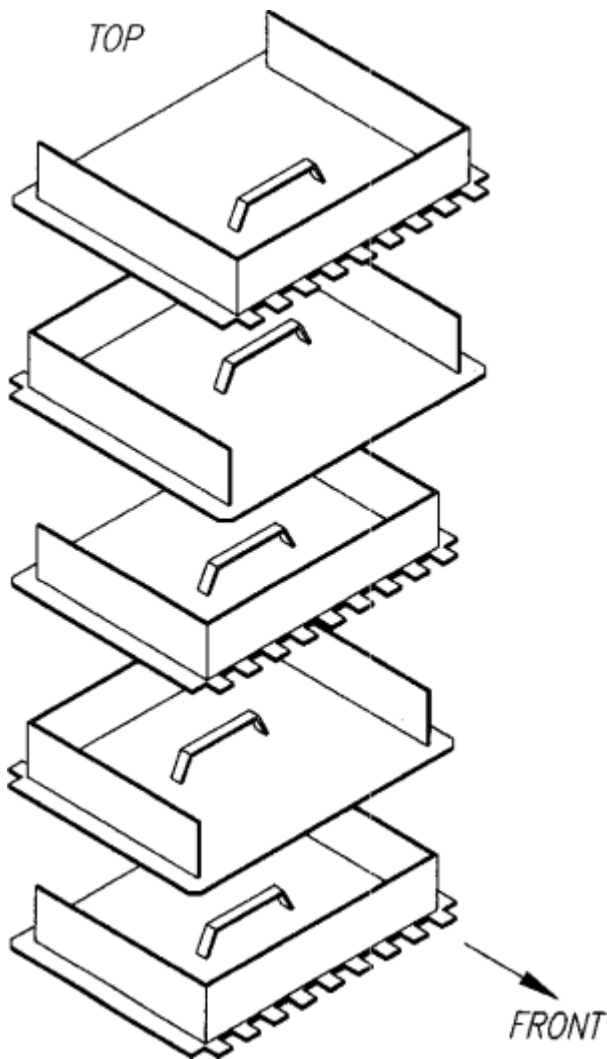


Fig 8.3a

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8:4 HEATING SYSTEM

During routine servicing, the system water should be "topped up" if necessary, using the Filling Loop when the system is cold. Refer to 7:5 Filling the system.

The following items should be checked on an annual basis at the very least.

1) System Pressure

The system Pressure should be checked periodically and increased as necessary using the Filling Loop.

Filling should be carried out on a cold system so that the pressure can be increased to the original cold fill design pressure (indicated by the red pointer on the system Pressure Gauge).

The pressure Gauge should be watched carefully during filling and Mains Isolating Valve opened slowly.

2) System Draining

The Boiler as well as the system, is under pressure and before disconnecting any components, the system

pressure must be reduced. The Boiler and storage tank each have a drain to facilitate this.

After replacing the relevant parts, refill the system as described in Section 7:5.

3) Pressure Relief Valve

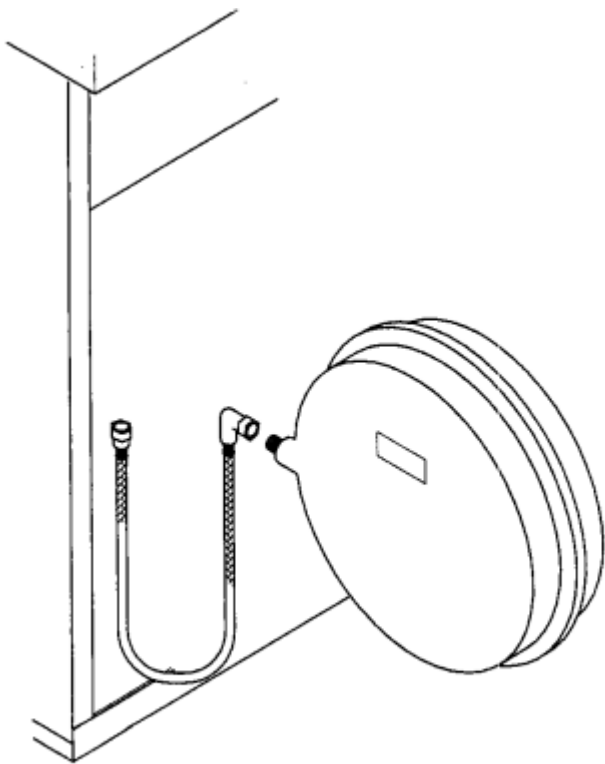
This should be checked for operation during annual servicing by increasing the system pressure outlined in Section 7:6.

4) Expansion Vessel Pressure

Should be checked to be in accordance with the cold design pressure of the system.

The design of the Camray 5 Combi enables the Pressure Vessel to be lifted and laid on to the floor whilst still connected to the Boiler, enabling full access to the Burner and Heat Exchanger.

Fig 9.1 b



Section 10 - Fault finding

10:1 FAULT FINDING

If the Boiler fails to start, make the following checks before calling a service engineer: -

Is there sufficient fuel in the storage tank?

Are all fuel supply valves open (turned fully anti-clockwise) and ball valves open? Is the mains electricity

supply switched on?

Is the programmer (or Boiler Operating Switch) set to call for heat? Is the Boiler Thermostat set to the desired temperature?

Is the Lock-out Reset Button on the Control Box and Control Panel neon illuminated? If so, press to reset Burner. Check the fuse which should have been fitted to the mains electricity supply to the programmer/boiler operating switch. If the fuse has blown, replace it. If it blows again, call a Service Engineer.

IMPORTANT - Electrical Safety

IT IS ESSENTIAL THAT BEFORE ANY PANELS OR COMPONENTS ARE REMOVED FROM THE BOILER, THAT THE MAINS ISOLATOR IS SWITCHED OFF

10:2 FAULT FINDING CHART

	Trouble or Complaint	Possible Cause	Action
1	Suspect oil supply.	No oil in tank.	Check and arrange for tank to be filled if necessary.
		Supply valves closed	Open all supply valves.
		Blockage in oil supply (Gravity head feed).	Shut off the burner-isolating valve. Disconnect the oil supply at the pump entry. Place receptacle under the pipe. Slowly open the valve, note if the flow is unrestricted, restricted or blocked.
		Wrong grade of oil.	Check for correct grade of fuel (see technical data).
		Water contamination.	Open tank, drain valve and check.
		Tank vent blocked.	Check.
		Filter blocked.	Check for water or blockage.
		Air locks in supply pipe supply.	Check for high points in main oil.
		Air lock in pump.	Bleed pump, check flexible oil line.
2	Burner will not start.	Interruption or absence of electrical supply at burner (check this at Control Box mains terminal with test lamp).	Check mains switch on. Check fuse in switched spur or plug. Check that time switch or programmer is closed. Check that the auxiliary stat is closed. Check boiler stat, cylinder stat, room stat are calling for heat.
		Control Box is locked out, refer to symptom 4	Press reset button on the burner box.
		Photo-resistor receiving false light.	Check that the photo-resistor is fully home in it's housing. Burner will not start with illuminated cell.
		Faulty control box.	Replace.
3	Burner lights up but locks out after 15 seconds.	No oil supply.	Check oil in the tank.
		Photo-electric cell not receiving light from flame.	Check that photo-electric cell is clean and fully home in housing.
		Photo-electric cell connections loose.	Check and tighten if necessary.
		Control Box photo - electric cell circuit faulty.	Replace control box.

		Flame instability.	Check combustion setting and re-set if necessary.
4	Burner starts but will not light up.	This can be due either to absence of oil or ignition.	
		Oil pump air locked (repeat air locking may be due to poor pipe Joints or defective gland packings).	Pump should be self-venting with two pipe system only. If a one pipe gravity feed is employed it must be purged through the vent port.
		Motor not driving pump Shaft slipping.	Check that flexible drive is functioning correctly and not slipping
		Blocked atomiser nozzles.	Remove and replace nozzle.
		Oil pressure abnormally low.	Check oil pressure on gauge and set to the correct pressure (see technical data).
		Solenoid valve faulty.	Break union at outlet to check presence of oil. Check that seat is clear. Check coil for continuity. inspect coil feed wiring to control box.
		Pump rotation incorrect	Check.
		Ignition failure:	
		Electrodes dirty.	Inspect and clean if necessary.
		Electrodes miss-set.	Inspect and reset gap 3 to 4mm between tips. 2mm in front of nozzle face.
		Cracked electrode.	Check and replace if cracked or Crazed.
5	Burner lights up, runs continuously and emits visible smoke or shows excess smoke on combustion check.	Air shutter closed.	Reset to correct position.
		Wrong nozzle.	Check make, type and spray angle.
		Worn atomiser nozzle.	Replace if necessary.
		Oversize nozzle fitted in error.	Check size and replace with correct size if necessary.
		Nozzle incorrectly stamped.	Replace with correct nozzle.
		Burner air supply Inadequate.	Inspect air intake and fan for fouling of impeller with dirt.
		Burner oil pressure excessive.	Check pressure and reset to correct pressure (see Technical Data)
6.	Burner lights up, runs normally but flame cuts off slowly on shut down (possibly with smoke or pulsation).	Air in nozzle.	Should self-correct; if air repeatedly present; check for leaks on oil line and flexible.
		Magnetic valve not operating correctly.	Inspect and replace if necessary.
		Shut off piston in pump sticking.	Check pressure and reset to correct pressure (see Technical Data).
7.	Burner Pulsates		
	(a) continuously.	Air supply setting incorrect or fan inlet blocked.	Inspect and reset or remove blockage.
		Grossly oversized nozzle size and type.	(see Technical Data).
		Air supply inadequate.	Check fan operation and cleanliness.
		Worn nozzle with excess	Replace with nozzle of correct type size (see

		throughput or uneven and spray pattern.	Technical Data).
	(b) at initial firing.	Air in supply line.	Purge at pump to remove.
		Blocked flue ways.	Clean boiler and flue.
8.	Burner locks out on morning starts then runs perfectly for rest of day.	Localised low voltage supply in early morning.	Check with local Electricity Board to fit recorder. Enlist aid of the Board
		Air present in oil supply.	Restart burner several times - press lockout reset button repeat 7(b) above.
		Bottom of oil tank below level of oil pump from tank.	Raise tank or install a two pipe oil supply.
		Non-return valve faulty or air leak in two pipe oil supply system.	Renew non-return valve. Rectify air leak.
9.	Burner fails due to blown fuse.	Short circuit in wiring.	Inspect wiring, sheathing and inter component connections for broken or damaged leads. Replace if necessary.
		Motor seized.	Check by hand and replace if necessary.
		Breakdown of insulation of motor windings.	Replace motor.
10.	Burner runs normally but will not reach desired temperature.	Oil throughput insufficient.	Check nozzle size and pressure against rating.
		Boiler has become undersized due to heating system expansion.	Check with heating installer.
		Low efficiency and CO ₂ .	Check combustion readings, reset air.
		Low efficiency due to high flue gas temperature.	Clean heat exchanger surfaces.
		Faulty boiler stat. Partially blocked filter.	Replace, check and clean.
11.	Poor combustion readings.	Low CO ₂ .	Check: CO ₂ , oil pressure, nozzle size (see Technical Data).
		High CO ₂ .	Check: CO ₂ , oil pressure, nozzle size (see Technical Data).
		High smoke.	Check: CO ₂ , oil pressure, nozzle size (see Technical Data). Check all baffles are in place and correctly located.
		High flue gas temperature.	Check: air shutter, nozzle size (see Technical Data), clean heat exchanger surfaces.
12.	Oil odour.	Leaking joints.	Break all leaking joints and re-make.
13.	High operating temperature.	Control stat failed and operating on limit stat.	Replace control stat and reset Limit Thermostat.
14.	Fumes in Boiler Room.	Inadequate draught due to unsatisfactory chimney or blockage of boiler flue ways or flue pipe.	Take necessary corrective action.
15.	Unstable flame, some	Air damper on burner	Set up burner as for commissioning using oil

puffing, ignition cuts in intermittently.	improperly adjusted or faulty nozzle or unsatisfactory draught conditions or faulty in oil supply.	pressure gauge, smoke pump, CO2 indicator and draught gauge, adjust settings as necessary, replace nozzle if necessary. See Commissioning Check List and Servicing Notes.
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10:3 FAULT FINDING SYSTEM SUMMER MODE (DHW ONLY)

Symptom	Fault	Remedy
High limit thermostat tripped, no hot water only cold at taps.	Circulating pump seized.	Free off circulating pump or replace circulating pump.
Boiler not firing, no hot water at taps. Tank LED not illuminated.	Mains supply not on, Tank control thermostat not functioning	Reinstate mains supply check operation of tank control thermostat and/or replace
	Relay/s failed.	change PCB.
Boiler fired, tank at Temperature, no hot water at taps. Flow LED not illuminated when DHW is demanded.	Flow switch not operating correctly. Relay/s failed	Test function of flow switch, replace if faulty.
Boiler fired, heated tank, tank LED indicator illuminated, boiler cycling.	Faulty tank thermostat. Faulty relay/s jammed in.	Test function of tank thermostat and replace. Replace PCB.
Boiler fired, heating tank, tripped manual reset limit thermostat.	DHW Thermostat failed in NC position.	Test thermostat and replace.
Boiler fires CH heats up when in summer mode, no DHW.	Diverter valve; seized in CH position.	Inspect diverter valve body, replace if seized, check correct operation of actuator head replace if faulty.
Boiler doesn't fire, circulating pump on, no DHW at taps only cold, both relay indicator neon's illuminated.	DHW stat failed in NO position.	Test functioning of DHW thermostat and replace if faulty.
Boiler not firing in summer mode, no DHW at taps only cold, flow LED indicator illuminated.	Tank control thermostat not switched on	Switch tank control thermostat on, set at desired temperature
	Tank thermostat failed in open circuit position.	Test thermostat, replace if faulty.
Boiler fires, Flow LED indicator illuminated, boiler keeps firing with no DHW draw off.	Faulty flow switch.	Test function of flow switch replace if faulty.
	Faulty relay - jammed in energised position.	Replace PCB.
Boiler fires, heats up tank, very low water pressure/ flow at hot taps, cold tap pressure ok.	Partially scaled up plate heat exchanger blockage on incoming mains to boiler	De-scale or replace plate heat exchanger disconnect cold mains to boiler and check for blockages.
Boiler fires heats up tank, very low water pressure/ flow hot and cold taps.	Fault on cold mains supply to residence.	Check stop cock fully open. Contact local water supplier and report fault.
Boiler has been functioning correctly, loss of DHW temperature, water pressure/ flow ok.	Air trapped in storage tank	Bleed air from storage tank using manual air vent positioned at the top right hand corner. Allow system to cool, check pressure in system and re-pressurise if required.

	Air trapped in boiler heat exchanger	Bleed air from boiler heat exchanger using manual air vent positioned on top of the boiler at the rear right hand corner and re-pressurise if required.
	Air trapped in pipe between tank and plate heat exchanger	Bleed air from pipe and re-pressurise if required.

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10:4 FAULT FINDING SYSTEM SUMMER MODE (DHW & CH)

Symptom	Fault	Remedy
Boiler not firing, no DHW or CH temperature, Tank LED Indicator not illuminated.	Tank stat and boiler stat not switched on. Tank stat or boiler stat faulty.	Turn both stats on and set to desired temperature. Test stats - replace if faulty.
Boiler fires, heats DHW tank, changes over to heat CH, DHW draw off - only cold water at taps - boiler continues to heat CH, flow LED indicator not illuminated.	Faulty flow switch Faulty relays Faulty diverter valve	Test flow switch, replace if faulty Check relay operation, replace faulty PCB. Check valve body and actuator, replace faulty part.
Boiler fires, heats tank, switches to CH - no heat to CH.	Faulty diverter valve Room stat faulty or not calling for heat	Check valve body and actuator, replace faulty part. Reset room stat or replace if faulty.
Boiler fires, heats CH and not DWH, tank LED indicator illuminated, boiler high limit manual reset stat tripped.	Diverter valve seized in CH position	Check valve body and actuator, replace faulty part.
Boiler fires, heats tank, switches to CH - no heat to CH, boiler doesn't fire, heating neon not illuminated.	Control stat switched off or faulty - failed open circuit.	Switch control stat on or check correct functioning of control stat, replace if faulty.
Boiler fires heats up tank and heating, DHW draw off - low water pressure/ flow from hot taps - cold taps OK.	Partially blocked plate heat exchanger or partially blocked cold supply to boiler.	Check cold supply to boiler, check flow through plate heat exchanger If low - de-scale or replace plate heat exchanger.
Boiler fires, heats tank and CH and high limit trips.	Faulty control stat.	Replace control stat.
Boiler fires heats tank and CH. pressure relief valve discharges.	Faulty pressure relief valve.	PRV operates between 2.7 & 3 bar. When DHW & CH are up to temperature, pressure should be no more than 2 bar. An extra vessel may be needed
	Incorrect charging.	Check charging procedure.
Boiler fires, high limit tripped.	Circulating pump seized.	Free off or replace circulating pump.

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10.5 PARTS REPLACEMENT INSTRUCTIONS

Note. Before attempting any parts replacement always isolate appliance from mains electricity supply.

1) To remove/replace circulating pump

- a) Isolate pump union valves
- b) Remove black plastic electrical connections cover
- c) Depress each grey lever and remove each wire in turn (for safety during this operation it advisable to insert each wire into a terminal block)
- d) Lift out cable complete with cable retaining clamp and move it to a safe position
- e) Using a shallow or other means of collecting water release pump union valves from circulating pump
- f) Lift pump out of appliance and replace with new unit ensuring that new rubber sealing washers are used
- g) Reassemble in reverse order ensuring that the pump head is inclined approximately 30 degrees to the horizontal
- h) Vent air from circulating pump via screw in pump head, check system pressure (topping up if necessary)
- i) Reinststate mains electricity supply and test correct operation of replacement pump

2) To remove/replace motorised valve actuator head

- a) Remove control panel rear cover, note position of motorised valve wires and remove
- b) Release cable grip and ease cable from control panel
- c) Remove access cover from front of control cover
- d) Remove two fixing screws from corners of valve actuator head and ease valve actuator head forwards and out of control panel
- e) Reassemble in reverse order and test correct functioning

3) To remove/replace motorised valve body

- a) Remove access body on front of control panel
- b) Remove two screws in valve actuator head and ease forwards off valve body and lay on control panel
- c) Isolate heating circuit using valves on heating flow and return
- d) Drain down top section of boiler, storage tank and pipe work
- e) Remove heating flow pipe (13 BS50044C) between isolating valve and three port motorised valve body
- f) Remove pump to three port valve pipe(10 BS50042)

- g) Remove both elbow fittings (9)
- h) Unscrew valve body from the storage tank
- i) Replace with new unit and reassemble in reverse order using jointing tape and paste where necessary (ensure correct tapping orientation)
- j) Refill boiler, storage tank and pipework to correct system pressure, open heating isolating valves
- k) Test correct functioning of valve

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4) To remove/ replace plate heat exchanger

- a) Isolate heating using valves on heating flow and return
- b Drain down top of boiler, storage tank and pipework
- c) Isolate cold mains supply using valve on cold mains pipe
- d) Remove heating flow pipe (13 BS 50044C)
- e) Remove tank to plate heat exchange pipe (8 BS 50045C)
- f) Unscrew flow switch actuator body and remove from brass body
- g) Remove cold mains supply pipe (7 BS 50048 C)
- h) Remove DHW supply pipe (19 BS 50047 C)
- i) Remove return manifold (14 BS 50046 C)
- j) Remove and replace plate heat exchanger
- k) Reassemble in reverse order using new gaskets on plate heat exchange joints (where necessary use jointing paste. Note : only use WRC approved jointing paste for joints containing potable water)
- l) Refill boiler, tank and pipework, pressurise to correct system pressure and open heating isolating valves
- m) Reinstate cold mains supply
- n) Check for leaks and function test appliance

5) To remove/replace actuator head

- a) Isolate cold mains supply using isolating valve on cold mains pipe
- b) Remove control panel rear cover
- c) Trace flow switch cable and disconnect from PCB
- d) Remove cable grip and ease cable from control panel

e) Reassemble in reverse order, reinstate cold mains supply and test correct functioning of flow switch

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<p>Buderus is one of the largest heating groups worldwide and enjoys a market-leading position in sales of hi-efficiency gas condensing boilers in Europe. Boulter Boilers was acquired by Buderus in December 2002, which brought together two organisations with a reputation for experience and quality in their respective markets. The new organisation, Boulter Buderus can be summed up by three points; reliability, quality and hi-efficiency.</p> <p>Boulter Boilers has over twenty years of experience in the oil-fired boilers market and Buderus has been involved in the manufacture of condensing boilers for over twenty-two years,</p> <p>Our philosophy is to provide products designed to meet the needs of our customers, which means that we lead the way in the development of new features for oil-fired boilers and build on Buderus' success with hi-efficiency condensing boilers</p> <p>Our oil-fired boilers are manufactured in Ipswich, Suffolk and the condensing boilers are imported from the Dutch organisation, Nefit Buderus.</p> <p>All products are approved to meet exacting European standards relating to quality, safety, efficiency and the environment. Our design, manufacturing, delivery and after sales service is certified and accredited by the ISO 9000 approval system.</p>	<p>To contact us ..</p> <p>Boulter Buderus Ltd, Magnet House, 30 white House Road, Ipswich IP1 5JA.</p> <p>Tel: +44 (0) 1473 241555 Sales Boilers: +44 (0) 1473 243780 Product Support: +44 (0) 1473 243770</p> <p>Fax: +44 (0) 1473 241321</p> <p>Email: sales@boulter-buderus.co.uk</p> <p>www.boulter-buderus.co.uk</p> <p>All Information is correct at time of gang to press. Boulter Buderus reserves the right to alter any information where necessary</p>
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