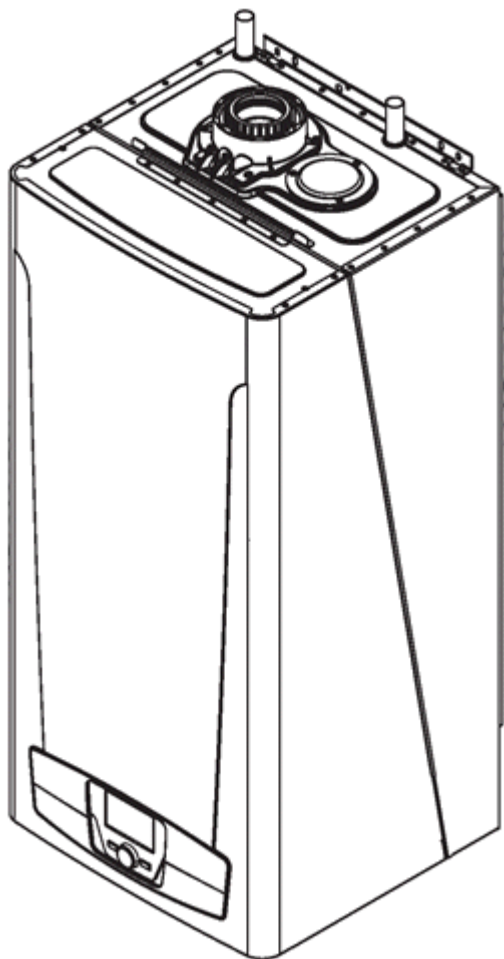


BAXI

Installation & Servicing Instructions



Ecogen 24/1.0

Gas Fired Wall Mounted Condensing Boiler and Power Generator

These instructions include the Benchmark Commissioning Checklist and should be left with the user for safe keeping.

Natural Gas

Propane

Baxi Ecogen 24/1.0 Baxi Ecogen 24/1.0 LPG

G.C.No 41 075 60 G.C.No 41 075 64

**This appliance contains a pressure vessel filled with Helium to 23 bar.
Do not strike, drop, drill or puncture the vessel.
Do not unbolt any of the covers or flanges.
The vessel contains no user serviceable parts.
Dispose of safely - see [section 18.0](#) for further safety information.**

The Benchmark Scheme

Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hotwater Industry Council who manage and promote the Scheme. Visit **www.centralheating.co.uk** for more information.

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The Company Secretary, Baxi Heating UK Ltd,
Brooks House, Coventry Road, Warwick. CV34 4LL

Full acknowledgement of author and source must be given.

WARNING: Any person who does any unauthorised act in relation to a copyright work may be liable to criminal prosecution and civil claims for damages.

Building Regulations and the Benchmark Commissioning Checklist

Building Regulations (England & Wales) require notification of the installation of a heating appliance to the relevant Local

Authority Building Control Department. From 1 April 2005 this can be achieved via a Competent Persons Self Certification

Scheme as an option to notifying the Local Authority directly.

In England and Wales the electrical installation of an Ecogen appliance is notifiable under the current Part P building regulations.

In Scotland the electrical Installation of an Ecogen appliance requires a building warrant (legal permission from the local authority to start the work). This building warrant has to be approved by a registered electrical installer (known formally as an 'approved certifier') or be checked by the local authority.

In Northern Ireland guidance should be taken from the local authority or equivalent governing body for all electrical works.

The Health & Safety Executive operates the 'Gas Safe Register', a self-certification scheme for gas heating appliances.

These arrangements represent a change from the situation whereby compliance with Building Regulations was accepted as being demonstrated by completion of the Benchmark Logbook (which was then left on site with the customer).

With the introduction of Self Certification Schemes, the Benchmark Logbook is being withdrawn. However, a similar document in the form of a commissioning checklist and service interval record is incorporated at the back of these instructions.

This company is a member of the Benchmark initiative and fully supports the aims of the programme. Its aim is to improve the standards of installation and commissioning of central heating systems in the UK and to encourage the regular servicing of all central heating systems to ensure safety and efficiency.

Building Regulations require that installations should comply with manufacturer's instructions. It is therefore important that the commissioning checklist is completed by the installer. The relevant section of Building Regulations only relates to dwellings. Therefore the checklist only applies if the appliance is being installed in a dwelling or some related structure.

The flowchart opposite gives guidance for installers on the process necessary to ensure compliance with Building Regulations.

Electrical Regulations

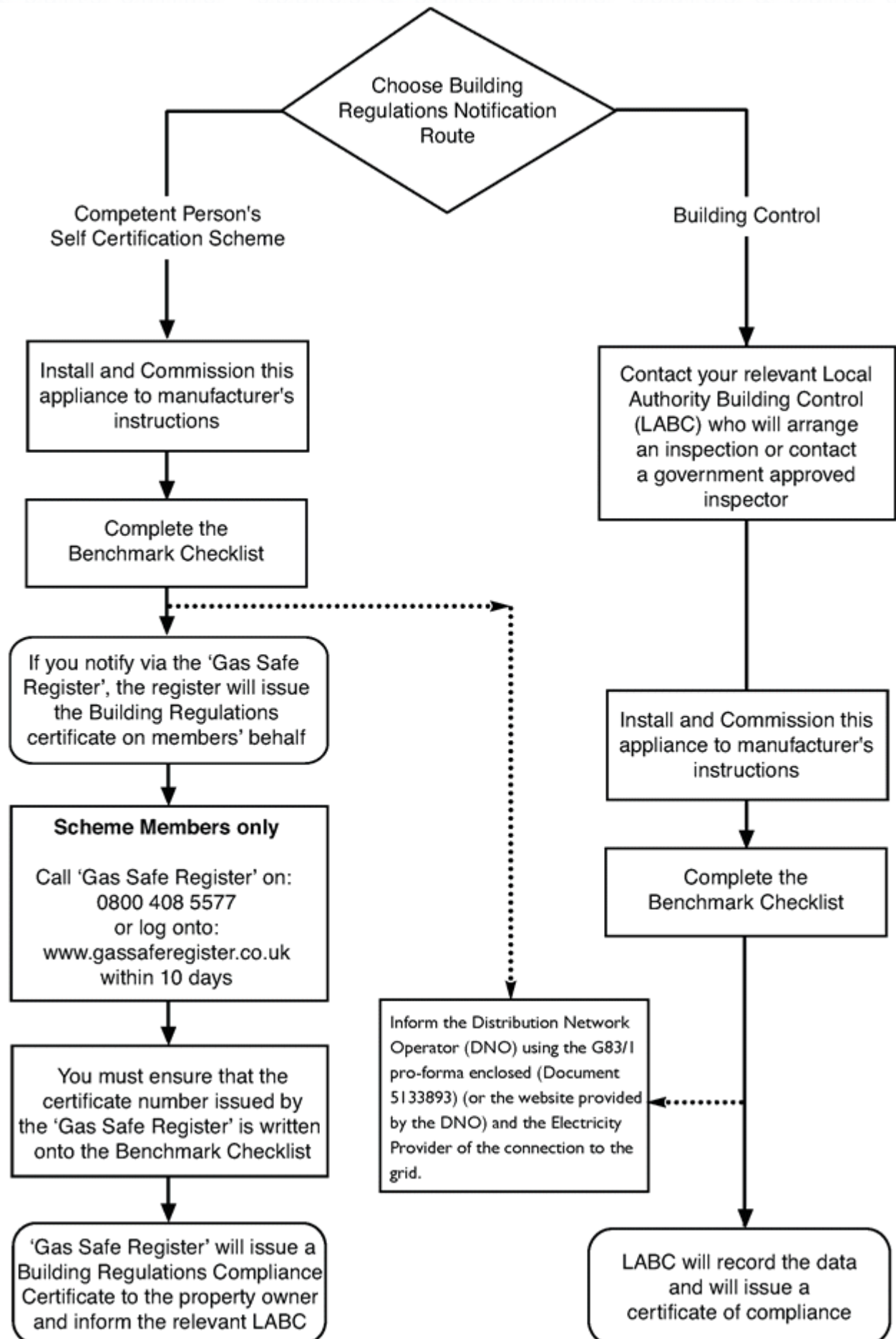
The Distribution Network Operator (DNO) and the Electricity

Provider must be informed of the appliances connection to the grid.

The DNO notification is achieved by the completion of a G83/1 connection pro-forma (see Document 5133893 supplied) or entry of the relevant details on the DNO website if available.



page 2



Legislation

This company declares that no substances harmful to health are contained in the appliance or used during appliance manufacture.

The appliance is suitable only for installation in GB and IE and should be installed in accordance with the rules in force, and only used in a suitably ventilated location.

In GB, the gas installation must be carried out by a Gas Safe

Registered Installer. It must be carried out in accordance with the relevant requirements of the:

- Gas Safety (Installation & Use) Regulations.
- The appropriate Building Regulations either The Building Regulations, The Building Regulations (Scotland), Building Regulations (Northern Ireland).
- The Water Fittings Regulations or Water Byelaws in Scotland.
- The Current I.E.E. Wiring Regulations. - section 15/87 (G83/1)
- Energy Networks Association Engineering Recommendation G83/1: The recommendations for the connection of Small Scale Embedded Generators (up to 16A per phase) in parallel with Low Voltage Distribution Networks

Where no specific instructions are given, reference should be made to the relevant British Standard Code of Practice.

In IE, the installation must be carried out by a competent Person and installed in accordance with the current edition of I.S. 813 'Domestic Gas Installations', the current Building Regulations and reference should be made to the current ETCI rules for electrical installation.

All systems must be thoroughly flushed and treated with inhibitor (see [section 6.2](#)).

Codes of Practice - refer to the most recent version

In GB the following Codes of Practice apply:

Standard	Scope
BS 5482 Part 1	Butane & Propane Gas Installation.
BS 6891	Gas Installation.
BS 5546	Installation of hot water supplies for domestic purposes.
BS EN 12828	Heating systems in buildings.
BS EN 14336	Installation & commissioning of water based heating systems.
BS 6798	Installation of gas fired hot water boilers.

BS 5440 Part 1 Flues.

BS 5440 Part 2 Ventilation.

BS 7074 Expansion vessels and ancillary equipment for sealed water systems.

BS 7593 Treatment of water in domestic hot water central heating systems.

In IE the following Codes of Practice apply:

Standard	Scope
-----------------	--------------

I.S. 813	Domestic Gas Installations.
----------	-----------------------------

The following standards give valuable additional information;

BS 5546	Installation of hot water supplies for domestic purposes.
---------	---

BS EN 12828	Heating systems in buildings.
-------------	-------------------------------

BS EN 14336	Installation & commissioning of water based heating systems.
-------------	--

BS 7074	Expansion vessels and ancillary equipment for sealed water systems.
---------	---

BS 7593	Treatment of water in domestic hot water central heating systems.
---------	---

BS 7671	Requirements for electrical installations
---------	---

BS 50438	Requirement for the connection of microgenerators in parallel with public low-voltage distribution networks.
----------	--

IMPORTANT - Installation, Commissioning, Service & Repair

This appliance must be installed in accordance with the manufacturer's instructions and the regulations in force. Read the instructions fully before installing or using the appliance.

In GB, this must be carried out by a competent person as stated in the Gas Safety (Installation & Use) Regulations and Part P of the Electrical Regulations.

Definition of competence: A person who works for a Gas Safe registered company and holding current certificates in the relevant ACS modules, is deemed competent.

In IE, this must be carried out by a competent person as stated in I.S. 813 "Domestic Gas Installations".

The addition of anything that may interfere with the normal operation of the appliance without express written permission from the manufacturer or his agent could invalidate the appliance warranty. In GB this could also infringe the Gas Safety (Installation and Use) Regulations.

Warning - Check the information on the data plate is compatible with local supply conditions.

All Gas Safe registered engineers carry an ID card with their licence number and a photograph. You can check your engineer is registered by telephoning 0800 408 5500 or online at www.gassaferegister.co.uk

Type test for purpose of Regulation 5 certified by:
Notified Body 0087.

Product/Production certified by:
Notified Body 0086.

For GB/IE only.

page 4

Safe Manual Handling

General

The following advice should be adhered to, from when first handling the boiler to the final stages of installation, and also during maintenance.

Most injuries as a result of inappropriate handling and lifting are to the back, but all other parts of the body are vulnerable, particularly shoulders, arms and hands.

Health & Safety is the responsibility of EVERYONE.

There is no 'safe' limit for one man - each person has different capabilities. The boiler should be handled and lifted using a suitable lifting device. A sack truck is ideal for manoeuvring the appliance to the room where the installation is to take place.

Do not handle or lift unless you feel physically able.

Wear appropriate Personal Protection Equipment e.g. protective gloves, safety footwear etc.

Preparation

Co-ordinate movements - know where, and when, you are all going.

Minimise the number of times needed to move the boiler - plan ahead.

Always ensure when handling or lifting the route is clear and unobstructed. If possible avoid steps, wet or slippery surfaces, unlit areas etc. and take special care on ladders/into lofts.

Technique

When handling or lifting always use safe techniques - keep your back straight, bend your knees. Don't twist - move your feet, avoid bending forwards and sideways and keep the load as close to your body as possible.

Where possible transport and manoeuvre the appliance into the installation site (package weight 120 kg) using a sack truck. Keep the appliance as upright as possible at all times, see note below.

Always grip the boiler firmly, and before lifting feel where the weight is concentrated to establish the centre of gravity, repositioning yourself as necessary. See the '[Installation](#)' section of these instructions for recommended lift points.

Remember

The circumstances of each installation are different. Always assess the risks associated with handling and lifting according to the individual conditions.

If at any time when installing the boiler you feel that you may have injured yourself **STOP !!**

DO NOT 'work through' the pain - you may cause further injury.

NOTE: The appliance must be transported at all times in the upright position. **The appliance must not be laid on its back / side / front.**

IF IN ANY DOUBT DO NOT HANDLE OR LIFT THE BOILER - OBTAIN ADVICE OR ASSISTANCE BEFORE PROCEEDING !!

page 5

CONTENTS

1.0 Introduction
2.0 General Layout
3.0 Appliance Operation
4.0 Technical Data
5.0 Dimensions and Fixings
6.0 System Details
7.0 Site Requirements
8.0 Flue Options
9.0 Installation
10.0 Electrical
11.0 Commissioning
12.0 Completion
13.0 Servicing
14.0 Changing Components
15.0 Combustion Check
16.0 Schematic Wiring
17.0 Fault Finding
18.0 Engine Fault Finding
19.0 Short Parts List

1.0 Introduction

1.1 Description

1. The Baxi Ecogen 24/1.0 is a fully automatic gas fired wall mounted condensing heat only boiler which will produce up to 1kW of electricity for use by the householder. Any electricity excess to requirements at the time of production will be fed back into the national grid. It is room sealed and fan assisted.
2. The boiler is set to give a maximum output of :-
24 kW (Heat), 1kW (Electric)
3. The boiler is suitable for use only on fully pumped sealed systems.
4. The boiler data badge gives details of the model, serial number and Gas Council number and is situated on the rear of the fascia ([Fig. 1](#)).
5. The boiler model name and serial number are also shown on the information label on the panel behind the fascia. This is for user reference.
6. Models are available for use on Natural Gas (G20) or Propane Gas (G31).
7. The boiler is intended to be installed in residential / commercial / light industrial E.M.C. environments on a governed metered gas supply only.
8. On Commissioning the appliance, the Distribution Network Operator (DNO) must be informed using the form provided.
9. The boiler must be installed with one of the purpose designed flues such as the standard horizontal telescopic flue kit, part no. 5118069.
10. **All systems must be thoroughly flushed and treated with inhibitor (see [section 6.1](#) & [2](#)).**

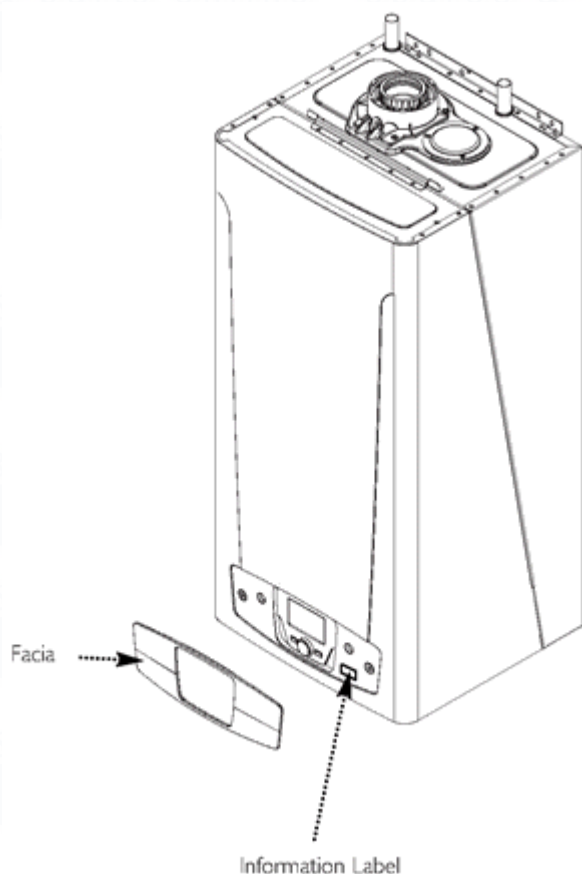


Fig. 1

1.2 Contents of Pack

The pack contains:-

- Boiler
- Wall Plate
- Gas Service Cock
- Fixing Screws & Wall Plugs
- Template
- Literature Pack

1.3 Optional Extras

1. Flueing kits - see [Section 8.0](#)
2. Removable THINK Controller
3. Wall Cradle & 5 LED Receiver Kit
4. Outside Sensor
5. Cylinder Sensor

2.0 General Layout

2.1 Layout

- 1 Supplementary Heat Exchanger
- 2 Burner - Supplementary
- 3 Ignition Electrodes
- 4 Flame Sensing Electrodes
- 5 Supplementary Gas Valve
- 6 Engine Burner
- 7 Engine Ignition Electrode
- 8 Engine Flame Sensing Electrode
- 9 Engine Gas Valve
- 10 Gas Inlet
- 11 Boiler Flow
- 12 Boiler Return
- 13 Engine Alternator
- 14 PCB Control/Cover
- 15 Water Flow Sensor
- 16 Safety Thermostats
- 17 Flow Temperature Sensor
- 18 Condensate Trap
- 19 Return Temperature Sensor
- 20 Fan
- 21 Spool Valve Motor
- 22 Spool Valve
- 23 Venturis
- 24 Overtravel Switches x 2
- 25 Combustion Test Point
- 26 Air Feed Test Point
- 27 Transit Bracket
- 28 Engine Head Thermocouples
- 29 Service Reset Button
- 30 Overcurrent Switch
- 31 Start/Stop Resistors
- 32 THINK Controller
- 33 Drain
- 34 Ignition Coils
- 35 Ambient Sensor
- 36 Wall Plate
- 37 EMC Mains Filter

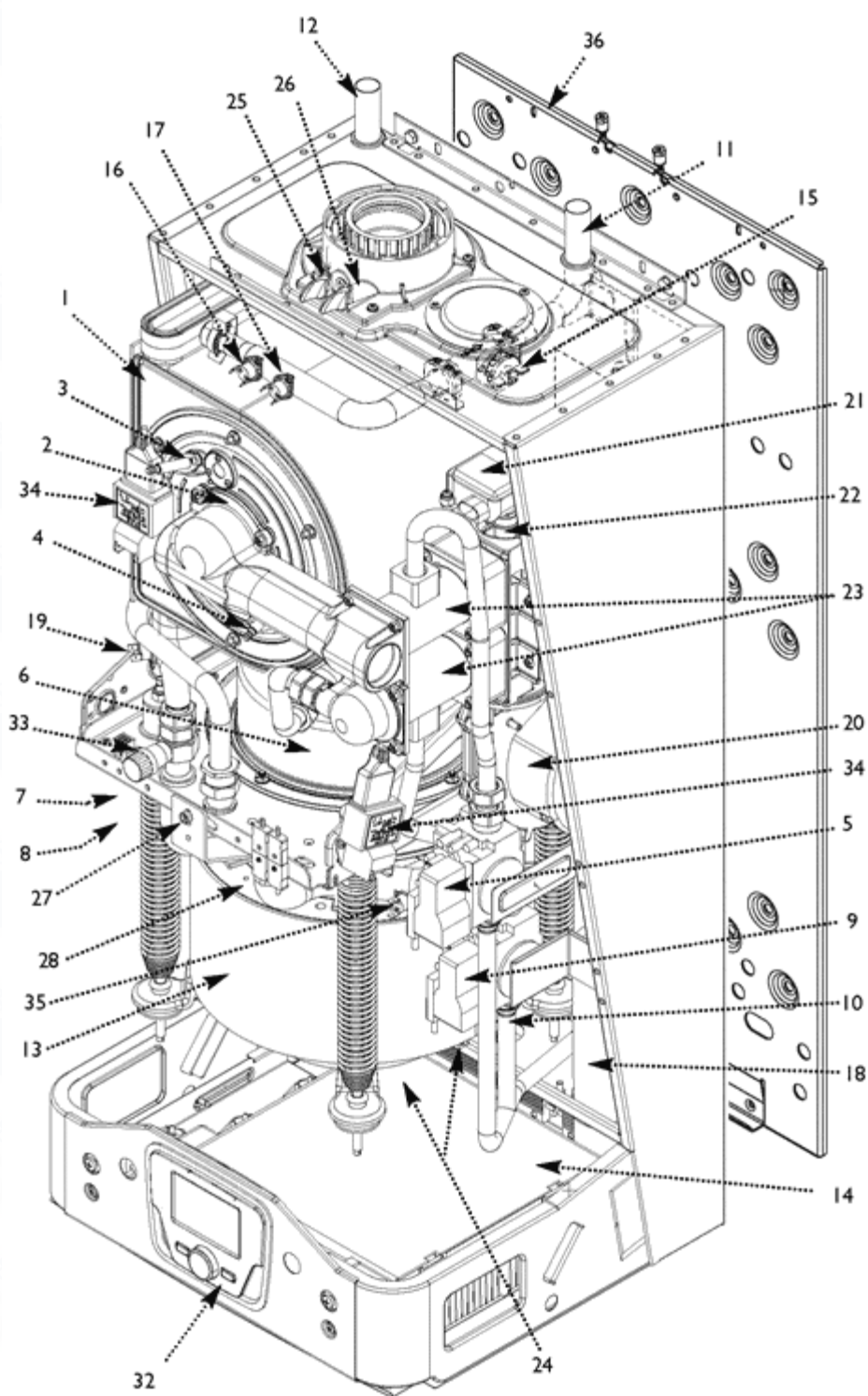


Fig. 2

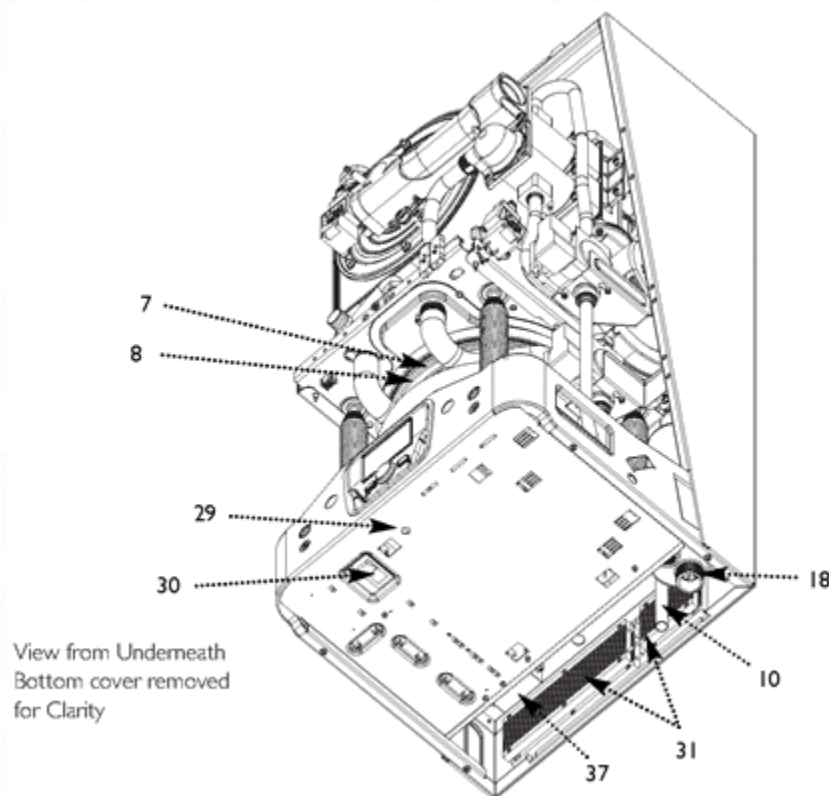


Fig. 2a

page 8

3.0 Appliance Operation

3.1 Operating Mode ([Fig. 3](#))

1. With a demand for heating or hot water, the pump circulates water through the primary circuit. If the flow is 4.0 L/min or above the ignition sequence will start.
2. When the flow temperature reaches the set point temperature, a 5 minute delay occurs before the burner relights automatically (anti-cycling). The pump continues to run during this period.
3. When the demand is satisfied the burner is extinguished and the pump continues to run for a period of 5 minute (Pump Overrun).

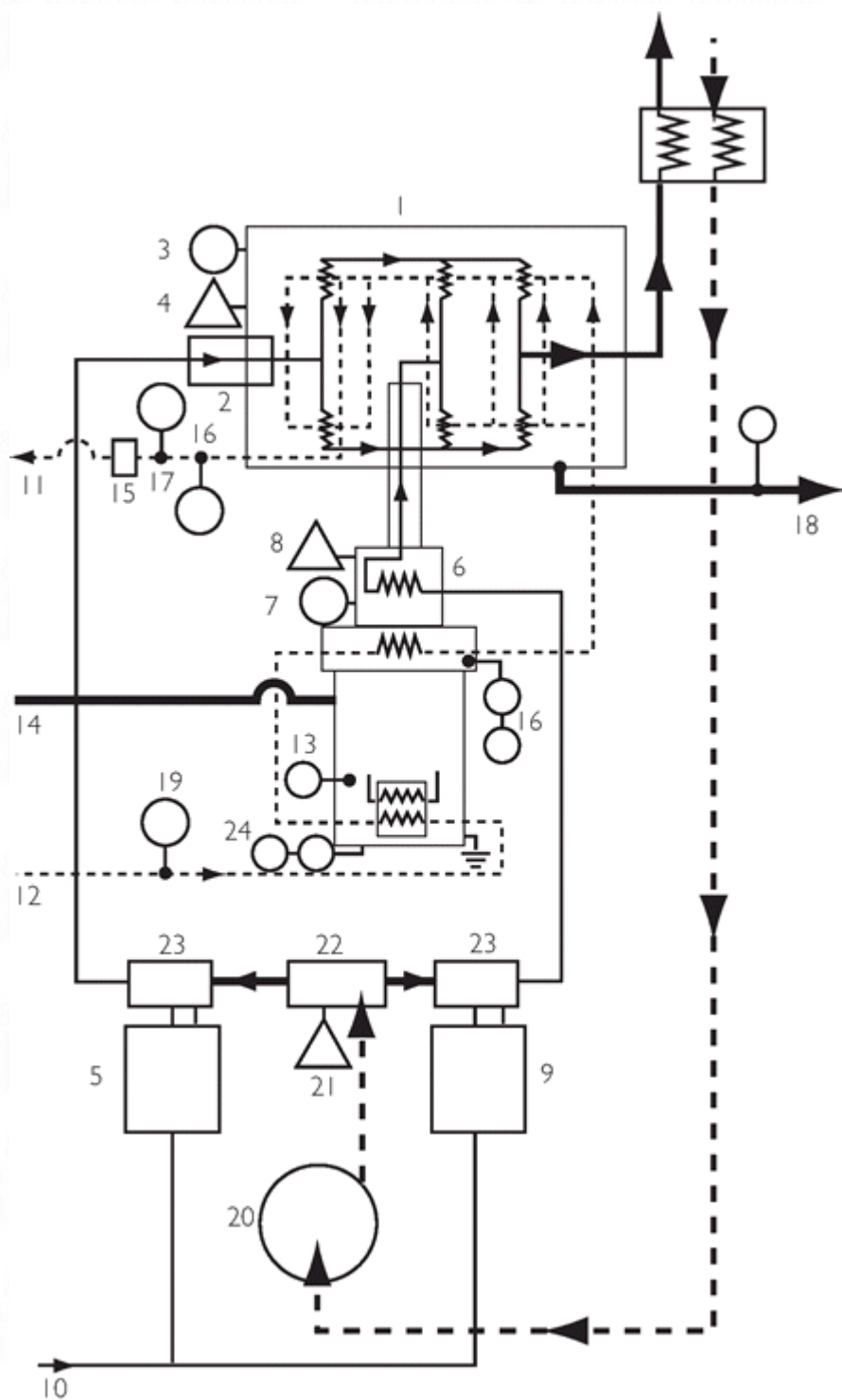


Fig. 3

Key

- | | | | |
|---|------------------------------|----|-------------------|
| 1 | Supplementary Heat Exchanger | 13 | Engine Alternator |
| 2 | Burner - Supplementary | 14 | PCB Control |
| 3 | Ignition Electrodes | 15 | Water Flow Sensor |

4	Flame Sensing Electrodes	16	Safety Thermostats
5	Supplementary Gas Valve	17	Flow Temperature Sensor
6	Engine Burner	18	Condensate Trap
7	Engine Ignition Electrode	19	Return Temperature Sensor
8	Engine Flame Sensing Electrode	20	Fan
9	Engine Gas Valve	21	Spool Valve Motor
10	Gas Inlet	22	Spool Valve
11	Boiler Flow	23	Venturis
12	Boiler Return	24	Overtravel Switches

3.2 Frost Protection Mode

1. If the boiler return temperature falls below 7° C, then the boiler pump and heating circuit pump/valve are activated or opened. If the temperature rises above 8° C, the frostprotection function will be terminated. If the boiler return temperature falls below 3°C, the supplementary burner will be switched on until the return temperature reaches 25°C and the appliance frost protection is stopped.
2. If the supplementary burner is locked, the engine burner will be used. In this case, the return temperature limit to start the burner is increased from 3 to 10° C.
3. If an existing room thermostat is to be used then further protection for the system can be incorporated by using a wall mounted frost thermostat. In certain circumstances it may be necessary to fit a pipe thermostat. If the THINK Controller is used as a room sensor then it will act as a room frost protection unit as well - see [Section 10.15](#).

3.3 Pump/Diverter Valve Protection

1. The pump and valve kick is a protective function aimed at preventing the pumps and valves from seizing.
2. Every Friday at 3.00am, the pumps and valves connected directly to the boiler unit are switched on 30 seconds and off for 30 seconds, one by one.

3.4 Legionella

1. When a DHW cylinder is fitted with a temperature sensor an anti-legionella function can be activated, so that at initial DHW charge and thereafter at regular intervals the cylinder is heated to destroy any legionella bacteria, the cylinder temperature is raised to 65°C.
2. By default this function is not active. Customers have the choice to activate the function and set how often, or on what day, and at what time this function runs. Customers should be informed that the temperature reached may be considerably higher than their normal requirements (See [Section 11.3](#) paragraph j).

4.0 Technical Data

4.1 Ecogen 24/1.0 and Ecogen 24/1.0 LPG

Country - GB/IE - Natural Gas

Appliance Category	CAT I _{2H}
Max Gas Rate (m ³ /hr)	
Both 2.68 Engine 0.82	Supplementary 1.86
Injector (mm)	
Engine 4.1	Supplementary 5.6
Inlet Pressure mbar 20	(Natural Gas - G20)

Country - GB/IE - Propane Gas

Appliance Category	CAT I _{3P}
Max Gas Rate (m ³ /hr)	
Both 1.04 Engine 0.32	Supplementary 0.72
Injector (mm)	
Engine 3.0	Supplementary 4.0
Inlet Pressure mbar 37	(LPG - G31)

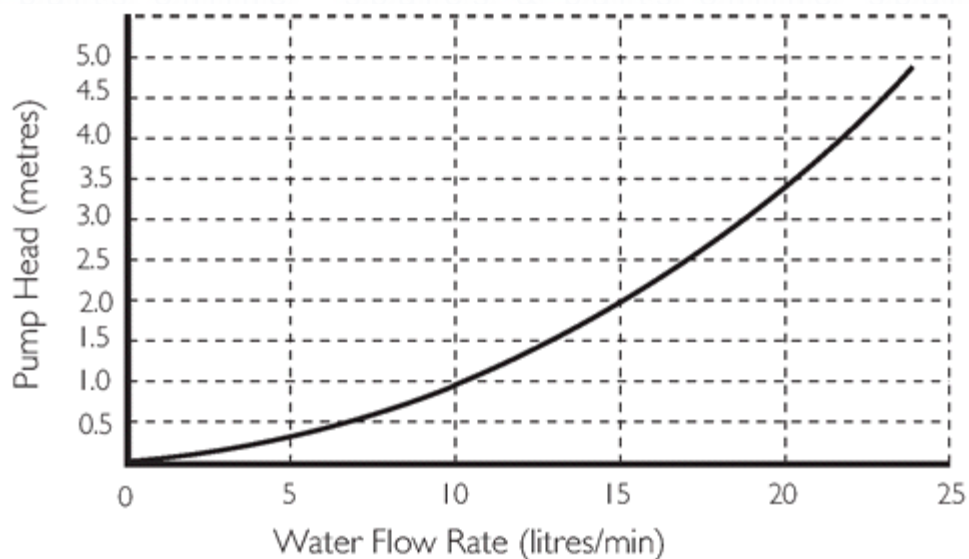
Heat Input	(Net)	Max	Min
	kW	25.3	3.7
Heat Input	(Gross)	Max	Min
	kW	28.1	4.1
Heat Output	(Non-Condensing)		
	kW	Max 23.7	Min 3.2
Heat Output	(Condensing)		
	kW	Max 24.3	Min 3.3

Appliance Type	C13	C33	C53
Electrical Supply	230V~ 50Hz		
(Appliance must be connected to an earthed supply)			
Power Consumption	24 model	150W	
Electrical Protection	IPX4		
External Fuse Rating	13A		
Internal Fuse Rating for pump & diverter valve	3.15A		
Condensate Drain			
To accept 21.5mm (3/4 in) plastic waste pipe			
Flue Terminal Dimensions			
Diameter	100mm		

Projection	125mm
Connections	copper tails
Gas Supply	-15mm
Central Heating Flow	-22mm
Central Heating Return	-22mm
Outercase Dimensions	
Casing Height	- 950mm
Overall Height Inc Flue Elbow	- 1135mm
Casing Width	- 450mm
Casing Depth	- 426mm

NOx Class	5
Central Heating Primary Circuit Sealed System only	
	bar
Safety Discharge	3
Max Operating	2.5
Min Operating	0.5
Recommended Operating	Range 1-2
Hydraulic Resistance	See graph below
Frost Thermostat	5° C
Weights	
Packaged Boiler Carton	117kg
Installation Lift Weight	110kg
Clearances	
Above Casing	300 mm Min (horizontal flue) 200 mm Min (vertical flue)
Below Casing	200 mm Min
Front	450 mm Min (For Servicing)
Front	5 mm Min (In Operation)
L.H. Side	5 mm Min
R.H. Side	60 mm Min (In Operation)

Appliance Hydraulic Resistance Chart

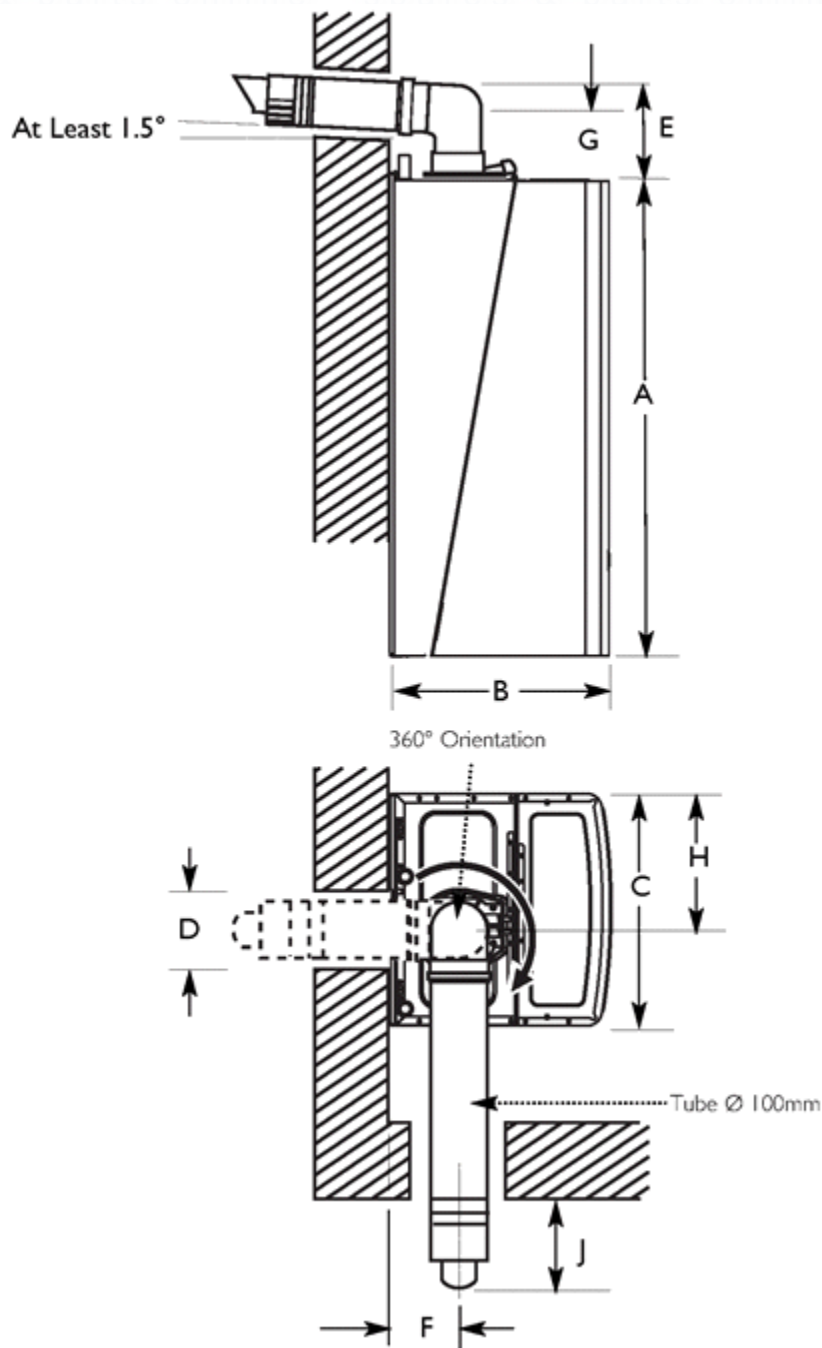


page 10

5.0 Dimensions and Fixings

Dimensions

- A** 950mm
- B** 426mm
- C** 450mm
- D** 116mm Ø Min.
- E** 190mm Allow at least 250mm for assembly and servicing
- F** 133mm
- G** 145mm
- H** 268mm
- J** 125mm



page 11

6.0 System Details

6.1 Water Circulating Systems

1. The appliance is only suitable for use on sealed systems.

2. Ideally fit a new sealed heating system to Building Regulations part L1 (2010). If an existing sealed system is to be used the following procedure must be completed before the Ecogen is installed.
 - The system must be cleaned with Fernox F3
 - Power flush the system according to the power flush equipment supplier's instructions.
 - Fernox MB-1 inhibitor must be added according to the supplier's instructions.

Following the treatment process a sample of system water must be taken and sent to Fernox for analysis to confirm the system cleaning and dosing process has been successful. A copy of the report to be sent to Baxi Heating UK Ltd, heateam, Ecogen team, Brooks House, Coventry Road Warwick CV3 4LL.

3. Please be aware of the resistance chart for this appliance, and if you are replacing a low resistance boiler ie. old cast iron, the system will need to be rebalanced (See [Section 4](#)).
4. **The following conditions should be observed on all systems:**
 - Drain cocks should be fitted to all system low points.
 - All gas and water pipes and electrical wiring must be installed in a way which would not restrict the servicing of the boiler.
 - Position isolating valves as close to circulating pump as possible.

6.2 Treatment of Water Circulating Systems

1. All recirculatory water systems will be subject to corrosion unless they are flushed and an appropriate water treatment is applied. To prevent this, follow the guidelines given in BS7593 "Treatment of Water in Domestic Hot Water Central Heating Systems" and the treatment manufacturers instructions.
2. Treatment must involve the use of a proprietary cleanser, such as Fernox F3 and an inhibitor such as Fernox MB-1.
3. Full instructions are supplied with the products, for further information contact Fernox (0870 870 0362).

Failure to flush and add inhibitor to the system will invalidate the appliance warranty.

4. It is important to check the inhibitor concentration after installation, system modification and at every service in accordance with the inhibitor manufacturer's instructions. (Test kits are available from inhibitor stockists.)
5. For information or advice regarding any of the above contact Technical Enquiries 0844 871 1555.

6.3 Pipework

1. The sizes of flow and return pipes from the boiler should be determined by normal methods, according to the requirements of the system. The connections to the boiler will accept 22mm pipe fittings. Compression fittings must be used to prevent heat damage to the boiler (as supplied see [Section 9.3](#)).
2. A 20 °C drop in temperature across the system is recommended for condensing boilers, but where radiator sizing is marginal it may be advisable to retain a system temperature drop of 11°C.
3. In systems using non-metallic pipework it is necessary to use copper pipe for the boiler Flow and Return. The copper must extend at least 1 metre from the boiler and include any branches ([Fig. 4](#)).

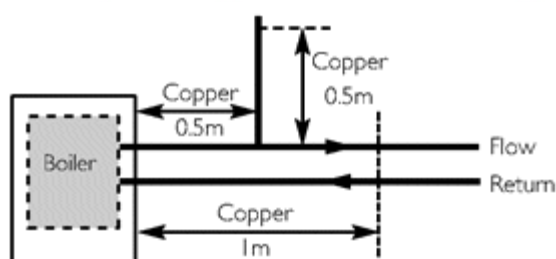


Fig. 4

6.4 Bypass Requirements

1. An Automatic Bypass must be fitted. The appliance requires a minimum bypass of 7 l/min for open vented systems.

6.5 Magnetic Cleaner ([Fig. 5](#))

1. A 'ADEY MagnaClean TwinTech' Magnetic Filter must be fitted on the return to boiler as close to the appliance as possible.

FAILURE TO FIT THIS DEVICE WILL INVALIDATE THE APPLIANCE WARRANTY.

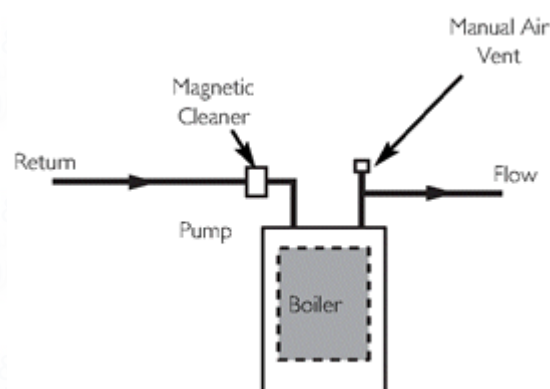


Fig. 5

6.6 Sealed Systems Details ([Fig. 8](#))

1. **SAFETY VALVE** - A safety valve complying with the requirements of BS 6750 Part 1 must be fitted close to the boiler on the flow pipe by means of a horizontal or vertically upward connection with no intervening valve or restrictions and should be positioned to facilitate testing. The valve should be pre-set and non-adjustable to operate at a pressure of 3 bar (45 lbf/in²). It must be arranged to discharge any water or steam through a pipe to a safe outlet position.
2. **PRESSURE GAUGE** - A pressure gauge of minimum range 0-4 bar (0-60 lbf/in²) with a fill pressure indicator must be fitted to the system, preferably at the same point as the expansion vessel in an easily visible position.
3. **EXPANSION VESSEL** - An expansion vessel complying with the requirements of BS 4814 must be fitted to the system by means of a connection close to the inlet side of the circulating pump in accordance with the manufacturer's instructions, the connecting pipe being unrestricted and not less than 15mm (1/2 in) nominal size. The volume of the vessel should be suitable for the system water content and the nitrogen or air charge pressure should not be less than the system static head (See [Table. 1](#)). Further details of sealed system design can be obtained from BS 5449 and the British Gas publication entitled 'Specifications for Domestic Wet Central Heating Systems'.
4. **FILLING LOOP** - A filling loop connection on the central heating return pipework must be provided to facilitate initial filling and pressurising and also any subsequent water loss replacement / refilling. The sealed primary circuits may be filled or replenished by means of a temporary connection between the primary circuit and a supply pipe provided a 'Listed' double check valve or some other no less effective backflow prevention device is permanently connected at the inlet to the circuit and the temporary connection is removed after use. The filling method adopted must be in accordance with all relevant water supply regulations and use approved equipment. Your attention is drawn to, for GB: Guidance G24.2 and recommendation R24.2 of the Water Regulations Guide. for IE: the current edition of I.S. 813 "Domestic Gas Installations".
5. **VENTING** - A method of venting the system during filling and commissioning must be provided by fitting manual vents. Care must be taken to ensure any air in the system is completely vented.
6. **HOT WATER STORAGE** - The hot water storage vessel must be of the indirect coil type. All components used in the system must be suitable for operation at 110°C and at the pressure allowed by the safety valve.

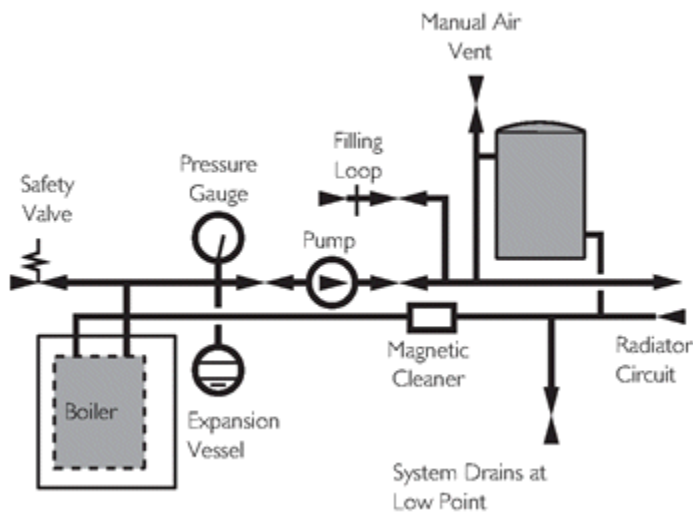


Fig. 8

Method of determining minimum valve of expansion vessel volume for sealed system

Vessel Charge Pressure (Bar)	Initial System Pressure (Bar)	Multiply Total Water Content Of System By (Litres)
1.0	1.0	0.087
	1.5	0.152
	2.0	0.330
1.5	1.5	0.125
	2.0	0.265

Table. 1

Example :- System Volume = 75 litres

Vessel Charge Pressure = 1.0 bar

Initial System Pressure = 1.5 bar

Then :- $75 \times 0.152 = 11.4$ litres

Expansion Vessel Volume = 12 litres

NOTE Where a vessel of the calculated size is not obtainable then the next available larger size should be used.

1. A THINK Controller is mounted on the appliance as standard (It can be mounted on a wall cradle and configured to use as a room sensor).

IMPORTANT: Before running the appliance ensure parameter 5700 has been set according to the type of system installed.

See [sections 10.4](#) to [10.11](#) for system types and [section 11.3.k](#) for the change procedure.

2. There Are 4 other optional control components as well as the THINK Controller which can be used in conjunction with the Ecogen appliance these are: -

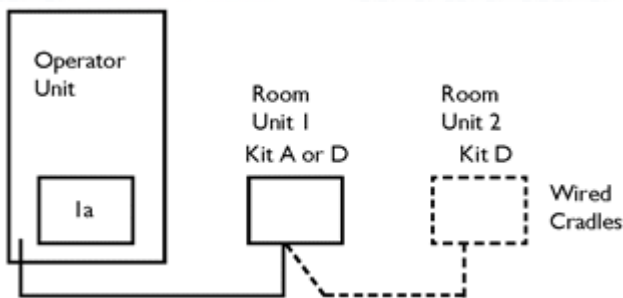
- A wired 5 LED Receiver - to run on or off the appliance.
- An RF 5 LED Receiver - to run on or off the appliance.
- A wired Wall cradle for the THINK Controller or either 5 LED Receiver.
- An RF Wall cradle for the THINK Controller.

3. The following Kits are available: -

- A) A wired Wall cradle with a wired 5 LED Receiver.
- B) An RF Wall cradle with An RF 5 LED Receiver.
- C) An RF Wall cradle with a THINK Controller.
- D) A wired Wall cradle with a THINK Controller.

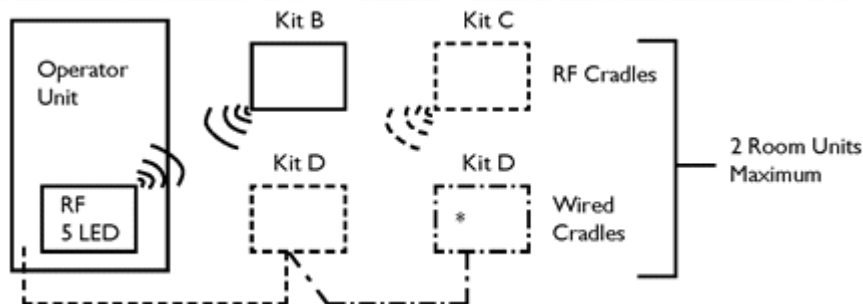
These can be combined to give the following set ups in the property

All wired connections



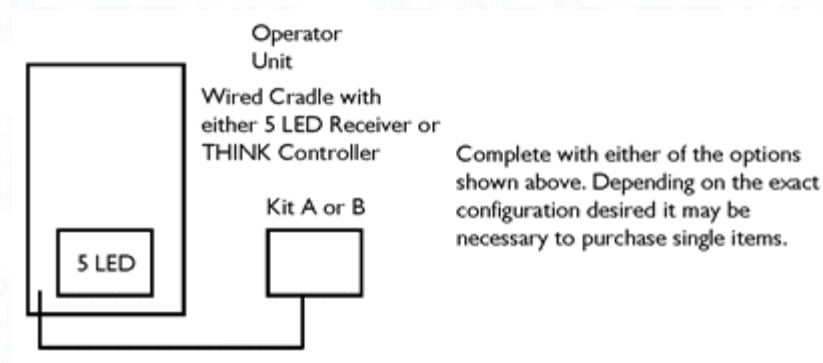
1a - THINK Controller or 5 LED Receiver

All RF connections or mixed



* A THINK Controller here implies that the RF facility is not being used - the customer has reverted to an all wired system

All RF connections or mixed with the user reset off appliance



NOTE:- Either a 5 LED Receiver or a THINK Controller must be fitted to the appliance for the safety of the user or visiting service personnel.

page 15

7.0 Site Requirements

7.1 Location

1. Must not be located in a living space (recommend locations, garage, utility, and outhouse).
2. There must be sufficient space at the installation location and in the route to the location for maneuvering and operating the lifting equipment (Genie GL-8 lifting equipment dimensions are 64cm wide x 175cm high x 95cm deep). This space must be maintained for future access of the lifting equipment for maintenance.
3. Wall structure must be a solid flat load bearing wall of brick or block. Partition and timber frame walls, and dot and dab plaster board are not suitable. If in doubt consult a Structural Engineer.
4. To eliminate the transmission of noise from the appliance and its pipework it is recommended that the central heating pipework is adequately routed and clipped so that contact between the structure of the building and pipework is eliminated.

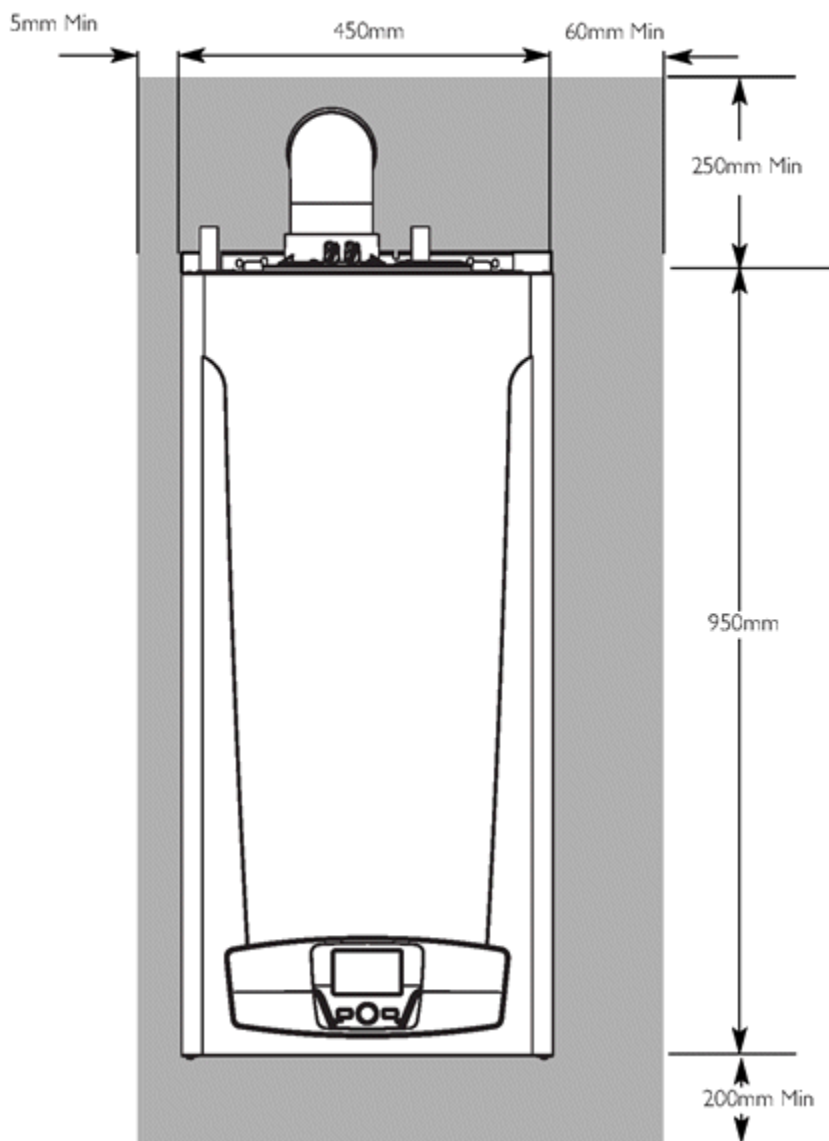


Fig. 9

Ensure that there is adequate clearance for the lifting equipment. (Genie GL-8 lifting equipment dimensions are 64cm wide x 175cm high x 95cm deep).

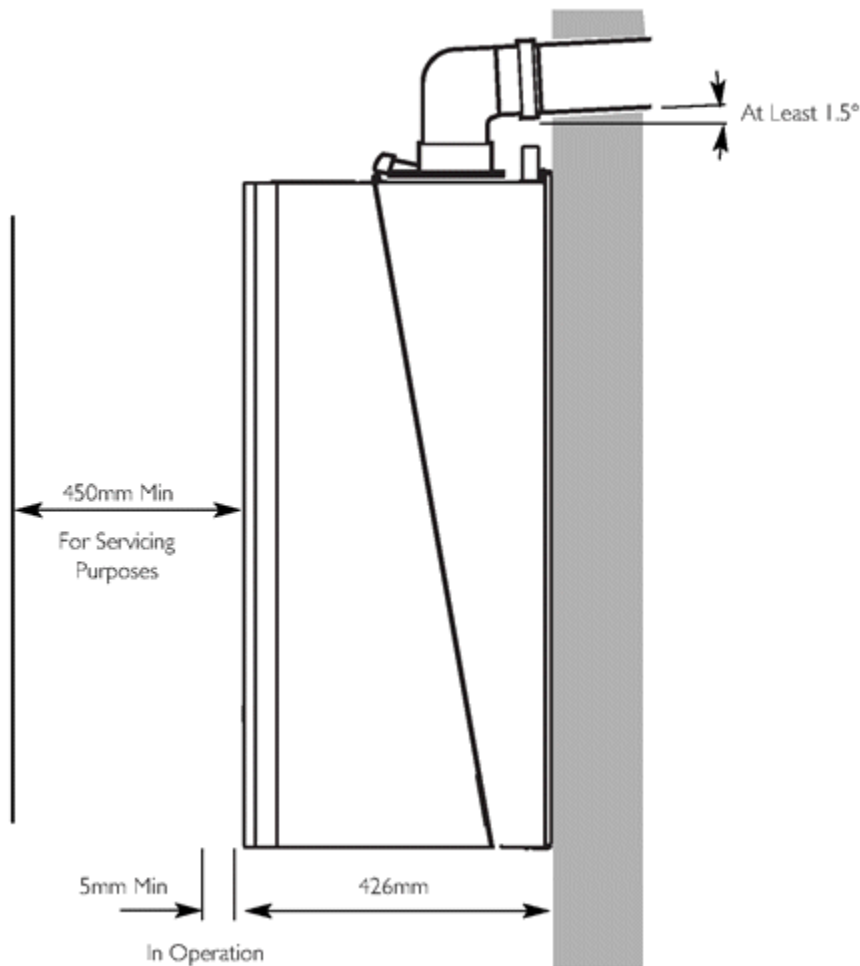


Fig. 10

7.2 Clearances ([Figs. 9 & 10](#))

1. A flat vertical area is required for the installation of the boiler.
2. These dimensions include the necessary clearances around the boiler for case removal, spanner access and air movement. Additional clearances may be required for the passage of pipes around local obstructions such as joists running parallel to the front face of the boiler.
3. **Ensure that there is adequate clearance for the lifting equipment** (Genie GL-8 lifting equipment dimensions are 64cm wide x 175cm high x 95cm deep).

7.3 Ventilation of Compartments

1. Where the appliance is installed in a cupboard or compartment, no air vents are required.
2. BS 5440: Part 2 refers to room sealed appliances installed in compartments. The appliance will run sufficiently cool without ventilation.

7.4 Gas Supply

1. The gas installation should be in accordance with the relevant standards. In GB this is BS 6891 (Natural Gas) or BS 5482-1 (Propane Gas). In IE this is the current edition of I.S. 813 "Domestic Gas Installations".
2. A gas service cock is supplied to enable connection using 15mm copper pipe ([Fig. 11](#)).
3. Ensure that the pipework from the meter to the appliance is of adequate size, and the demands of any other gas appliances in the property are taken into consideration. It is recommended that 22mm diameter pipe is used to within 1m of the appliance.

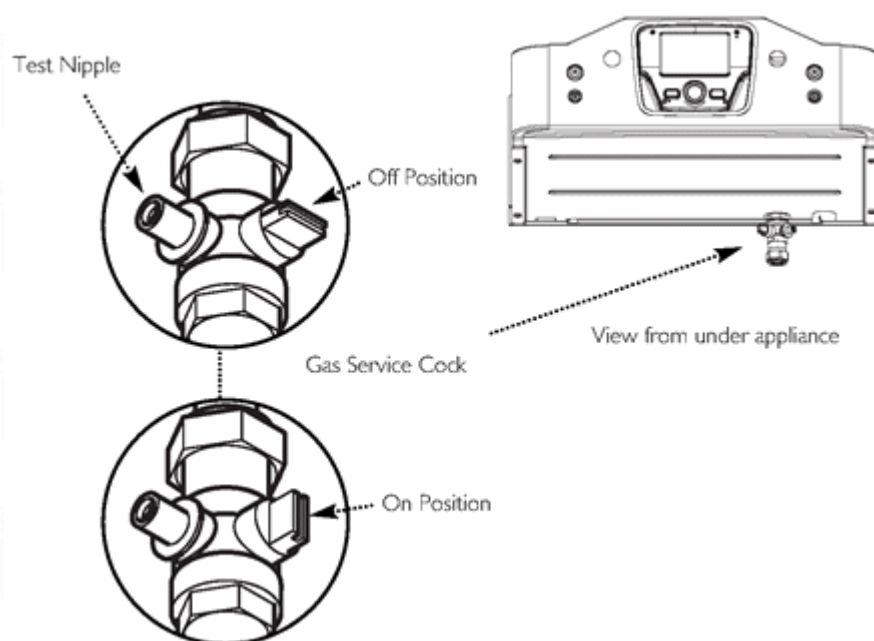


Fig. 11

7.5 Electrical Supply

1. External wiring must be correctly earthed, polarised and in accordance with relevant regulations/rules. In GB this is the current I.E.E. Wiring Regulations. In IE reference should be made to the current edition of ETCI rules.
2. The mains supply is 230V ~ 50Hz fused at 13A.

NOTE: The method of connection to the electricity supply must facilitate complete electrical isolation of the appliance.

Connection must be via a 13A BS1363 Switched Fuse Spur servicing the boiler and system controls only.

NOTE: this appliance will not work in conjunction with prepaid meters. Prepaid meters must be replaced by the electricity provider to enable export of electricity back into the grid.

page 17

7.6 Heating Plant Emissions Rate (HPER)

1. To enable the house holder to claim the Feed in tariff (FIT) the heating plant emission rate must be calculated and entered into the MCS certification submission and recorded in the Micro chp system commissioning checklist benchmark sheets at the back of these instructions.

See the Baxi website to calculate the HPER values

<http://www.baxi.co.uk/products/get-fit-with-baxi-ecogen.htm>.

Calculate perform - <http://www.ecogen.baxi.co.uk/mcsperform>

2. To find the Heating Plant Emissions Rates for Plant Size Ratios between 0.5 and 4.0 please see the table below.

PSR	HPER
0.5	0.295
0.6	0.282
0.7	0.269
0.8	0.256
0.9	0.243
1	0.231
1.1	0.225
1.2	0.219
1.3	0.213
1.4	0.207
1.5 to 4	0.201

7.7 Electrical Connection - General

1. The product must be installed by a competent trained electrician that has been on a Baxi approved course.
2. The fuse rating of the securable isolator shall be 13A.
3. A mains supply of 230V ~50Hz is required.
4. Mains wiring external to the product must be in accordance with the **current IEE (BS 7671)** Requirements for Electrical Installation (Wiring Regulations) and any local regulations.
5. Connection must be made in a way that allows complete isolation of the electricity supply - a double pole switch serving only the product and system controls. The manual isolation switch shall be capable of being secured in the off (isolated) position.

ation) position; this switch is to be located in an accessible position within the customer's installation.

6. Connection to the mains must be made in accordance with the latest addition of the Engineering Recommendation G83 - Recommendations for the connection of Small - Scale Embedded Generators (SSEG) in parallel with public low voltage distribution networks.
7. The Distribution Network Operator (DNO) must be provided with information regarding the SSEG Guidance Notes, installation on the day of commissioning. A notification sheet is provided which should be completed and sent to your Distribution Network Operator (DNO) - alternatively this may be done through the DNO's website.
8. Two labels ([Figs. 12](#) & [12a](#)) are provided to be placed at:-

- a) The consumer unit
- b) The appliance

9. The installer shall provide labeling at the supply terminals (fused cut-out), meter position, consumer unit and at all points of isolation within the user's premises to indicate the presence of a micro-CHP unit. An example of the warning label to be left on site is shown ([Fig. 12a](#)).
10. There are two ways in which the Ecogen 24/1.0 appliance can be electrically installed.

Connection by dedicated circuit ([Fig. 13](#))

Connection into an existing final circuit ([Fig. 13a](#))

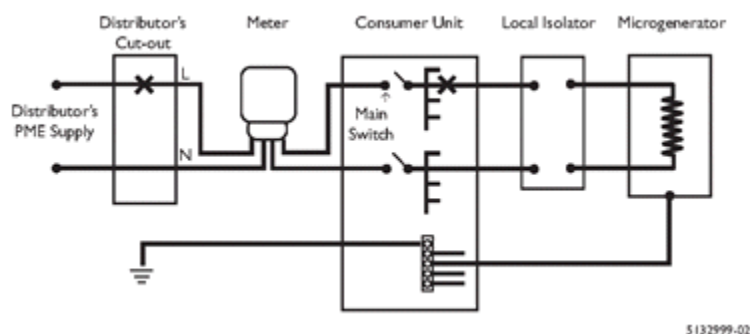


Fig. 12

WARNING - DUAL SUPPLY



ISOLATE BOTH MAINS AND ON-SITE GENERATION
BEFORE CARRYING OUT WORK

ISOLATE THE
MAINS AT

ISOLATE THE
GENERATOR AT

7.7 Installer information

11. Whichever of the two options is chosen, it is imperative that the safety of the electrical installation is not impaired by the installation of the Ecogen 24/1.0.
12. To enable the FIT to be claimed the electricity generated and exported must be monitored by meters installed into the electricity supply as shown in [Figs. 13](#), [13a](#) and [13b](#), for the export either bi-directional meters as in [Figs. 13](#) and [13a](#), or by leaving the existing meter and adding an additional meter as in [Fig. 13b](#). An extra meter must be added just before the appliance to measure the electrical generation. The serial number must be submitted for MCS submission and recorded in both the DNO leaflet and the Micro CHP system commissioning checklist benchmark sheets at the back of these instructions.
13. **The Ecogen 24/1.0 must not be connected to an installation by means of a plug and socket.**
14. The essential criteria which must be met are given below for both options.
15. **Connection of an Ecogen to a dedicated circuit**

(i) The basic design parameters for the circuit are:

$I_b > I_g$ where I_b is the design current and I_g is the rated output current of the Ecogen

$I_n > I_b$ where I_n is the nominal current of the overload protective device

Disconnection of the final circuit in the event of an earth fault on the circuit and de-energising of the Ecogen should both occur within an overall maximum time of 0.4 s for TN systems and 0.2 s for TT systems. However, if the protective device for automatic disconnection in case of an earth fault disconnects line and neutral conductors, it is not necessary to take account of the time taken for the Ecogen to de-energise.

(ii) Where an Ecogen is connected on the same side of an RCD as final circuits protected by that RCD, the RCD must disconnect the line and neutral conductors.

(iii) The Ecogen must be provided with means of isolation and of switching off for mechanical maintenance.

16. Connection of a Ecogen to an existing final circuit

(i) The basic design parameters for the circuit are:

$I_z > I_n + I_g$ where I_z is the current carrying capacity of the conductors of the final circuit, I_n is the nominal current of the overload protective device and I_g is the rated output current of the Ecogen. This may require the protective device to be replaced with one having a lower nominal current rating.

Disconnection of the final circuit in the event of an earth fault on the circuit and de-energising of the Ecogen should both occur within an overall maximum time of 0.4 s for TN systems and 0.2 s for TT systems. However, if the protective device for automatic disconnection in case of an earth fault disconnects line and neutral conductors, it is not necessary to take account of the time taken for the Ecogen to de-energise.

IMPORTANT: In designing a connection for the Ecogen 24/1.0 the electrical installer has to consider all the issues that would need to be covered for a conventional final circuit, including:-

In Accordance with BS: 7671.

- the maximum demand (and the generator output)
- the type of earthing arrangement
- the nature of the supply
- external influences
- compatibility, maintainability and accessibility
- protection against electric shock
- protection against thermal effects
- protection against over current
- isolation and switching
- equipment selection and installation issues

The electrical installer should check that the prospective fault current would not change sufficiently to exceed the fault rating of existing protective devices.

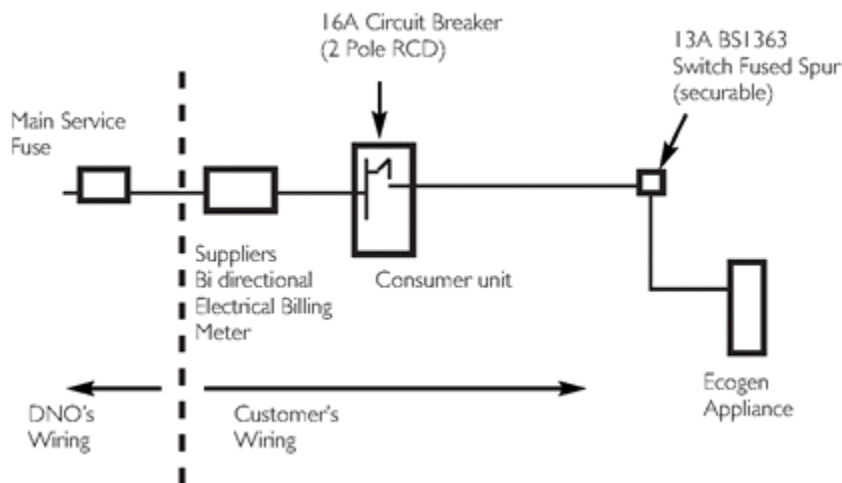


Fig. 13

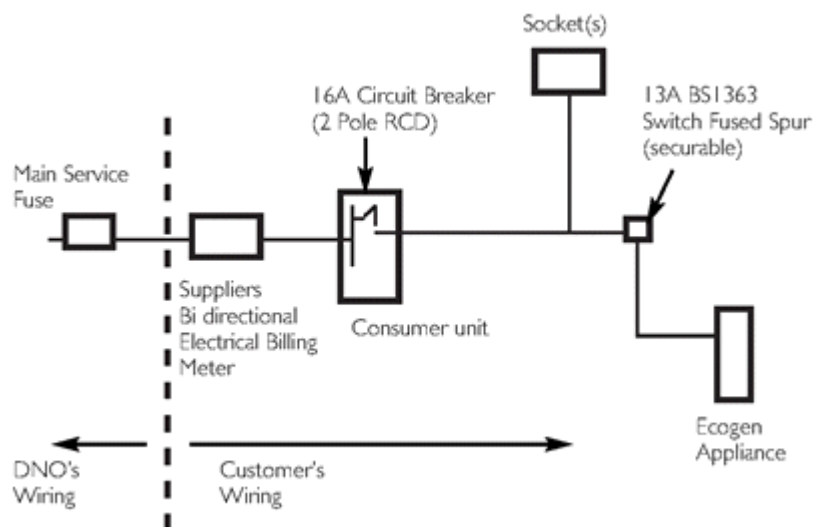


Fig. 13a

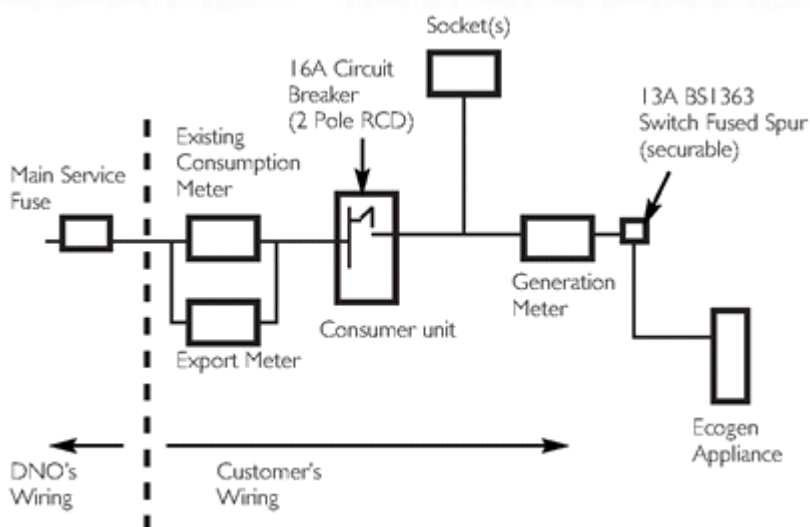


Fig. 13b

7.8 Condensate Drain

FAILURE TO INSTALL THE CONDENSATE DISCHARGE PIPEWORK CORRECTLY WILL AFFECT THE RELIABLE OPERATION OF THE BOILER.

CAREFUL CONSIDERATION MUST BE GIVEN TO THE POSSIBILITY OF THE PIPEWORK BEING SUBJECT TO FREEZING CONDITIONS AND APPROPRIATE MEASURES TAKEN TO PREVENT BLOCKAGE. CORRECT INSTALLATION IN ACCORDANCE WITH THIS SECTION WILL CONSIDERABLY MI

NIMISE

THE LIKELIHOOD OF BLOCKAGE AND SUBSEQUENT BOILER LOCK-OUT.

A CONDENSATE DISCHARGE PUMP AND PIPE 'TRACE HEATING' ARE AVAILABLE AS ACCESSORIES

- see paragraph 7.8.12 to 7.8.15 for further details.

The condensate discharge pipe **MUST NOT RISE** at any point along its length.

There **MUST** be a fall of **AT LEAST 2.5°**

(50mm per metre) along the entire run **EXCEPT** when employing a suitable condensate pump in basement and cellar or similar applications.

The boiler condensate trap incorporates a seal of 75mm, therefore it is unnecessary to install an air break and trap in the discharge pipework.

1. The condensate outlet will accept 21.5mm (3/4in) plastic overflow pipe. **It is strongly recommended that this discharges internally into the household drainagesystem.** Where this is not possible, discharge into an outside drain is permissible providing every possible precaution is taken to prevent freezing.
2. Ensure the discharge of condensate complies with any national or local regulations in force. **BS 6798 & Part H1 of the Building Regulations give further detailed guidance.**
3. The discharge pipe should be run in a proprietary drain pipe material e.g. PVC, PVC-U, ABS, PVC-C or PP.
4. Metal pipework is **NOT** suitable for use in condensate discharge systems.
5. The pipe should be a minimum of 21.5mm diameter and must be supported using suitably spaced clips of the correct design to prevent sagging.
6. **It is advisable that the full length of condensate pipe is run internally and preferably be less than 3 metres.**
7. **Internal runs greater than 3 metres or runs in cold areas should use 32mm waste pipe.**
8. **External runs MUST be a MINIMUM of 32mm and fully insulated with material suitable for external use.**
9. If the boiler is fitted in an unheated location the entire condensate discharge pipe should be treated as an external run and sized and insulated accordingly.
10. In all cases discharge pipe must be installed to aid disposal of the condensate. To reduce the risk of condensate being trapped, as few bends and fittings as possible should be used and any burrs on cut pipe removed.

Examples are shown of the following methods of termination:-

[i\) to an internal soil & vent pipe](#)

[ii\) via an internal discharge branch \(e.g. sink waste\) downstream of the trap](#)

[iii\) to a drain or gully](#)

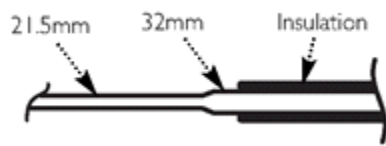
[iv\) to a purpose made soakaway](#)

[v\) pumped into an internal discharge branch \(e.g. sink waste\) downstream of the trap](#)

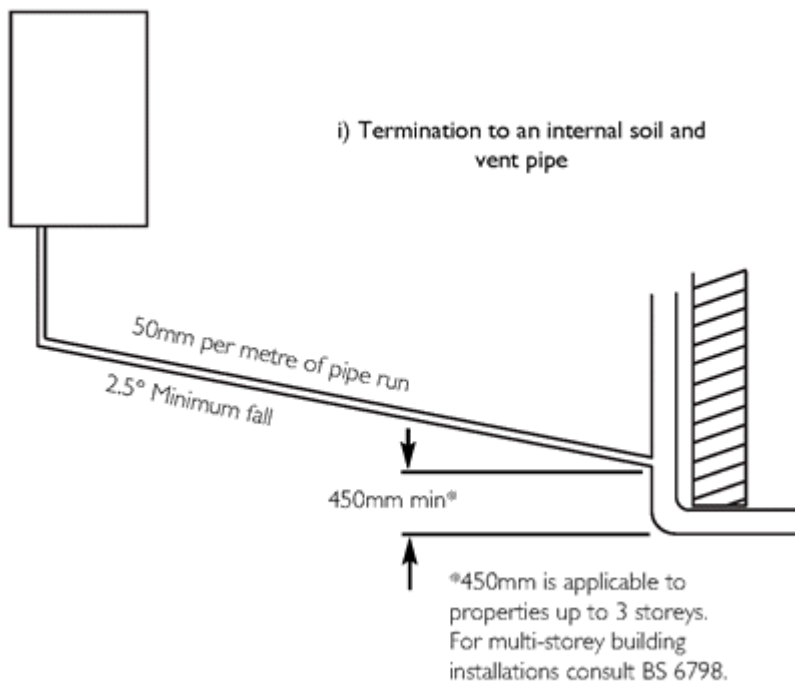
[vi\) pumped into an external soil & vent pipe](#)

[vii\) to a drain or gully with extended external run & trace heating](#)

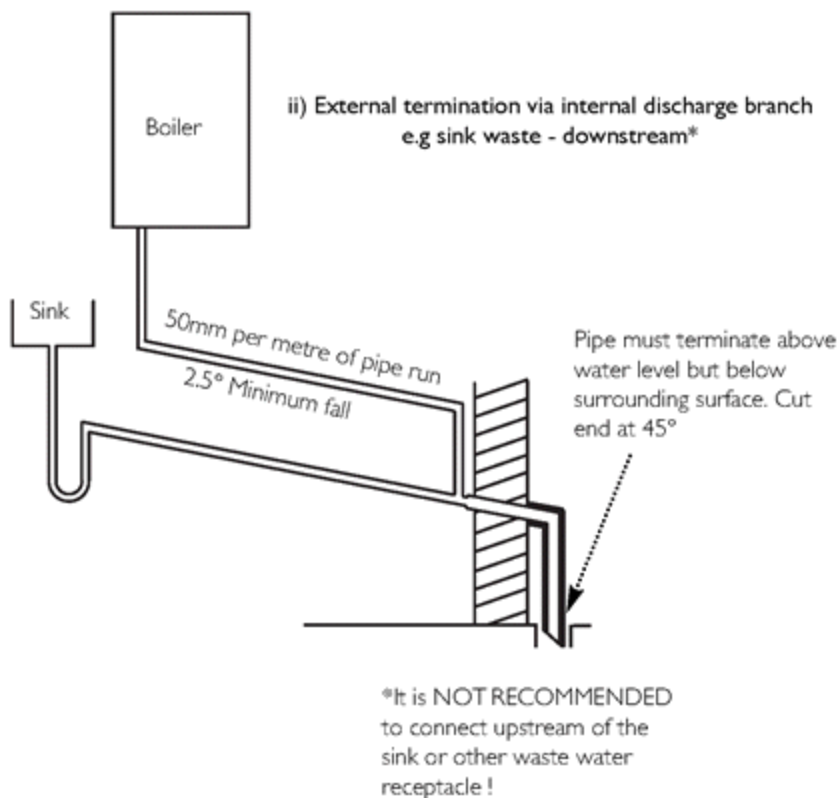
It is strongly recommended to discharge internally into the household drainage system. If connecting to a rain water drain, that drain **MUST** discharge into a foul drain.



i) Termination to an internal soil and vent pipe



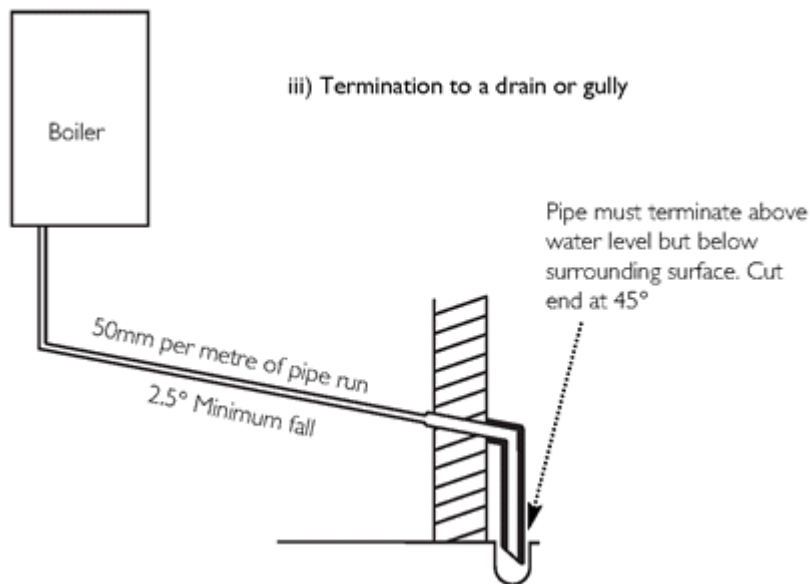
ii) External termination via internal discharge branch e.g sink waste - downstream



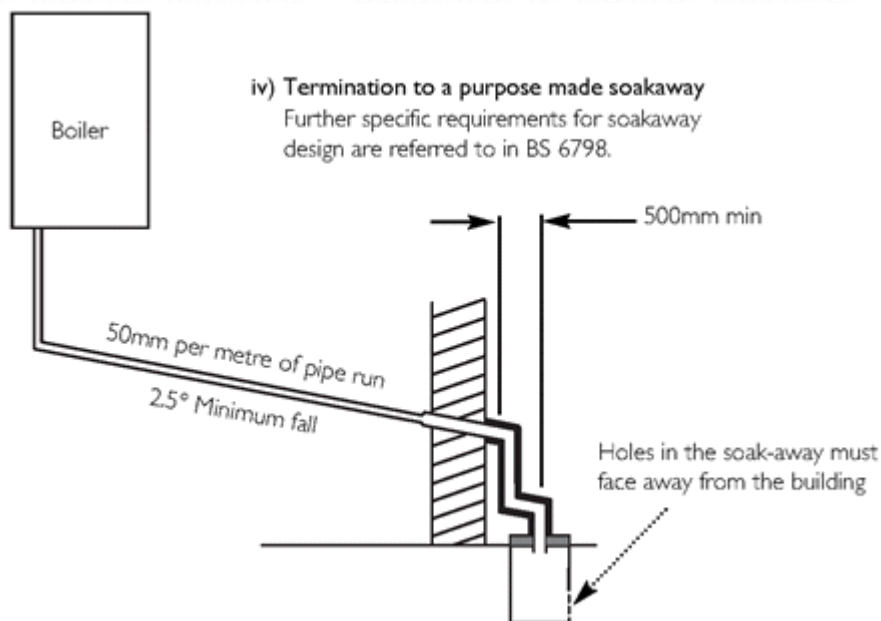
page 20

11. When discharging condensate into a soil stack or waste pipe the effects of existing plumbing must be considered.
If soil pipes or waste pipes are subjected to internal pressure fluctuations when WC's are flushed or sinks emptied then back-pressure may force water out of the boiler trap and cause appliance lockout.

iii) Termination to a drain or gully



iv) Termination to a purpose made soakaway Further specific requirements for soakaway design are referred to in BS 6798.



page 21

12. A boiler discharge pump is available, 'MULTIFIT' part no. 720648301. This pump will dispose of both condensate & high temperature water from the relief valve. It has a maximum head of 5 metres.

Follow the instructions supplied with the pump.

13. Condensate Drain Pipe 'Trace Heating' Elements are available in various lengths. 'MULTIFIT' part nos.:-

- 1 metre 720644401
- 2 metre 720664101
- 3 metre 720664201
- 5 metre 720664401*

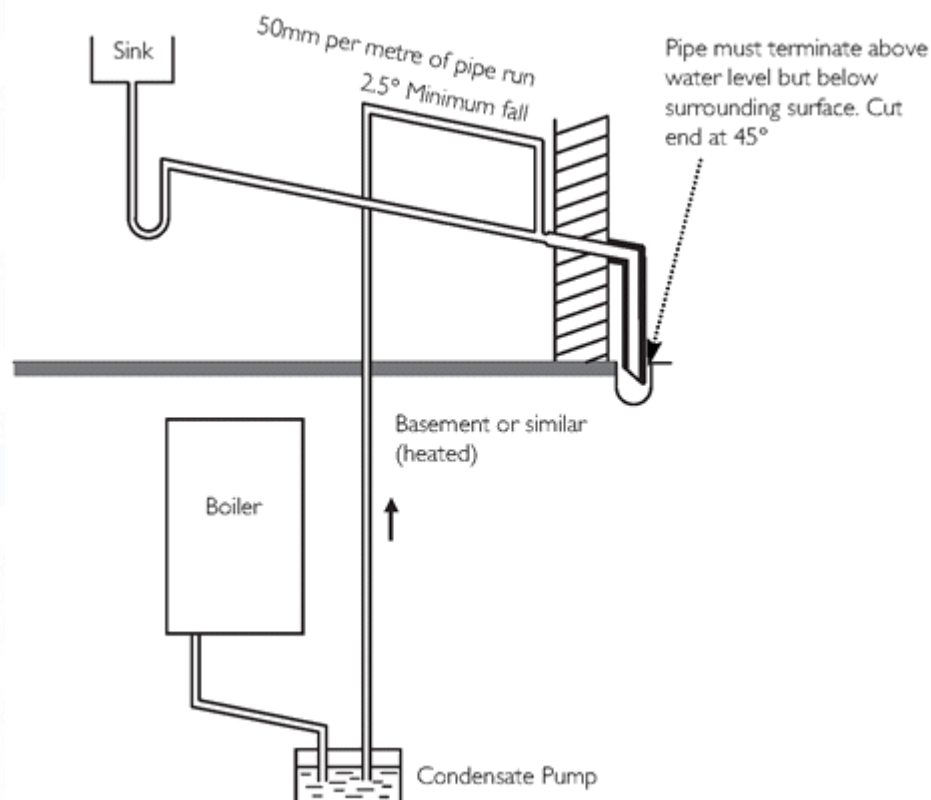
* Where the drain is between 3 & 5 metres a 5 metre kit can be used and "doubled back" upon itself.

14. It is possible to fit the element externally on the condensate drain or internally as detailed in the instructions provided.

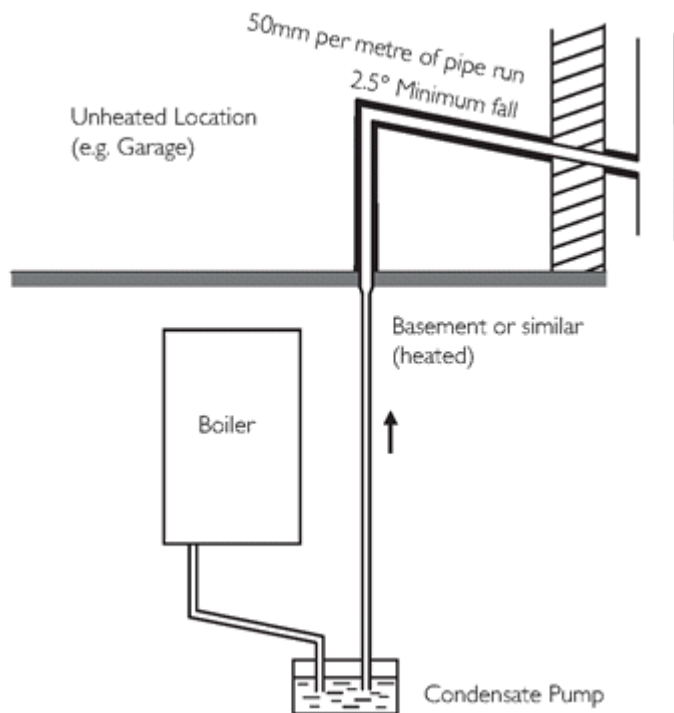
15. The fitting of a 'Trace Heating' Element is NOT a substitute for correct installation of the condensate drain.

ALL requirements in this section must still be adhered to.

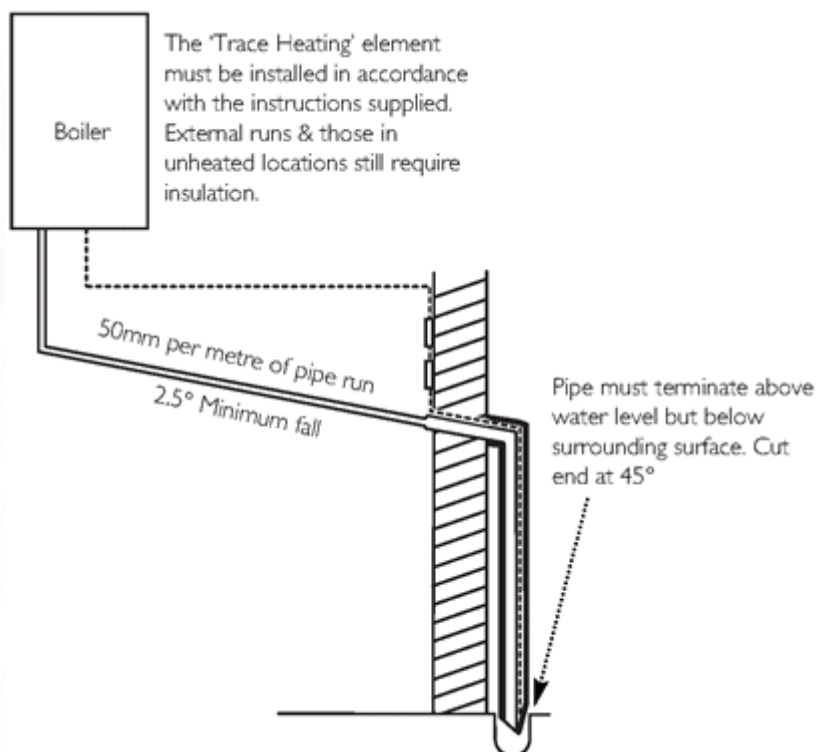
v) pumped into an internal discharge branch (e.g. sink waste) downstream of the trap



vi) pumped into an external soil & vent pipe



vii) to a drain or gully with extended external run & trace heating



NOTE: Due to the nature of the boiler a plume of water vapour will be discharged from the flue. This should be taken into account when siting the flue terminal.

1. The following guidelines indicate the general requirements for siting balanced flue terminals. For GB recommendations are given in BS 5440 Pt 1. For IE recommendations are given in the current edition of I.S. 813 "Domestic Gas Installations".
2. If the terminal discharges onto a pathway or passageway, check that combustion products will not cause a nuisance and that the terminal will not obstruct the passageway.
3. If a terminal is less than 2 metres above a balcony, above ground or above a flat roof to which people have access, then a suitable terminal guard must be provided.
4. * Reduction to the boundary is possible down to 25mm but the flue deflector kit (part no. 5111068) must be fitted.

IMPORTANT:

- Under car ports we recommend the use of the plume displacement kit.
- The terminal position must ensure the safe and nuisance - free dispersal of combustion products.

Terminal Position with Minimum Distance (Fig. 15)	(mm)
A ¹ Directly below an opening, air brick, opening windows, etc.	300
B ¹ Above an opening, air brick, opening window etc.	300
C ¹ Horizontally to an opening, air brick, opening window etc.	300
D ² Below gutters, soil pipes or drain pipes.	25 (75)
E ² Below eaves.	25 (200)
F ² Below balconies or car port roof.	25 (200)
G ² From a vertical drain pipe or soil pipe.	25 (150)
H ² From an internal or external corner.	25 (300)
I Above ground, roof or balcony level.	300
J From a surface or boundary line facing a terminal.	600
K From a terminal facing a terminal (Horizontal flue).	1200
From a terminal facing a terminal (Vertical flue).	600
L From an opening in carport (e.g. door, window) into the dwelling.	1200
M Vertically from a terminal on the same wall.	1500
N Horizontally from a terminal on the same wall.	300
R From adjacent wall to flue (vertical only).	300
S From an adjacent opening window (vertical only).	1000
T Adjacent to windows or openings on pitched and flat roofs	600
U Below windows or openings on pitched roofs	2000

¹ In addition, the terminal should be no nearer than 150 mm to an opening in the building fabric formed for the purpose of accommodating a built-in element such as a window frame.

² Only **ONE** 25mm clearance is allowed per installation. If one of the dimensions D, E, F, G or H is 25mm then the remainder **MUST** be as shown in brackets, in accordance with B.S.5440-1.

NOTE: The distance from a fanned draught appliance terminal installed parallel to a boundary may not be less than 300mm in accordance with the diagram below

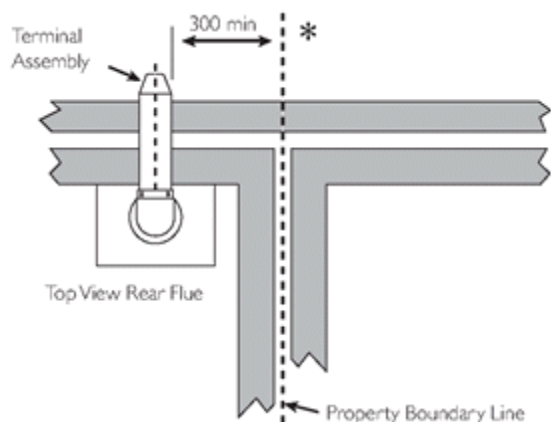


Fig. 14

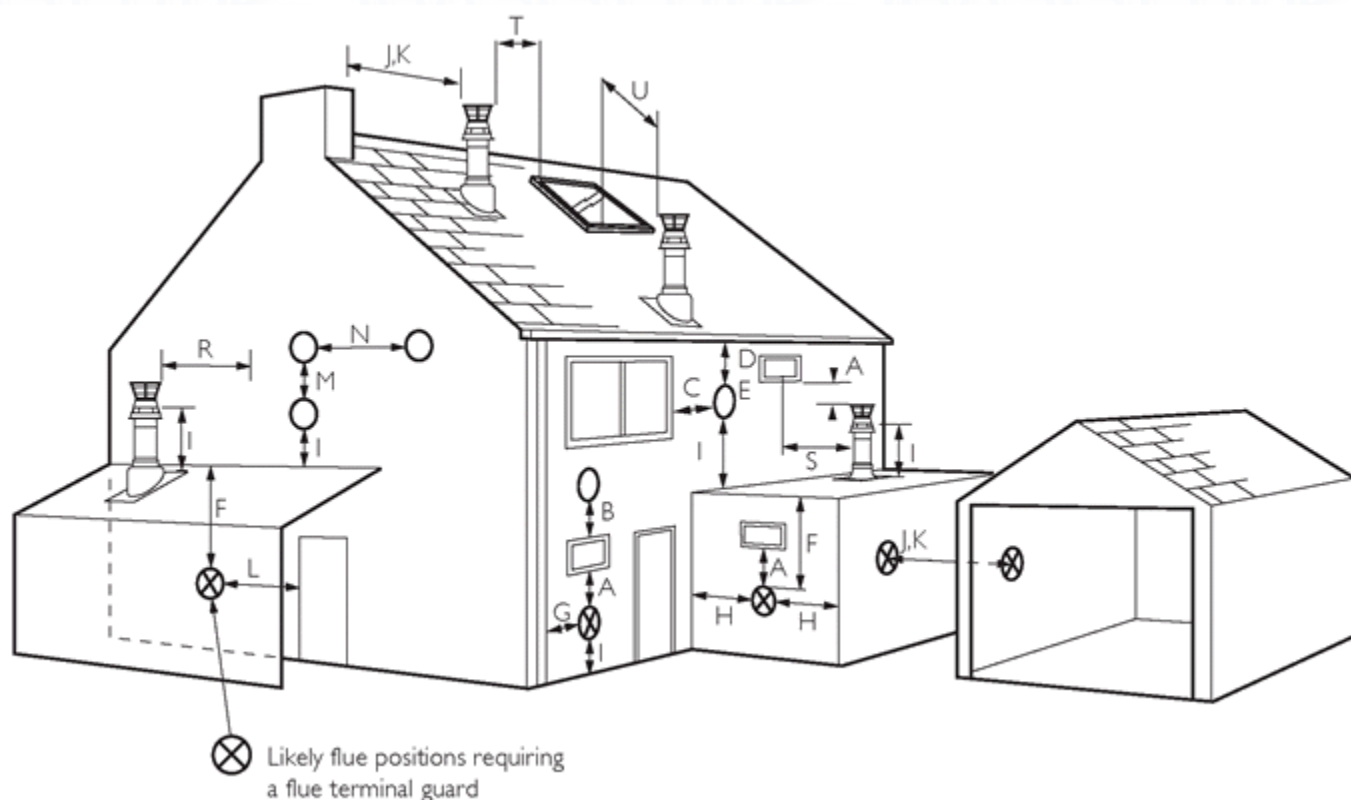


Fig. 15

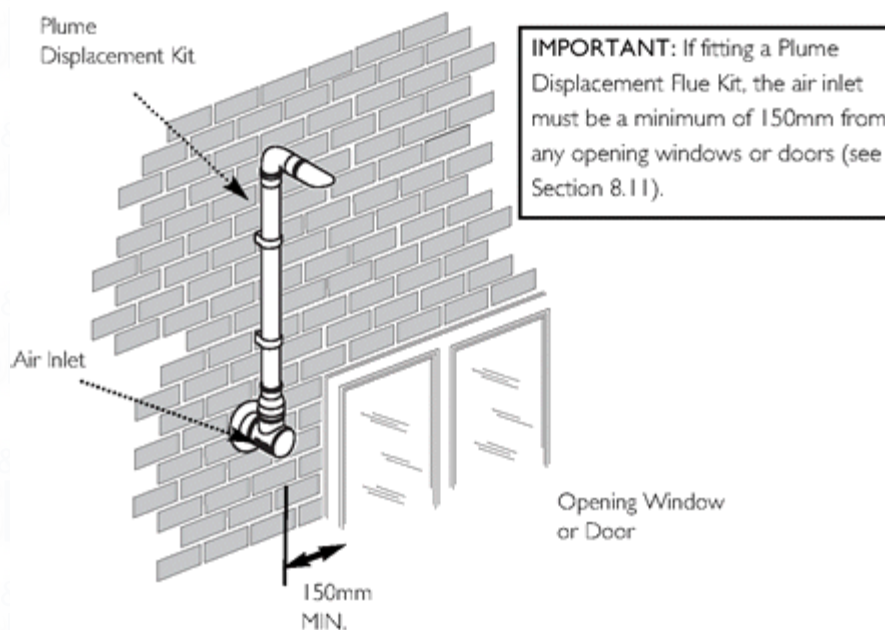


Fig. 15a

page 23

8.0 Flue Options

8.1 Horizontal Flue Systems

1. The standard flue is suitable only for horizontal termination applications.
2. All fittings should be fully engaged. The approximate engagement is 40 mm. Use the lubrication provided in the kit to aid assembly.
3. For long flue runs allow 5 mm per metre for expansion.
4. Maximum permissible equivalent flue lengths are:- Horizontal Concentric (60/100) 5 metres
5. Any additional "in line" bends in the flue system must be taken into consideration.

Their equivalent lengths are:-

Concentric Pipes:

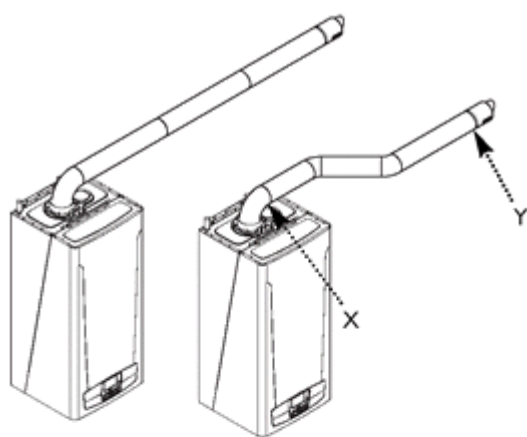
(60/100)	135° bend 0.5 metres
	93° bend 1.0 metres

The elbow supplied with the standard horizontal telescopic flue kit is not included in any equivalent length calculations

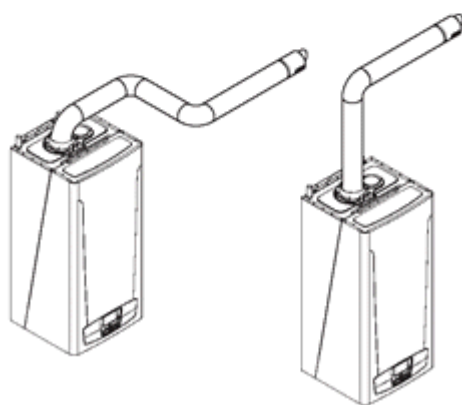
NOTE: Flue length is measured from point X to Y as shown.

IMPORTANT: All flue systems must be securely supported at least once every metre. Suitable pipe supports are available as accessories.

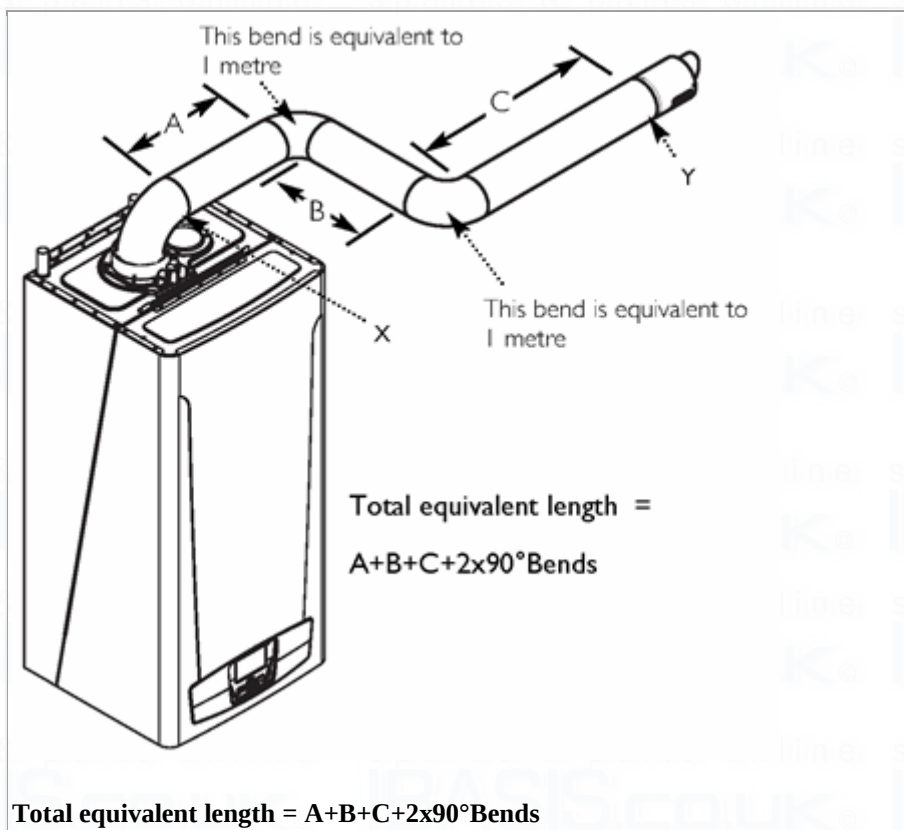
Horizontal Flues



Horizontal
Flues



NOTE: Horizontal flue pipes should always be installed with at least 1.5° fall from the terminal to allow condensate to run back to the boiler.



page 24

8.2 Twin & Vertical Flue Systems

1. Maximum permissible equivalent flue lengths are:-

Vertical Concentric (60/100) 5 metres
 Vertical Twin Pipe (80/80) 10 metres

2. Any additional "in line" bends in the flue system must be taken into consideration.

Their equivalent lengths are:-

Concentric Pipes:

135° bend 0.5 metres
 93° bend 1.0 metres

Twin Flue Pipe

135° bend 0.25 metres
 91.5° bend 0.50 metres

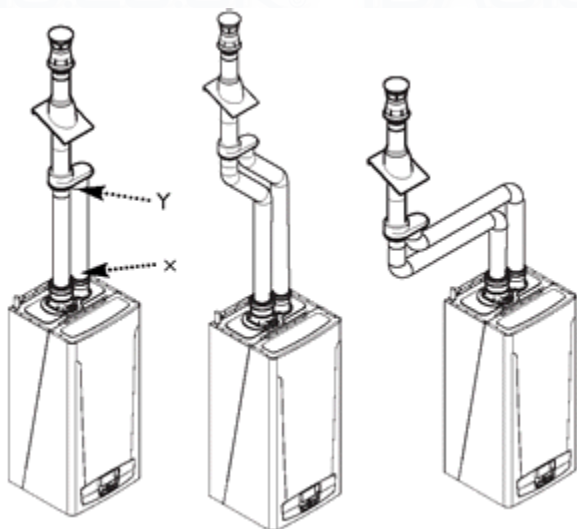
The elbow supplied with the standard horizontal telescopic flue kit is not included in any equivalent length calculations

NOTE: Flue length is measured from point X to Y as shown.

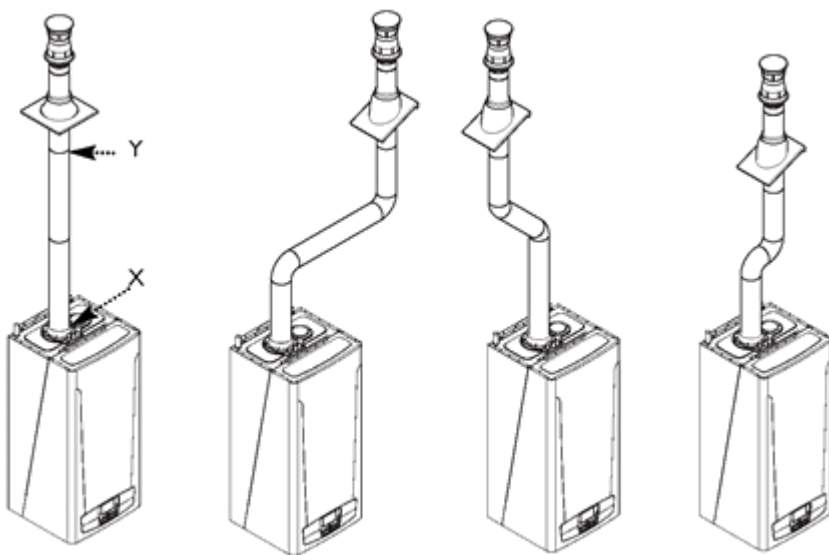
IMPORTANT:

All flue systems must be securely supported at least once every metre.
Suitable pipe supports are available as accessories.

Vertical Flues (Twin Pipe)



Vertical Flues



Total Equivalent Length =
A+B+C+1x90°Bend

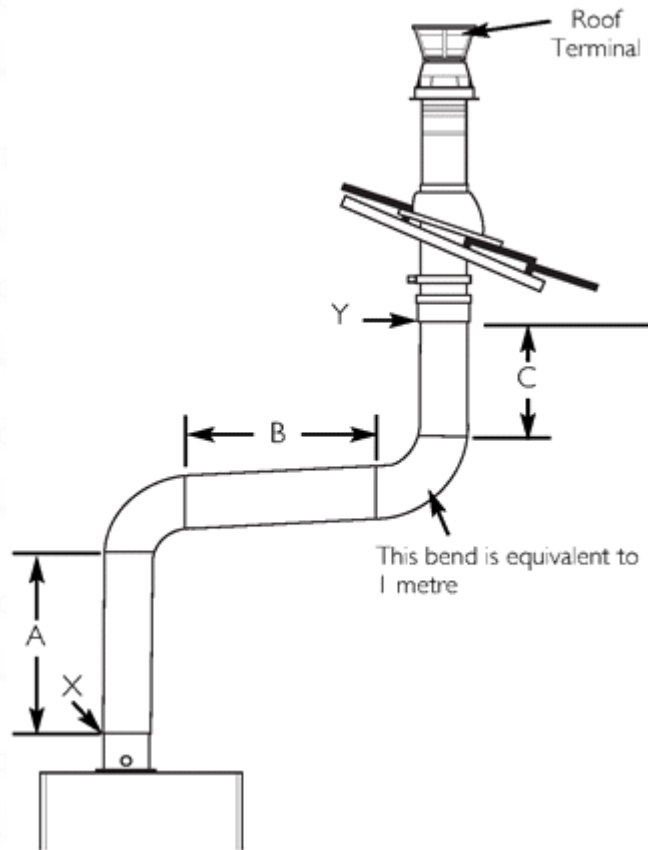
All vertical and angled runs must be included, measured from the boiler adaptor (point X) to the joint with the flue terminal (point Y).

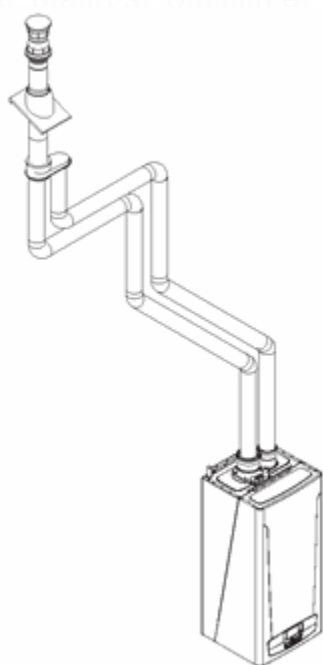
One 91.5° bend or two 135° bends can be included without reduction of the flue length.

If further elbows are required the flue length must be reduced by the following amounts:-

1 metre for each 91.5° bend

0.5 metre for each 45° bend





The total equivalent length for this example is = 6.5 metres.

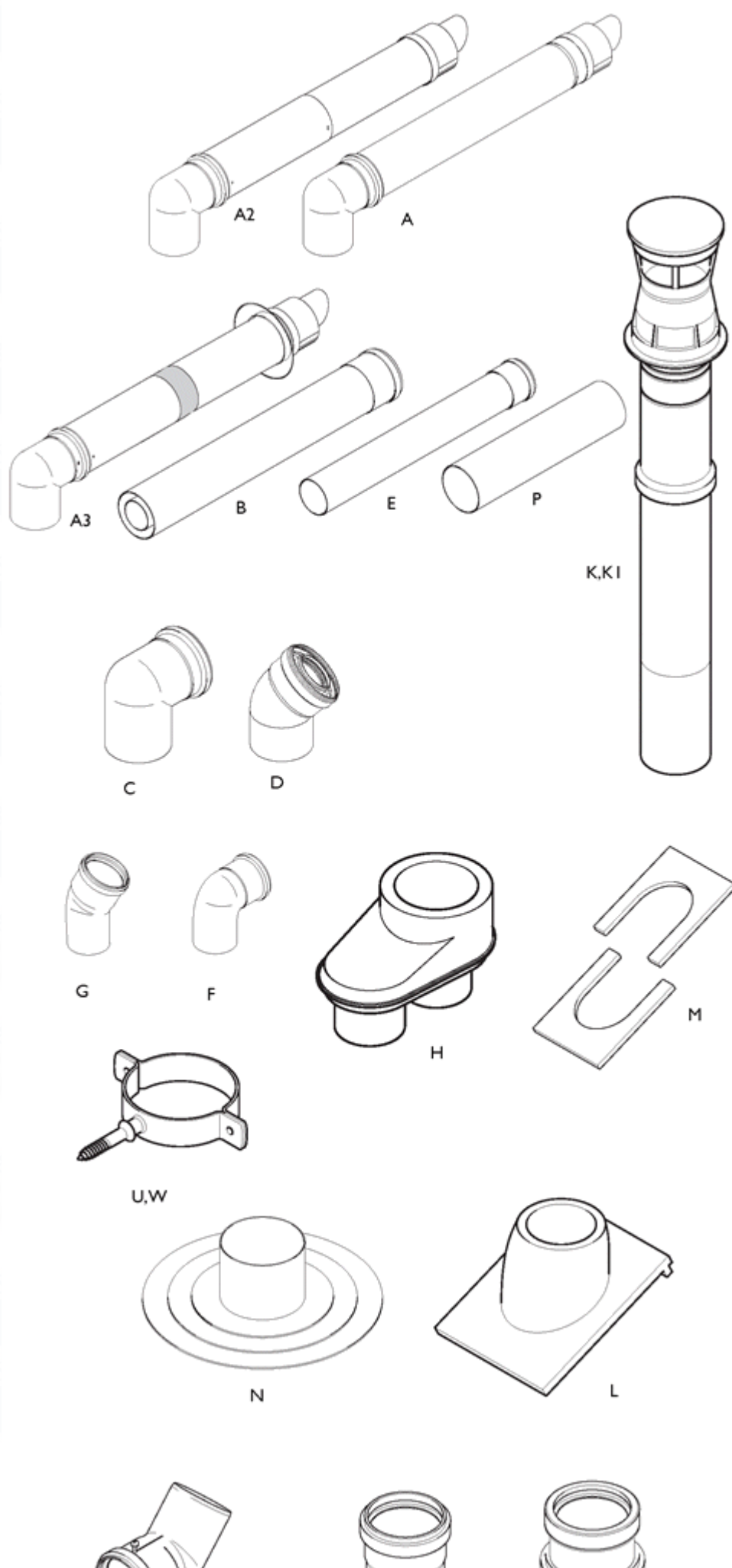
AIR DUCT			
	Equivalent Length Value	No offittings/pipes	Sub total
1m extension	1m	5	5.0m
135° bend	0.25m	2	0.5m
91.5° bend	0.5m	2	1.0m
Equivalent Length Air Duct = 6.5m			
FLUE DUCT			
	Equivalent Length Value	No offittings/pipes	Sub total
1m extension	1m	5	5.0m
135° bend	0.25m	2	0.5m
91.5° bend	0.5m	2	1.0m
Equivalent Length Flue Duct = 6.5m			

page 25

8.3 Flue Accessories

Key	Accessory	Size	Code No
FLUE GROUP A			
Concentric Flue System 100mm diameter			
A3	Telescopic Internal Flue Kit	315-500mm	5119654
A2	Telescopic Flue (incl elbow)		5118069
A	Horizontal Flue Terminal (incl elbow)		5118489

B	Flue Extension	1000mm	5111074
C	Flue Bend	93°	5111075
D	Flue Bend (pair)	135°	5111085
U	Pipe Support (painted)	100mm Ø	5111080
P	Wall Liner		5111067
S	Flue Terminal Deflector		5111068
FLUE GROUP N			
Twin Flue System 80mm diameter			
E	Flue Extension (pair)	1000mm	5111087
F	Flue Bend (pair)	90°	5111072
G	Flue Bend (2 pair)	135°	5111086
J	Vertical Flue Boiler Adaptor Kit		5111079
H	Vertical Flue Adaptor		5111084
W	Pipe Support (pair)	80mm	5111081
FLUE GROUP A, N, G			
Vertical Flue Kits			
K	Vertical Flue Terminal (80/125 use with Item H)		5111078
K1	Vertical Flue Terminal (60/100)		5118576
L	Pitch Roof Flashing	25°/50°	5122151
M	Roof Cover Plate		246143
N	Flat Roof Flashing		246144



For Twin Flue Systems fit the adaptors as follows:-

8.4 Flue Duct Adaptor ([Fig. 17](#))

1. Engage the flue adaptor on the boiler adaptor, making sure that it is pushed down as far as possible.

8.5 Air duct adaptor ([Fig. 18](#))

1. Undo the screws securing the blanking plate to the boiler top panel. Discard the plate.
2. Take one of the gaskets supplied in the kit and place on the boiler top panel.
3. Using the screws previously removed secure the inlet adaptor to the top panel.
4. Continue to fit the twin flue system.

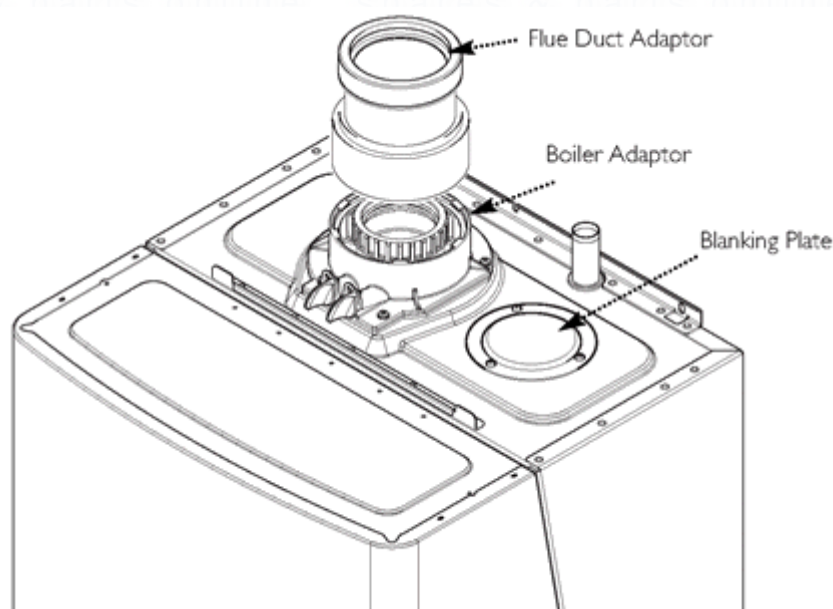


Fig. 17

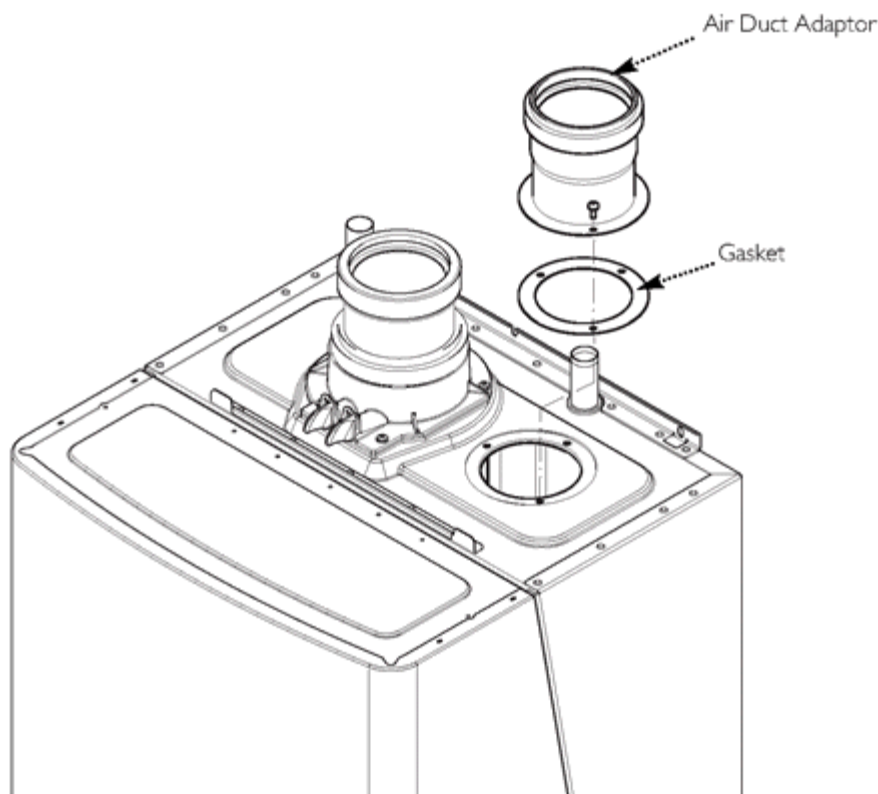


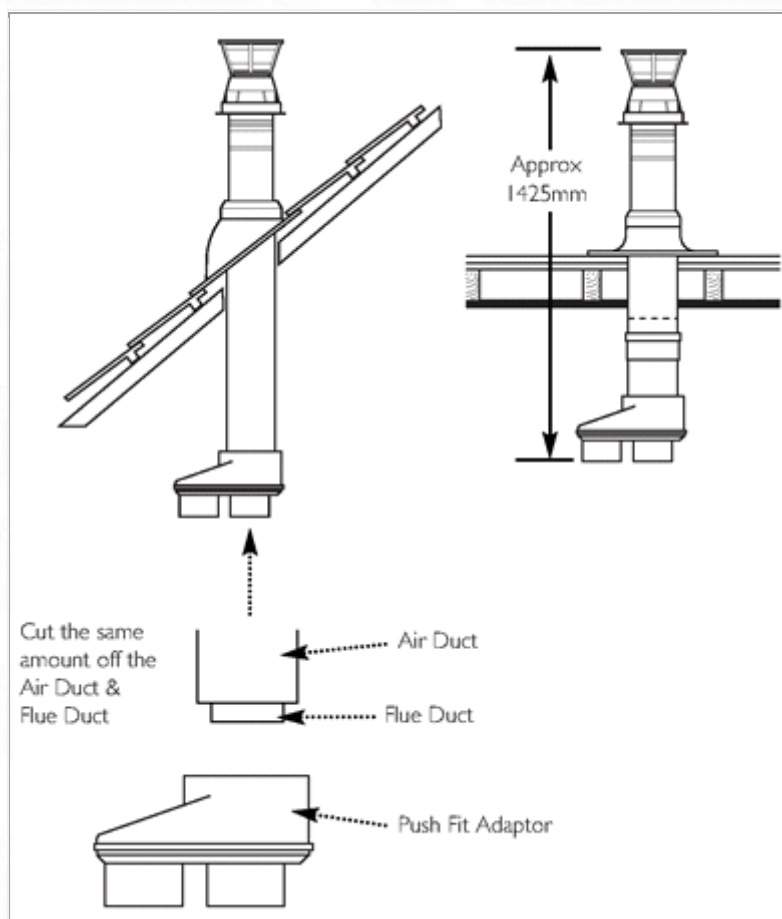
Fig. 18

page 27

8.6 For Roof Terminals

1. In the case of a pitched roof 25 - 50 degrees, position the lead tile to replace/fl ash over existing roof tiling. Make an aperture in the roof suitable for the lower tube of the roofterminal and ensure the integrity of the roof cover is maintained. The adjustable plastic collar can either be positioned on the lead tile or the lower tube of the roof terminal prior to the final positioning of the vertical flue through the tile. Check the collar is correctly located to suit required roof pitch (either 25° to 38° or 37° to 50°). From inside the roof adjust the flue to a vertical position and secure to the roof structure with the clamp supplied.
2. For flat roof installations the aluminium flashing must be incorporated into the roof covering and the appropriate aperture made in the roof decking. The vertical flue is lowered onto the flashing making sure the collar of the flue locates securely with the flashing.
(A mastic seal may be necessary). From inside the roof, adjust the flue to a vertical position and secure to the roof structure with the clamp supplied.

IMPORTANT: If the boiler is not fitted immediately after the flue system, temporary precautions must be taken to prevent rain entry into the room of installation.
Any precautionary measures must be removed prior to commissioning the boiler.



8.7 Flue Dimensions

The standard horizontal telescopic flue kit allows for lengths between 315mm and 500mm from elbow to terminal ([Fig. 19](#)).

The maximum permissible equivalent horizontal flue length is: 5 metres

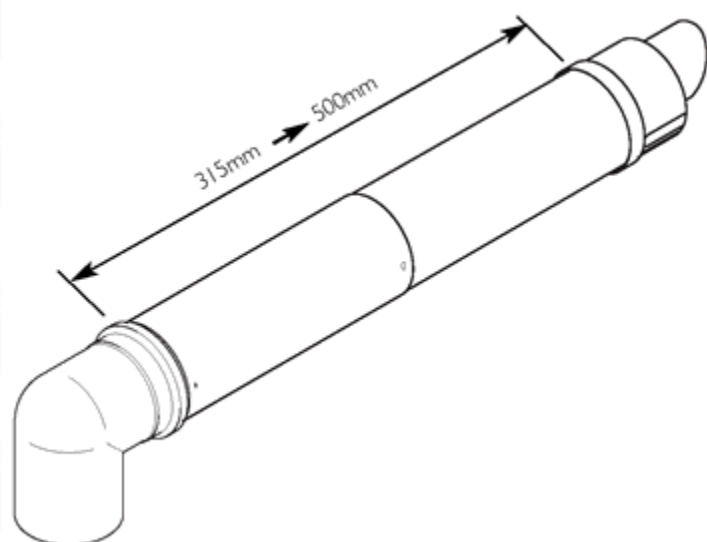


Fig. 19

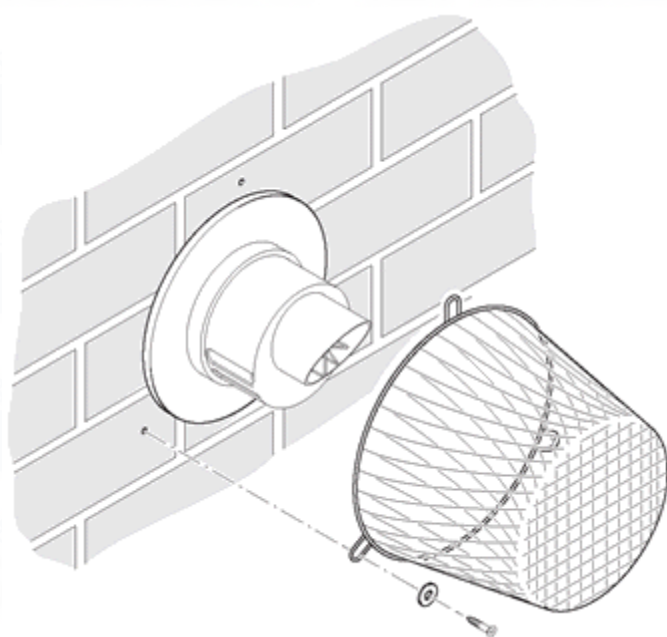


Fig. 20

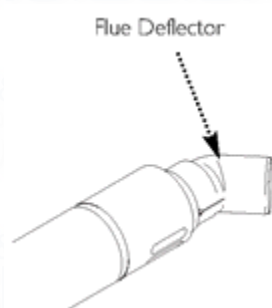


Fig. 21

8.8 Flue Trim

1. The rubber flue trim supplied may be fitted to either the outside wall or on the inner wall of installation.

8.9 Terminal Guard ([Fig. 20](#))

1. When codes of practice dictate the use of terminal guards, they can be obtained from most Plumbers' and Builders' Merchants.
2. There must be a clearance of at least 50mm between any part of the terminal and the guard.
3. When ordering a terminal guard, quote the appliance name and model number.
4. The flue terminal guard should be positioned centrally over the terminal and fixed as illustrated.

8.10 Flue Deflector ([Fig. 21](#))

1. If required, push the flue deflector over the terminal end and rotate to the optimum angle for deflecting plume. Secure the deflector to the terminal with screws provided.

page 28

8.11 Plume Displacement Kit ([Fig. 21b](#))

Kit No 5118638

Content of kit

- 1 0.9m 60/100 Concentric Flue
- 1 1m 60 Dia Exhaust Flue Pipe
- 1 Adaptor
- 2 60 Dia Support Brackets
- 1 93° Elbow/Plume Outlet Assembly
- 1 Flexible Flue Trim
- 3 "O" Rings
- 1 Jubilee Clip
- 1 Elbow

1. This kit is recommended for installations where the condensate plume emitted from the flue may cause a nuisance or affect the surroundings.
2. The terminal must be positioned outside the building with the air inlet facing downward and outlet connection upwards.
3. The plume outlet must always be at least 45° to the wall, with the 'peak' uppermost to prevent rain entry ([Figs. 21c & 21d](#)), and be at least 2 metres above g

round level. It must be secured as shown in [Fig. 15a](#). The plume outlet must also be at least 500mm from the air inlet in any direction ([Fig. 21d](#)).

NOTE: The outlet must be positioned so that any condensate plume is directed away from adjacent surfaces. There must be a constant fall along the entire length of the flue system from the outlet back to the boiler.

4. It is possible to reduce or increase (with the addition of extensions) the length of either or both the 60/100 concentric and 60Ø exhaust.
5. Standard concentric flue extension kits may be added between the boiler elbow and the terminal assembly.
6. The minimum length of the concentric flue is 100mm when measured from the edge of the flue elbow.

IMPORTANT: The maximum equivalent length of concentric flue is:- **5 metres**
Additional bends may be fitted in the concentric flue, but the equivalent length must be reduced by 1 metre (93° elbow) or 0.5 metres (45° elbow).

7. 60Ø 1 metre extensions (including support bracket), and additional 93° & 45° elbows are available. Any additional 93° & 45° elbows must be accounted for when calculating flue lengths.

NOTE: Permitted positions of the plume outlet relative to doors, windows etc. are the same as for conventional concentric flues as detailed in the main Installation & Servicing Instructions and BS5440 Pt. 1. It is NOT necessary to fit a terminal guard over the air inlet or the plume outlet.

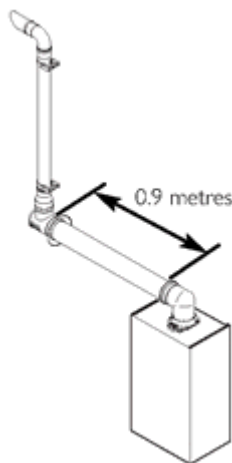


Fig. 21a

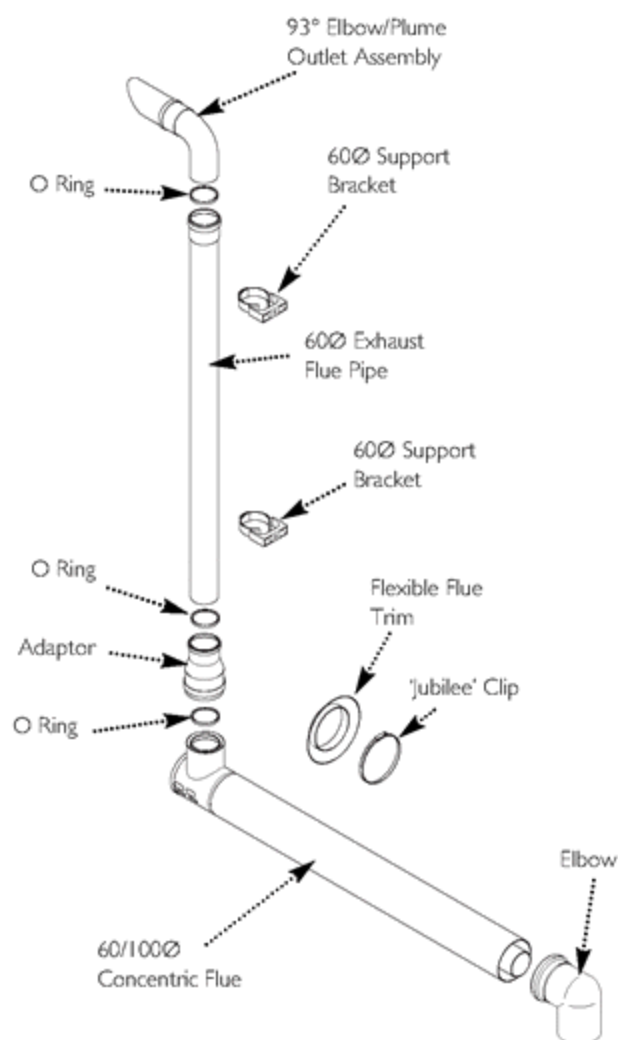


Fig. 21b

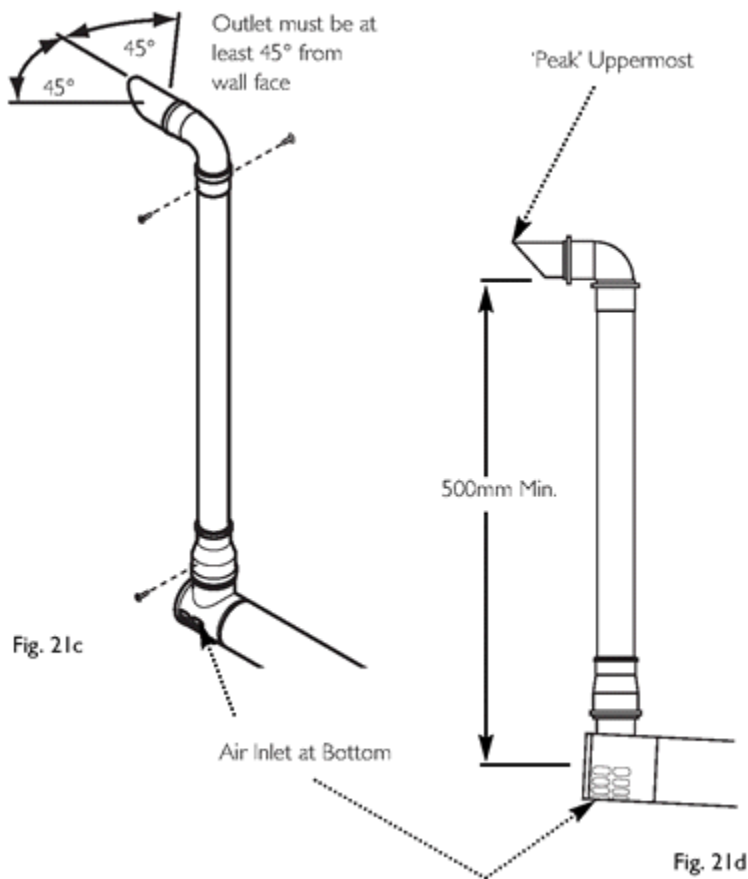


Fig. 21c & Fig. 21d

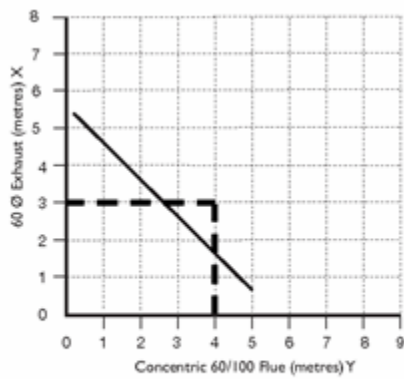
page 29

8.12 Determining Permissible Lengths

In the graph the solid line diagonal represents the relationship between the concentric flue assembly (and any extensions) and the 60Ø exhaust (and any extensions or additional bends).

Example 1 - Not Permissible

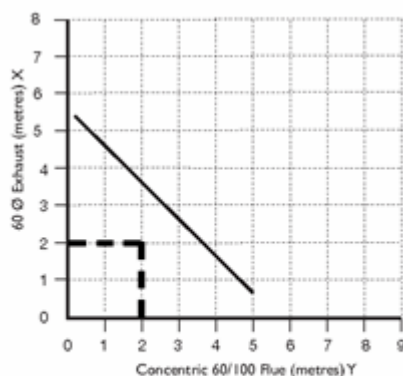
If, for instance, a concentric length of 4 metres was required and the 60Ø exhaust needed to be 3 metres the graph shows that this combination would **NOT** be permissible as the intersection point would be above the solid diagonal line.



Example 1
Flue Lengths - Not Permissible

Example 2 - Flue Lengths OK

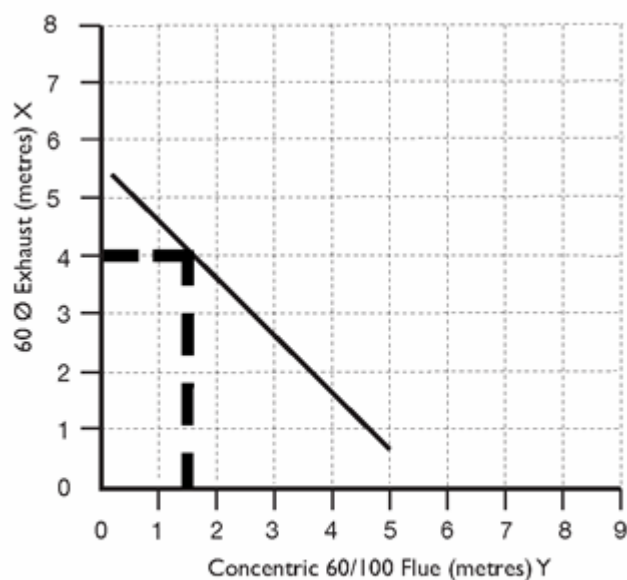
Where both lengths have been determined they can be applied to the graph to check that the installation is permissible. For example, if it was known that 2 metres of concentric flue and 2 metres of 60Ø exhaust were required, the values could be applied to the graph as shown in [Example 2](#). As the point of intersection of the dotted lines is below the solid diagonal line, the combination of lengths is shown to be acceptable.



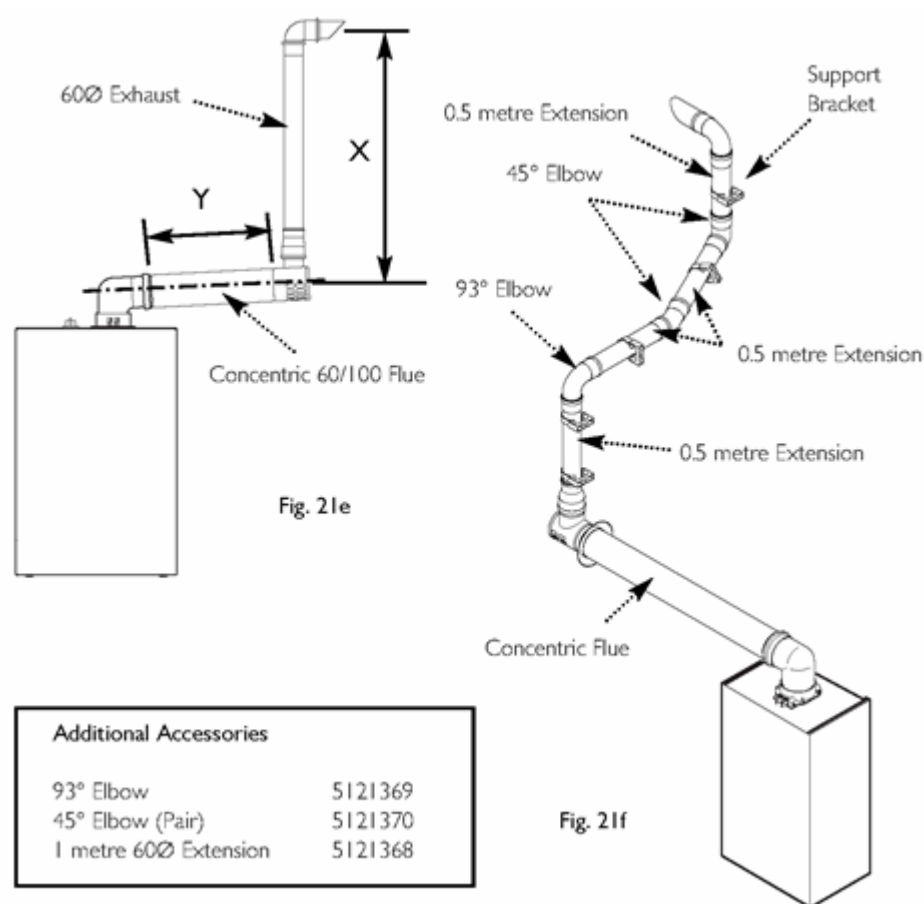
Example 2
Flue Lengths - OK

Example 3 - Flue Lengths OK

In the example shown, assume that the concentric part of the flue needs to be 1.6 metres long. Find the position of '1.6' on the horizontal axis of the graph and then project upwards to the solid diagonal line. This is represented by the vertical thick dotted line. Where this dotted line intersects with the solid diagonal line on the graph, project across to the vertical axis. As can be seen this corresponds with 4.0 metres. Therefore, the total equivalent length of the 60Ø exhaust can be up to 4.0 metres. Any elbow equivalencies must be accounted for i.e. 93° elbows are equal to 1 metre, each 45° elbow to 0.5 metres.



Example 3
Flue Lengths - OK



Additional Accessories

93° Elbow	5121369
45° Elbow (Pair)	5121370
1 metre 60Ø Extension	5121368

Fig. 21e & Fig. 21f

Flue Length - Worked Example

In the diagram ([Fig. 21f](#)) above an additional 93° elbow and pair of 45° elbows have been included in the 60Ø exhaust.

Also 1 straight extension piece has been used.

To calculate total length:-

Length of 60Ø supplied in kit	=	1 metre
1 metre Extension	=	1 metre
1 x 93° Elbow	=	1 metre
2 x 45° Elbow	=	1 metre (0.5 metres each)
Total 60Ø	=	4 metres

After consulting the table in [Example 3](#) it can be determined that the concentric flue could be up to approximately 1.6 metres long.

page 30

8.13 General Fitting Notes

NOTE: The flue system may only be installed as described in this section

1. Cut a hole in the external wall which the concentric flue assembly will pass through. The hole should allow the flue to fall back to the boiler at an angle of 1.5° to 3°.
2. When completed the terminal must be at least 2 metres above ground level ([Fig. 21g](#)).
3. Measure and cut to size the concentric assembly and any extensions that are being used.
4. Insert the concentric assembly through the hole from outside the building.
5. If required, the flexible flue trim should be fitted prior to this as it cannot be fitted after. Use the large 'Jubilee' clip to secure the trim to the flue (See [Fig. 21h](#), trim shown dotted), with the screw part of the clip at the bottom.
6. Connect any extensions or elbows that are being used to the concentric assembly. Engage the extension, elbow or concentric assembly in the boiler flue elbow. Fit the boiler flue elbow to the boiler adaptor.
7. Ensure that the concentric assembly and any extensions fall back to the boiler at an angle of at least 1.5° and that the external air inlet is to the bottom.
8. Use suitable brackets to support the concentric assembly and any extensions, and make good inside and outside.
9. The 60Ø exhaust can now be fitted. Slide the adaptor over the plain end of the 60Ø exhaust ([Fig. 21k](#)) and engage the exhaust in the terminal. Slide the adaptor down over the spigot. Mark and drill the adaptor, using a 2mm bit, as shown in [Fig. 21j](#). Secure the adaptor to the spigot using one of the screws supplied.
10. If it is necessary to shorten the 60Ø exhaust or any of the extensions, the excess material must be cut from the plain end of the pipe.
11. Determine the position of the 60Ø exhaust and mark on the wall a suitable position for the support bracket. If extensions are being used, a support bracket is supplied in each kit.

12. Drill the wall, and fit the bracket(s) using the plug and screw provided.
13. Mark and drill the 60Ø exhaust, using a 2mm bit, as shown in [Fig. 21L](#). Complete the installation of the 60Ø exhaust, securing in the brackets.
14. Fit the 93° elbow/plume outlet and secure with the two remaining screws supplied. Ensure the plume outlet is at least 45° to the wall and that the 'peak' is up permost ([Fig. 21m](#)).

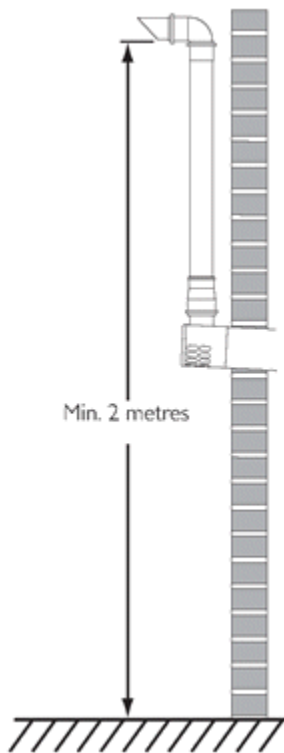


Fig. 21g

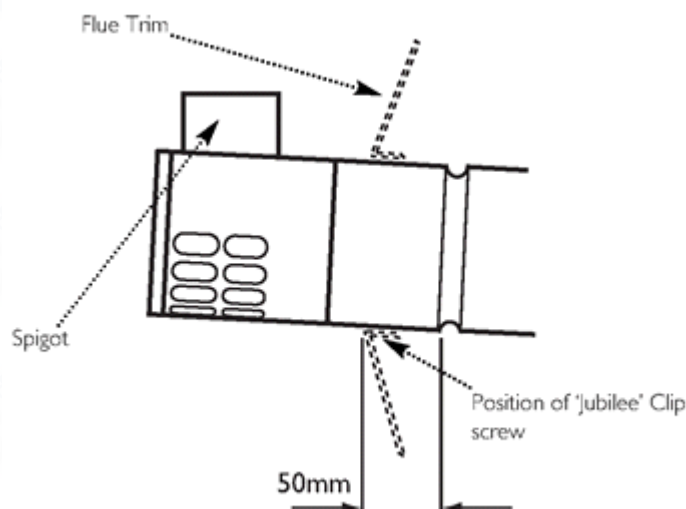


Fig. 21h

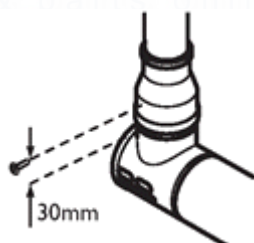


Fig. 21j

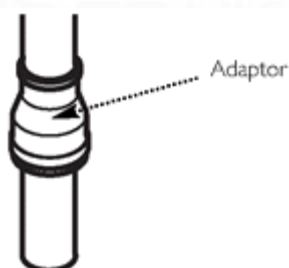


Fig. 21k

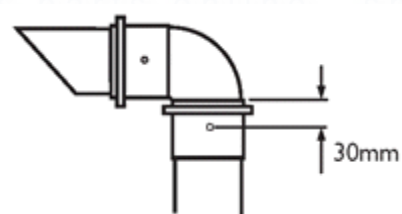


Fig. 21L

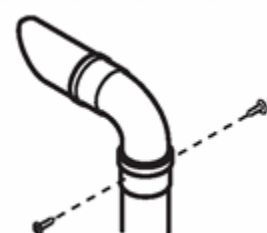


Fig. 21m

15. For aesthetic purposes it is permissible to route the 60Ø exhaust in an enclosed box, but the air inlet and plume outlet **MUST** remain in free air.

16. It is also possible to separate the plume outlet from the 93° elbow to allow the flue to be installed as shown in [Fig. 21n](#).

17. To do this, first slacken the two screws retaining the plume outlet to the elbow, and remove the outlet ([Fig. 21p](#)). The elbow can now be used to connect the

vertical to horizontal 60Ø exhaust ([Fig. 21n](#)). Retighten the screws in the elbow.

18. The outlet can now be fitted into the female end of an 60Ø extension piece. It must be secured using two of the screws supplied in the bag with the 'Jubilee' clip.
19. Mark the female end of the extension at 30mm as shown in two positions, directly opposite each other ([Fig. 21g](#)).
20. Using a suitable bit (e.g. 2mm), drill through the extension and outlet. Secure using two of the screws supplied.
21. The remaining screw must be used to secure the adaptor to the concentric terminal.
22. When the plume outlet is positioned under a balcony or other projection ([Fig. 21r](#)) it must protrude at least 200mm (it is not necessary to extend it further than this).
23. When under balconies or projections it is permissible to rotate the concentric flue length up to 70°, clockwise or anticlockwise ([Fig. 21s](#)), if there is insufficient space to connect vertically.
24. This will allow the connection of the exhaust to the outlet spigot.
25. All other minimum & maximum dimensions must be adhered to, and the air inlet positioned such that it will not be subject to rain entry.

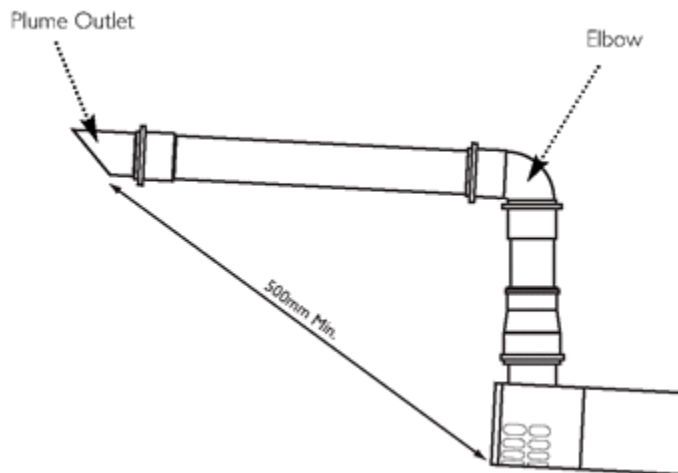


Fig. 21n

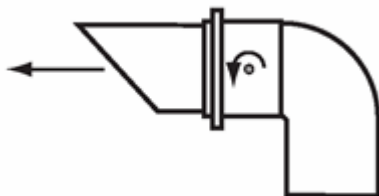


Fig. 21p

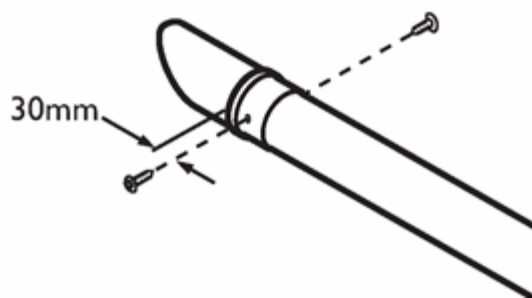


Fig. 21q

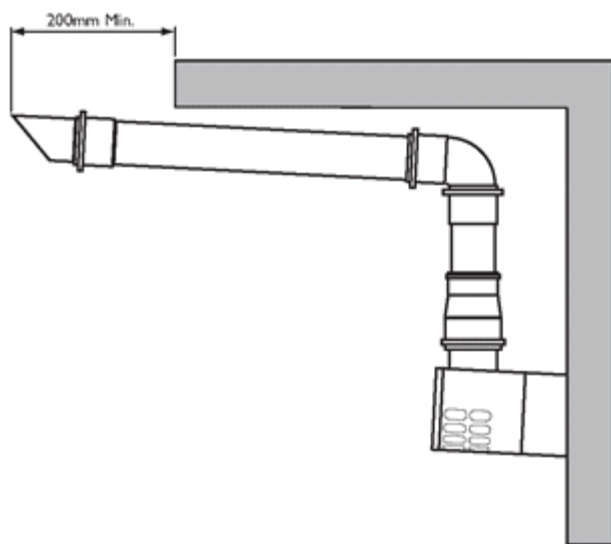


Fig. 21r

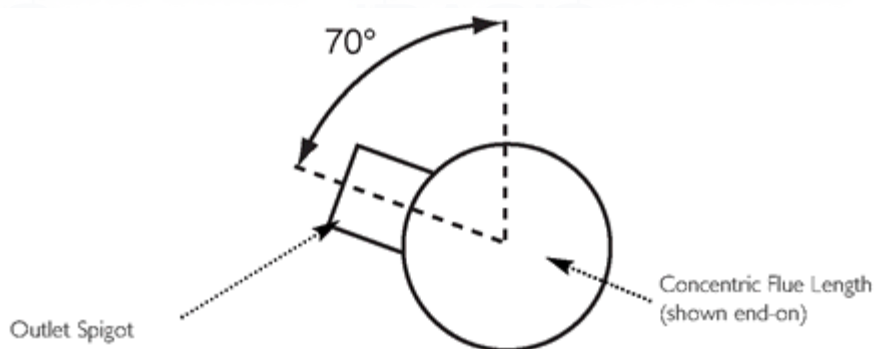


Fig. 21s

9.0 Installation

NOTE: - Installers of this appliance must have undergone Baxi Ecogen Training and been approved to install this appliance.

9.1 Unpacking & Initial Preparation

NOTE: Maintain the appliance upright at all times. Do not lay the appliance on its back, sides or front.
Drilling of the wall or ceiling for flue and pipe work must be completed before the appliance is fitted to the wall.

The gas supply, gas type and pressure must be checked for suitability before connection (see [Section 7.5](#)).

- a) Remove the shrink wrap and literature pack.
- b) Remove the upper packaging to leave the appliance on the base packaging ([Fig. 23](#)).
- c) Remove the back plate from the appliance by removing the 2 securing screws and undo the 2 fixing nuts on the top of the panel using a 10mm spanner ([Fig. 24](#)).
- d) **Take care:-** The back panel can fall suddenly on release.
 1. After considering the site requirements (see [Section 7.0](#)) position the fixing template on the wall ensuring it is level both horizontally and vertically. **Ensure that there is adequate clearance for the lifting equipment (see [Section 7.2](#))**.
 2. Mark the position of the six most suitable fixing holes for the wall plate positions B+C (as marked on the template). Where possible mark the position of the centre top fixing position A (marked on template).
 3. Mark the position of the centre of the flue hole (rear exit) using the paper template supplied. For side flue exit, mark as shown ([Fig. 25](#)).
 4. If required, mark the position of the gas and water pipes.

Remove the template.

5. Cut the hole for the flue (minimum diameter 116mm, a minimum horizontal hole of 116mm will give the correct clearance for the flue to run at the required angle).
6. Drill the single hole (10mm diameter for wall plugs provided) as previously marked and position the back plate on the wall position A on template. Push one of the wall plugs supplied through the plate and secure it to the wall with one of the 80mm screws ([Fig. 26](#)). If it is not possible to use Position A use one of the other six positions marked B+C.
7. Check that the top edge is horizontal with a spirit level. Retighten the screw. Drill the remaining 6 positions at B+C and secure the back plate to the wall.
8. **For correct installation the back plate must be absolutely flat and vertical - check before mounting the boiler. If there is any unevenness or the back plate is not mounted in the vertical plane use packing to correct any out of true.**

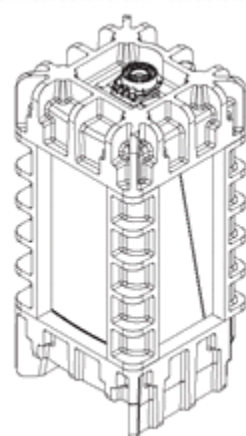


Fig. 22

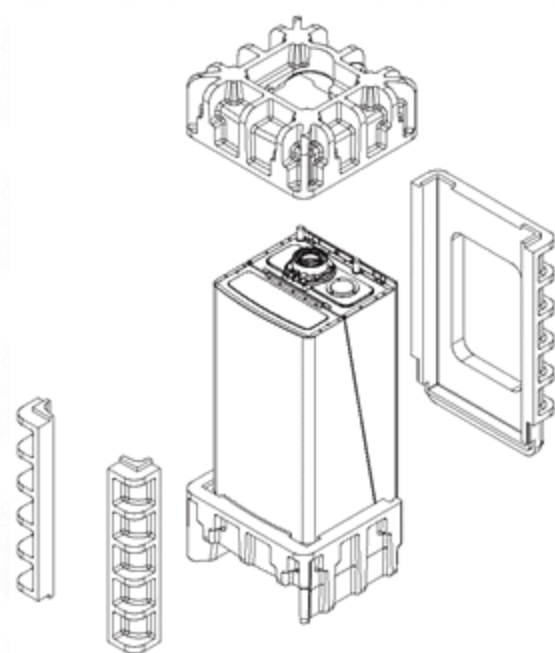


Fig. 23

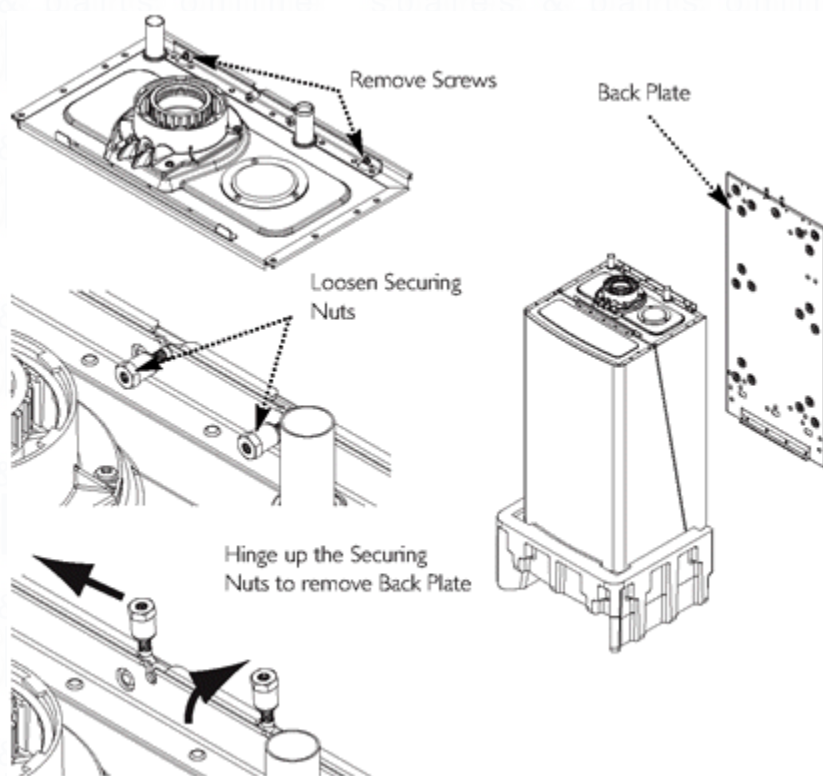


Fig. 24

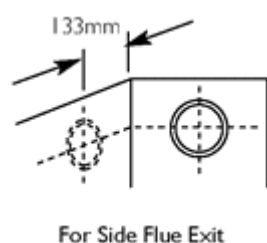


Fig. 25

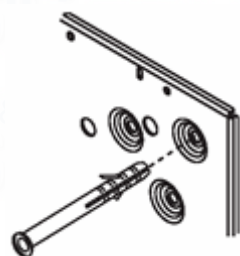


Fig. 26

9.2 Fitting The Boiler

1. Using a suitable lifting device, lift the appliance on its base packaging. Offer the appliance up to the wall plate and engage the bottom edge of the back of the appliance on to the wall plate ([Figs. 27 & 28](#)).

Ensure that there is adequate clearance for the lifting equipment (see [Section 7.2](#)).

2. Push the appliance back onto the wall plate and engage the securing nuts at the top of the appliance by sliding to the right and swinging down ([Figs. 28 & 29](#)).
3. Tighten the two securing nuts on the wall plate and complete the securing of the appliance by replacing the two screws previously removed. ([Figs. 29 & 30](#)).
4. Remove the base packaging.

Ensure that there is adequate clearance for the lifting equipment.

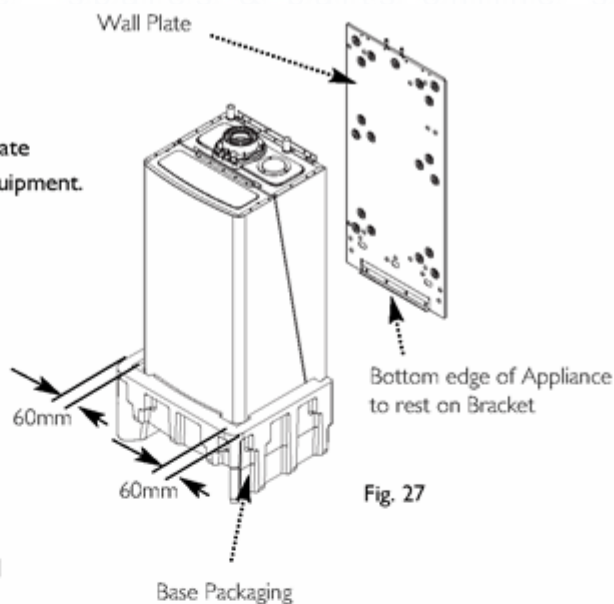
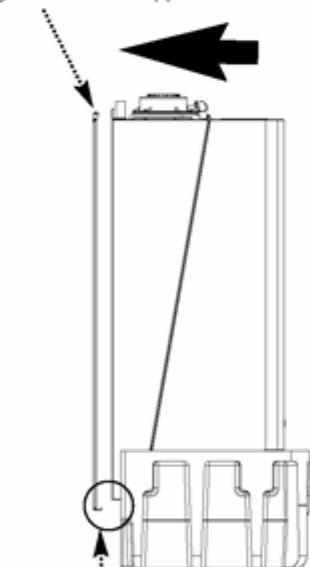


Fig. 27

Engage Securing Nuts and tighten to secure appliance



Push appliance back to wall plate and engage securing nuts

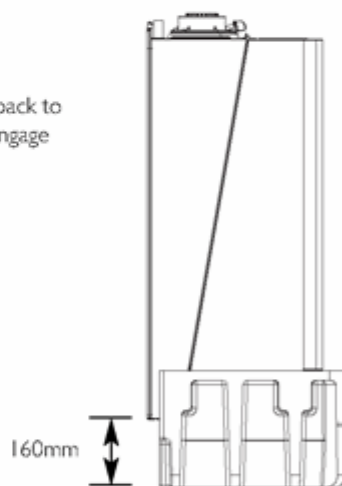


Fig. 28

Engage bottom edge of appliance on to wall plate

Fig. 27 & Fig. 28

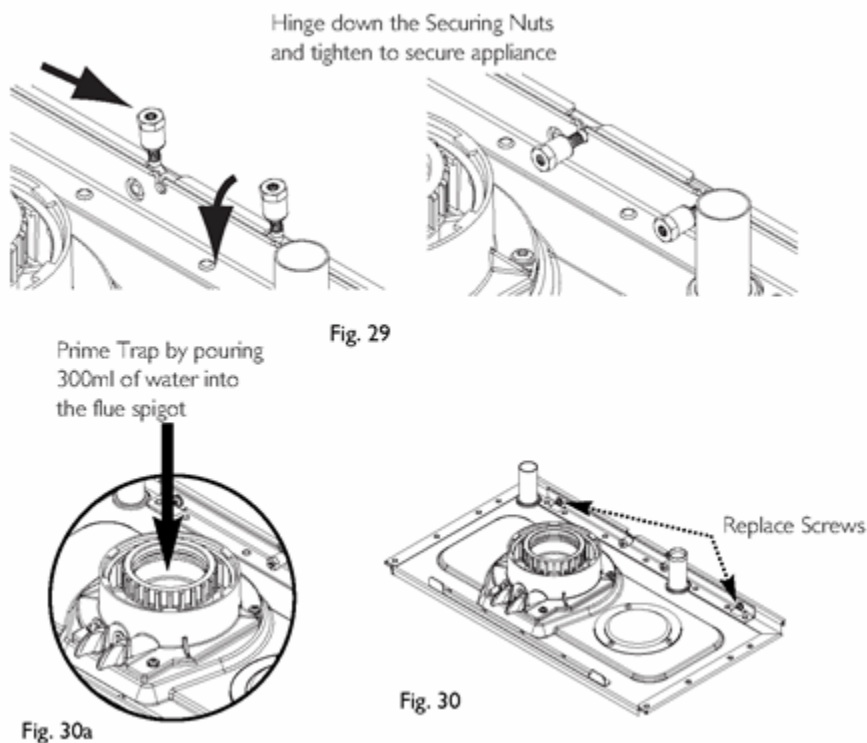


Fig. 29, Fig. 30 & Fig. 30a

9.3 Service connections

1. Connect the central heating circuit to the top of the appliance using 22 mm compression fittings to avoid heat damage to the case and seals; the return is on the left and the flow is on the right.

NOTE: To assist with the purging of air from the system pour water into the flow and return connections to displace the air in the heat exchangers.

2. Connect the gas to the bottom right of the appliance using the 15 mm gas cock provided (in the top of the packaging). Remove the bottom cover and lower the control tray (See [Section 10.1](#) paragraph 3 and [Figs. 40](#) and [41](#)). Install with the test nipple to the left (see [Fig. 11](#)) this allows the connection to the appliance to be tightness tested independently of the gas pipework up to the appliance which then can be tested using the test nipple on the gas meter. It may be difficult to reassemble the bottom panel if this is not done.
3. **Note:** Care must be taken to ensure that the over current switch is not disturbed from its correct position (See [Fig. 2a](#) when replacing the bottom cover). The switch should be up at the back - the '1' should be depressed.

9.4 Condensate Drain - see [section 7.8](#)

1. Connect the condensate drain to the trap outlet pipe.

Ensure the discharge of condensate complies with any national or local regulations in force (see British Gas "Guidance Notes for the Installation of Domestic Gas Condensing Boilers").

2. The connection will accept 21.5mm (3/4in) plastic overflow pipe which should generally discharge internally into the household drainage system. If this is not possible, discharge into an outside drain is acceptable.
3. The condensate trap should be primed by pouring approximately 300ml of water into the flue spigot. Do not allow any water to fall into the air inlet.

page 34

9.5 Fitting The Flue

HORIZONTAL TELESCOPIC FLUE

1. There are two telescopic sections, the Terminal Assembly and the Connection Assembly, a roll of sealing tape and two self tapping screws. A 93° elbow is also supplied. The outer duct of the Connection Assembly is painted white. On the Terminal Assembly the outer duct is unpainted.
2. The two sections can be adjusted to provide a length between 315mm and 500mm ([Fig. 31](#)) when measured from the flue elbow (there is 50mm engagement into the elbow).
3. Locate the flue elbow on the adaptor at the top of the boiler. Set the elbow to the required orientation ([Fig. 33](#)).

NOTE: The flue elbow is angled at 93 degrees to ensure a fall back to the boiler.

4. Measure the distance from the outside wall face to the elbow. This dimension will be known as 'X' ([Fig. 32](#)).
5. If the distance from the flue elbow to the outside face of the wall ('X' in [Fig. 32](#)) is less than 250mm the Connection Assembly can be discarded and the Terminal Assembly cut and fitted directly into the elbow.
6. In instances where the dimension 'X' ([Fig. 32](#)) is between 250mm and 315mm it will be necessary to shorten the Terminal Assembly by careful cutting to accommodate walls of these thicknesses.
7. To dimension 'X' add 50mm. This dimension to be known as 'Y'.

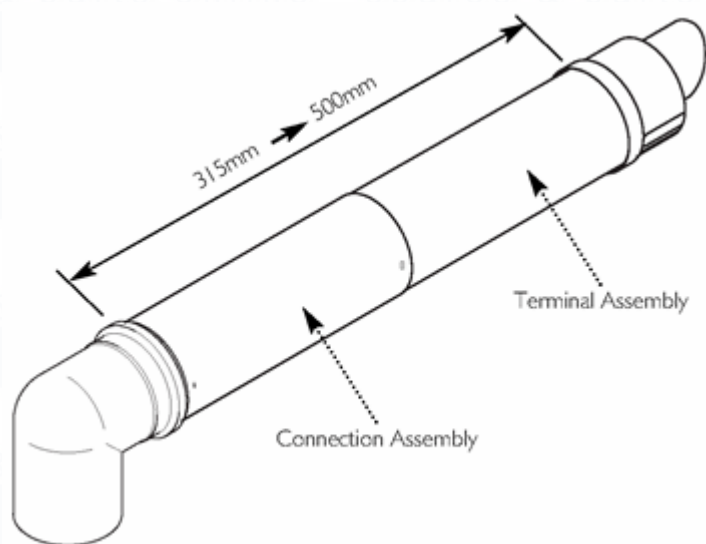


Fig. 31

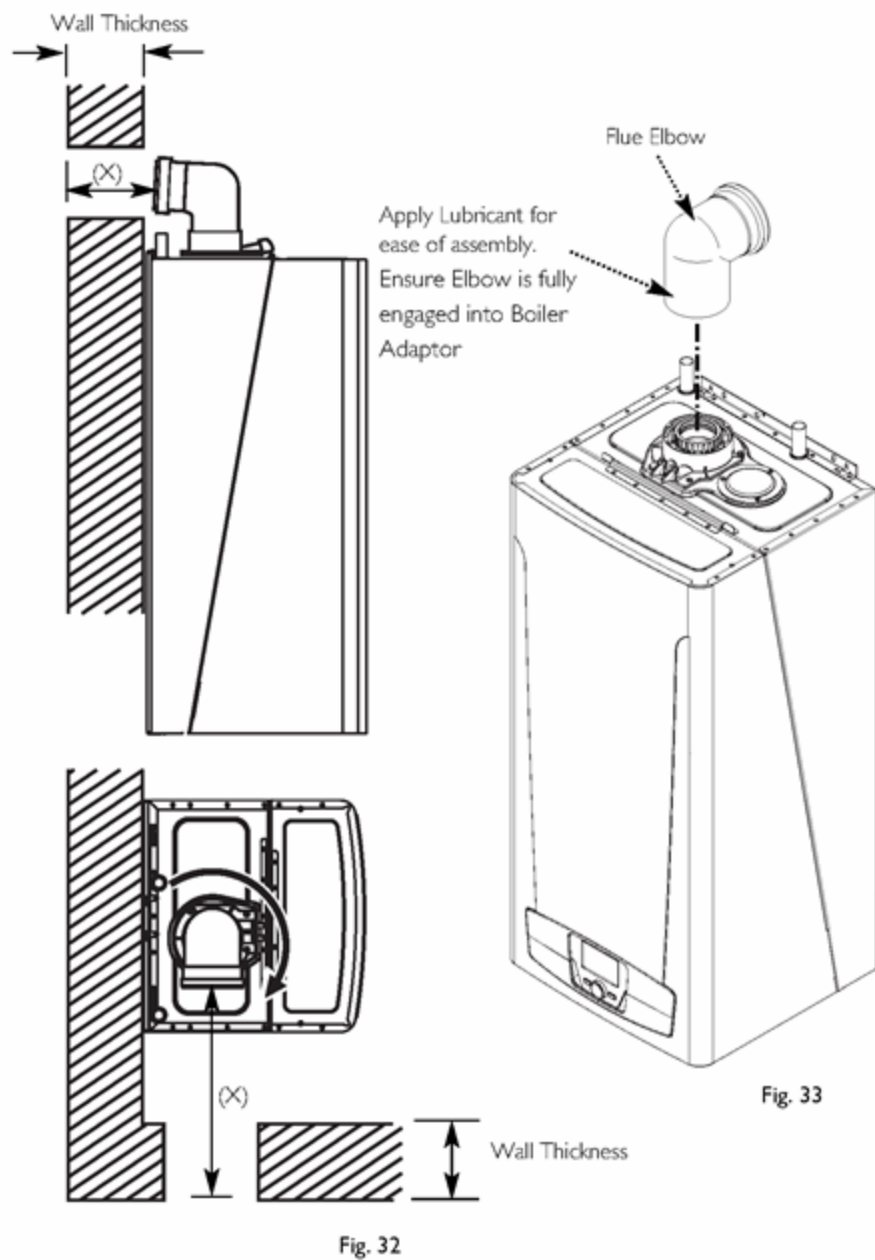


Fig. 32 & Fig. 33

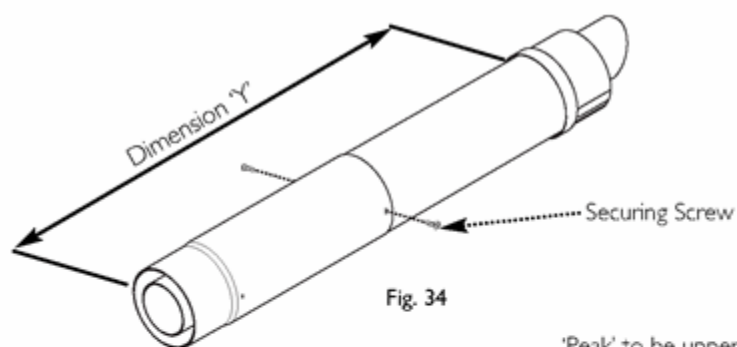


Fig. 34

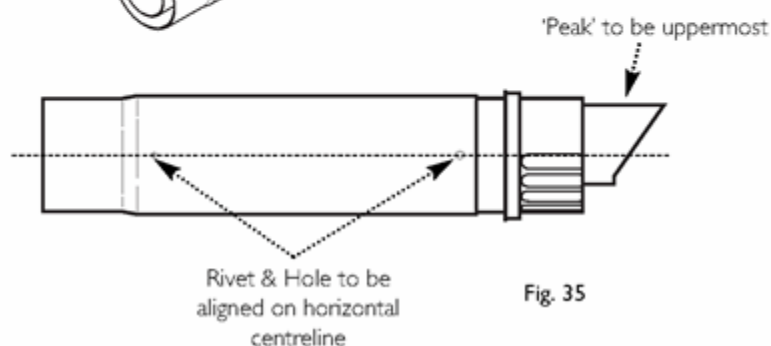


Fig. 35

Fig. 34 & Fig. 35

Apply Lubricant for ease of assembly.
Ensure Flue is fully engaged into Flue Elbow

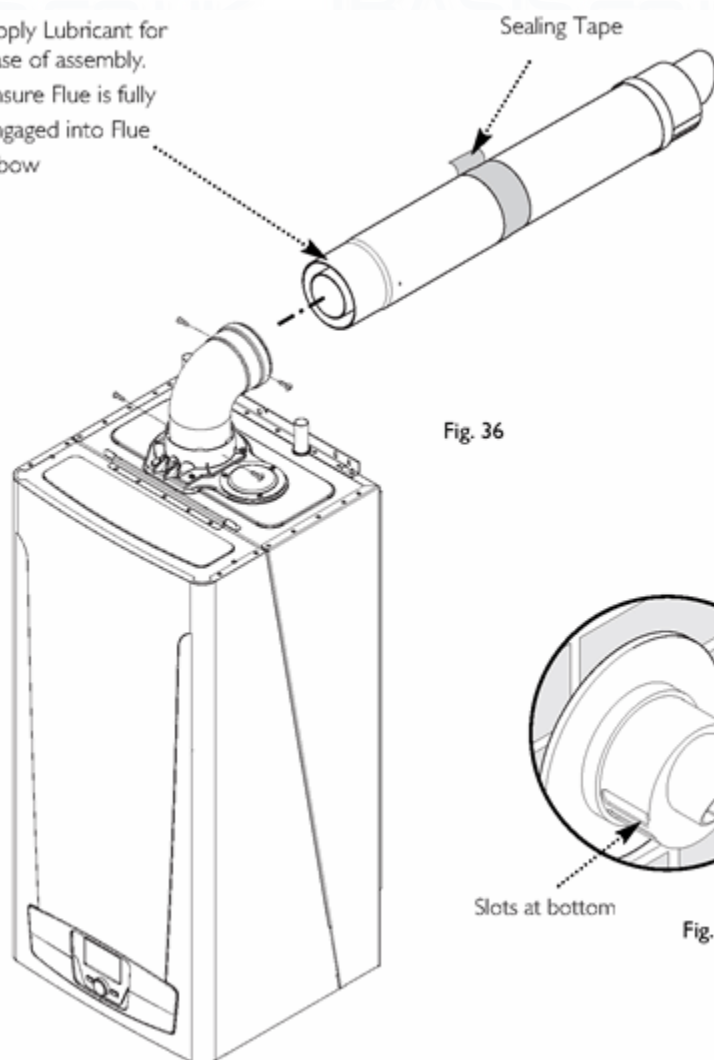


Fig. 36



Fig. 37

Fig. 36 & Fig. 37

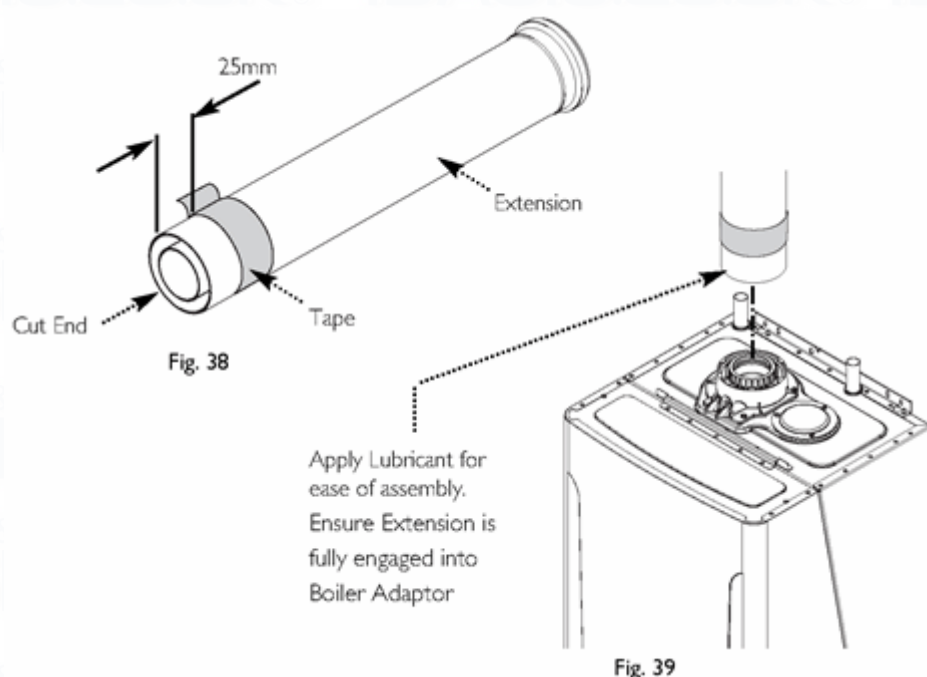


Fig. 38 & Fig.39

8. Adjust the two telescopic sections to dimension 'Y' ([Fig. 34](#)). Ensure that the rivets and holes in the Connection Assembly are aligned horizontally ([Fig. 35](#)).
9. Using a 2mm bit, drill through the holes at the end of the Connection Assembly into the Terminal Assembly and secure them together using the screws supplied ([Fig. 34](#)). Seal the joint with the tape provided ([Fig. 36](#)).
10. Remove the flue elbow and insert the flue through the hole in the wall. Refit the elbow to the boiler adaptor, ensuring that it is pushed fully in ([Fig. 36](#)).
11. Draw the flue back through the wall and engage it in the elbow. It may be necessary to use soap solution or similar to ease assembly of the elbow adaptor and flue ([Fig. 36](#)).
12. Ensure that the terminal is positioned with the slots to the bottom ([Fig. 37](#)). Secure the flue to the elbow with the self drilling screws supplied ([Fig.36](#)).

IMPORTANT: It is essential that the flue terminal is fitted as shown to ensure correct boiler operation and prevent water entering the flue.

13. If necessary make good between the wall and air duct outside the building.
14. Fit the flue trim if required, and if necessary fit a terminal guard (see [Section 8.8](#) & [8.9](#)).

CONCENTRIC VERTICAL FLUE

15. Once the length of the vertical concentric extension has been determined mark and carefully cut off the excess material. The cut end **MUST** be square and free of burrs to ensure correct insertion into the boiler adaptor.

16. Measure 25mm from the end of the flue extension and apply a length of tape around the outer duct ([Fig. 38](#)).
17. Engage the extension into the adaptor up to this position ([Fig. 39](#)). Once the installation of the flue is complete and all support brackets are securely in place remove the tape.

page 36

10.0 Electrical

10.1 Making The Electrical Connections

This appliance shall be connected to a suitably protected electrical supply i.e., 16A - see [section 7.7](#).

NOTE: Ensure all cables are secured using the cable clamps provided. When accessing the appliance controls area, take care not to let the control box drop down in an uncontrolled manner as this may cause damage.

1. To gain access to the controls tray / electrical wiring area, remove the outer case by lifting off the plastic fascia that is held on by two magnets. Undo the two screws holding the outer case, pull the bottom edge forward, lift and disengage from the top of the appliance ([Fig. 40](#)).
2. Slacken the four screws from the bottom cover and remove the cover ([Fig. 40](#)).
3. Remove the two screws holding the control tray. Pull the front of the control tray forward and lower it carefully ([Fig. 41](#)). **DO NOT allow the tray to fall in an uncontrolled manner.**
4. Ensure all cables are secured using the cable clamps provided.
5. Ensure that the lengths of the live and neutral conductors are shorter than the earth conductor, so that if the cable slips in its anchorage the current carrying conductors become taut before the earth conductor.

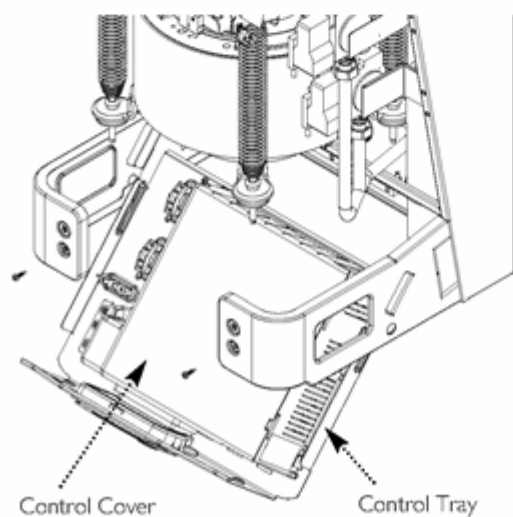
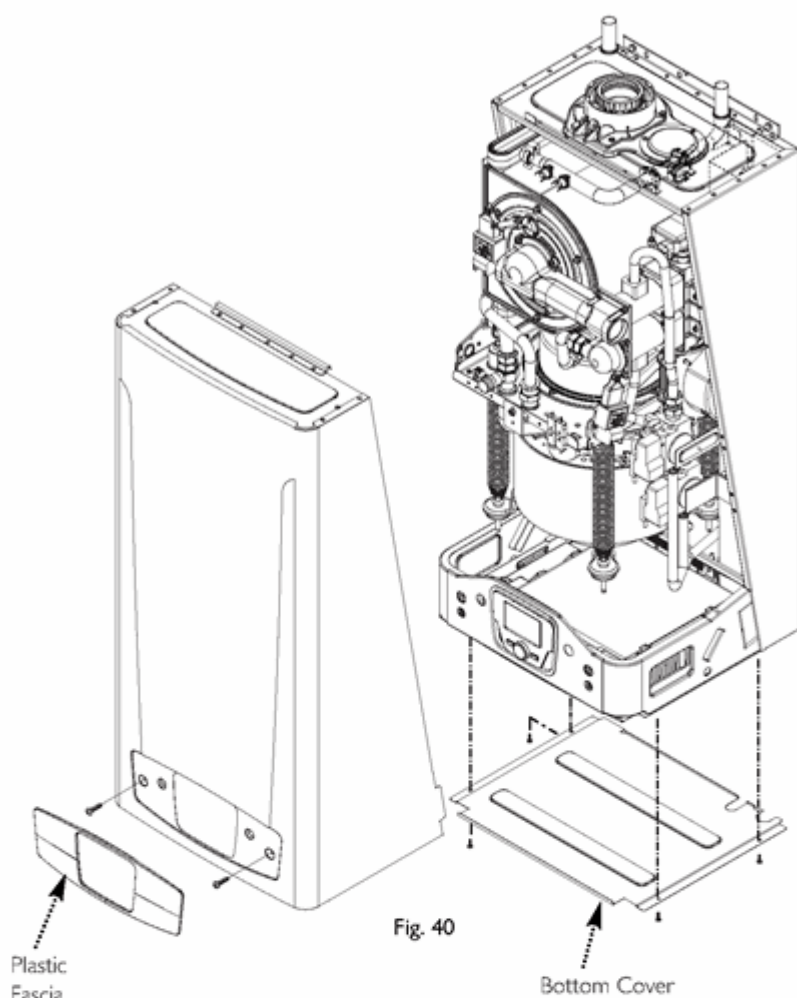


Fig. 41

Fig. 40 & Fig. 41

10.2 System installation options.

1. There are two installation options available, **Intelligent** and **Retro**. Y-plan, S-plan, W-plan and S-

Plan with a second heating circuit are all available both with **Intelligent** and **Retro** installations.

IMPORTANT: Before running the appliance ensure parameter 5700 has been set according to the type of system installed.
See [sections 10.4](#) to [10.11](#) for system types and [section 11.3. k](#) for the change procedure.

A) An **Intelligent** system operates the Ecogen with room sensors, an optional extra outdoor sensor (an outdoor sensor can only be installed in conjunction with a room sensor to enable weather compensation), a DHW tank sensor or DHW tank thermostat and will give the highest overall efficiency with increased electrical power generation and is therefore the recommended way to install the appliance.

The Removable THINK Controller must be used as a Programmable Room Sensor for all intelligent installation.

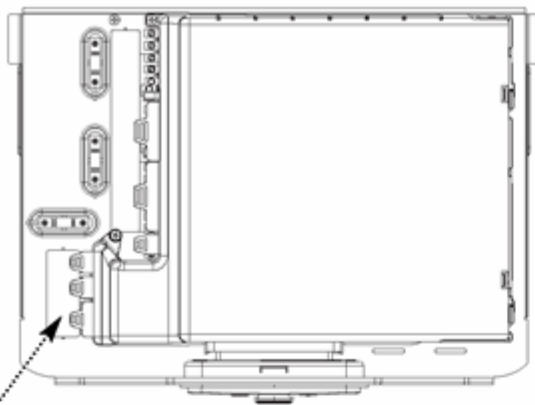
B) **Retro** installations operate the Ecogen with a new or existing external system wiring centre. This means that the installer has the option to retain an existing room thermostat, DHW thermostat and programmer. An outdoor sensor for weather compensation cannot be used in this case. The THINK Controller must remain on the appliance (See [Section 10.11](#)).

page 37

10.3 Complete Wiring Configuration

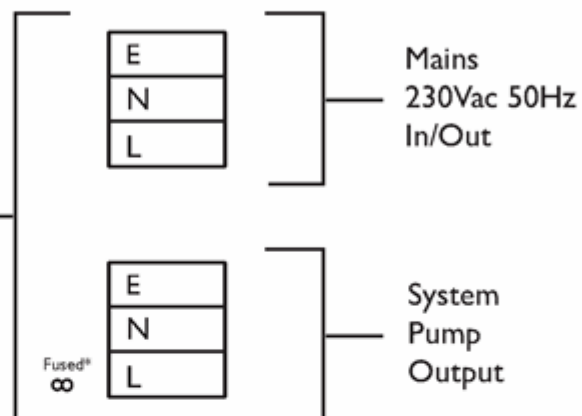
1. All wiring external to the appliance must be in accordance with I.E.E. BS 7671 - requirements for Electrical Installations.

IMPORTANT: Before running the appliance ensure parameter 5700 has been set according to the type of system installed.
See [sections 10.4](#) to [10.11](#) for system types and [section 11.3.k](#) for the change procedure.

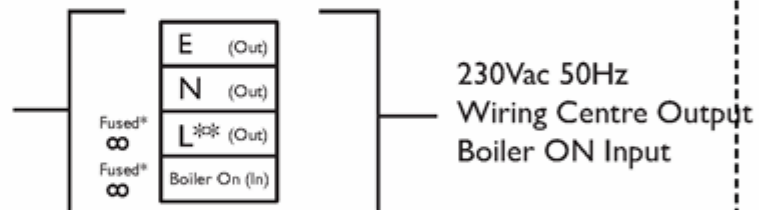


'Break-off Tabs

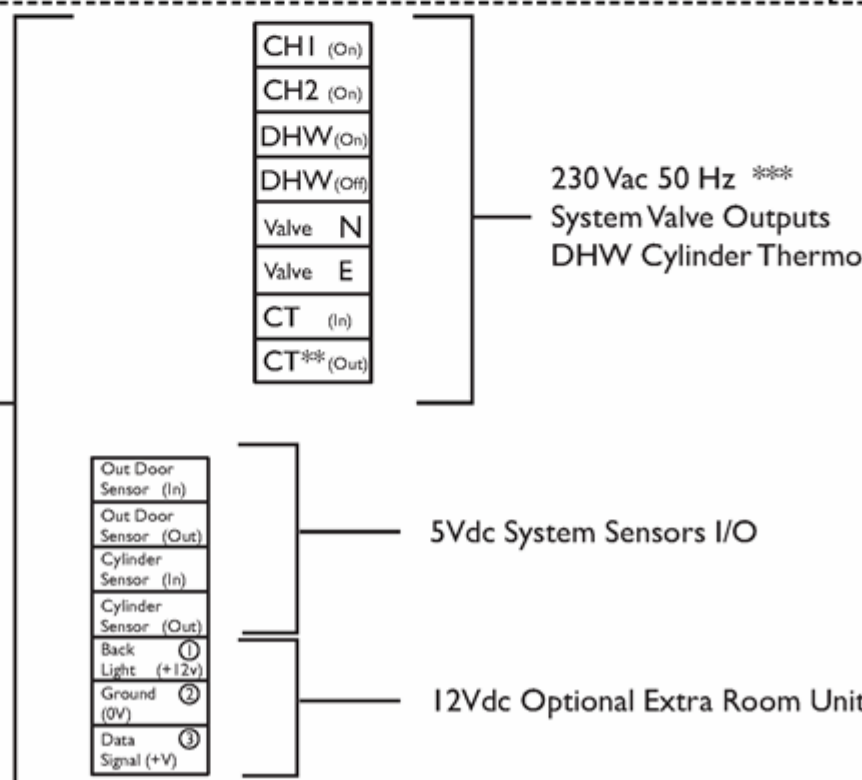
Requirement for
all installation types



**Retro
Installation**



**Intelligent
Installations
(Recommended)**



*** NOTE: All F
uses 3.15 A**

* Permanent Live once the 230V supply is connected

*

* Ensure all system wiring is correct to wiring regulations (BS7671) and fully tested before

* connection to avoid any damage to the appliance controls.

*

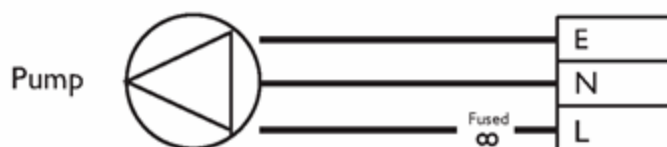
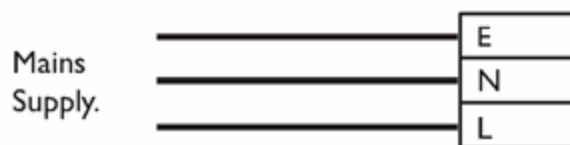
page 38

10.4 Y-Plan with DHW cylinder sensor

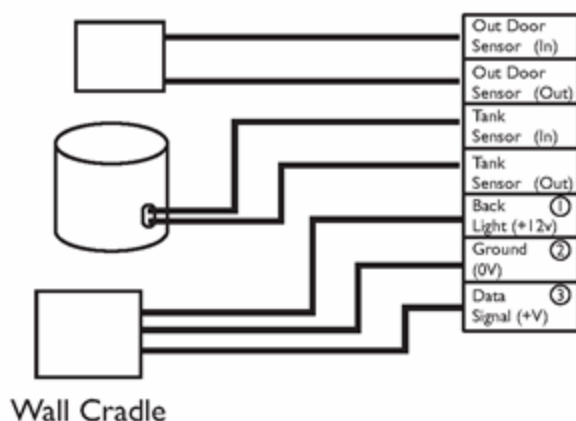
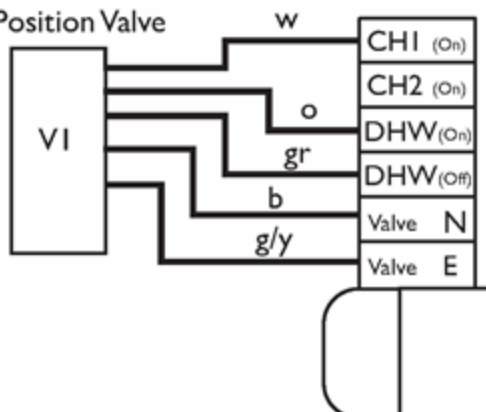
1. The appliance **MUST** have a permanent Live/Neutral/Earth connection. The pump must be connected to the appliance as shown.
2. Set parameter 5700 to '2' for one heating circuit - see [section 11.3.k](#).

NOTE: It is not possible to operate a second heating circuit with a Y-Plan system. Intelligent Installations

Key
w - White
o - Orange
gr - Grey
b - Blue
g/y - Green/Yellow

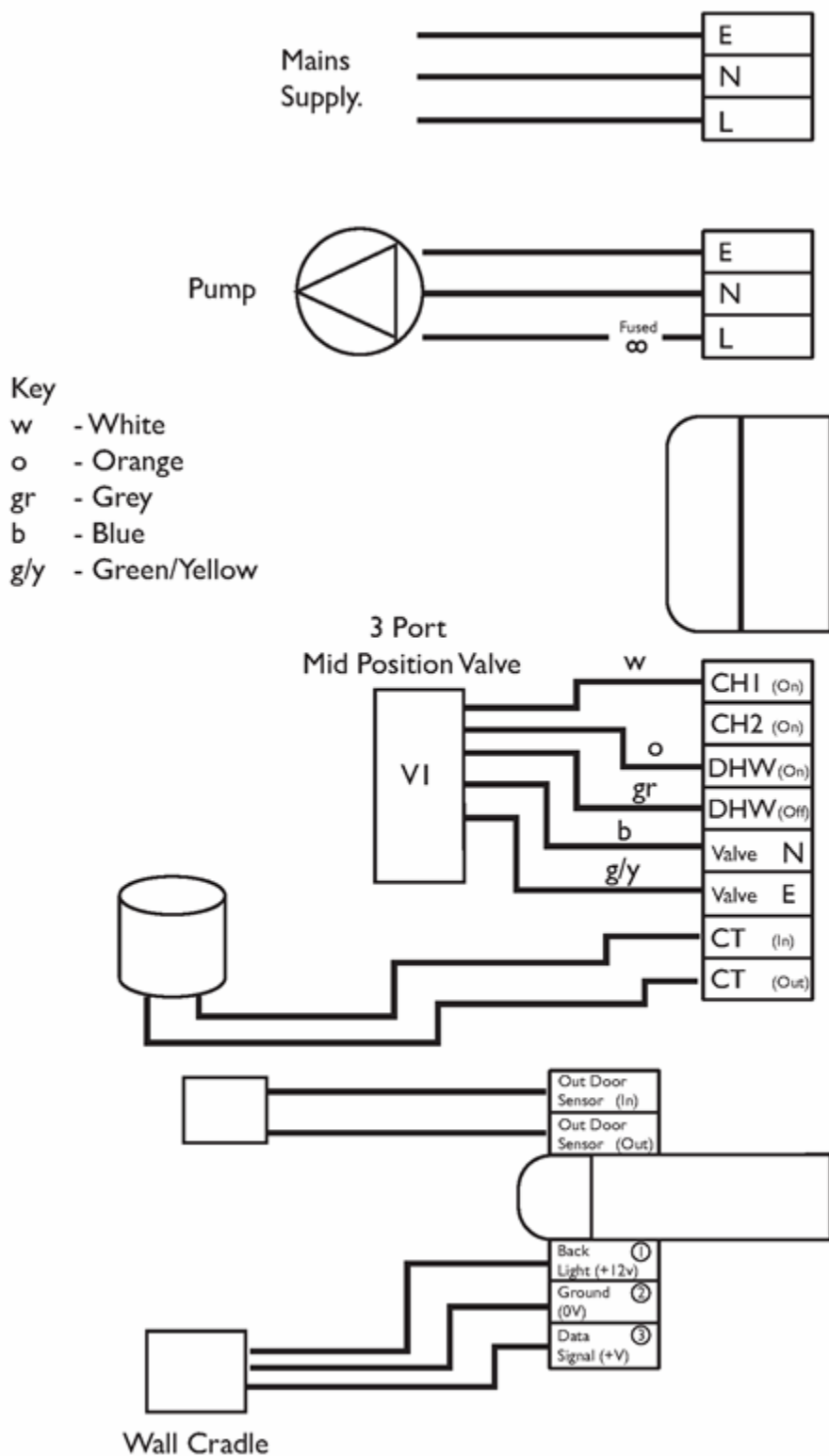


3 Port
Mid Position Valve



1. The appliance MUST have a permanent Live/Neutral/Earth connection. The pump must be connected to the appliance as shown.
2. Set parameter 5700 to '2' for one heating circuit - see [section 11.3.k](#).
3. The DHW set point on the THINK Controller must be the same as the thermostat set point on the cylinder. If this is not done the DHW temperature may not be achieved or the recovery time will be increased.

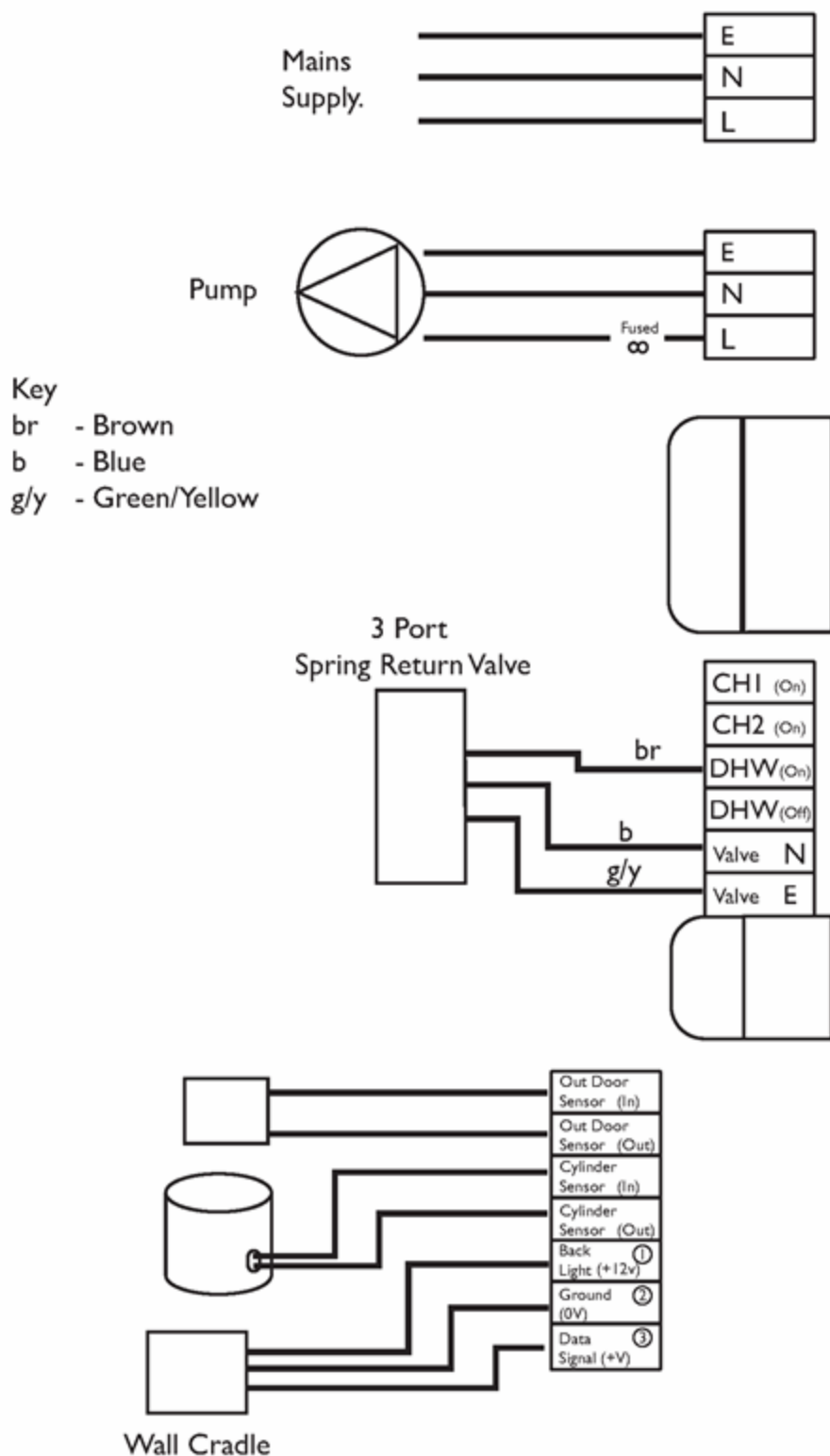
NOTE: It is not possible to operate a second heating circuit with a Y-Plan system.



10.6 W-Plan with DHW cylinder sensor

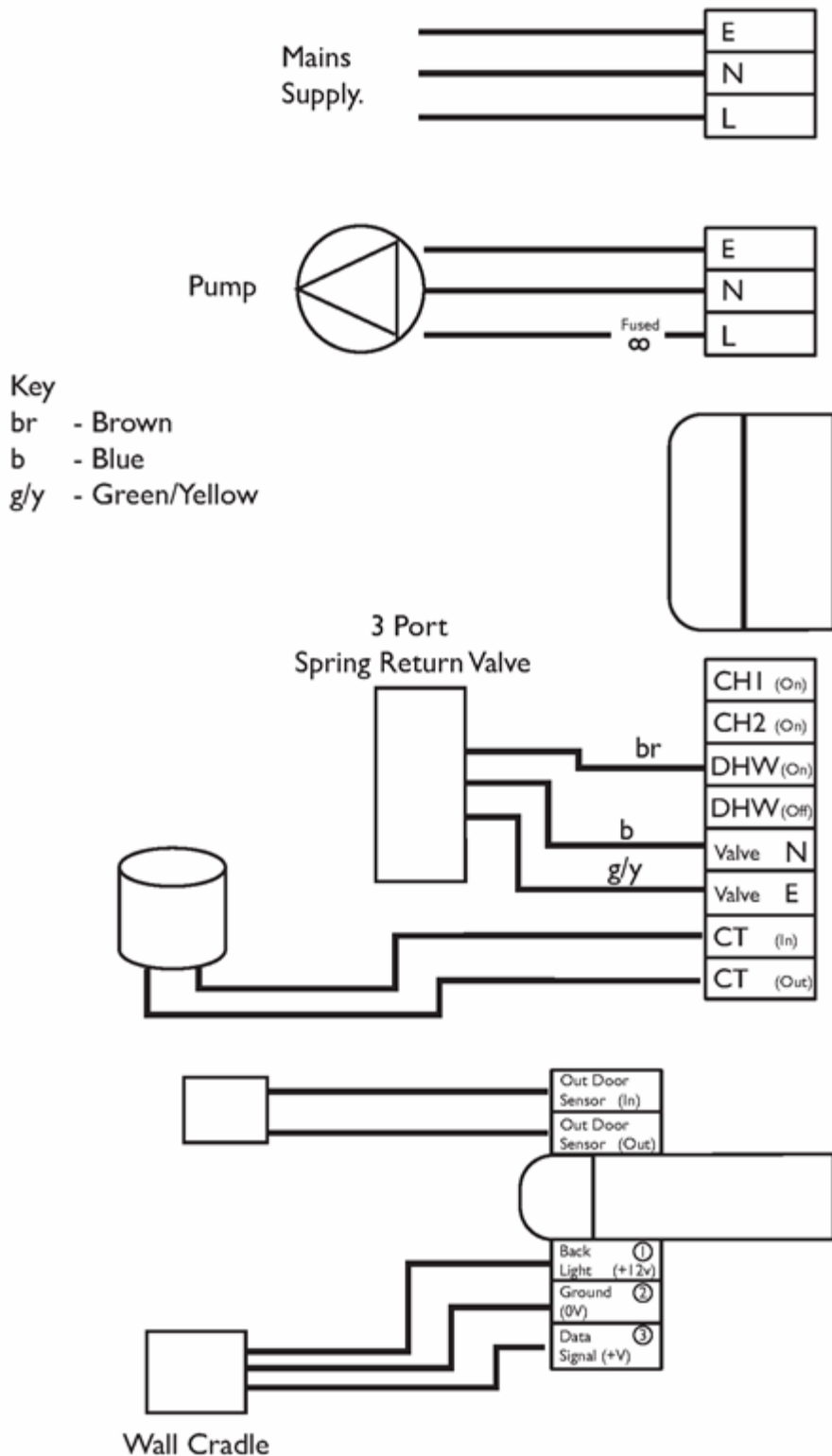
1. The appliance **MUST** have a permanent Live/Neutral/Earth connection. The pump must be connected to the appliance as shown.
2. Set parameter 5700 to '2' for one heating circuit - see [section 11.3.k](#).
3. The rest port of the 3 port valve needs to be connected to the central heating circuit so that the valve is driven to the DHW position. It is most likely that the three port valve on an existing primary circuit will have to be turned round.

NOTE: It is not possible to operate a second heating circuit with a W-Plan system.



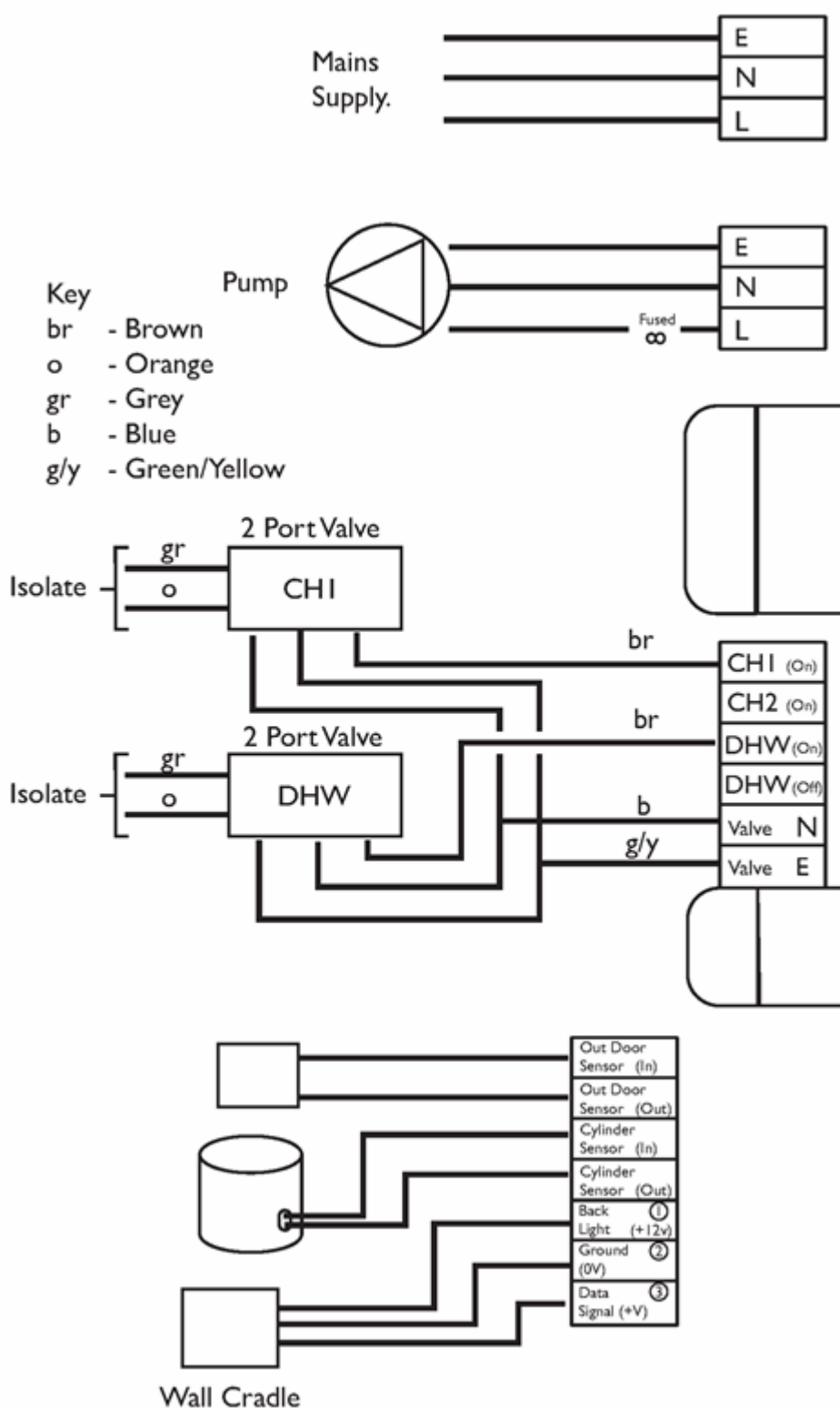
1. The appliance **MUST** have a permanent Live/Neutral/Earth connection. The pump must be connected to the appliance as shown.
2. Set parameter 5700 to '2' for one heating circuit - see [section 11.3.k](#).
3. The rest port of the 3 port valve needs to be connected to the central heating circuit so that the valve is driven to the DHW position. It is most likely that the three port valve on an existing primary circuit will have to be turned round.
4. The DHW set point on the THINK Controller must be the same as the thermostat set point on the cylinder. If this is not done the DHW temperature may not be achieved or the recovery time will be increased.

NOTE: It is not possible to operate a second heating circuit with a W-Plan system.



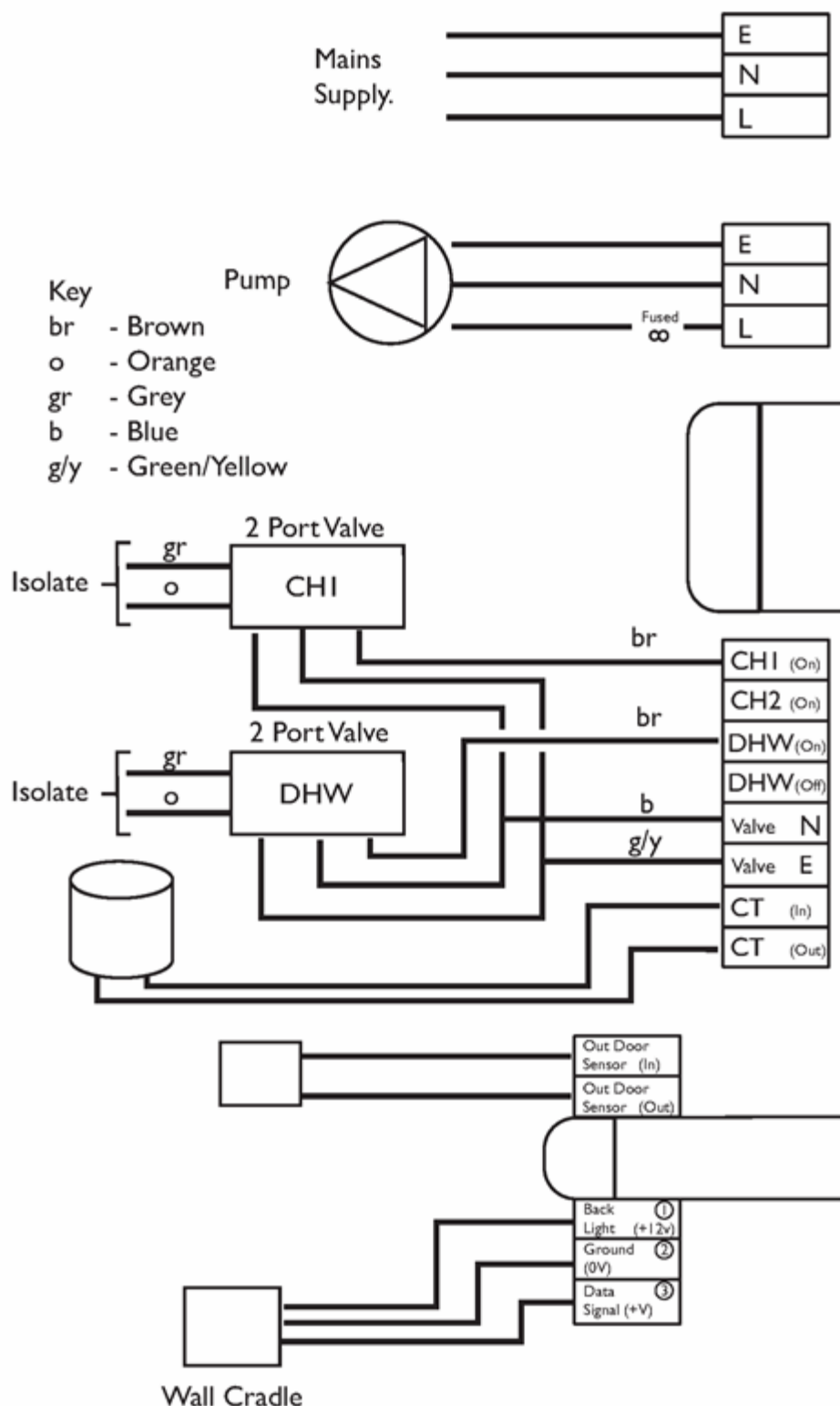
10.8 S-Plan with DHW Cylinder sensor

1. The appliance **MUST** have a permanent Live/Neutral/Earth connection. The pump must be connected to the appliance as shown.
2. Set parameter 5700 to '2' for one heating circuit - see [section 11.3.k](#).



10.9 S-Plan with DHW Cylinder Thermostat

1. The appliance **MUST** have a permanent Live/Neutral/Earth connection. The pump must be connected to the appliance as shown.
2. Set parameter 5700 to '2' for one heating circuit - see [section 11.3.k](#).
3. The DHW set point on the THINK Controller must be the same as the thermostat set point on the cylinder. If this is not done the DHW temperature may not be achieved or therecovery time will be increased.



1. The appliance **MUST** have a permanent Live/Neutral/Earth connection. The pump must be connected to the appliance as shown.
2. Set parameter 5700 to '3' for two heating circuits - see [section 11.3.k](#).
3. To control the second heating circuit a second THINK Controller is required - this is available as an optional extra. For guidance on installing the second THINK Controller see [section 11.3 paragraph k](#).

Use either a cylinder sensor or thermostat as in [section 10.8](#) & [9](#)

10.11 Wiring Center

NOTE: As the boiler does not know what the actual room or DHW temperature is, the boiler temperature is fixed at 80°C. Appliance **MUST** have a permanent Live/Neutral/Earth connection. Pump **MUST** be connected directly to the appliance.

System Requirement - The default for parameter 5700 ('1'), is setup to control through an external wiring centre. To check the parameter - see [section 11.3.k](#).

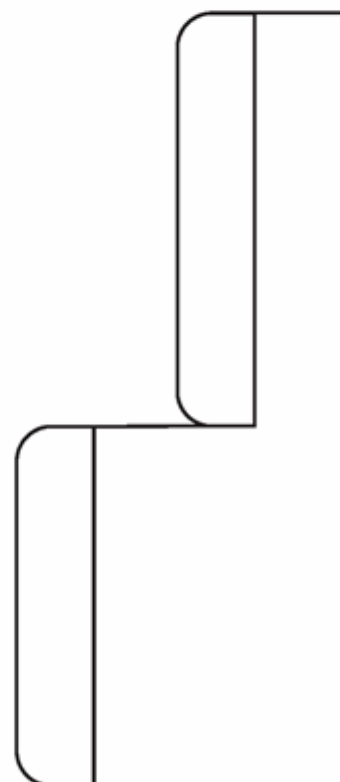
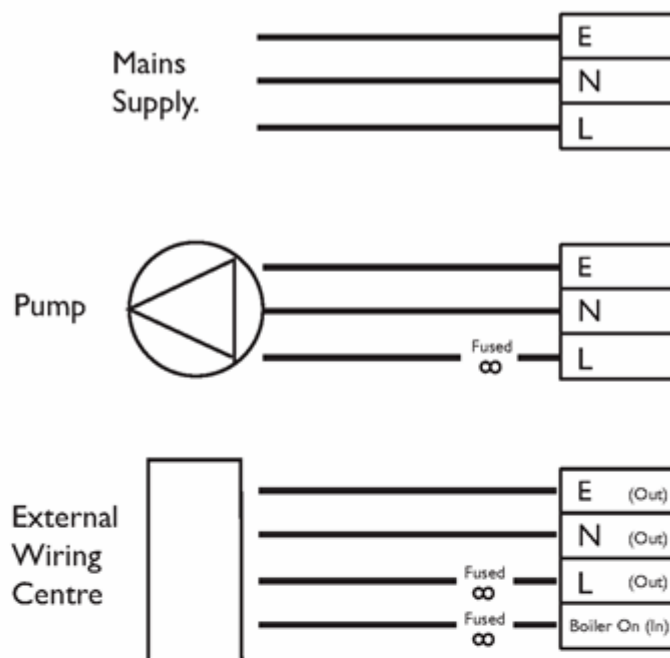
As an external programmer will be used to control the central heating and domestic hot water times, the installer must make sure that the boiler THINK Controller program s time for the central heating and DHW are set to 24h on (see User Manual).

Retro Installations

NOTE: This installation is used only if the user wishes to utilise their existing temperature and time controls.

Outside and DHW sensors cannot be used. The THINK Controller must remain on the appliance.

S - Plan System Components
 Y - Plan System Components
 W - Plan System Components



	Burner in Operation 1 - Engine 2 - Supplementary
	Heating to the Comfort Set Point
	Heating to the Reduced Set Point
	Central Heating Times Active
	DHW Times Active
	Combustion Check Function Active
	Holiday Function Active
	Manual Override - Time Switch Function Overridden
	Time Switch Function Active
	Wireless Communication Established
	THINK Controller Configured as a Room Sensor
	Error Message
	Stand By - Appliance On/Off
	Outdoor Sensor Connected
	System / Appliance Attention Required
	Maintenance / Special Mode
	Change Battery (only if radio control fitted)

1. The THINK Controller is effectively an interface which allows the householder to programme the appliance to provide the desired comfort levels for the central heating and hotwater. It also gives information on the appliance - error codes electrical power generated etc.
2. Whilst the THINK Controller is on the appliance the standard screen displays the appliance flow temperature. External sensors/room thermostats can be connected to monitor and control the room and domestic hot water temperatures - see [sections 10.3 to 10.11](#).
3. The THINK Controller may be removed from the appliance and configured as a programmable room sensor - in which case the standard screen displays the room temperature.
4. If the THINK Controller is to be used as a room sensor it must be configured so that the appliance will recognise it as such.

Display showing all available segments

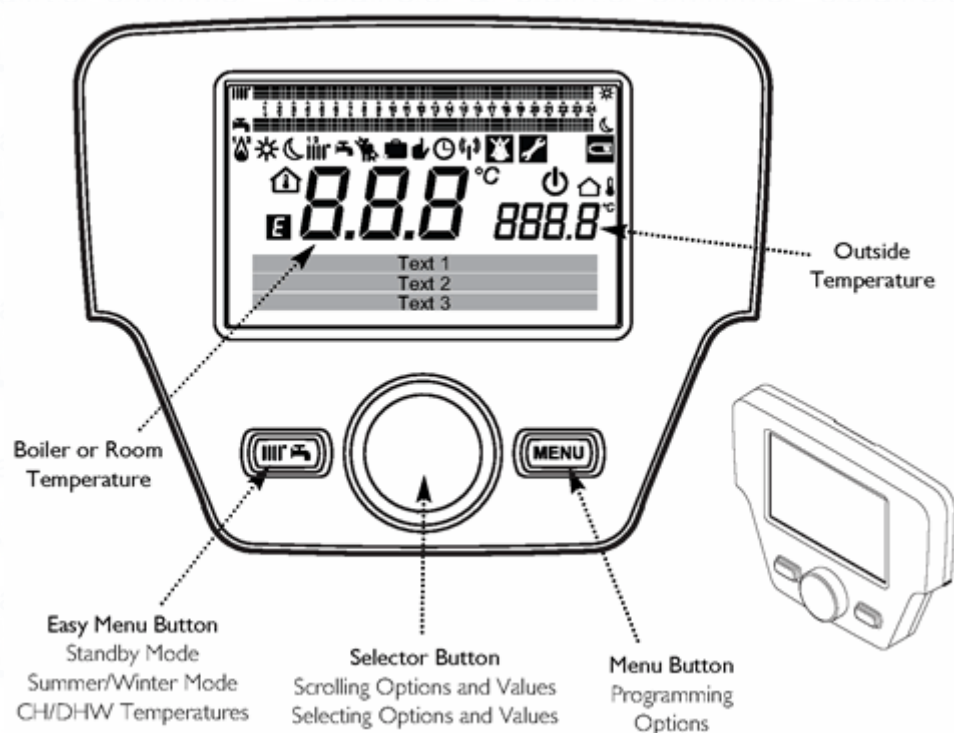


Fig. 42

THINK Controller

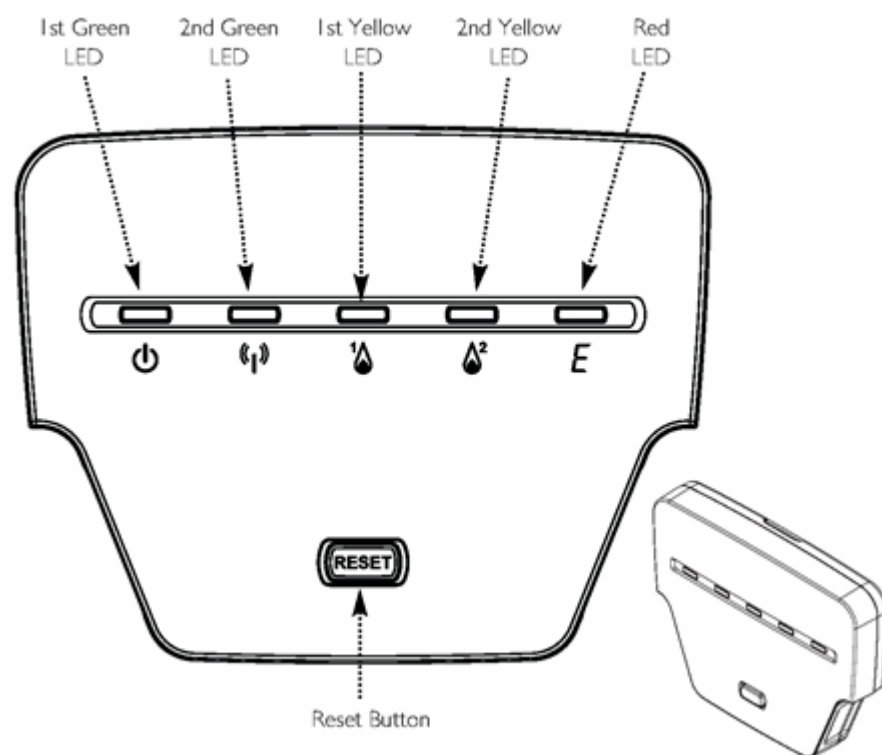


Fig. 43

5 LED Receiver ([Fig. 43](#))

Inputs

Reset button: Used for user reset.

Outputs

1st Green LED	-	Mains On
2nd Green LED	-	Communication status
1st Yellow LED	-	Engine burner status
2nd Yellow LED	-	Supplementary burner status
Red LED	-	Fault status

10.13 To Configure the THINK Controller as a Room Sensor

IMPORTANT: Before running the appliance ensure parameter 5700 has been set according to the type of system installed.
See [sections 10.4](#) to [10.11](#) for system types and [section 11.3](#) for the change procedure.

1. To configure the THINK Controller to act as a room sensor parameter 40 must be changed from Operator Unit 1 (the appliance) to Room Unit 1 (room unit).
2. To access parameter 40

Press the Menu Button to reveal 'Information'.

Press and hold Easy Menu and Menu Buttons until 'Enduser' is revealed.

Turn the Selector Button to highlight 'commissioning' and press to select.

Turn the Selector Button to highlight 'operator section' and press to select.

Turn the Selector Button to highlight 'Used as' and press to select,

whilst flashing turn the Selector Button to show the desired room unit and press to select.

page 47

-
3. Press the menu button repeatedly until the standard screen is available. The Programmable Room Unit symbol should be shown on the screen if the THINK Controller has been configured correctly, see [Fig. 42](#).
 4. If a second THINK Controller is to be used to control either a second heating circuit or to remain on the appliance then the parameter settings are slightly altered, see [Section 11.3](#) paragraph k and [Table 2](#).
 5. To complete the reconfiguring the main PCB must be rebooted with the information from the THINK Controller, so switch off the appliance and then re-power after 10 seconds. The THINK Controller will now act as a programmable room sensor when mounted into a wall cradle.
 6. The THINK Controller's can be replaced on the appliance at any time but to avoid conflict and Error 84 address collision problems, parameter 40 must be reconfigured back to 'Operator Unit 1'.

7. When a THINK Controller is mounted in a wall cradle, the 5 LED Receiver fills the space on the appliance. It acts as an indicator see [fig. 43](#) and enables us to carry out resets as they cannot be performed remotely.

Wiring connections to appliance - see [Section 16.6](#)

Wired THINK Controller Wall Cradle Control Terminal Function

1. Power supply 12v
2. Ground (0v)
3. Data Signal (+v)

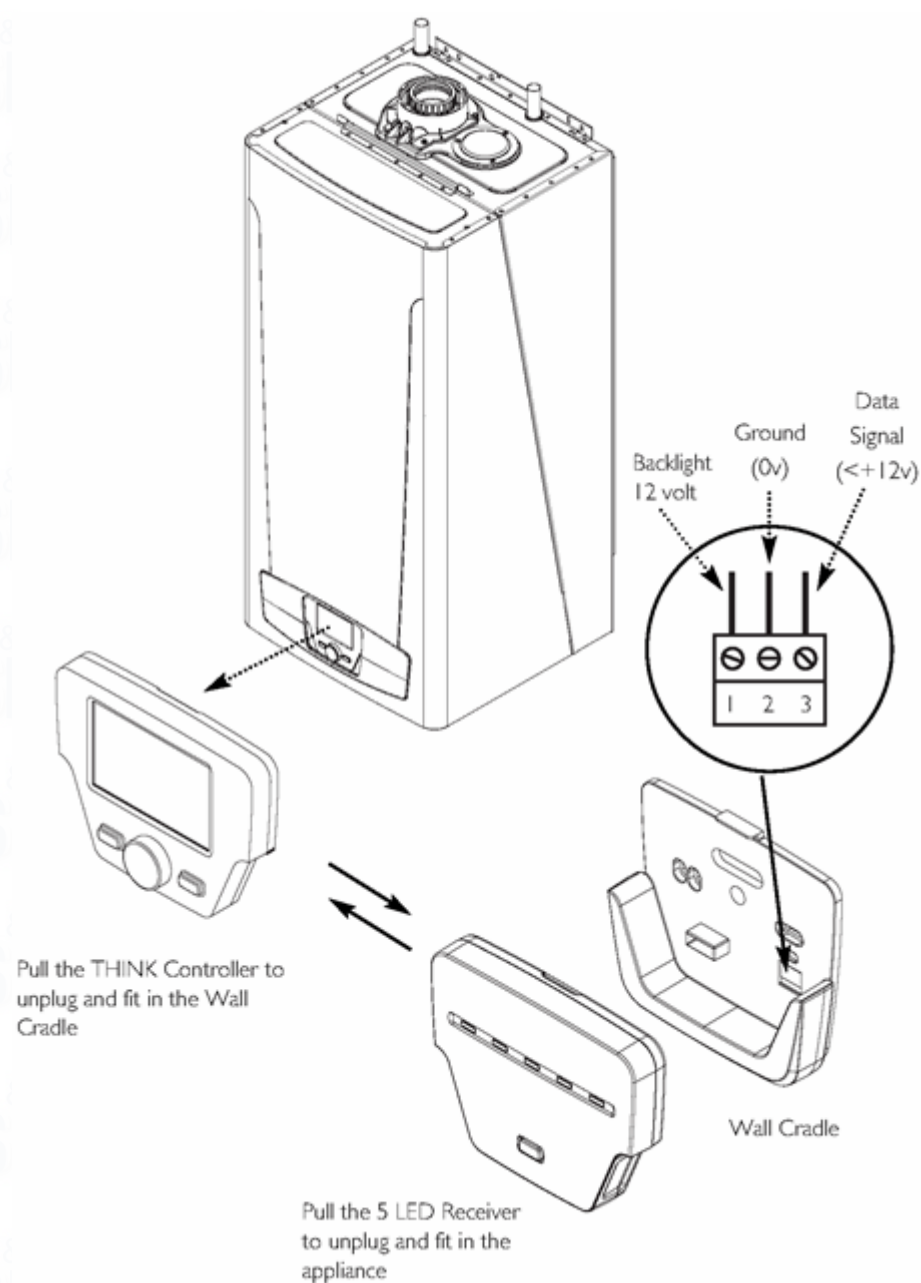


Fig. 44

10.14 To Install the 5 LED Receiver and THINK Controller

1. Isolate the appliance.
2. Remove the 5-LED Receiver from the wall cradle (as supplied).
3. Connect the wire terminals between the room unit wall cradle and the appliance controls installation area, using wire suitable for 12v. (<200m)
4. Install the wall cradle in a suitable room or hall way. (see [Section 10.15](#))
5. Make sure the wall cradle is not in a position where it can be accidentally knocked or tampered with.
6. Remove the THINK Controller from the appliance and place it in the wall cradle.
7. Place the 5-LED Receiver onto the appliance.
8. Switch on the appliance.
9. If the THINK Controller has not been configured as a Room Sensor correctly, you may see error 84: BSB collision. If this does happen, repeat from [Section 10.13](#) paragraph 2 while the THINK Controller is on the wall cradle. Once the parameters have been checked down power the appliance for 10 seconds and then switch the appliance back on.

page 48

10.15 Room Unit Installation Procedure

1. **Room unit location:** The wall cradle should be located in the main living room while giving consideration to the following points:

The place of installation should be chosen such that the sensor can capture the room temperature as accurately as possible without getting adversely affected by direct solar radiation or other heat or refrigeration sources (about 1.5 meters above the floor) ([Fig. 45](#)).

There must be sufficient clearance around the unit, enabling it to be fitted and removed.

Important : A TRV should not be fitted to the radiator in the same room as the room sensor. If a TRV has been installed on this radiator, the TRV must remain set open at all times, otherwise the house holder will experience room temperature control problems.
--

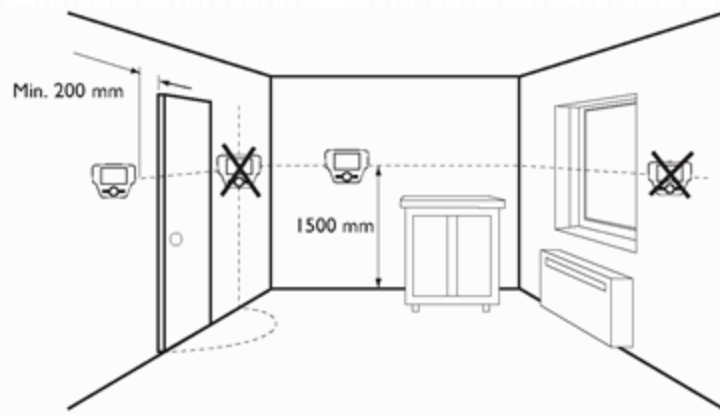


Fig. 45

10.16 Outside sensor unit installation procedure

1. Outside sensor location: The outside sensor carton is illustrated with Suitable locations and advises against locations which are likely to give poor / false readings.
2. Avoid south facing walls; preferably choose a west to north facing location.
3. The ideal height for the sensor is at approximately half the height of the living space of the dwelling and no less than 2.5m off the ground.
4. Avoid locating the sensor close to the flue terminal where the flue plume could heat the sensor and cause the appliance to switch off prematurely.
5. Two core "bell wire" is suitable.
6. When correctly connected and once the 'Save sensor' procedure has been done (See [Section 11.4](#)), the outside temperature and icon will be display on the THINK Controller(See [Section 10.12](#) and [Fig 42](#)).

page 49

10.17 Wireless Installation

1. If a wireless system is being installed then communication must be established between the various RF components and the special RF 5 LED Receiver which contains the transceiver for the appliance. Each kit as outlined in [section 6.7](#) includes installation instructions. An overview is given below: -
2. In the wireless 5 LED kit (part no. 720026201) the wireless 5 LED Receiver and the cradle are prebound but subsequent cradles holding THINK Controller for second heating circuits must be connected or 'bound' to the 5 LED transceiver.
3. The available RF component transmitters are: -
 - The cradle - enables direct connection with the THINK Controller.
 - The outside sensor transmitter.
 - The repeater unit - enables components to be positioned in otherwise dead areas to the RF 5 LED Receiver. The repeater unit requires a mains supply.

4. Observe the same considerations for locating the wireless THINK Controller as the wired room sensor.
5. To bind the units together use the following procedures.
6. Each THINK Controller must be allocated to the correct heat circuit i.e. room unit 1/room unit 2/operator unit as described in [Section 10.13](#) and [11.3 paragraph k](#), this can be done on the appliance or later when in the RF cradle.
7. Switch the appliance on and insert the RF 5 LED Receiver into either the appliance or an off appliance wired cradle.
8. If the RF Cradle and RF 5LED Receiver came boxed together then they will be prebound. Insert the 3xAA batteries into the RF cradle and insert the THINK Controller, 'dataupdate' will show and then the percentage progress will show if the THINK Controller is new to the appliance. After a short while 'Operator unit ready' then the standard screen will appear. The THINK Controller can now be used as an RF programmable room sensor.
9. If Error 83 appears move the THINK Controller in the RF cradle closer to the RF 5 LED Receiver. If distance/line of sight is not the problem the RF components will need to be connected or 'bound' together using the following procedure: -
10. Press and hold the reset button on the RF 5 LED Receiver around 10 seconds until the second and fourth LEDs are lit.
11. Press the menu button to enter the user menu and then press and hold the easy menu and menu buttons until the other access levels appear. Scroll down to the commissioning option and select by pressing the Selector Button. Scroll down to the wireless options and select to enter this list as shown opposite.
12. Select parameter 120, scroll to 'yes'.
'Wait' will appear until the unit is bound. As each unit is bound they will appear in the list above as being 'in operation'. If a unit does not appear, move it to a different location and then choose and confirm test mode. This will initiate a series of 24 test signals which are shown along the top of the display and sent back and shown on a line underneath. Move the unit to a location where at least 20 of these signals are echoed back. If few or no signals are received it will be necessary to use a repeater unit to relay the signal.

NOTE: The THINK Controller refresh rate will be slower than when it is mounted directly on the appliance or in a wired cradle.

IMPORTANT: Before running the appliance ensure parameter 5700 has been set according to the type of system installed.
See [sections 10.4](#) to [10.11](#) for system types and [section 11.3.k](#) for the change procedure.

Wireless menu				
	Line 2	Line 3		Parameter
1.	Binding	Trigger?	no/yes	120
2.	Test mode	Trigger?	no/yes	121
3.	Room Unit 1	Delete device?	missing/in operation	130
4.	Room Unit 2	Delete device?	missing/in operation	131

5.	Room Unit 3	Delete device?	missing/in operation	132
6.	Outside sensor	Delete device?	missing/in operation	133
7.	Repeater unit	Delete device?	missing/in operation	134
8.	Operator Unit 1	Delete device?	missing/in operation	135
9.	Delete all devices	-	no/yes	140

page 50

11.0 Commissioning

11.1 Preliminary Electrical Checks

1. Reference should be made to BS:EN 12828, 14336 and 5449 Section 5 when commissioning the boiler.
2. Prior to commissioning the boiler preliminary electrical system checks should be carried out.
3. Remove the outercase, the bottom panel and lower the control tray to gain access to the electrical connections (see [section 10.1](#)).
4. These should be performed using a suitable meter, and include checks for Earth Continuity, Resistance to Earth, Earth Loop Impedance, Short Circuit and Polarity.
5. At the time of commissioning, complete all relevant sections of the [Benchmark Checklist](#) at the rear of this publication.

11.2 Commissioning the Boiler

NOTE: The transit brackets - 3 off must only be removed just before commissioning the appliance.

1. The engine is held securely for transit by 3 brackets ([Figs. 48 & 49](#)). To ensure that all 3 brackets are removed before firing the appliance, two security measures must be overcome:
 - a) Firstly all 3 brackets are wired together. Remove the bottom (left and right hand) brackets first ([Fig. 49](#)) by removing the screws from underneath the engine and then undo the M6 screws securing the brackets to the back of the appliance. Disengage the brackets and withdraw.

Remove the top centre bracket by removing the three M5 screws (8mm spanner) ([Fig. 48](#)).

NOTE: Please retain the screws and brackets in case re-siting the appliance is necessary. The center bracket should also be refitted to protect the engine head during servicing.

b) This will release the second security measure now that the top bracket has been removed. The push on connector can be disengaged from the cut out and reconnected to the return temperature sensor ([Figs. 48a & 48b](#)) (the appliance will not operate until this reconnection is made, Error 40 will show).

2. Refit the control tray, the bottom panel and the outer-case before switching on the appliance.
3. Ensure that the filling loop is connected and open, then open the heating flow and return valves on the boiler.
4. The system must be flushed in accordance with BS 7593 (see [Section 6.1](#)) and the flushing agent manufacturers instructions.
5. Pressurise the system to 1.5 bar then close and disconnect the filling loop.
6. Turn the gas supply on and purge the system according to in GB BS 6891 (Natural Gas) BS 5482-1 (Propane Gas) and in IE I.S. 813 "Domestic Gas Installations".

IMPORTANT : Lockout may occur and Error Codes E261 & E262 displayed if the gas supply pipe is not adequately purged.

7. Test for gas tightness.

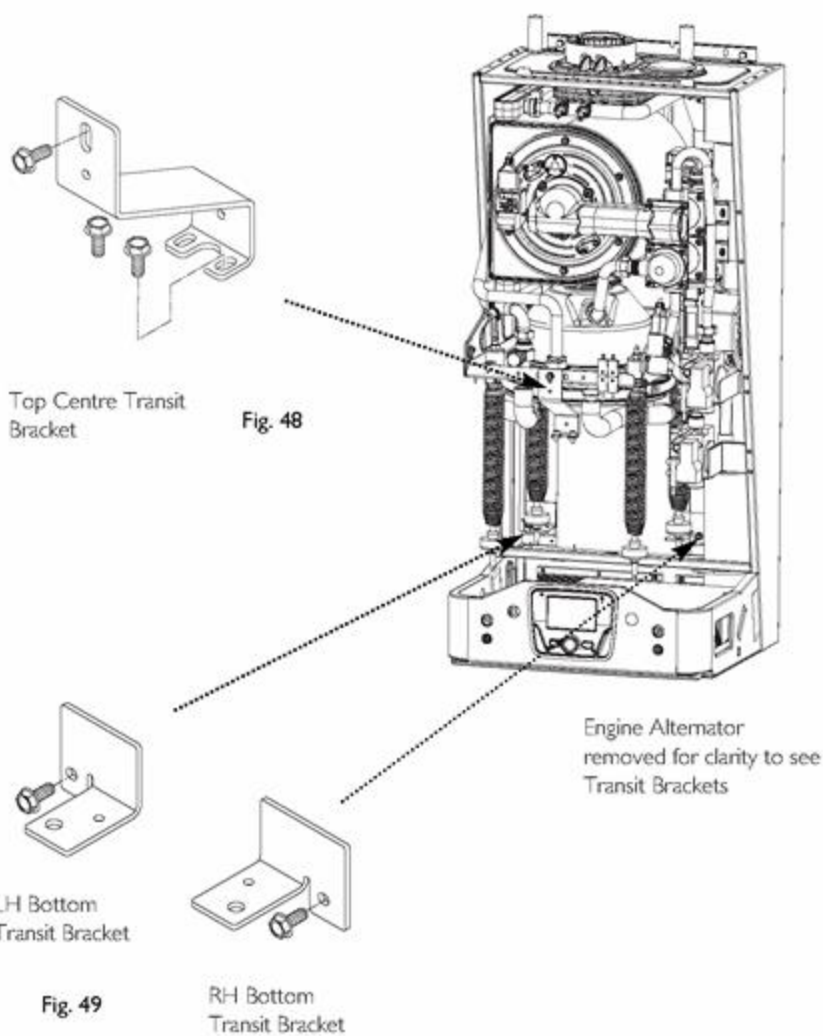


Fig. 48 & Fig. 49

Remove Top Centre
Transit Bracket

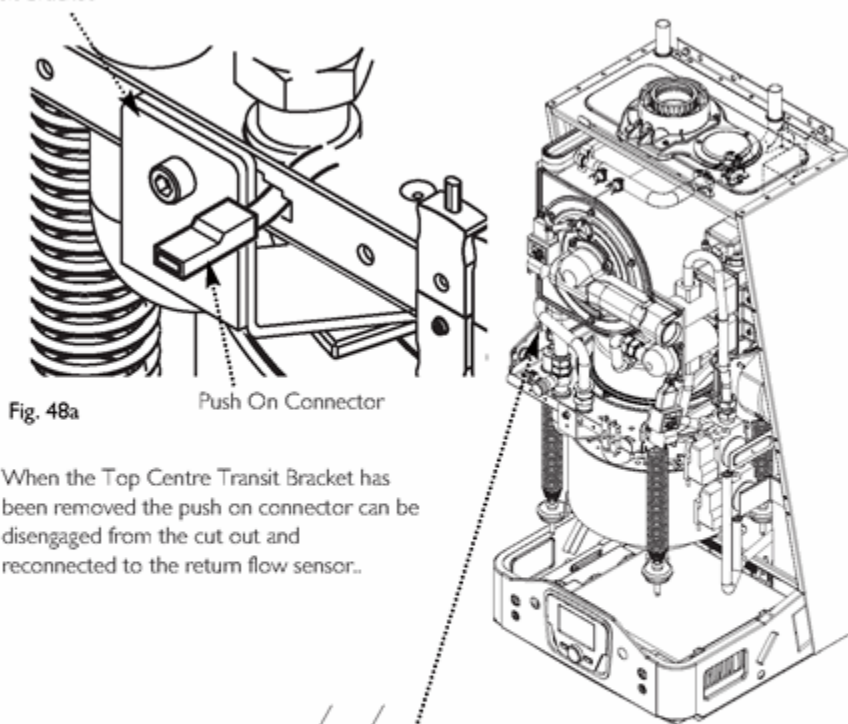


Fig. 48a

Push On Connector

When the Top Centre Transit Bracket has been removed the push on connector can be disengaged from the cut out and reconnected to the return flow sensor..

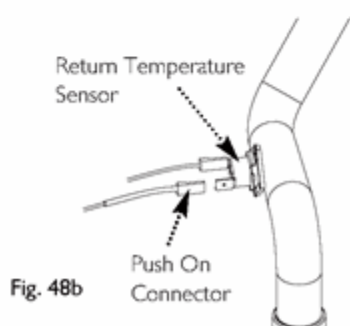


Fig. 48b

Fig. 48a & Fig. 48b

page 51

11.3 Commissioning of Controls

Every time the appliance is powered up, the controls carries out 2 checking functions

a) **315: Initialization** - Main PCB gathers data on connections and sensors. This takes around 2 minutes.

b) **312: De-**

aeration Function - all circulation valves are opened and the circulating pump is exercised. On for 6 seconds off for 5 seconds for 4.5 minutes. See [section g\)](#) De-aerationfunction

A number of actions are required to complete the commissioning procedure.

Time and Date settings.

Operating mode

Temperature settings.

DHW set point for thermostat control.
Time Program settings.
Chimney sweep (checking the gas rates)

A number of commissioning actions may be required ([Paragraphs g to l](#)):

Deaeration Function
Central Heating - Optimised start.
System frost protection (outdoor sensor required).
Legionella settings (DHW sensor only).
Configuring the appliance for the heating system - Parameter 5700.
2nd Heating Circuit room unit allocation.

a) Date and Time Settings

When the THINK Controller is powered up initially, 'Date and Time' setting function is activated. See [Section 4.0](#) Setting the Time in the User's Operating Instruction Booklet.

b) Operating Mode

To avoid unnecessary/unwanted start ups during installation and commissioning, the appliance is delivered in the standby mode which is confirmed by the () symbol shown in [section 10.12 Fig. 42](#). The standby mode will only allow the appliance to run if either: -

Hot water boost has been selected.
Chimney sweep function has been activated.
Frost protection is activated for either the appliance or room.
De-aeration allows exercising of the pump and valves for priming of the circuit and the removal of the air in the system.

To take the appliance out of standby and enable 'normal' operation: -

From the standard screen on the THINK Controller press the easy menu button.
Scroll the Button and press to select Standby/operation.
'Standby/operation - Operation' appears briefly on the THINK Controller and the action is confirmed by the disappearance of the standby symbol.

The central heating and domestic hot water active times are shown at the top of the THINK Controller as shown in [fig. 42](#). (See paragraph e).

To set up the appliance to the modes of operation required for the householder

- see [Section 7.0](#) of the User's Operating Instructions.
[Section 7.1](#) Selecting the Space Heating Mode.
[Section 7.4](#) Selecting the DHW Mode.

c) Temperature Settings.

Please refer to the User's Operating Instructions [Section 7.0](#).

d) DHW set point for thermostat control.

Remember: Make sure the user DHW setpoint on the THINK Controller is equal to or greater than the set point on the thermostat at the cylinder.

If this procedure is not performed the recovery time of the DHW maybe be increased unacceptably.

e) Time Program Setting

Please refer to the User's Operating Instructions Section 5 (CH) and Section 6 (DHW).

f) Chimney Sweep - Checking the gas rates - see [Section 11.5](#).

g) Deaeration function

If during commissioning repeated E164 and E274 errors occur which will stop the appliance from running, (see [section 17 fault finding](#)) it may be useful to run the De-aerationfunction. This will run the pump and exercise the system valves to help purge the air from the system.

- To activate this function from the standard screen: -
- Press and hold both the easy menu and menu buttons until chimney sweep function appears.
- Deaeration function will appear shortly afterwards.
- Scroll down and press to select.
- '312: Deaeration function' will appear and last for 4¹/₂ mins.

This action can be used repeatedly until the 164 and 274 errors are removed. However if the problem persists check to see if shut off valves, pump valves, wiring etc are correct.

h) Central Heating - Optimum start activation The engine and supplementary burner s are fired so that the property is up to the set room temperature at the programme On time.

- To activate the function press the 'Menu' button to enter the programming menu.
- Press and hold 'Easy Menu' and 'Menu' button together until the access level menu appears (>8sec).
- Select 'Commissioning'.
- Select 'Temps/mode CH1'.
- Press Selector Button to confirm.
- Select 'Optimum start control max' (P 790).
- Press Selector Button.

- Change the values to the desired time.
- Press Selector Button to confirm.
- Press 'Menu' button to escape to the normal operating screen.

i) System Frost protection An outdoor sensor must be fitted to activate system frost protection.

- To activate the function press the 'Menu' button to enter the programming menu - 'Information' appears.
- Press and hold 'Easy Menu' and 'Menu' button together until the access level menu appears (>8sec).
- Select 'Commissioning'.
- Select 'Configuration'.
- Select 'System frost protection' (P 6120).
- Press Selector Button.
- Select 'On'.
- Press Selector Button to confirm.
- Press 'Menu' to escape to normal operating screen.

Remember: The function is most likely to activate the pump during the night. Pump activation at less than 1.5° C.

page 53

j) Legionella

Legionella is only possible if DHW cylinder sensor is used. The function default activation time is 'Monday at 8:00am'.

- To modify the legionella time press 'Menu' button to enter the programming menu.
- Scroll to and select 'Domestic Hot Water'.
- Scroll to and select 'Legionella function weekday'.
- Change and confirm new day.
- Select 'Legionella funct time'.
- Change and confirm new time.

k) Configuring the appliance for the heating system Parameter 5700.

The default setting for parameter 5700 is '1' is for a retro-efficient system with a switched live using a wiring centre - see [section 10.11](#).

For intelligent installations change parameter 5700 to: - '2' - for one heating circuit and '3' - for two heating circuits.

From the main screen press the menu button to show 'information'.

- Press and hold the easy menu and menu buttons until 'end user' appears.

- Turn the selector button to highlight 'commissioning' and press to select.
- Turn the selector button to highlight 'Presetting parameter 5700' and press to select.
- Whilst the existing parameter is flashing turn the selector button to the desired number and press to select.

Press the menu button repeatedly to return to the standard screen.

I) 2nd Room Unit Allocation Procedure

When two or more THINK Controller's are used as opposed to one THINK Controller with a 5 LED Receiver.

Install the wall cradles and connect to the appliances using the same connections as shown in [Fig. 44](#) - up to two THINK Controllers can be installed in this way.

Power up the appliance:

- After the standard screen appears press the menu Button to reveal 'Information'.
- Press and hold the Easy Menu and the Menu Button until 'User' appears.
- Turn the Selector Button to highlight 'Commissioning' and press to select.
- Turn the Selector Button to highlight 'Operator unit' - parameter 40 and press to select.
- Turn the Selector Button to highlight 'Room unit 2' and press to select.
- Parameter 42 and 43 are automatically assigned and not accessible.
- Press the Menu Button repeatedly to escape to the standard screen.

Power down the appliance for ten seconds and then power up. If two heating circuits have been programmed correctly the THINK Controller's should show a small 1 and 2 next to radiator along with the room unit symbol as in [Fig. 42](#).

If it is required to replace the THINK Controller back on the appliance then parameter 40 must be reassigned to operator unit 1 - see [section 10.13](#).

After all reprogramming of these parameters the appliance must be down powered and then re powered after 10 seconds.

Parameter settings for the THINK Controller when used as a room sensor with either a 5LED Receiver or THINK Controller on the appliance

On the Appliance	1st Room Unit			2nd Room Unit		
5LED THINK Controller	Parameter					
	40	42	43	40	42	43
	RU1 RU1	All HC All HC	Central Central	RU2 RU2	Automatically Assigned	

Table 2

Reprogramming of location and central control parameters.

The default settings used for the THINK Controller on the appliance regardless of other equipment are :-

Parameters 40 = Operator Unit 1

42 = All Heating Circuits (All HC)

43 = Central

The parameters 42 and 43 are accessed as parameter 40 as above.

page 54

11.4 Saving the sensor connections

1. For intelligent installations where sensors are used, after all of the connections are made and all the THINK Controller's have been programmed as room sensors, the sensor connections need to be saved.
2. From the main screen: -
 - Press the Menu Button to reveal 'Information'.
 - Press and hold Easy Menu + Menu for 5 seconds to reveal 'user'.
 - Turn the Selector Button to highlight 'commissioning' and press to select.
 - Turn the Selector Button to highlight 'configuration' and press to select.
 - Turn the Selector Button to highlight 'save sensors' and press to select.
 - Turn the Selector Button to highlight 'yes' and press to select.
 - The 'yes' will change back to 'no' to show that the sensors have been saved.
3. The sensors that are connected to the appliance are automatically recognised and used to control the comfort levels.

page 55

11.5 Starting the Appliance and Checking the Gas Rate

1. The gas valve is factory set and in normal running the burner pressure cannot be measured as it is controlled by the fan and modulates as demand on the boiler alters.
2. The gas rate must be checked (as in accordance with Gas Regulation 98 Paragraph 26/9) with any other appliances and pilot lights turned off.
3. The gas rate measurement may be made with the Engine and Supplementary burners both on maximum.

Approximate rate is:- $\pm 5\%$ 2.68 m³/hr at 20mb inlet pressure for G20 (Natural Gas) 1.04 m³/hr at 37mb inlet pressure for G31 (Propane Gas), see [Section 4.1](#).

NOTE: For retro-

fit systems using a wiring centre - ensure that all external controls are calling for heat

IMPORTANT: The combustion for this appliance has been checked, adjusted and preset at the factory for operation on the gas type specified on the appliance data plate.
No measurement of the combustion is necessary. Do not adjust the air/gas ratio valve.

4. Having checked:

- That the boiler has been installed in accordance with these instructions.
- The integrity of the flue system and the flue seals.
- The integrity of the boiler combustion circuit and the relevant seals.

Proceed to put the boiler into operation as follows:

5. Activate the chimney sweep function by pressing and holding the easy menu and menu buttons ([Fig. 49a](#)) whilst in the normal operation screen until chimney sweep function option appears. Press the Selector Button to switch the chimney sweep function on.
6. The THINK Controller will show Chimney Sweep Function on. Chimney Sweep function Burner Output Adjust appears.
 - Press the Selector Button. 'Engine burner min' will flash.
 - Use the wheel to scroll through the six options

- a) Engine burner minimum
- b) Engine burner maximum
- c) Supplementary burner minimum
- d) Supplementary burner maximum
- e) Engine and Supplementary burners minimum
- f) Engine and Supplementary burners maximum

7. Choose the maximum operation f) and ok your choice. No matter what the previous state is, the burners will restart before achieving the desired rate.

As soon as both burners are lit as shown by the flame numbers .

8. With the boiler operating in the maximum rate condition check that the operational (working) gas pressure at the inlet gas pressure test point ([Fig. 50](#)) is in accordance with B.S. 6798 & B.S. 6891.
9. Ensure that this inlet pressure can be obtained with all other gas appliances in the property working.

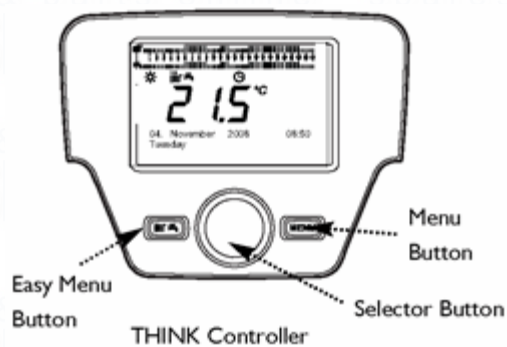
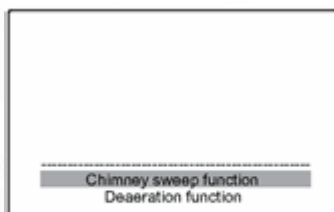
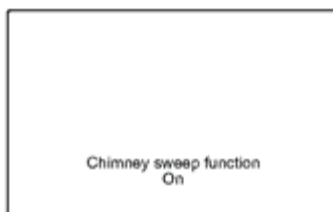


Fig. 49a

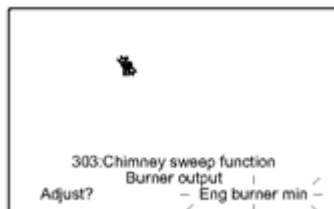
STEP 1



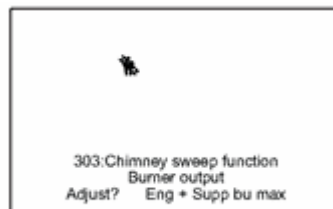
STEP 2



STEP 3



STEP 4



page 56

10. Carry out the rate measurement. The burners will remain at maximum rate unless: -

- a) A fault condition occurs - the burner/s will switch off - depending on the fault.
- b) The boiler set flow condition is reached (see note) - the burners will switch off.
- c) The power generated reaches 1kW - the engine burner will modulate down.

For this reason the measurement needs to be carried out on a cold system to be sure of obtaining an accurate result.

NOTE: The boiler set flow temperature is set to 90° to avoid interruption of the rate measurement.

11. The chimney sweep function can be deactivated in the same manner as it is activated. It will deactivate automatically after 20 minutes, or in the event of an fault.
12. **Remember:** The engine burner will not restart until the Head Temperature is below 165°C.

12.0 Completion

12.1 Completion

1. Instruct the user in the operation of the boiler and system including the THINK Controller, explaining the operational sequence.
2. Set the central heating and hot water temperature comfort levels to the requirements of the user.
3. Carefully read and complete all sections of the [Benchmark Commissioning Checklist](#) at the rear of this publication that are relevant to the appliance and installation. These details may be required in the event of any warranty work. The publication must be handed to the user for safe keeping and each subsequent regular service visit recorded.
4. Complete the 'Notice of Installation' booklet and submit on the day of commissioning to the Distribution Network Operator.
5. For IE, it is necessary to complete a "Declaration of Conformity" to indicate compliance with I.S. 813. An example of this is given in I.S. 813 "Domestic Gas Installations". This is in addition to the [Benchmark Commissioning Checklist](#).
6. Hand over the Users Operating, Installation and Servicing Instructions giving advice on the necessity of regular servicing.

Advise the customer of the necessity of informing the electricity provider with regard to billing and payback. See the Users Operating instructions section 13.3.

NOTE: See also www.baxi.co.uk/products/get-fit-with-baxi-ecogen

page 57

13.0 Servicing

13.1 General

1. For reasons of safety and economy, it is recommended that the appliance is serviced annually. Servicing must be performed by a competent person in accordance with BS 7967-4:2007.
2. After servicing, complete the relevant [Service Interval Record](#) section of the [Benchmark Commissioning Checklist](#) at the rear of this publication.

NOTE: Service and maintenance engineers must have undergone Baxi Ecogen Training and been approved to service this appliance.

3. Before electrically isolating the appliance: remove all demands for heat and ensure the engine has disconnected from the grid.
(Power = 0 kW) This will protect the engine from the stresses produced by disconnecting during electricity generation.

IMPORTANT:

During routine servicing, and after any maintenance or change of part of the combustion circuit, the following must be checked:-

- The integrity of the complete flue system and the flue seals.
- The integrity of the boiler combustion circuit and relevant seals as described in [Section 14.14](#).
- The operational gas inlet pressure as described in [Section 11.5](#) and the gas rate as described in 11.3.8.
- The combustion performance as described in 'Check the Combustion Performance' ([15.1](#)).

4. **Competence to carry out Checking Combustion Performance**

- B.S. 6798 'Specification for Installation & Maintenance of Gas Fired Boilers not exceeding 70kW' advises that:-

- The person carrying out a combustion measurement should have been assessed as competent in the use of a flue gas analyser and the interpretation of the results.
- The flue gas analyser used should be one meeting the requirements of BS7927 or BS-EN50379-3 and be calibrated in accordance with the analyser manufacturers' requirements.
- Competence can be demonstrated by satisfactory completion of the CPA1 ACS assessment, which covers the use of electronic portable combustion gas analysers in accordance with BS 7967, Parts 1 to 4.

NOTE: It is not possible to undertake any servicing of the engine and its burner and as such it should be regarded as a sealed unit.

When performing combustion checks each burner must be run independently, see [section 15.0](#) Combustion Checks.

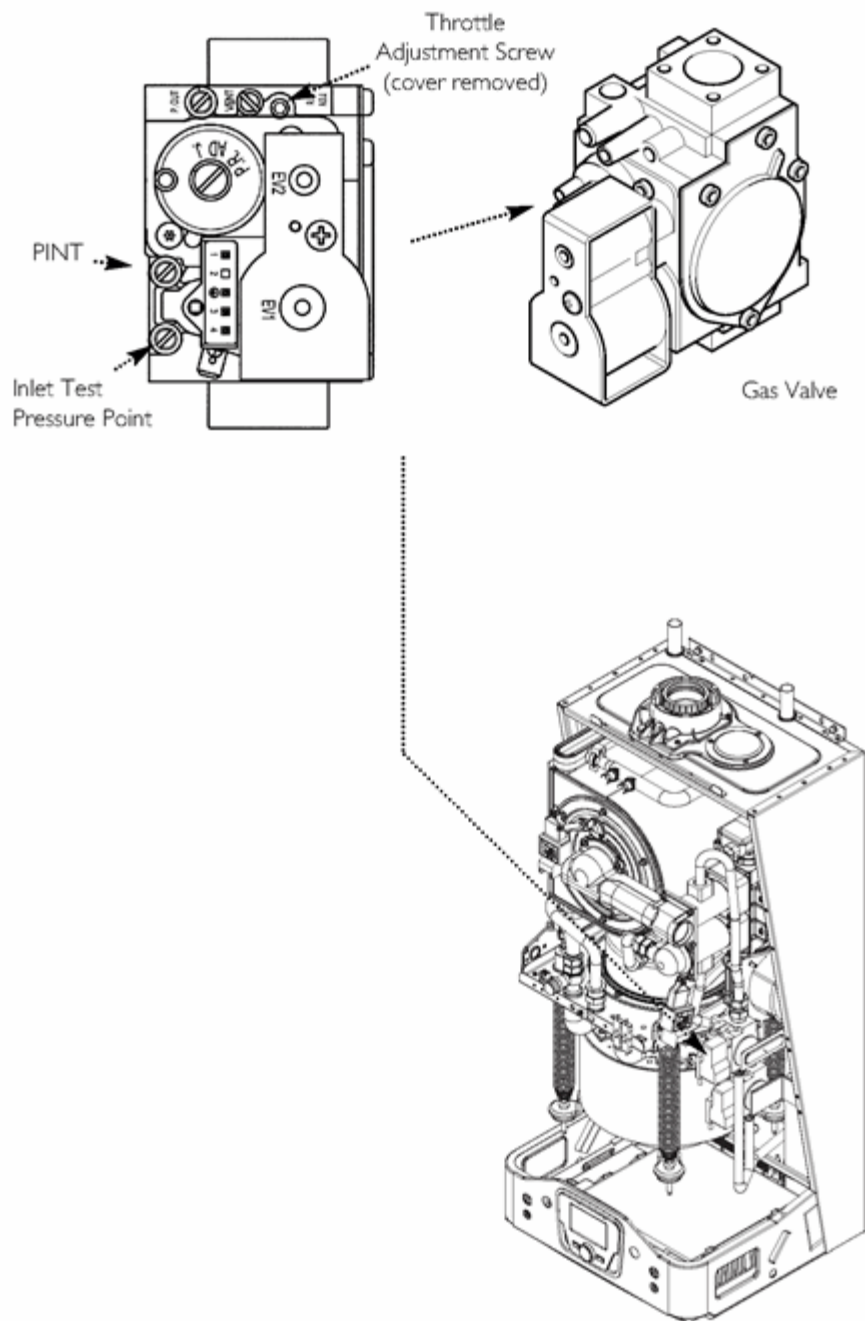


Fig. 50

13.2 Power generation

1. Ensure the system is cold and use the chimney sweep mode to force the Engine burner to maximum rate see [section 15.1](#).
2. Use the THINK Controller to observe the power generated.
3. Monitor the head temperature and the power via the I-think controller - see [section 13.3](#) -safety note.
4. The power should be between 800 to 1000W within 10 minutes of the engine burner starting - the head temperature should be between 450-500 deg C.

5. If the power level is low when the head has reached temperature the engine is not producing power correctly - [see section Q](#) for fault finding on the engine.

page 58

13.3 Servicing - Internal Integrity

Safety Note: Before removing the front cover; the correct shut down sequence must be followed for your own safety.

Before servicing, ensure that the boiler is cool with the engine head below 120°C - otherwise there is a risk of

electric shock even with the supplies disconnected.

The head temperature may be accessed via the THINK Controller.

Press the MENU Button. Turn the Selector Button to highlight 'Information'.

Press the Button to select. Turn Selector Button until 'head temp actual value' is shown.

Ensure that both the gas and electrical supplies to the appliance are isolated - wait a minimum of 6 minutes 30 seconds

before any work is started - again there is a risk of electric shock even with the supplies disconnected.

NOTE: Before undertaking any service work that entails the removal and replacement of parts, ensure that the center transit bracket is refitted to protect the engine head (see [Fig.48](#)).

This bracket must then be removed before running the engine.

1. Remove the plastic fascia on the front of the appliance which is held on by two magnets ([Fig. 51](#)).
2. Remove the two screws and the front case by pulling forward at the bottom edge and then lifting clear of the engagement at the top of the appliance ([Fig. 51](#)).
3. Undo the four screws from the bottom cover and remove the cover ([Fig. 51](#)).
4. Remove the two screws on the front of the control tray to gain access to the control tray area ([Fig. 52](#)).
5. Inspect the unit for any signs of water damage and rectify any leaks.
6. Generally check the conditions of the wiring of the appliance and the external wiring for and loose/ poor connections and remake if necessary.
7. Inspect the condition of the condense trap for signs of debris and possible blockage. If necessary remove the service plug, drain and clean the compartment. Replace the plug, reassemble the case and check for correct operation when the appliance is running.
8. Check and clean the magnetic filter if it is of the serviceable type, otherwise replace the cartridge. If it is observed that there is excessive amounts of corrosion product - black residue/sludge check the inhibitor level in the system and top up with inhibitor solution as required.

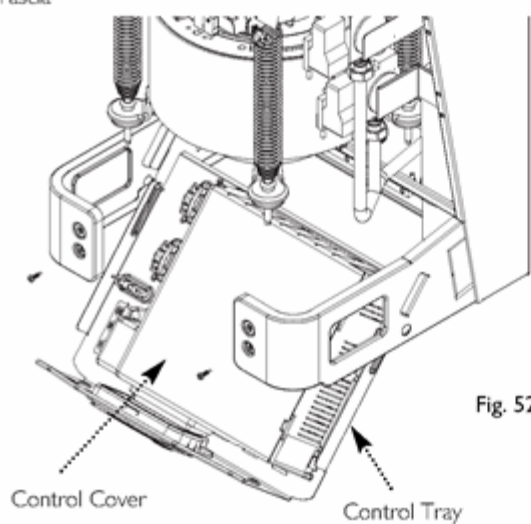
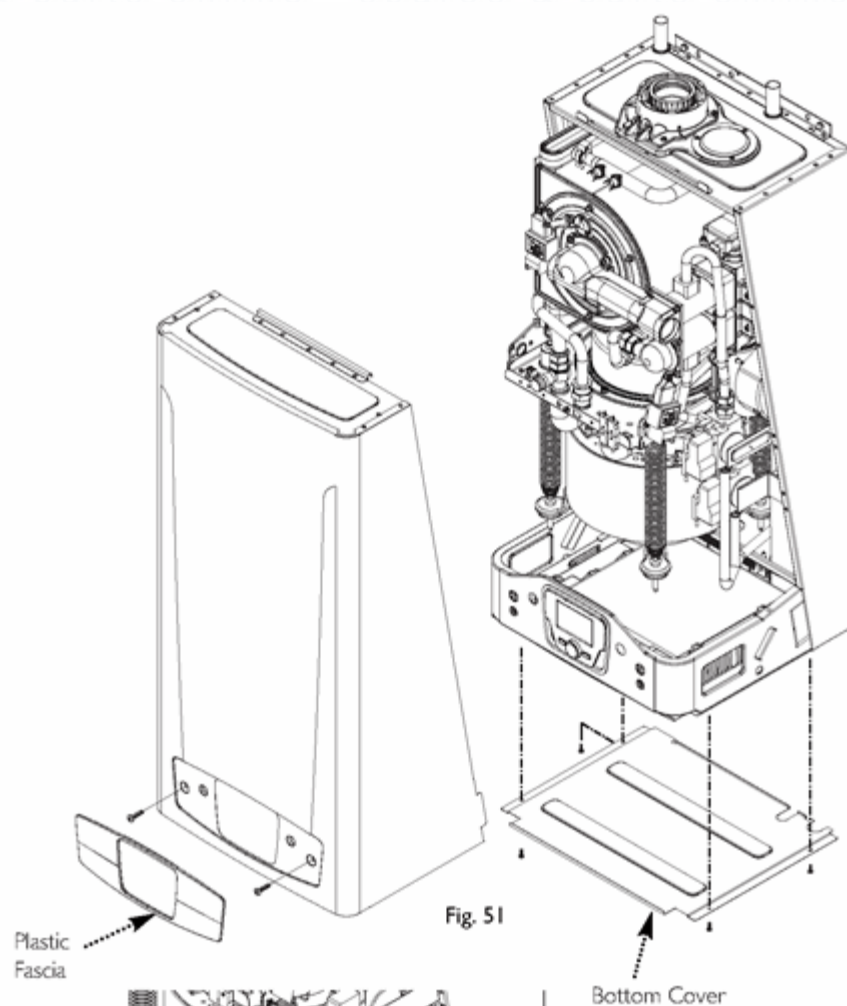


Fig. 51 & Fig. 52

page 59

13.4 Servicing - Combustion and Rate Checks

1. Perform combustion and rate checks by using the chimney sweep mode to force each burner into maximum rate (see [section 15.0](#) Combustion Checks). Combustion reading of CO₂ ~ 8.7 - 9.3 and CO less than 100 ppm are acceptable for both burners. Measure the CO/CO₂ ratio. This value must be less than 0.004.
2. Set each burner separately to a minimum and check that the burner stays lit with clean combustion.
3. If there is a problem with the rate or combustion see [Section 15.2](#).
4. If there is a problem with the ignition, the following servicing should be carried out.

See SAFETY NOTE [Section 13.3](#) Engine Ignition and Flame Sensing Electrodes ([Fig. 53](#))

1. Detach the ignition and flame sense leads from the wiring harness noting their positions.
2. Undo the long nuts (7mm spanner) retaining the engine ignition and flame sense electrodes.
3. Carefully withdraw the electrodes from the engine.
4. Examine and clean or replace the electrodes as necessary. The spark gap should be 3.5 - 4.0 mm, adjust the earth pin if required ([Fig. 54](#)).
5. Always use the new gaskets provided when replacing the electrodes.
6. Replace in the reverse order.

Supplementary Burner and Heat Exchanger, Igniter and Flame Sensing Electrodes ([Fig. 55](#))

1. Detach the supplementary Igniter plug.
2. Detach the flame sense lead from the wiring harness.
3. Remove the four M5 screws at the right of the supplementary air gas manifold.
4. Undo the six nuts around the burner door perimeter noting the position of the earth lead.
5. Carefully withdraw the burner door and manifold.
6. Clean any debris from the heat exchanger and check that the gaps between the tubes are clear.
7. Inspect the burner, insulation and the electrodes, clean or replace if necessary. Reset the electrode spark gap to between 3.5 - 4.0 mm by adjusting the earth pin if required ([Fig. 54](#)).
8. If it is necessary to replace electrodes always use the gaskets provided.
9. Reassemble in the reverse order remembering to attach the earth wire.

Complete the relevant [Service Interval Record](#) section of the [Benchmark Commissioning Checklist](#) at the rear of this publication and then hand it back to the user.

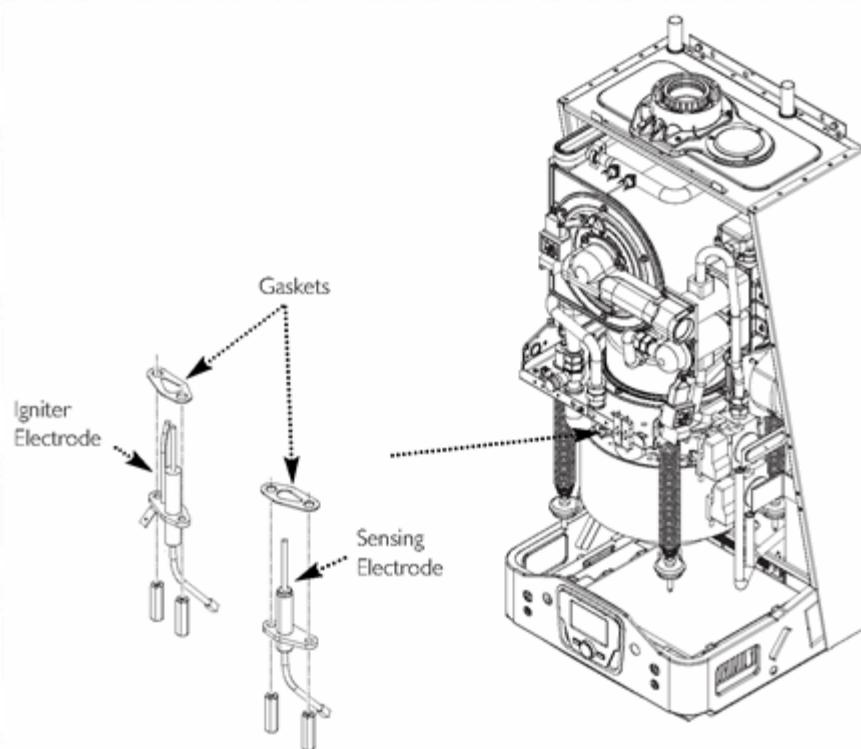


Fig. 53

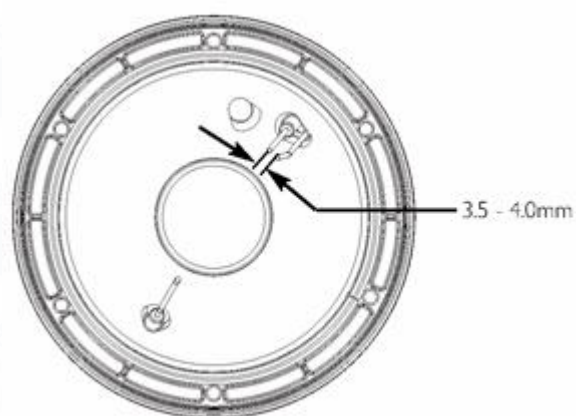


Fig. 54

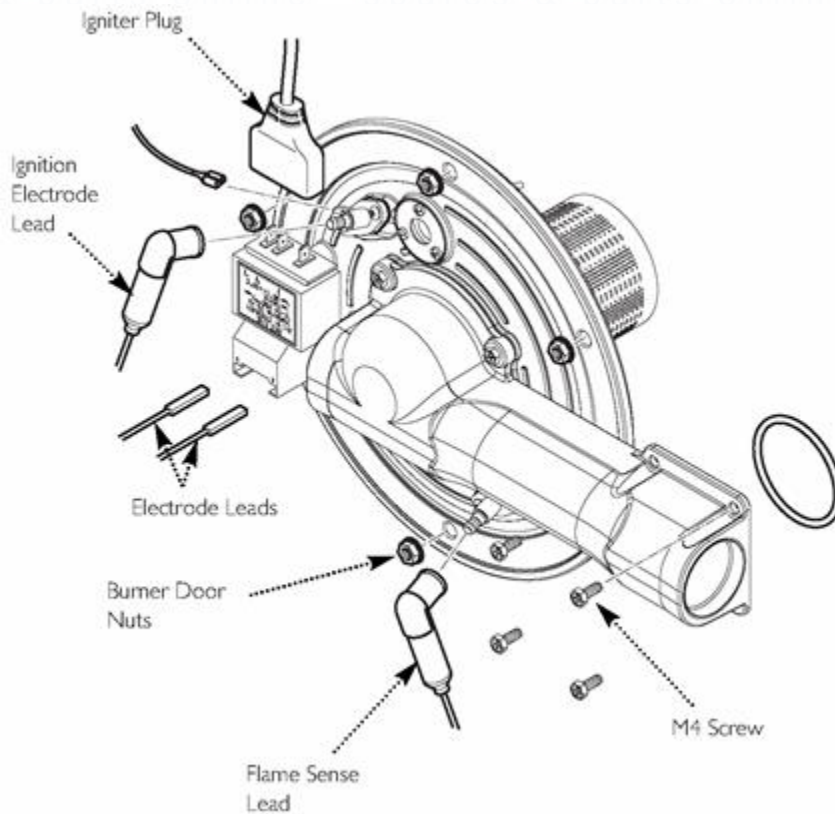


Fig. 55

page 60

14.0 Changing Components

IMPORTANT: When changing components ensure that both the gas and electrical supplies to the boiler are isolated before any work is started. Wait a minimum of 6 minutes 30 seconds before working on the interior components to allow the capacitor to discharge.

See [Section 13.3](#) "Servicing" for removal of case panel, door etc.

14.1 Supplementary & Engine Igniter ([Fig. 56](#))

1. Disconnect the igniter plug and the electrode leads, noting their positions.
2. Undo the screws securing the igniter and remove it being careful to retain the washers.
3. Reassemble in reverse order.

14.2 Supplementary Igniter and Sensing Electrodes ([Fig. 57](#))

1. Disconnect the electrode leads, noting their positions.

2. Remove the retaining screws securing each of the electrodes to the burner door and withdraw the electrodes.
3. Replace the sealing gaskets.
4. Reassemble in reverse order.

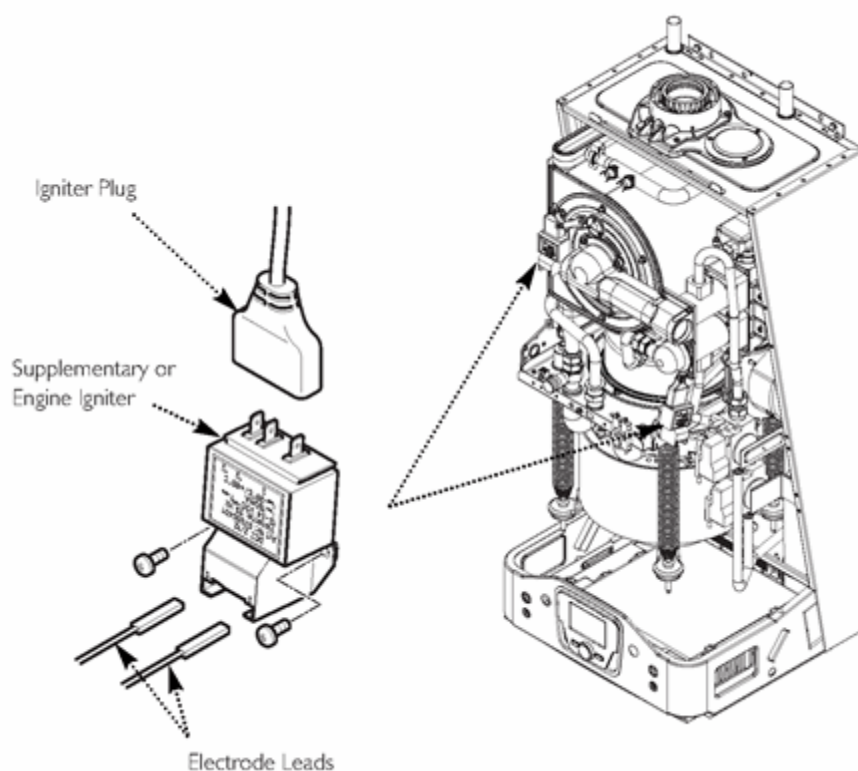


Fig. 56

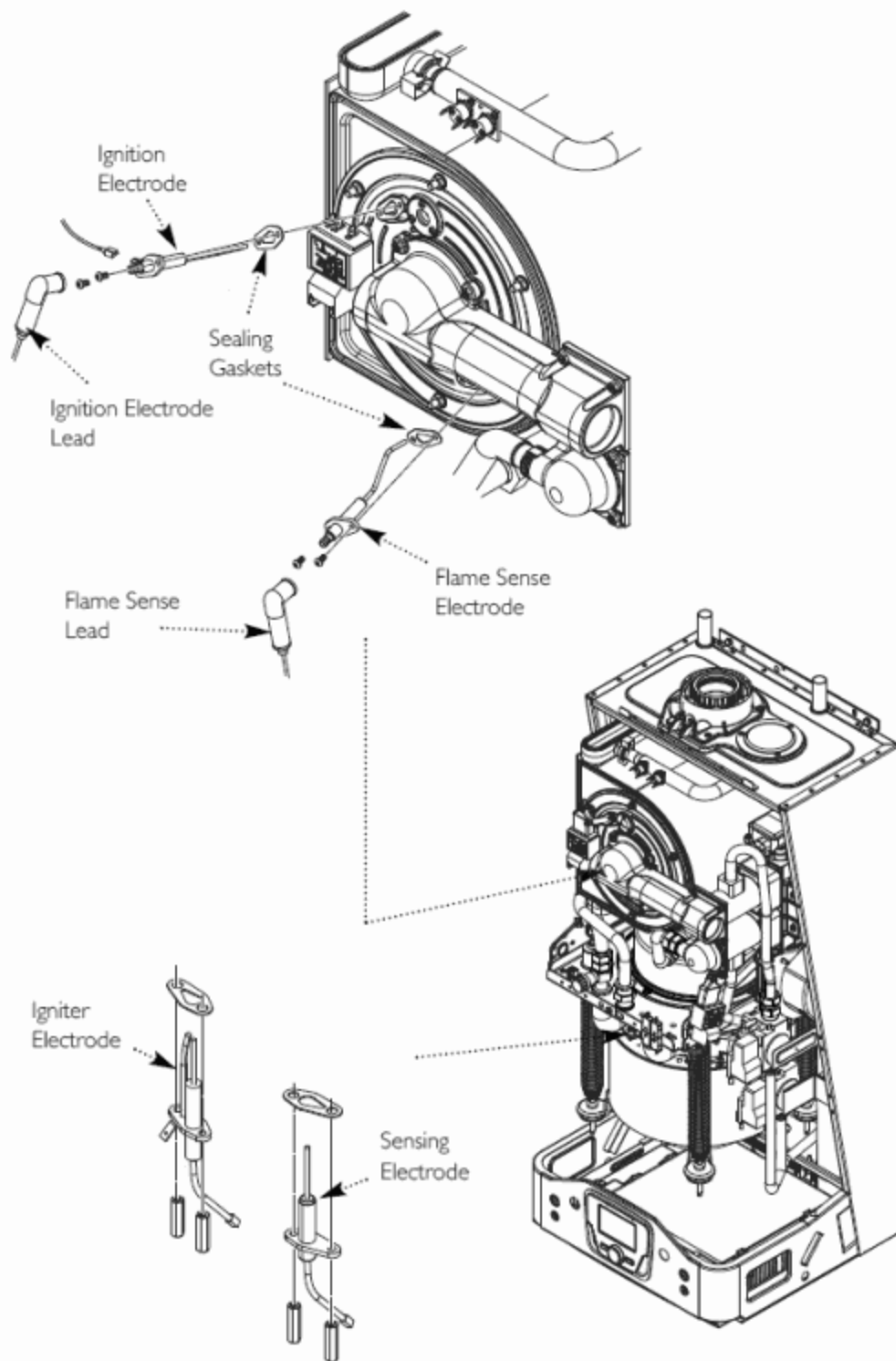


Fig. 57 & Fig. 58

14.3 Engine Igniter and Sensing Electrodes ([Fig. 58](#))

1. Disconnect the electrode leads, noting their positions.
2. Using a 7mm ring spanner remove the 2 long nuts securing each of the electrodes to the engine burner.
3. Replace the sealing gaskets.

4. When replacing the electrodes ensure that they are offered to the assembly vertically to avoid damaging/snagging the internal ceramic block.
5. Reassemble in reverse order.

page 61

14.4 Fan, Venturi - Spool Valve ([Figs. 59 & 60](#))

1. Undo the nuts on top of the gas valves.
2. Remove pipes from the venturis.
3. Remove electrical connections from fan and spool valve motor.
4. Undo the three screws securing the manifold onto the burner door.
5. Undo the nut retaining the 22mm pipe at the centre of the engine air/gas manifold.
6. Remove the three screws holding the spool valve on to the side panel. Lift the assembly out.
7. Examine the burner gasket and replace if necessary.
8. Reassemble in reverse order, ensuring that the injector is in place and the sensing pipe is connected to the venturis.

14.5 Spool Valve Motor ([Figs. 59 & 60](#))

1. Remove the Fan, Venturi - Spool Valve Assembly as in [section 14.4](#).
2. Remove the 3 screws holding the motor in place.
3. Reassemble in reverse order ensuring the motor drive shaft engages correctly in the spool motor.

14.6 Venturis/Air Flow Straighteners ([Figs. 59 & 60](#))

1. Remove the Fan, Venturi - Spool Valve Assembly as in [section 14.4](#).
2. Remove the 8 manifold screws and the 8 nuts attaching the venturis to the 2 air flow straighteners.
3. Slide the venturis and then the air flow straighteners off the long M5 studs.
4. Clean/replace as necessary. Reassemble in reverse order.

14.7 Fan ([Figs 59 & 60](#))

1. Remove the Fan, Venturi - Spool Valve Assembly as in [section 14.4](#).
2. Remove the 4 M5 screws on the fan flange.
3. Reassemble in reverse order.

14.8 Spool Valve ([Figs 59 & 60](#))

1. Remove the Spool Valve Motor, Venturi, Air Flow Straighteners and Fan - see relevant sections above.
2. Remove the countersunk M5 screw retaining the spool valve bush and carefully withdraw the spool valve from the body.

Do not allow the spool valve to slide out in an uncontrolled manner as this may result in damage to the component.

3. Clean/replace as necessary. Reassemble in reverse order.

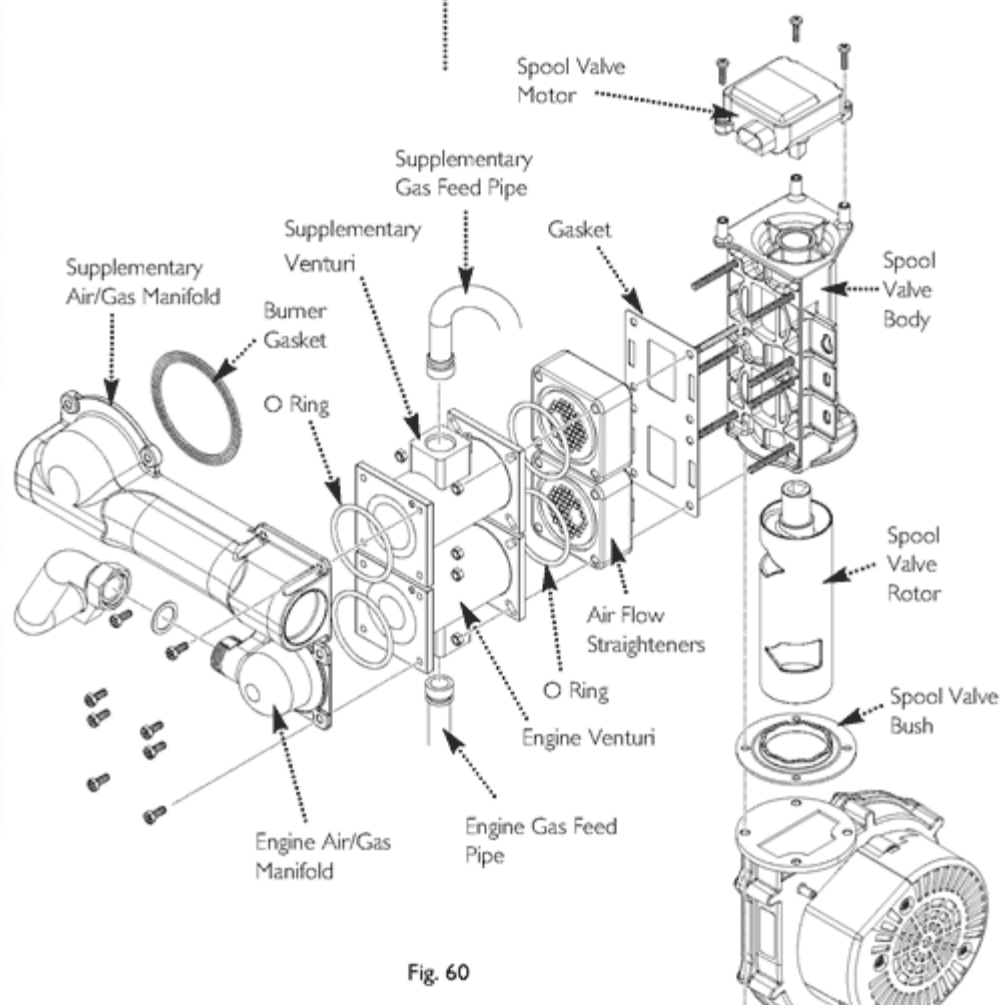
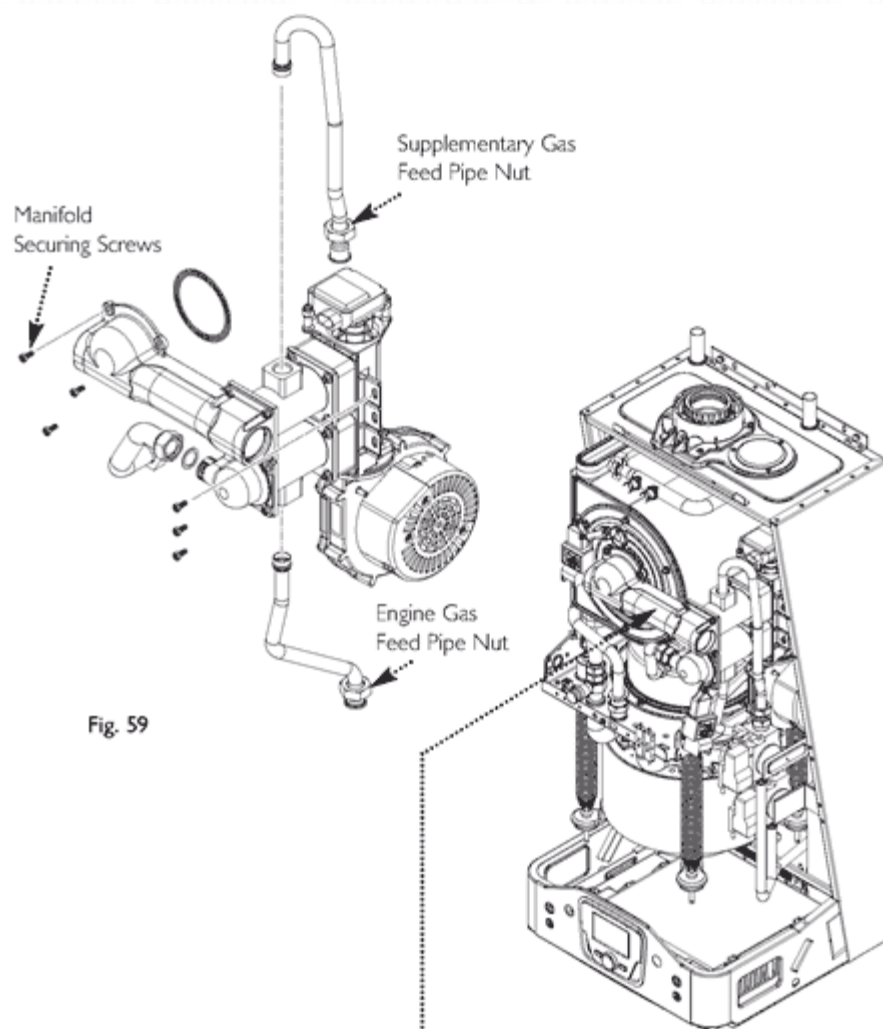


Fig. 59 & Fig. 60

page 62

14.9 Supplementary Burner ([Fig. 61](#))

1. Undo the screws securing the manifold to the burner door and the supplementary venturi.
2. Remove the manifold and the burner gasket.
3. Withdraw the burner from the burner door and replace with the new one.
4. Examine the gasket and the 'O' ring at the venturi end, replacing if necessary.
5. Reassemble in reverse order.

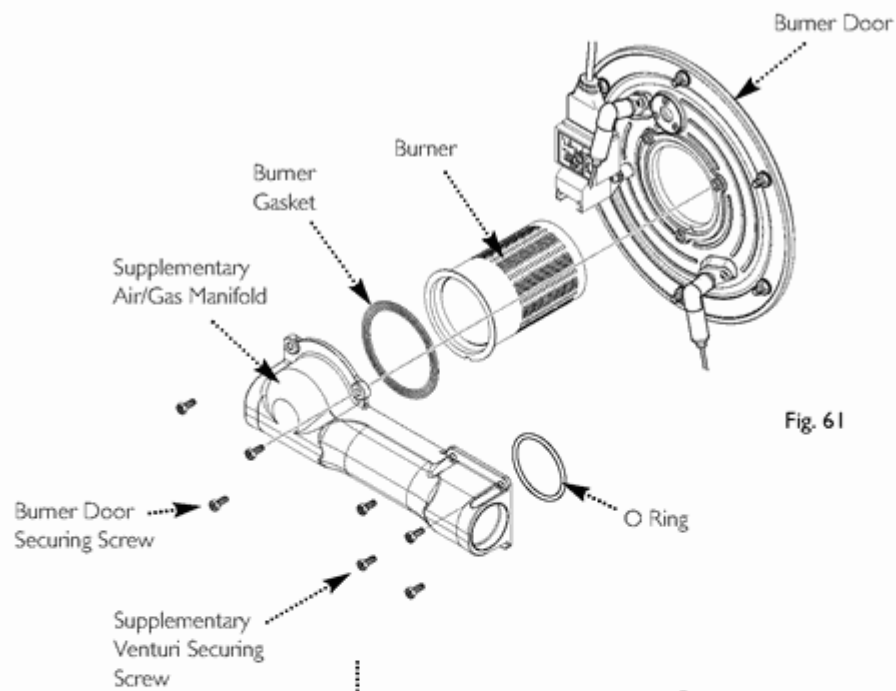


Fig. 61

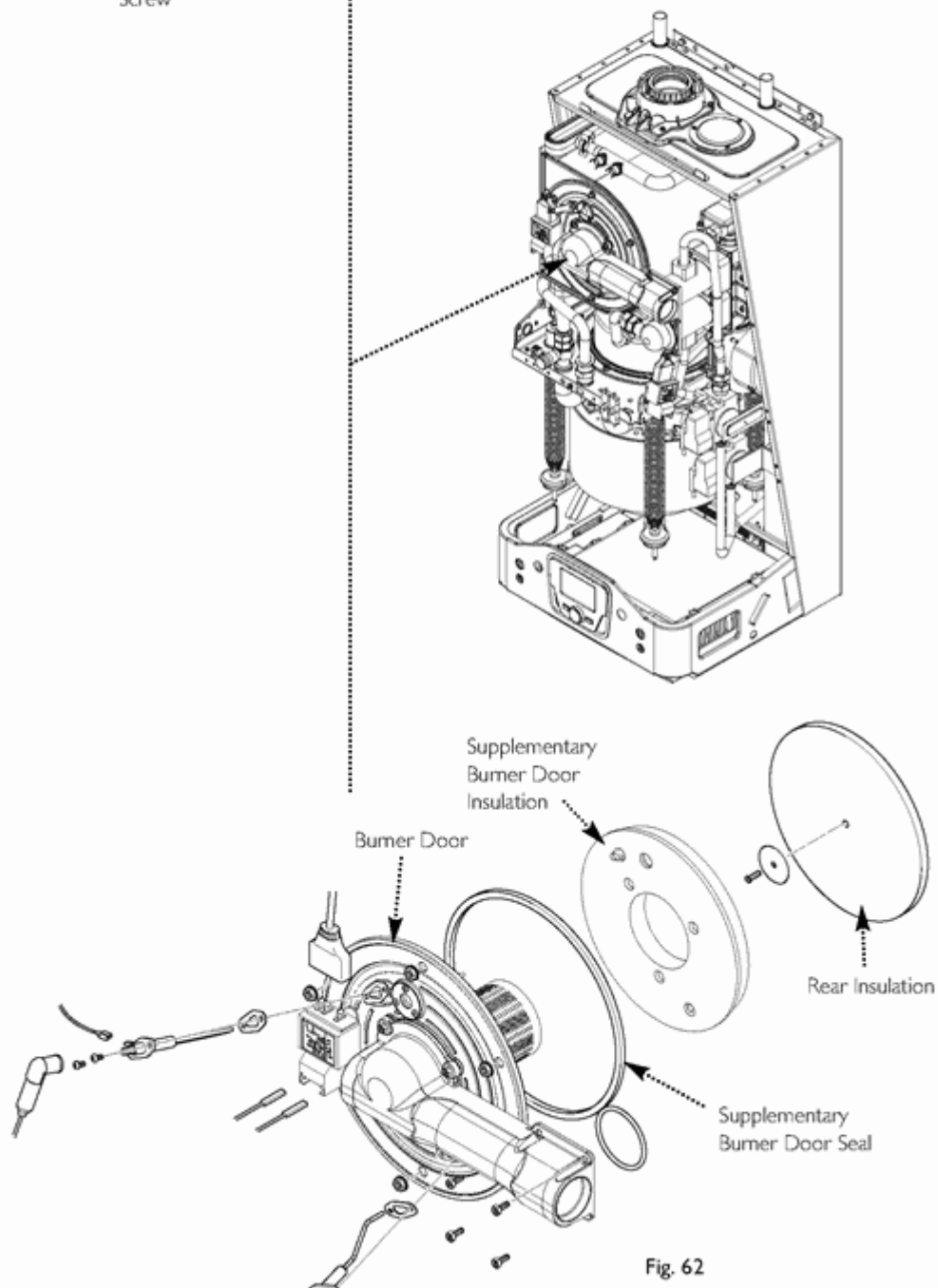


Fig. 62

Fig. 61 & Fig. 62

14.10 Supplementary Burner/Heat Exchanger Insulation ([Fig. 62](#))

1. Remove the electrode leads, noting their positions. Also remove the electrodes as described in [section 14.2](#).
2. Undo the screws securing the manifold to the venturi and the nuts holding the burner door to the heat exchanger. Draw the assembly away from the heat exchanger.
3. Inspect and remove the burner door insulation.
4. Fit the new insulation carefully over the burner and align it with the slots for the electrodes.
5. Inspect the rear insulation, replace if cracked or broken. It is retained by a small screw and a large washer. Undo the screw carefully, remove the insulation and fit new insulation. Clean any debris from the heat exchanger - preferably with a vacuum cleaner.
6. Examine the burner door seal and replace if necessary.
7. Reassemble in reverse order.

page 63

14.11 Central Heating Flow & Return Temperature Sensors ([Figs. 63 & 64](#))

1. Disconnect the connections.
2. Remove the retaining screws
3. Fit new sensor and reassemble in the reverse order.

14.12 Overheat Thermostat ([Fig. 63](#))

1. Pull the connectors off the thermostat.
2. Remove the screws securing the thermostat to the mounting plate on the flow pipe.
3. Fit new thermostat and reassemble in reverse order.

14.13 Ambient Sensor

1. Pull the connectors off the sensor.
2. Remove the screw.
3. Fit the new sensor and reassemble in the reverse order - ensure the gas valve electrical connections is securely home.

14.14 Water Flow Sensor ([Fig. 65](#))

1. Drain the primary circuit (see [Section 14.15](#) paragraph 2).
2. Carefully remove the 3 wire connector noting orientation - there is a small latch.

To remove just the sensor element only (recommended): -

- a) Remove the locking ring by twisting anti clockwise.
- b) Withdraw the sensor element.
- c) Reassemble in the reverse order - there is a key way to ensure the sensor is lined up with the body correctly.
- d) Reconnect the 3 wire connector ([Fig. 65a](#)).

To remove just the sensor body: -

- a) Disconnect the four wires on the temperature sensors ([Fig. 63](#)).
- b) Remove the three pipe clips. One near the heat exchanger and two on the body flow sensor ([Figs. 63 & 65](#)).
- c) Carefully withdraw the assembly from the heat exchanger and the rear central heating flow pipe.
- d) Remove the sensor body from the flow pipe.
- e) Reassemble in the reverse order being careful not to damage the O rings.
Ensure the sensor body is fitted in the correct orientation with the arrow pointing to the back of the appliance ([Fig. 65](#)).
- f) Ensure the 3 wire connector is fitted the correct way round ([Fig. 65a](#)).

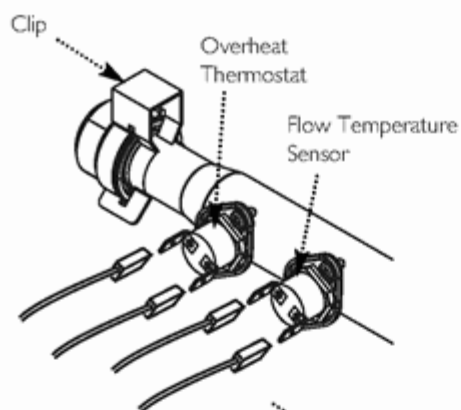


Fig. 63

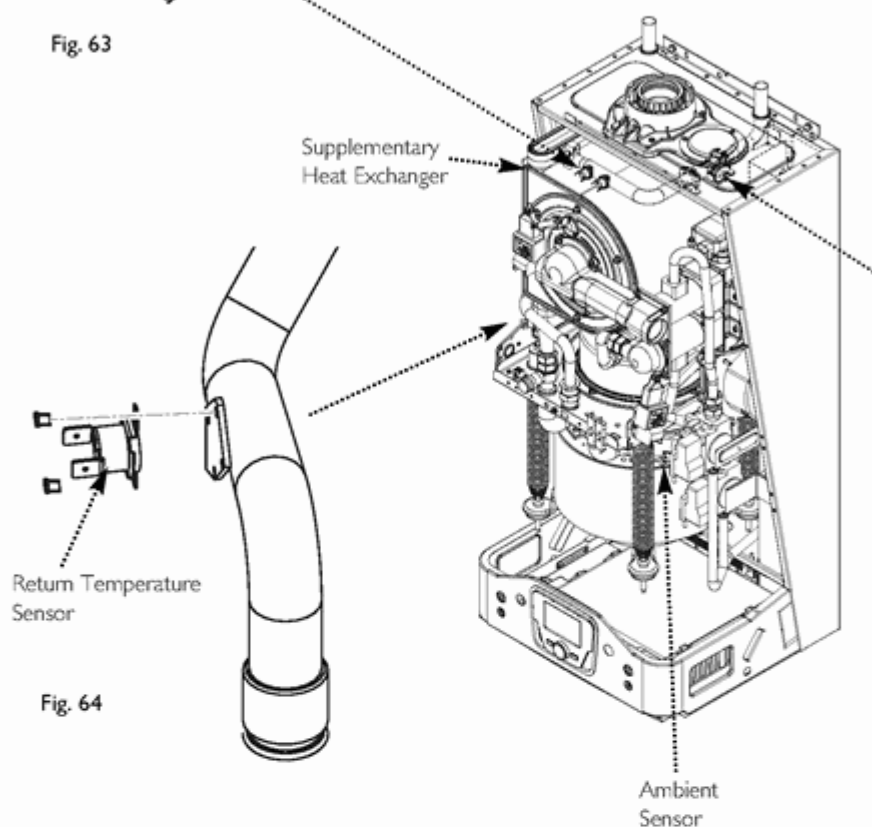


Fig. 64

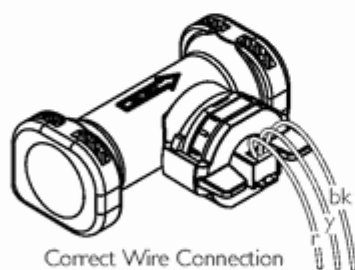
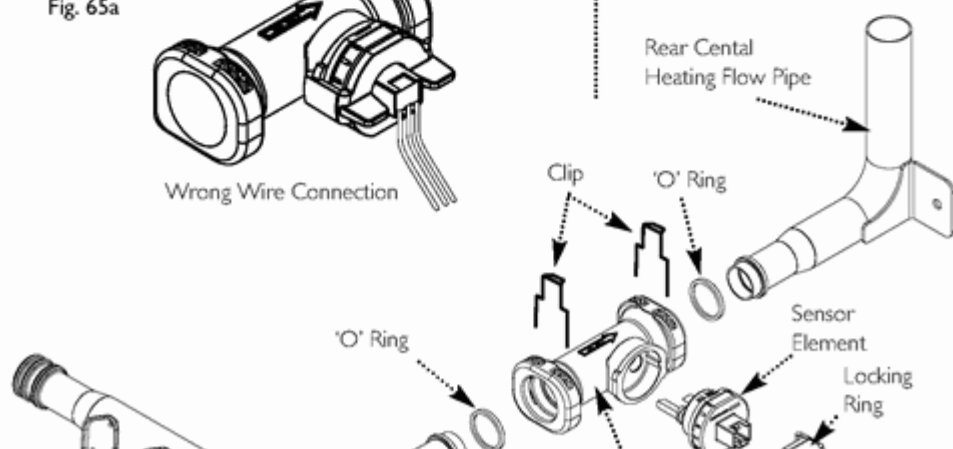
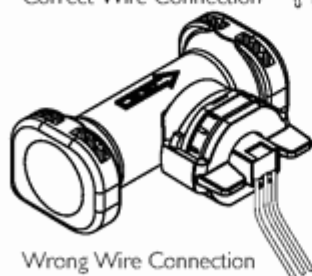


Fig. 65a



14.15 Supplementary heat exchanger

Before starting this procedure ensure the appliance has cooled sufficiently to allow handling of the heat exchanger. If it is not intended to replace the heat exchanger ensure that a service kit is on hand for reassembling.

1. Isolate the appliance from all services.
2. Use the drain point ([Fig. 66a](#)) to remove the system water from the appliance.
3. Remove the assemblies shown in [sections 14.4](#), the burner door assembly as described in [14.10](#) and the water flow switch as in [section 14.14](#). Disconnect the flue and remove the flue connector assembly by undoing the four self tapping screws.
4. Release the flow pipe from the supplementary heat exchanger - remove the spring clip ([Fig. 67](#)). Undo the fitting at the top of the drain valve. Loosen the compression fittings on the flow and return pipes to the appliance and then swing the pipes away from the supplementary heat exchanger.
5. Using a 5mm hex drive, undo and remove the clamping collar between the supplementary heat exchanger and the engine burner.
6. Disconnect the condense drain tube at the bottom back of the heat exchanger ([Fig. 67](#)).
7. The supplementary heat exchanger will still contain system water so care is needed to be taken when it is lifted from the appliance. Ensure that the electrical connections and the PCB area are protected from any possible spillages. Carefully lift the heat exchanger to the right of the appliance and pull forwards. Ensure that the drain extension does not foul the engine burner insulation. There will still be system water in the heat exchanger so care needs to be taken when handling to avoid accidental spillages.
8. Remove the supplementary return pipe from the supplementary heat exchanger by removing the two screws and the retaining plate ([Fig. 67](#)).
9. Reassemble in the reverse order. Use a new engine burner/supplementary gasket and O rings. A kit of parts is provided with a new heat exchanger.

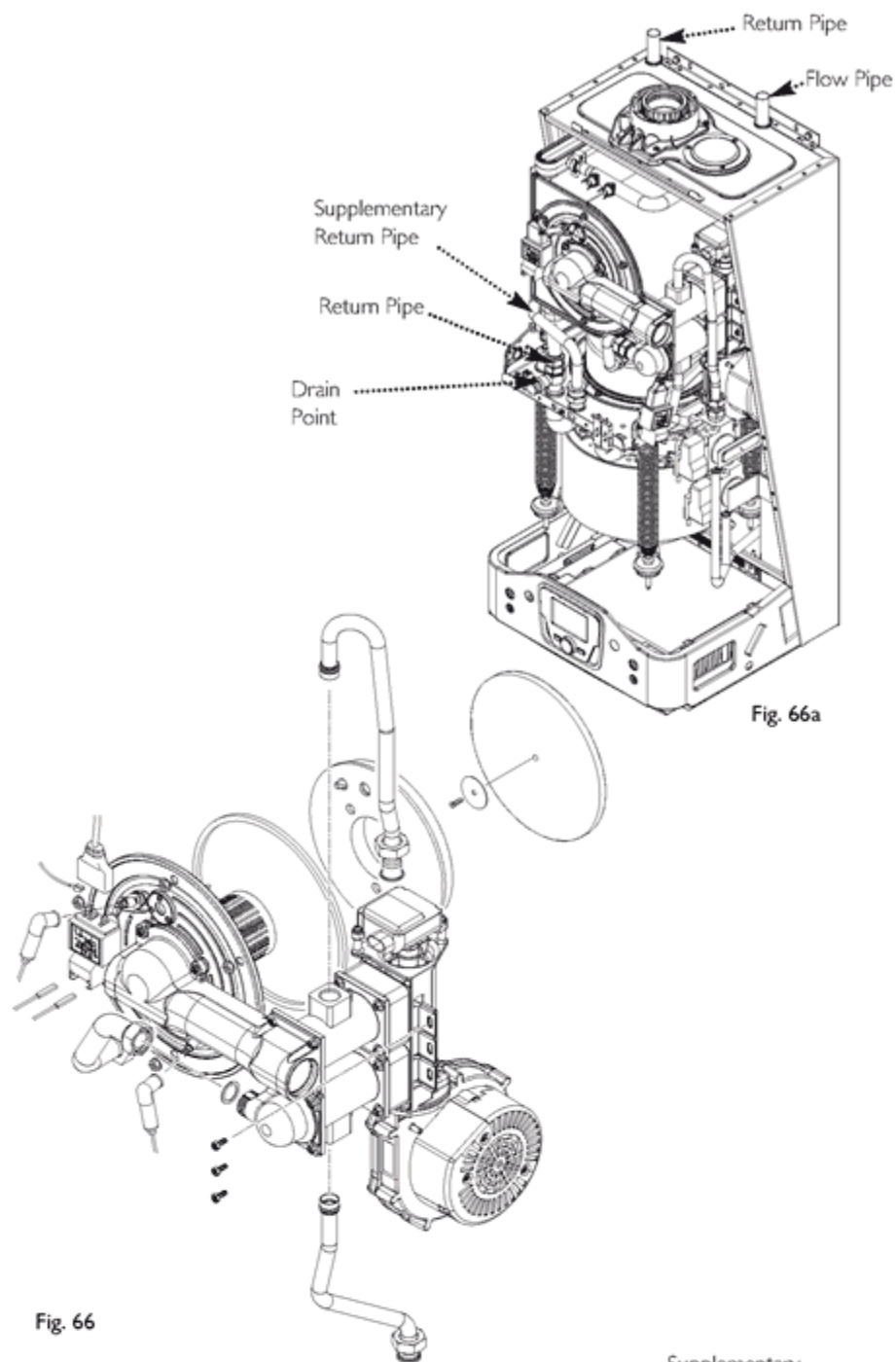
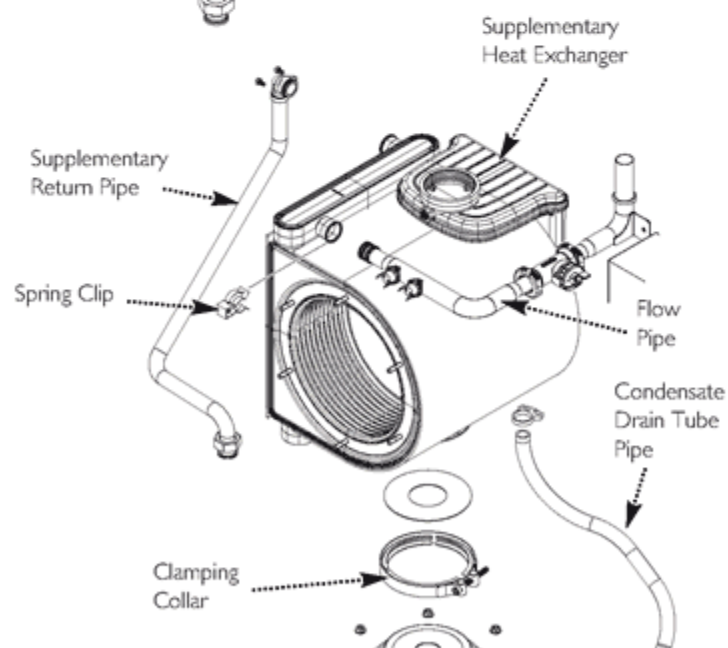


Fig. 66a

Fig. 66



14.16 PCB Main ([Figs. 68,69](#) & [70](#))

1. Undo the 4 screws from the bottom cover and remove the cover.
2. Undo the 2 screws securing the control tray, pull the assembly forward and carefully allow the assembly to drop down.
3. Remove the 2 screws securing the control cover at the left hand corners. Lift at the left hand side and disengage from the G83/24V power supply housing on the right.
4. Carefully remove the connections. There are three connections to each burner control unit (BCU). Four connections on the main board and fifteen around the edge.
5. Remove the screw at the back left hand corner. Push the PCB/cover assembly back (approx 10mm) and lift out the assembly.
6. Reassemble in the reverse order.

NOTE: The connections are "justified" so that it is impossible to connect up incorrectly.

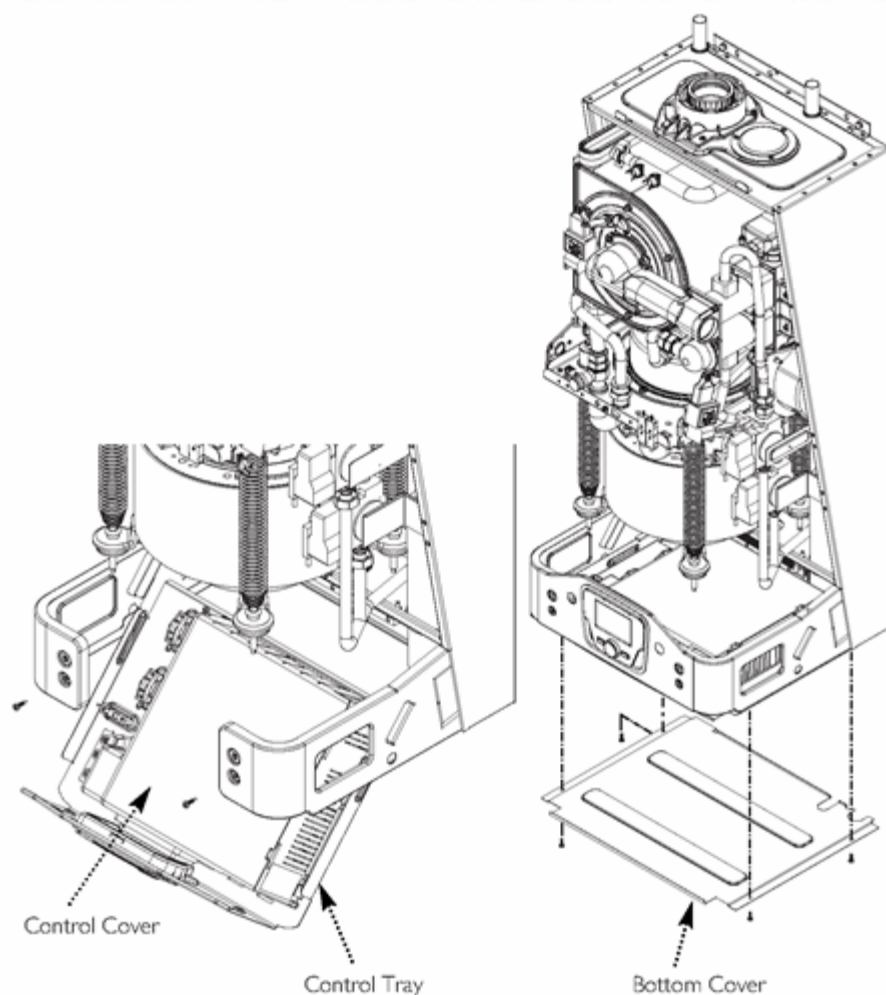


Fig. 68

14.17 PCB (G83/24Vdc Power Supply) ([Figs. 69 & 71](#))

1. Remove the control cover as detailed in [section 14.16](#).
2. Carefully remove the four connections.
3. Remove the screw from the back left hand corner. Push the G83 assembly back (approx 10mm) and lift out.
4. Reassemble in the reverse order.

14.18 EMC Mains Filter ([Figs. 69a](#))

1. Undo the 4 screws from the bottom cover and remove the cover.
2. Undo the 2 screws securing the control tray, pull the assembly forward and carefully allow the assembly to drop down.
3. Remove the Mains connections from either side of the filter.
4. Undo the screws securing the filter to the underside of the panel ([Fig. 69a](#)). Remove the earth tag.
5. Reassemble in reverse order ensuring that the earth tag is in place.

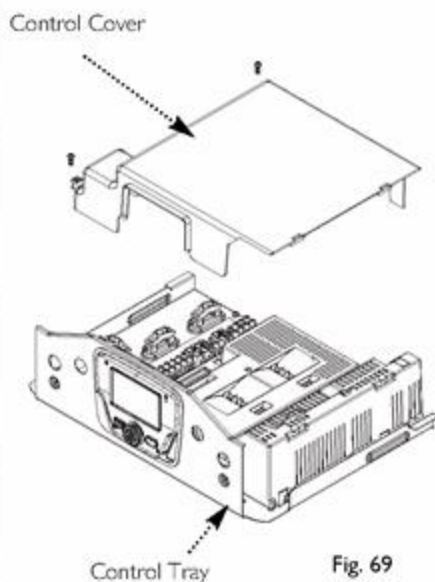


Fig. 69

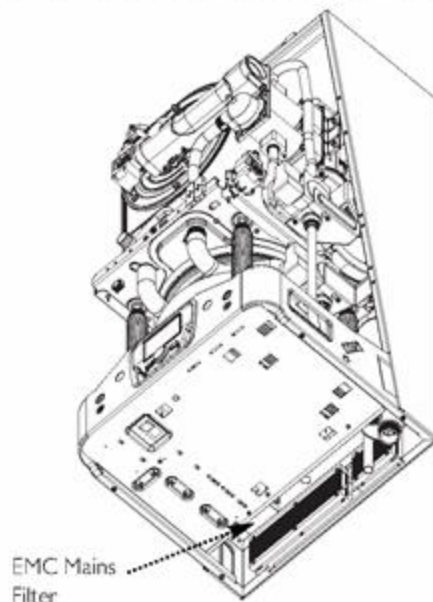


Fig. 69a

View from Underneath
Bottom cover removed
for Clarity

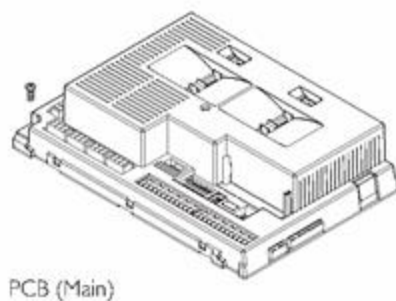


Fig. 70

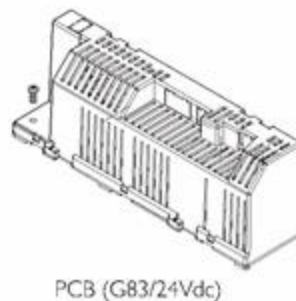


Fig. 71

Fig. 69 - Fig. 71

page 66

14.19 Gas Valves ([Fig. 72](#))

IMPORTANT: After replacing the valve the CO₂ must be checked and adjusted as detailed in [Section 15.0](#) Combustion Check.
Only change the valve if a suitable calibrated combustion analyser is available, operated by a competent person - see [section 13.1](#).

1. Turn the gas cock off.
2. Undo the screw holding the electrical connector in place and detach. Remove the earth lead and sensing tube.
3. Remove the screws securing the valve to its bracket.

4. Undo the nuts either side of gas valve. Ease the upper pipe aside and remove the gas valve.
5. Inspect the washers either side of the valve and replace if necessary.
6. Reassemble in reverse order.

14.20 Condensate trap ([Fig. 73](#))

1. Remove the case front and the bottom cover as detailed in [13.2](#) and [14.16](#).
2. Unscrew the condensate removal pipe from the bottom of the trap.
3. Slacken the two self tapping screws holding the condensate trap in place.
4. Twist the body anti clockwise and lower the trap until the electrical connections are visible between the gas valve brackets. Detach the push on connections noting their positions.
5. Withdraw the condensate trap noting its orientation.
6. Replace in the reverse order.

14.21 Overcurrent switch ([Fig. 74](#))

1. Remove the case front and the bottom cover as detailed in [13.2](#) and [14.16](#).
2. Lower the control tray by removing the screws at either side.
3. Remove the control cover by undoing the two screws at the left hand corners.
4. Remove the 4 push on connections from the back of the switch noting their positions.
5. Observe the orientation of the switch. Extract the switch from the panel.
6. Replace in the reverse order. Refer to [Sections 16.4](#) and [16.5](#) for the electrical connections.
7. Ensure the switch is pressed up at the back ie. the '1' is depressed.

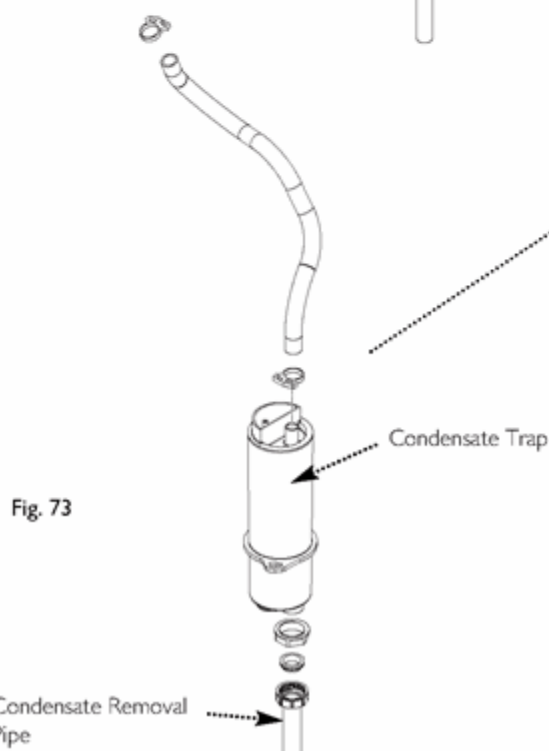
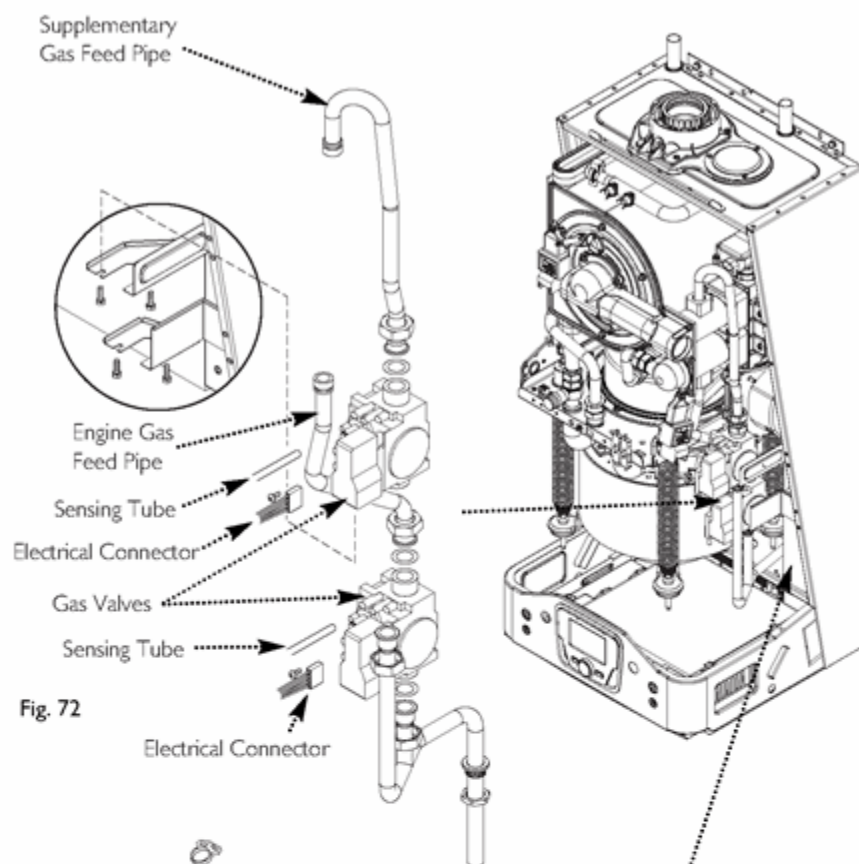


Fig. 72 & Fig. 73

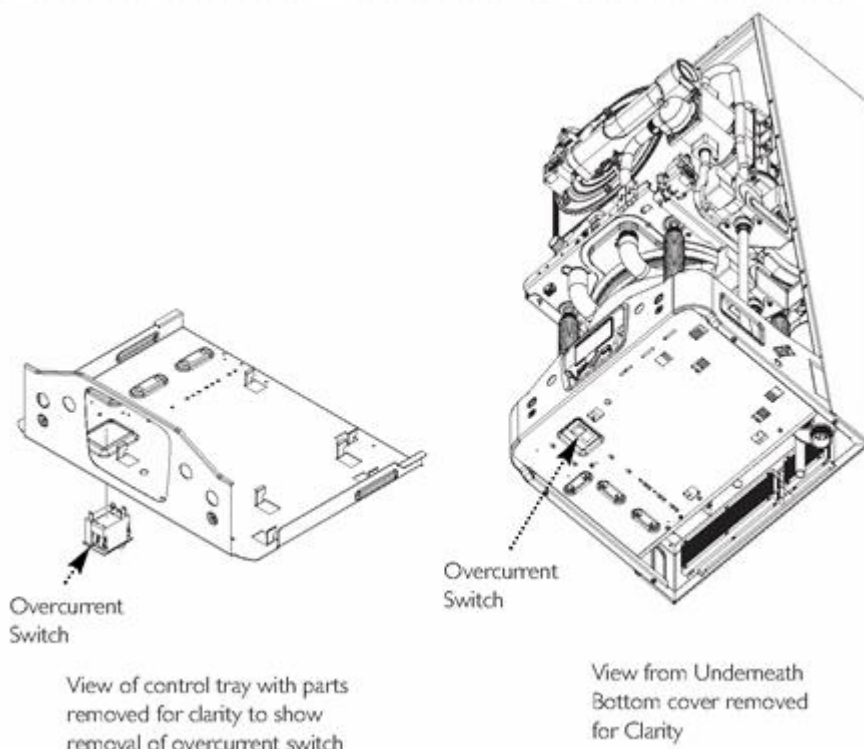


Fig. 74

page 67

15.0 Combustion Check

15.1 Checking the CO2

IMPORTANT: The CO2 must only be checked and adjusted if a suitable calibrated combustion analyser is available.

1. The combustion (CO2) may be checked using a suitably calibrated analyser after running the boiler for several minutes.
2. To do this it is necessary to activate the chimney sweep function by pressing and holding the easy menu and menu buttons ([Fig. 74a](#)) whilst in the normal operation screen until chimney sweep function option appears. Press the Select or Button to switch the chimney sweep function on.
3. The Selector Button will show Chimney Sweep Function on. Chimney Sweep function Burner Output Adjust 'Engine burner min' appears.
 - Press the Selector Button. Engine burner min will flash.
 - Use the wheel to scroll through the six options

- a) Engine burner minimum
- b) Engine burner maximum

- c) Supplementary burner minimum
- d) Supplementary burner maximum
- e) Engine and Supplementary burners minimum
- f) Engine and Supplementary burners maximum

Choose the single maximum operation b) or d) and press to confirm your choice. The burner will fire and remain at maximum rate unless a fault condition occurs or the set boiler flow temperature is attained when the burners will turn off.

NOTE: The boiler set flow temperature is set to 90° to avoid interruption of the rate measurement.

4. After 1 minute remove the plug from the flue adaptor test point. Insert the analyser probe and allow time for the reading to settle ([Fig. 75](#)).
The CO₂ should be 9.0% ± 0.3 for the supplementary
The CO₂ should be 9.0% ± 0.3 for the engine

Propane Gas - When either burner is tested individually at maximum rate: The CO₂ should be 10.2% ± 0.3.

5. It is possible to alter the CO₂ at the maximum rate by adjustment of the gas valve. Remove the blue plastic cover from the 'Throttle' adjustment screw.
At maximum rate the 'Throttle' adjustment screw should be turned, using a suitable 2.5mm hexagon key, until the correct reading is obtained ([Fig. 76](#)).
Turning clockwise will reduce the CO₂. Anti-clockwise will increase the CO₂

6. The CO₂ must then be checked at minimum rate.

The CO₂ should be 8.7% ± 0.3 for the supplementary
The CO₂ should be 8.8% ± 0.3 for the engine

Propane Gas - CO₂ at minimum rate:-

The CO₂ should be 9.6% ± 0.3 for the supplementary
The CO₂ should be 9.8% ± 0.3 for the engine

The CO₂ levels at the minimum rate must always be less than those measured for the maximum rate - see [section 15.2](#). 'Using a Combustion Analyser to adjust the valve offset' [paragraph 3a](#). If there appears to be a problem refer to [section 15.2](#).

7. The 'Calibration Function' is maintained for 20 minutes unless the maximum CH temperature is exceeded. The function can be disabled at any time by repeating paragraph 2.

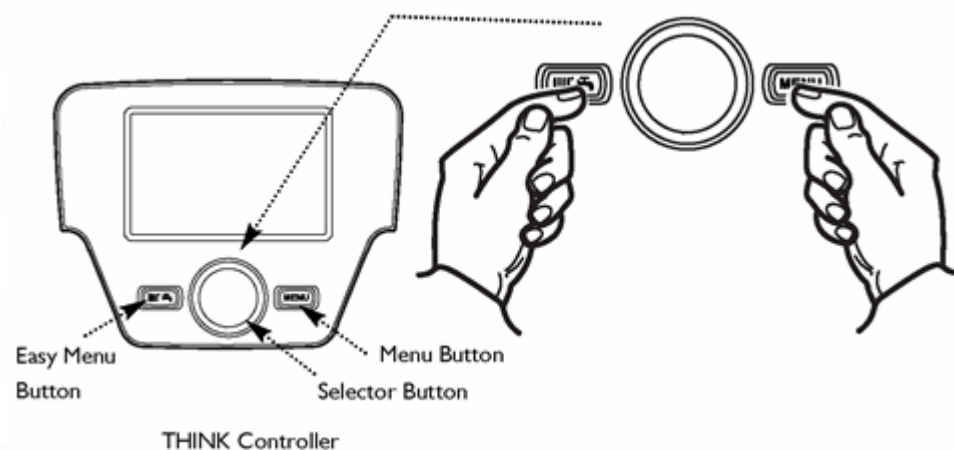


Fig. 74a

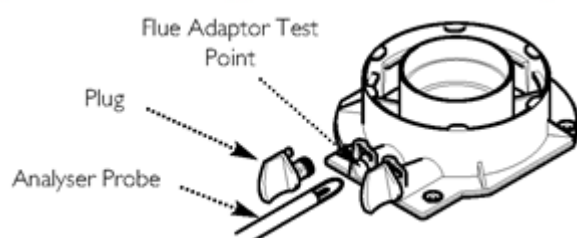


Fig. 75

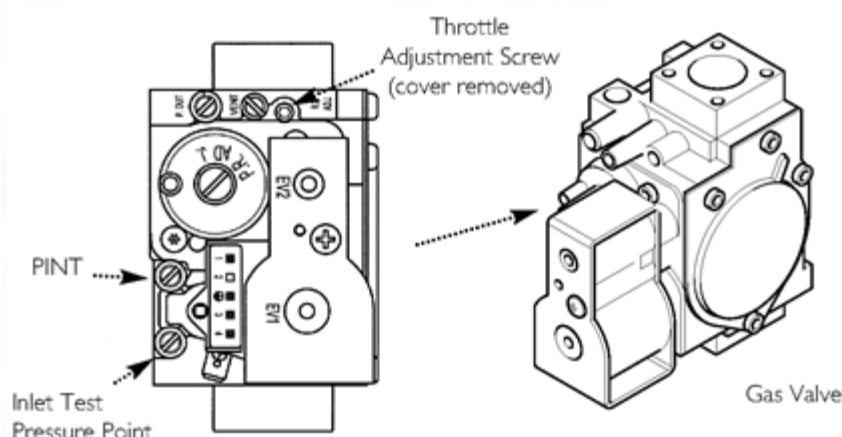


Fig. 76

15.2 Air/Gas Valve Setup Procedure

The preferred method is to use a micro manometer as outlined below, however if a micro manometer is not available a combustion analyser may be used as described below.

Using a Micro Manometer to adjust the valve offset.

Procedure to correctly set new Air/Gas Valve using a micro manometer. Connect the micro manometer with the appliance off - fan not running as below.

1. Loosen screw in the internal pressure test point (PINT) and connect to + (positive) side of differential micro manometer.
2. Tee the - (negative) side of the micro manometer into the air sense tube ([Fig. 77](#)).
3. Ensure micro manometer is in Pa or mbar scale and has zeroed correctly. If in doubt, re-zero the instrument.
4. Use the chimney sweep function to enable either Engine or Supplementary minimum rate. Before the air/gas valve opens, the pressure shown should be negative ie. -30Pa or -25Pa respectively for each burner.
5. When the burner lights see that the reading is -5 to -6Pa if outside these values use the offset screw to adjust the 4mm hexhead underneath the dust cover.

NOTE: Turning adjustment screw clockwise reduces negative differential; anticlockwise increases negative differential.
A 4mm hexagon key should be used to make the adjustment.

6. Now check the combustion - Carbon dioxide and Carbon Monoxide at the maximum rate for each air/gas valve.

Using a Combustion Analyser to adjust the valve offset.

Follow the procedure as outlined in [section 15.1](#). paragraph 1-6 to adjust the Carbon Dioxide percentage at the maximum rate.

For the supplementary the CO₂ should be 9.0% ± 0.3
For the engine the CO₂ should be 9.0% ± 0.3

Propane Gas - When either burner is tested individually at maximum rate: The CO₂ should be 10.2% ± 0.3.

1a. To adjust the offset check the Carbon Dioxide percentage at the minimum rate. Remove the offset adjustment dust cover using a flat bladed screw driver and adjust the offset using a 4 mm hex driver to give the following percentages: -

Supplementary the CO₂ should be 8.7% ± 0.3 (minimum rate)
Engine the CO₂ should be 8.8% ± 0.3 (minimum rate)

Propane Gas - CO₂ at minimum rate:-

The CO₂ should be 9.6% ± 0.3 for the supplementary
The CO₂ should be 9.8% ± 0.3 for the engine

2a. Recheck the Carbon Dioxide % at max rate, adjust the throttle adjustment screw if necessary.

3a. The differences between the maximum/minimum percentages should be as close as possible to the differences in the ranges quoted; they must not be equal or less.

i.e.: - For the Supplementary burner maximum rate, the Carbon Dioxide should be around 0.6 % greater than at the minimum rate.

For the Engine burner maximum rate, the Carbon Dioxide should be around 0.2% greater than at the minimum rate.

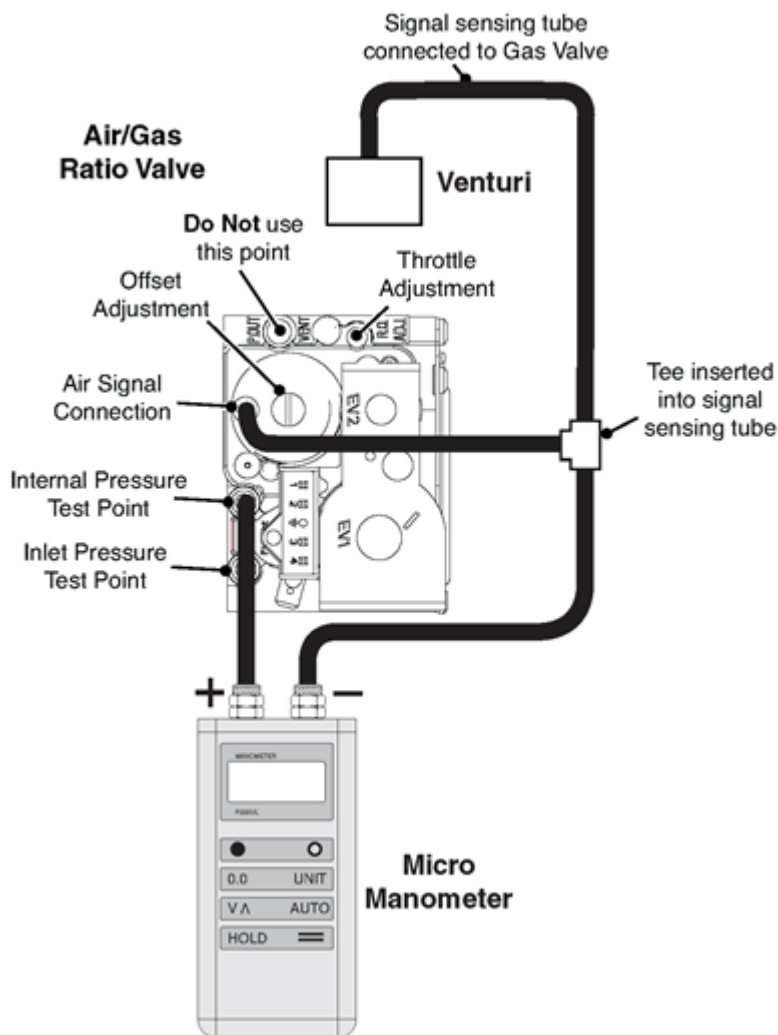


Fig. 77

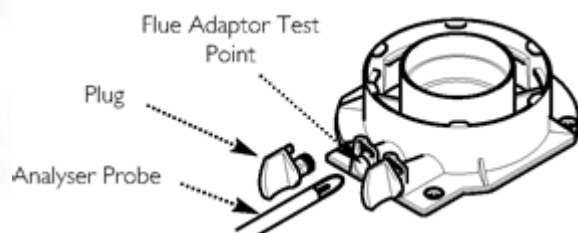


Fig. 78

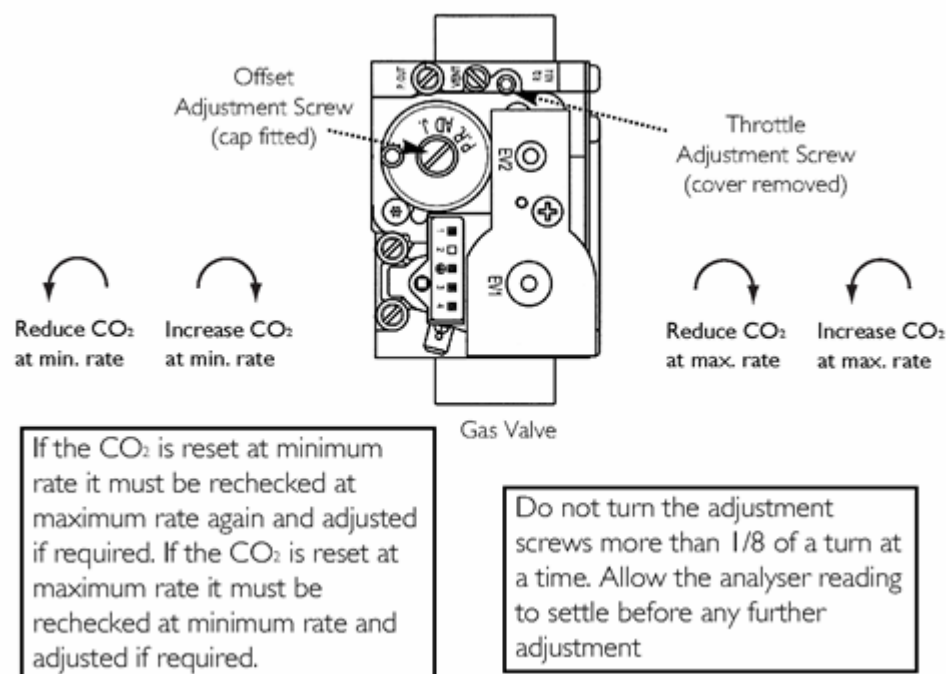
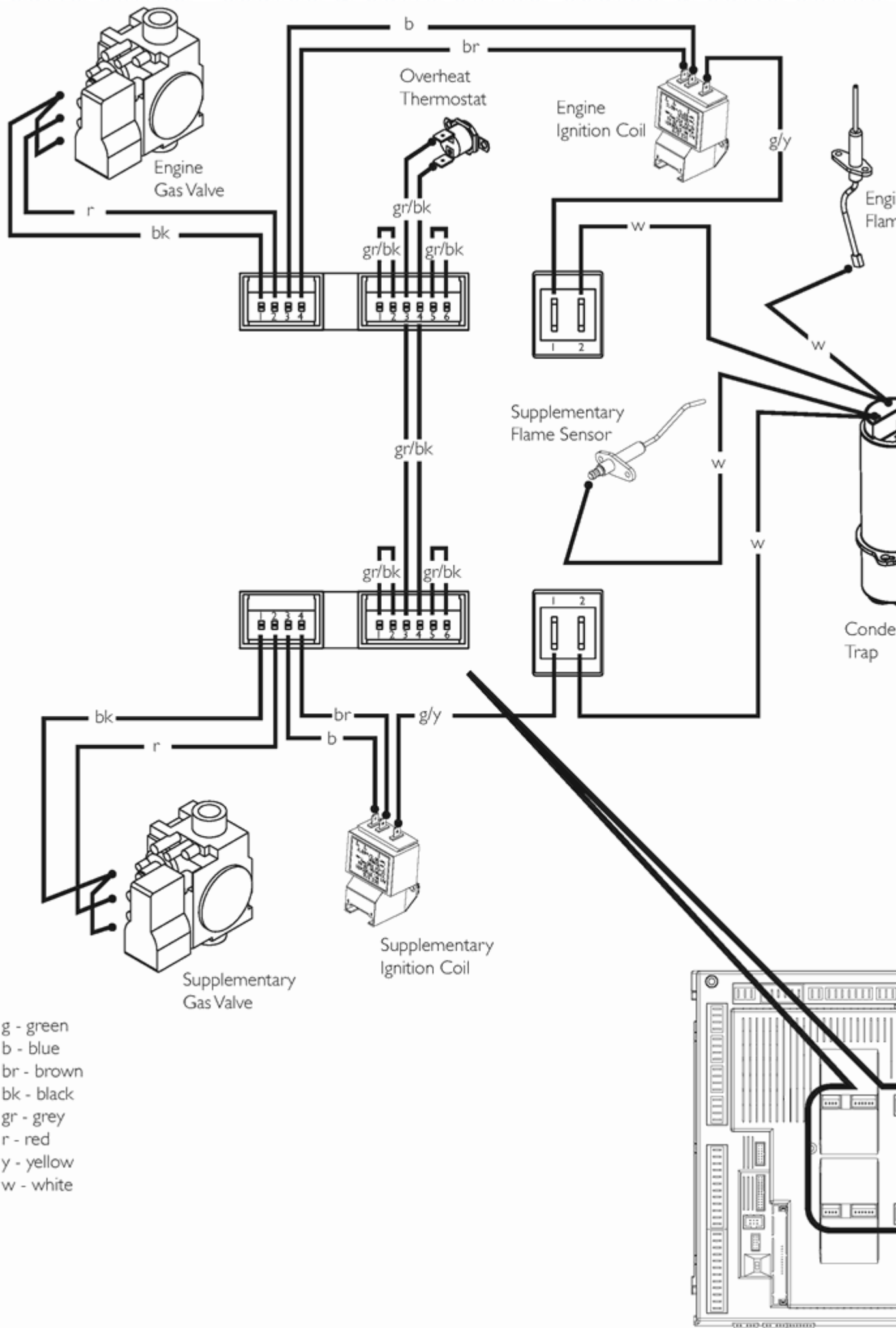


Fig. 79

16.0 Schematic Wiring

16.1 Burner Control Units (BCU) Connections



16.2 Milligrid (24 way Connector)

IBAS

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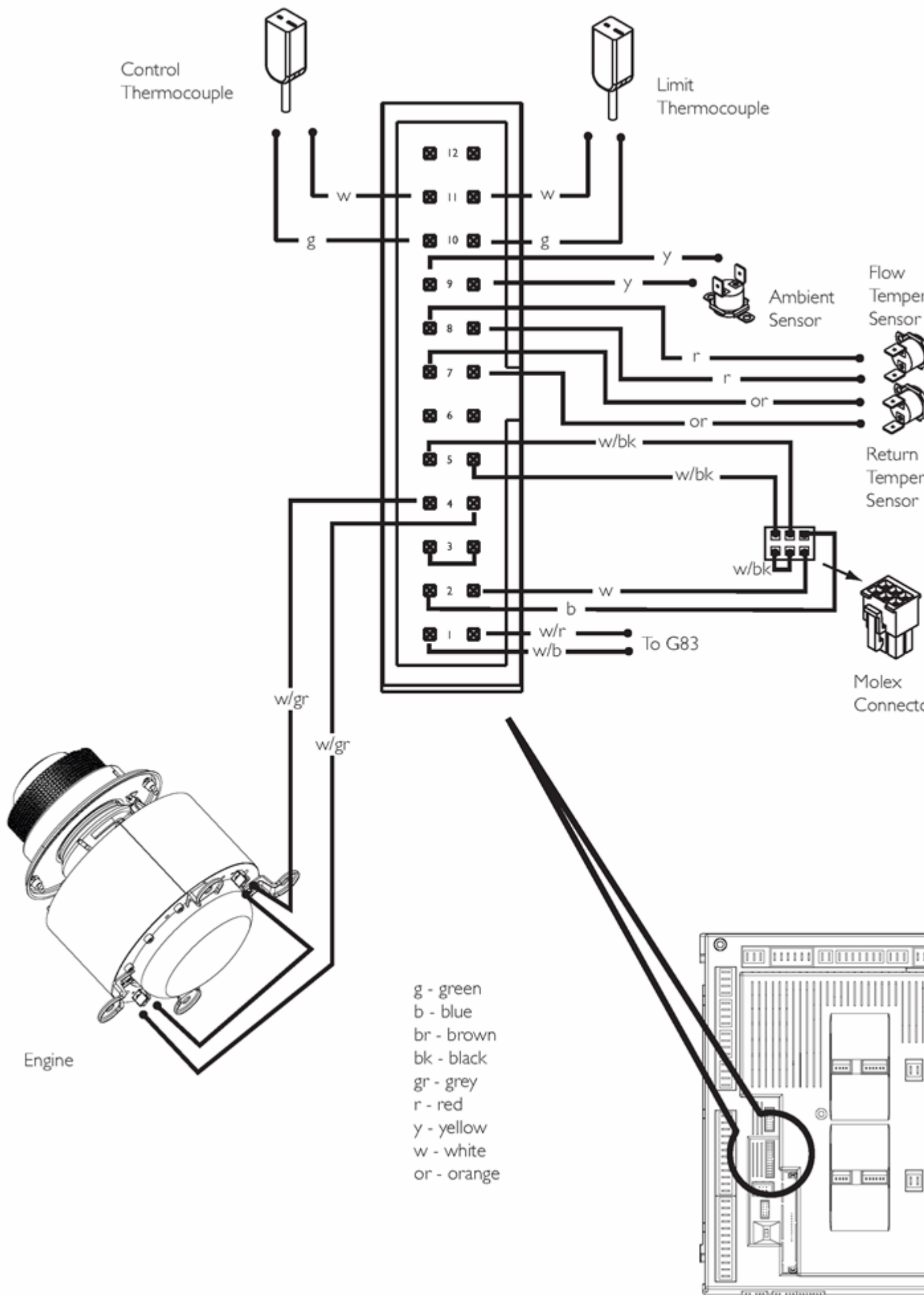
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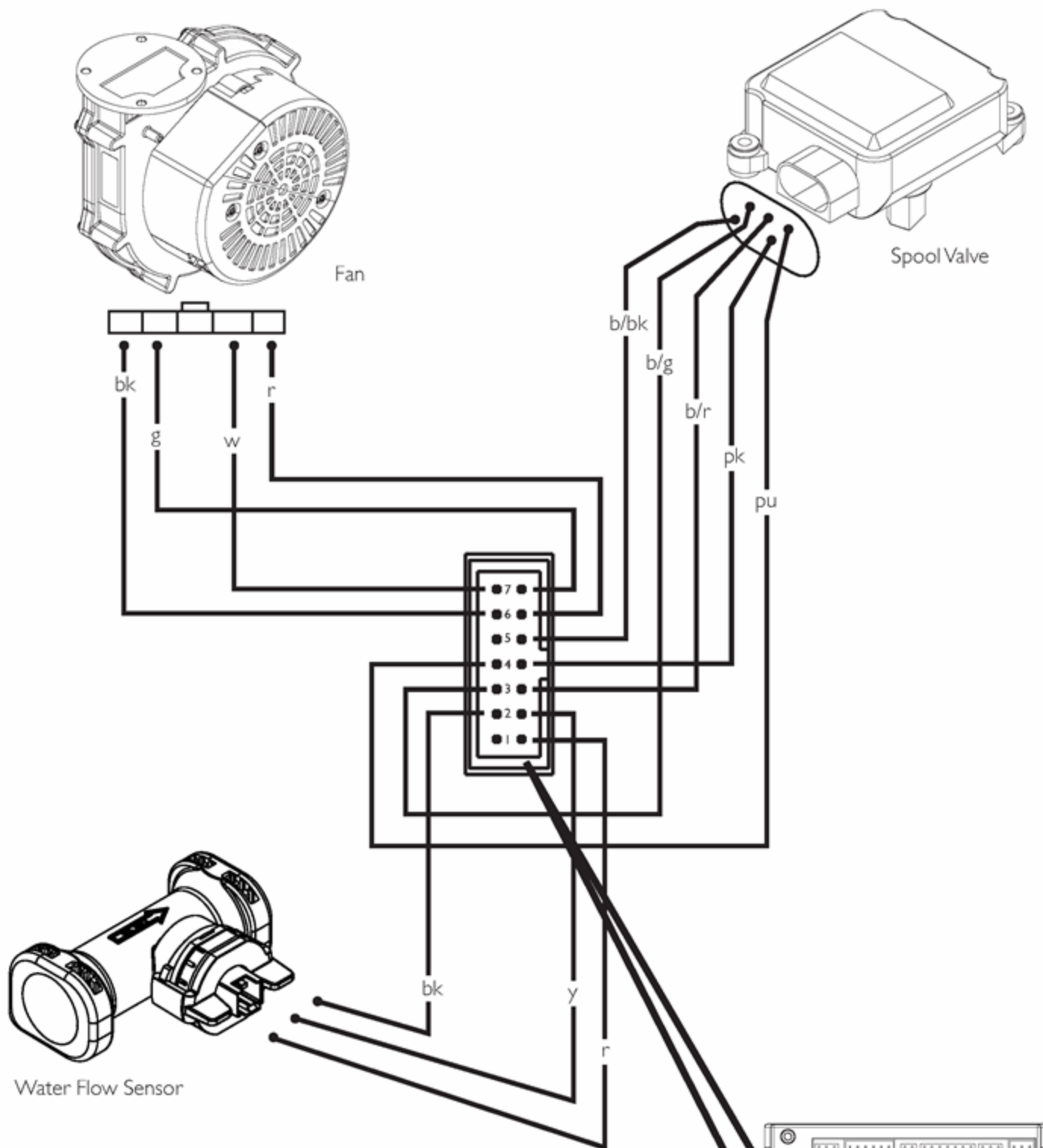
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16.3 14 way Connector

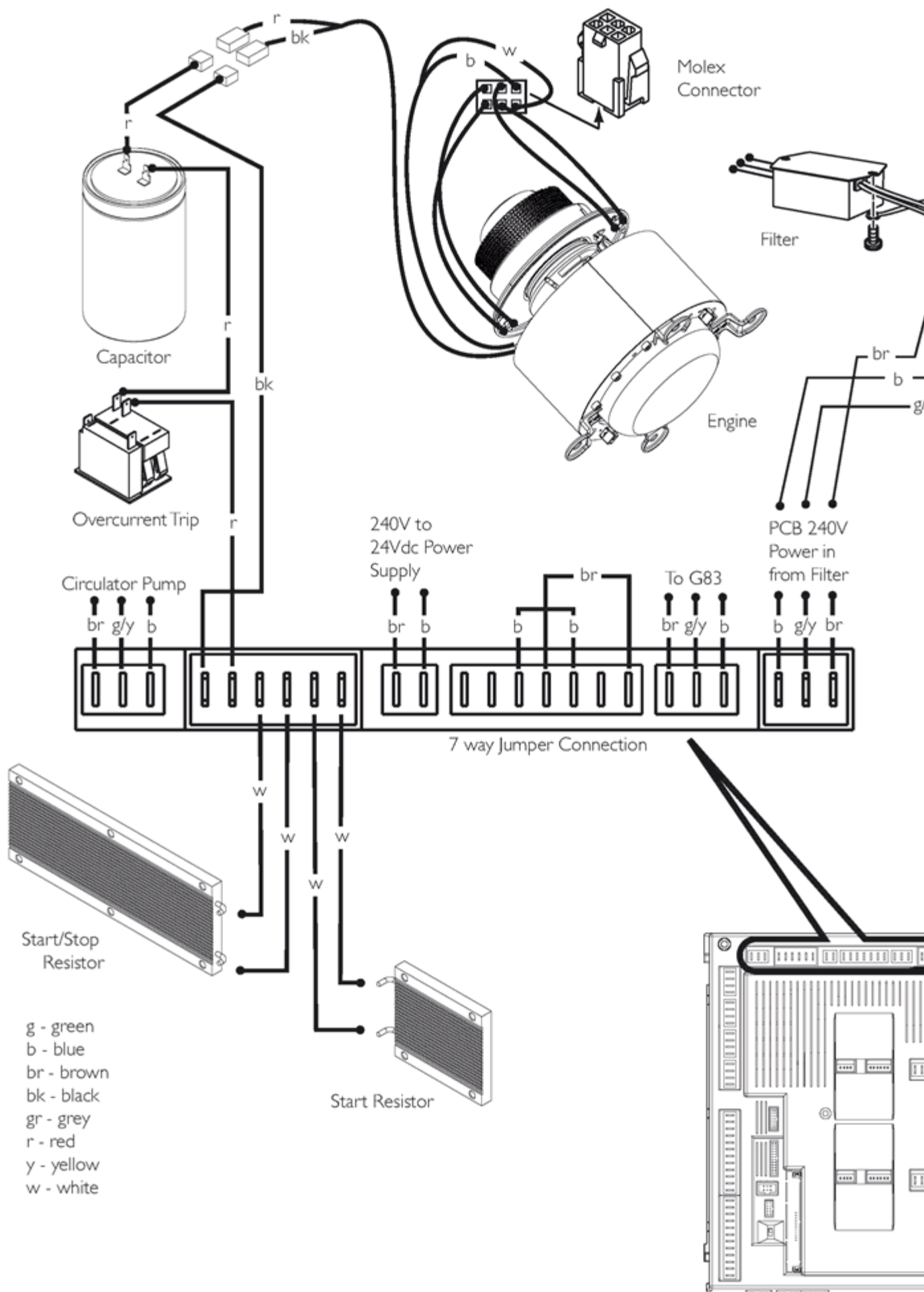


- g - green
- b - blue
- br - brown
- bk - black
- gr - grey
- r - red
- y - yellow
- w - white
- pk - pink
- pu - purple

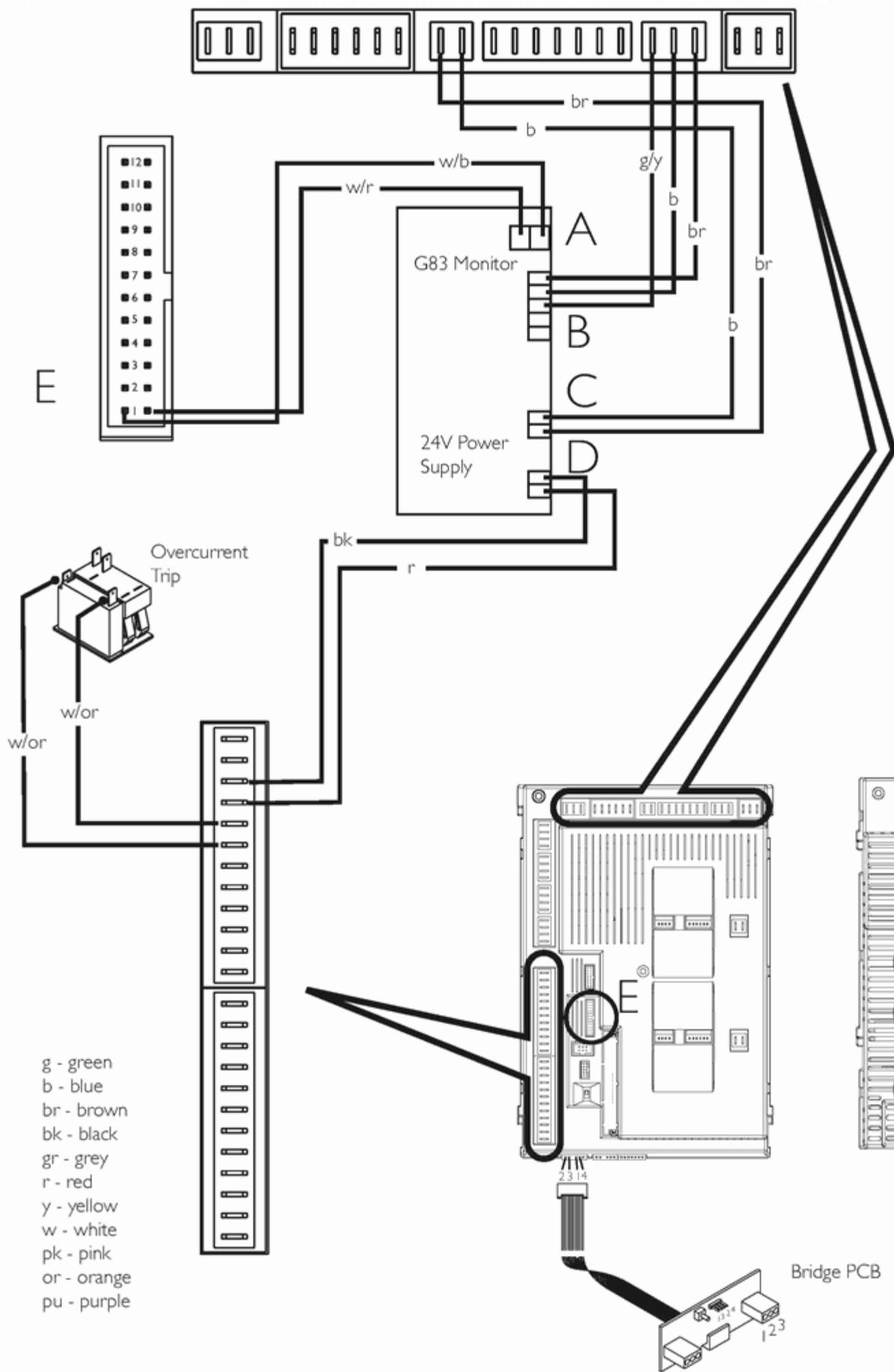


16.4 Engine Circuit

Do not disconnect any element of this circuit unless testing/replacing components

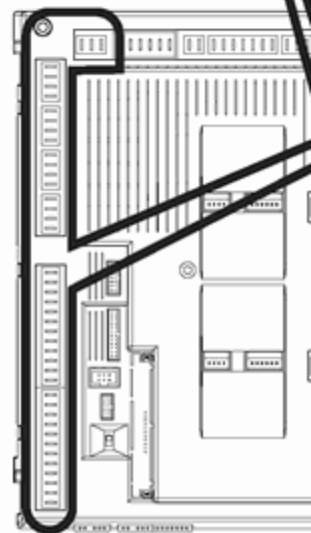
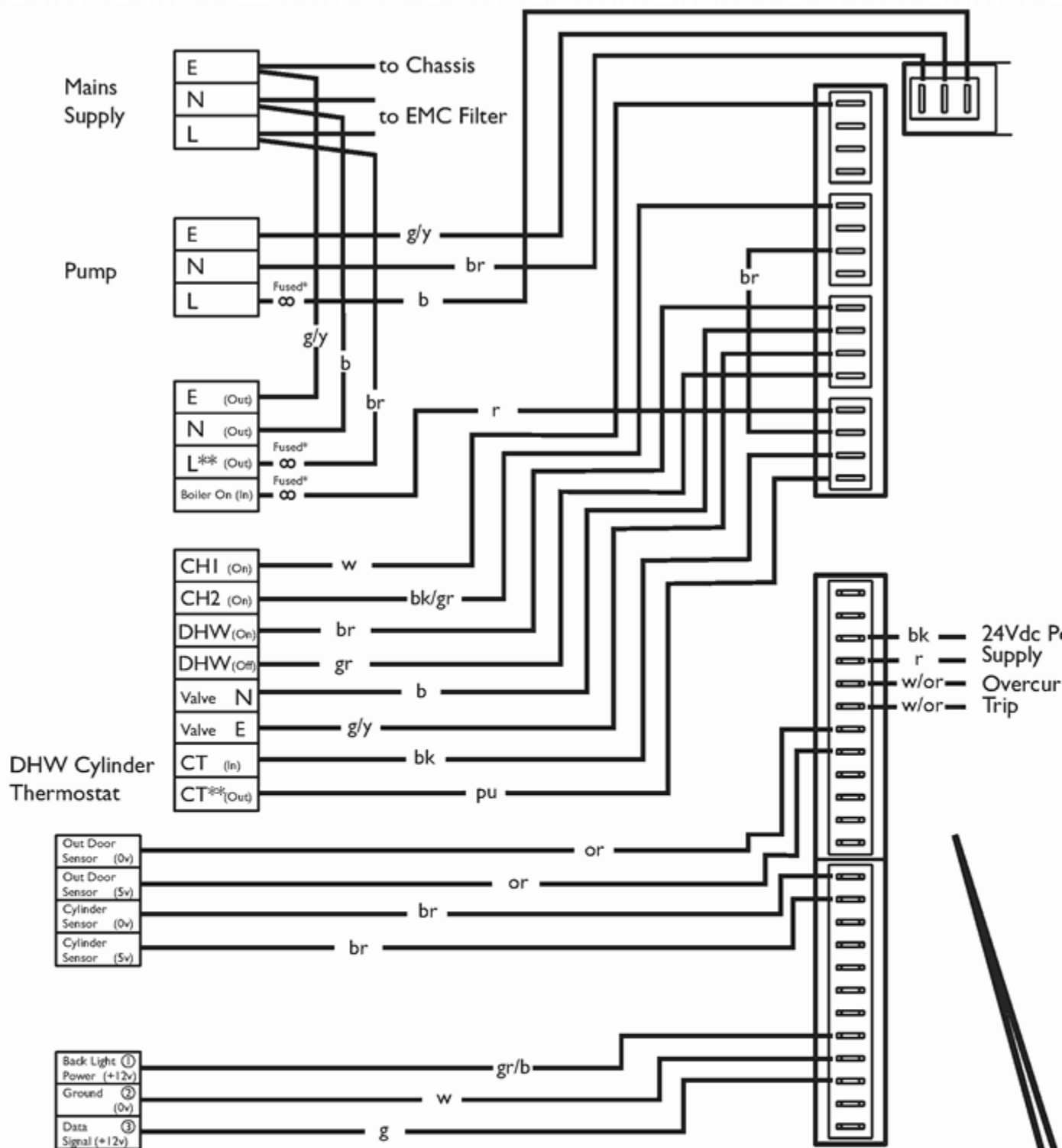


16.5 Power Monitoring /24Vdc Power Supply



16.6 External Connections

External Wiring



17.0 Fault Finding

17.1 Operating Sequence

1. With a demand for heating or hot water, the pump circulates water through the primary circuit. If the flow is at least 8 l/min. the ignition sequence will start.
2. The engine burner will light first. Once the engine burner has established at the ignition rate (a flame symbol will be displayed along with a '1' on the THINK Controller  it will ramp up to the max rate of around 7.5 kW input, after about 1 minute the engine will be connected to the grid and the appliance will start generating electricity. The power generated may be viewed on the THINK Controller.
3. The control will only allow the supplementary burner to light if certain conditions in the engine are satisfied or if the rate of increase in the flow temperature is not sufficient to satisfy demand within a certain time.
4. Once these criteria are met the supplementary burner will be lit at the ignition rate ('2' will appear next to the ) drop to minimum and then modulate to the rate required according to the boiler setpoint temperature. As the boiler flow temperature approaches the setpoint the supplementary burner will modulate down and switch off before the engine burner.
5. Each burner has five attempts at lighting which take about 25 seconds each. At the end of the fifth attempt if no flame is detected an error message will be displayed.
6. If the engine burner fails to light, the control will switch to lighting the supplementary burner.
7. When the demand is satisfied the burner is extinguished and the pump continues to run for a period of 5 minutes (Pump Overrun).
8. If for any reason a fault occurs which prevents the appliance from running correctly an error code will be displayed.

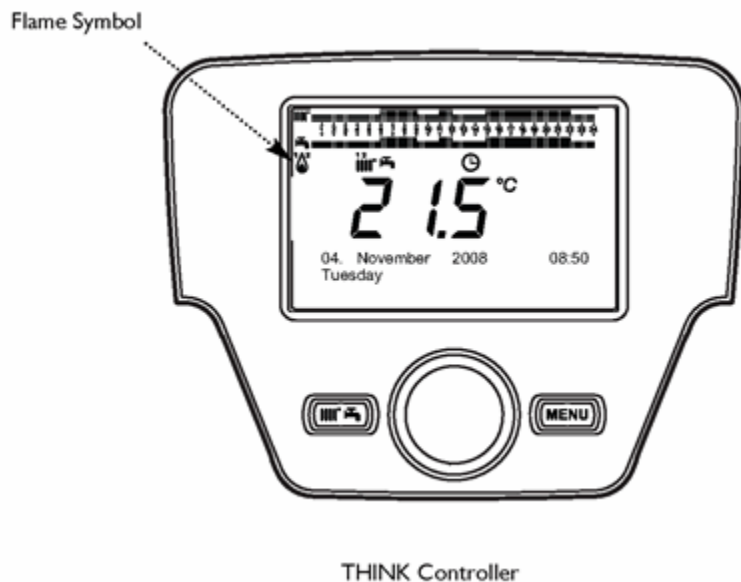


Fig. 80

page 76

17.3 Error Codes

Below are shown the error codes which will be displayed on the THINK Controller if a fault occurs on the appliance. Error Codes shown on remote interfaces may be collective codes -

refer to the THINK Controller for the exact error message. More than one error may be present so that subsequent error codes will be shown as the original error is reset. The occurrence of an error code will prevent some or all of the operations of the appliance.

Error codes specific to the running of the engine will not prevent the supplementary burner from operating and visa verse.

There are three levels of error code with associated reset procedures as follows: -

1. **Automatic reset - (AR)** Examples are mainly to do with temperature sensing but also include monitoring of the mains supply. Automatic reset only occurs if the fault condition is eliminated.
2. **User reset - (UR)** An example would be the restoration of the gas supply to enable ignition.
3. **Service reset - (SR)** arises when a reset of the condition needs to be accompanied by the attendance of a service engineer.

There are two special conditions: -

1. **Automatic reset after power down - (ARP)** an automatic reset can only occur after the electrical supply is interrupted. Usually this implies data corruption and is in effect a'reboot' of the PCB.
2. **No restart possible - (NRP)** occurs if there is corruption of stored data for instance and implies that the PCB will have to be replaced.

page 77

17.4 List of Error Codes

In the table below: - PCB = Main Control Board, BCU = Burner Control Unit.

Error code: Display	Description	Lockout/ Resetaction		Fault Section
		Eng	Sup	
10: Outsidesensor	Fault outside temp sensor	AR	AR	B
20: Boiler sensor 1	Fault boiler flow temp sensor	AR	AR	C
40: Return sensor 1	Fault return temp sensor boiler	AR	AR	C
50: DHW tanksensor	Fault DHW1 sensor	AR	AR	B
60: Room sensor 1	Fault room temp sensor HC1	AR	AR	B
65: Room sensor 2	Fault room temp sensor HC2	AR	AR	B
83: BSB short-circuit	Boiler system bus short-circuit	AR	AR	B
84: BSB address collision	More then 1 room units are assigned to the same HC Assign one of them to HC 2 or assign QAA7x not as room unit	ARP	ARP	B
85: Radio communication	Communication to radio device interrupted	AR	AR	B
91: Data loss in EEPROM	Failure in Class B-SW: Irreparable data loss in EEPROM	NRP	NRP	B
92: Device electronics error	RAM failure, HBC processor register failure, blocking chain undefined (toggling), safety chain discrepancy. Reset: Press Service Reset within 20 seconds after Power up	NRP	NRP	B
95: Time of day invalid	The real time clock unit detected corrupted time of day.			B
96: Minor SW failure	Failure in Class B-SW: Stack overflow or program sequence failure	AR	AR	B

97: SW or H W failure	Failure in EGC-SW which causes non-volatile lock.	NRP	NRP	B
102: Clock without backup	The charging of the clock backup ran out	AR	AR	B
114: Shut'd flue gas thermo	Shutdown due to flue gas thermostat of safety chain	SR	SR	D
127: Legionella temperature	Legionella temperature not achieved within 48 hours			C
157: Boiler Flow Thermostat	Boiler flow overheat thermostat / safety chain open	UR	UR	C
158: Condensate	Condensate switch of safety chain opened	UR	UR	D
164: Flow pressure switch H C	Low flow or air in system / faulty connection or water flow sensor	AR	AR	I
253: Ambiguous error cause	The controller is unable to identify the error cause	UR/SR	UR/SR	F
257: Pack sensor	Fault pack temp sensor			C
258: Pack overtemp	Internal ambient temperature too high	AR	AR	C
259: CJC sensor	Fault cold junction compensation sensor	AR		C
261: Loss of flame Engine burner	No flame after five ignition tries in Engine	UR		E
262: Loss of flame Supplementary burner	No flame after five ignition tries in Supplementary		UR	E
263: Engine burner BCU failure	Multiple communication request of Engine Burner Control Unit unsuccessful. 1) Failure caused by BCU 2) BCU Communication Timeout on Main Control Board	ARP AR		F
264: Supplementary burner BCU failure	Multiple communication request of Supp. Burner Control Unit unsuccessful. 1) Failure caused by BCU 2) BCU Communication Timeout on Main Control Board		ARP AR	F
265: BCU failure	Not supported in Main Control Board			F
266: Fan fault	Fan fault: The fan speed differs from its set point for more than 30 seconds.	SR	SR	G
267: Fan calibration	Fan calibration error: After power-up the test threshold of 4,700 rpm was not attained.	ARP	ARP	G
268: Spool valve fault	Feedback signal of spool valve did not reach required value within detection time - typically 60 sec.	SR	SR	H
269: Spool valve calibration	During start up the feedback signal of the spool valve did not register a correct calibration	SR	SR	H

Error code: Display	Description	Lockout/ resetaction		Fault Section
		Eng	Sup	
270: exc temp. diff h'exch	Excessive max temperature difference across the heat exchanger during 5 minutes or excessive limit temperature difference. If temperature difference fell below (threshold -switching differential boiler): automatic reset - when the maximum setting was exceeded immediately - when the limit value was exceeded after 10 minutes	AR	AR AR 10'	I
274: Dry fire prot	Flow sensor did not detect at least 4 L/min within 4 mins	UR	UR	I
278: Max Temp Rise	Maximum flow temperature rise exceeded, automatic reset after 10 minutes		AR 10'	I
280 : Inner iron overtemp	Engine dome overtemp has operated	AR		P
281: Dynabsorber overtr	Dynamic absorber over-travel switches have been activated	SR		P
282: G83/ENS/G1M	G83/ENS module has detected an unhealthy mains condition	AR		P
283: Altern' overload	Alternator overload protection thermostat has operated	SR		P
284: WCS overtemp	Water cooled seal thermostat has operated	SR	SR	J
285: Alternat SC	Power monitor IC has detected a short-circuit condition	AR		P
286: Eng head over temp	Engine head temperature thermocouple measurement has exceeded 565 degrees C	SR		K
287: Eng head under temp	Engine head temperature thermocouple measurement below 103 degrees C when the CXrelay is energised	AR		N
288-297: Various fault messages	Milligrad and water cooled thermostat continuity problems	SR		K / O
298: False flame engine burner	Ionisation probe of engine burner detected false flame	AR		
299: False flame supplementary burner	Ionisation probe of supplementary burner detected false flame		AR	
300: Eng head under SW	Engine head control temperature less than 150 degrees C when connected to the grid	UR		N
301: Eng head over SW	Engine head control temperature greater than 540 degrees C	AR		C
302: Eng head thermocouple diff	Magnitude of the difference between the engine head control and limit thermocouples is greater than 100 degrees C	UR		C
303: Eng head thermocouple cont	Engine head control thermocouple failure	UR		C

304: Eng headt'couple lim	Engine head limit thermocouple failure	UR		C
305: Eng undercurrent	Engine current less than 0.1A, 60 seconds after grid connection	SR		L
308: Stopresistor integrity	The stop resistor integrity check has failed	SR		M
309: Power failedetection	Power failure detected	AR		F
310: Power monitor comm fail	No data received from the power meter IC in the last 10 seconds or the power monitor failed to register with the EGC microcontroller within 10 seconds of power up	AR		F
311: EGC comm. failure	Communication timeout or communication failure	AR		F
394: Eng BCU comm fail	Engine BCU comm. failure	AR P		F
395: Supp BCU comm fail	Supplementary BCU comm. failure		ARP	F
396: Eng head control therm.	Engine head control thermocouple false reading	AR		C
397: Eng head limit therm.	Engine head safety thermocouple false reading	AR		C
398: Eng head control rise	Engine head control thermocouple rise rate less than 30 deg C in first min.	AR		C
399: Eng head limit rise	Engine head safety thermocouple rise rate less than 30 deg C in first min	AR		C
400: Flow direction at gen	Return temperature > flow temperature for longer than 3 minutes	UR	UR	I
421: Eng burner excessive temp diff h/ex	Engine burner excessive temperature difference across the heat exchanger	AR		I
422: BCU Engine burner inconsistent	Transmitted state of the engine burner BCU isn't consistent	AR		F
423: BCU Supplementary burner inconsistent	Transmitted state of the supplementary burner BCU isn't consistent		AR	F
424: Repeated loss of flame engine burner	Repeated loss of flame engine burner	UR		E
425: Repeated loss of flame supplementary burner	repeated loss of flame supplementary burner		UR	E
428: Boiler flow Eng burner	Flow has been < 7 L/min for more than 30 minutes	AR		I

17.5 Exceptional conditions

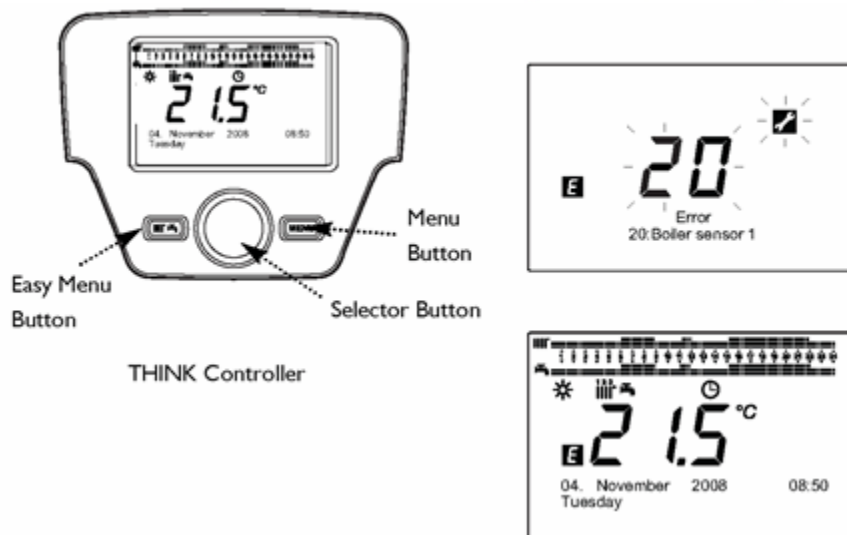
1. In exceptional cases, the display will show an error screen see diagram below
2. With the following information: -

An error number

A short description of the error

The display may show a flashing spanner, a flame crossed out or both depending on the level of the error

- Pressing the menu button will return the THINK Controller to the standard display which will now show the following symbol - **E** which indicates that an error or fault has occurred in the appliance. After 1 minute the display will automatically revert to the error screen.
- Press the menu button twice to revert to the error display immediately. A list of error codes is shown in [section 17.4](#). This list contains both user reset and automatic reset codes. Automatic codes are given here as they are capable of clearing automatically and do not necessarily indicate that a service visit is required.



THINK Controller	5 LED	Reset Type
	ERROR Light Flashes	Auto
	ERROR Light Flashes	User
	ERROR Light On	Service

17.6 Automatic reset

- If a flashing spanner is shown on the THINK Controller the error may reset once the condition has cleared. Many of these automatic reset errors are connected with temperaturesensors of both the system and the appliance and once the appliance has cooled it may restart. If the problem persists where the sam

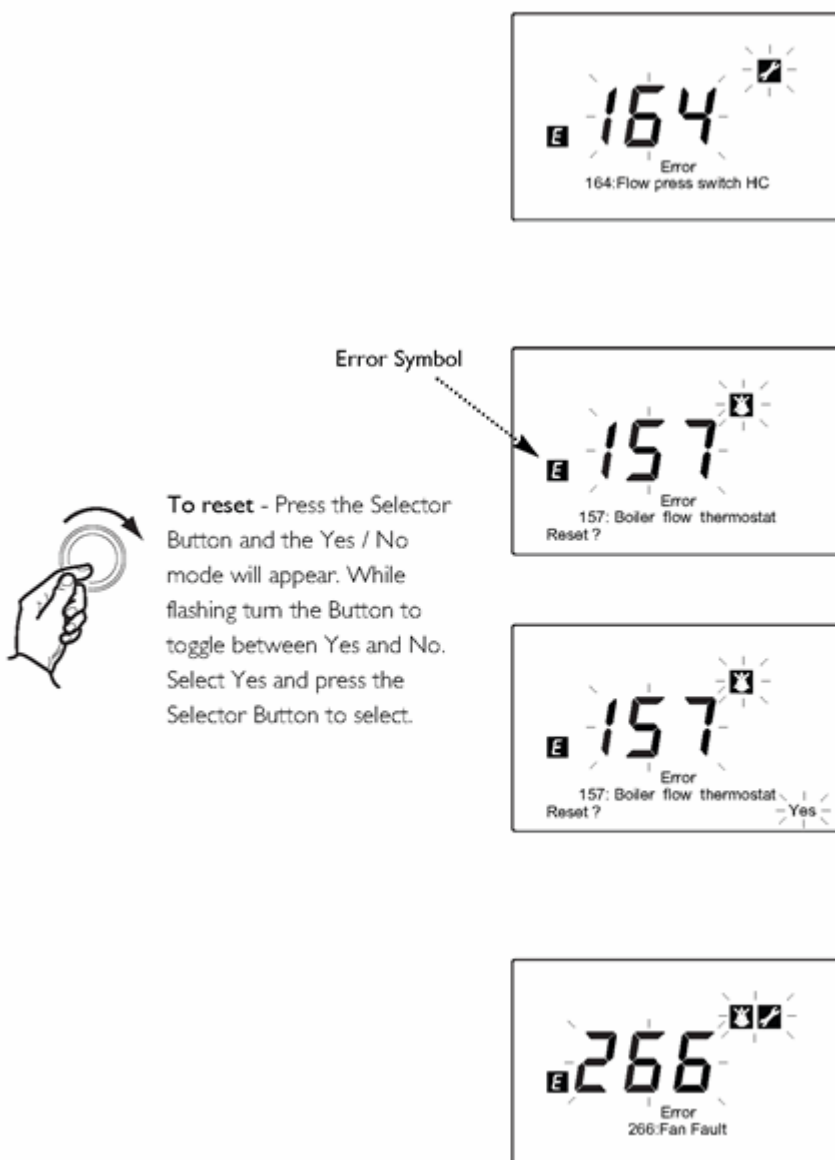
if the error code is repeatedly displayed or the error will not clear you should call for a service engineer.

17.7 User reset

1. A user reset can only be carried out on the THINK Controller or 5 LED Receiver not on a room sensor.
2. To perform a user reset:-
 - a) on the 5 LED Receiver, press the reset button at the bottom of the Receiver, after a further 6 flashes the red LED will go out.
 - b) on the appliance THINK Controller, from the standard screen press the Selector Button twice, after a few seconds the error symbol should disappear.
3. The error will clear and the appliance will restart if there is a demand for heat as long as the error condition has cleared.
4. If the error returns the fault condition is still present.

17.8 Service reset

1. When a flashing spanner is accompanied by a crossed out flame symbol on the appliance, a fault has occurred which requires the presence of a service engineer. When ringing the Heateam Service Department to request a service engineer please quote the error code and accompanying message along with the serial number of appliance.



2. A Service reset should only be carried out by a service engineer after **making a note of the error code**. Untrained personnel who perform a service reset may void the warranty.
3. To perform a reset, remove the bottom panel by undoing the 4 M4 pozi headed screws.
4. Using a small pointed non-metallic instrument such as a matchstick, press and hold in for at least 3 seconds (any time between 3 and 20 seconds) the reset button on the underside of the PCB (see [Fig. 81](#)). Allow time for the error to reset.
5. If the condition causing the error has been rectified the error code should reset and allow the appliance to run.
6. Replace the bottom panel.

7. If the fault persists then a component change may be required. If the fault is suspected to be related to the engine the technical help line should be contacted.

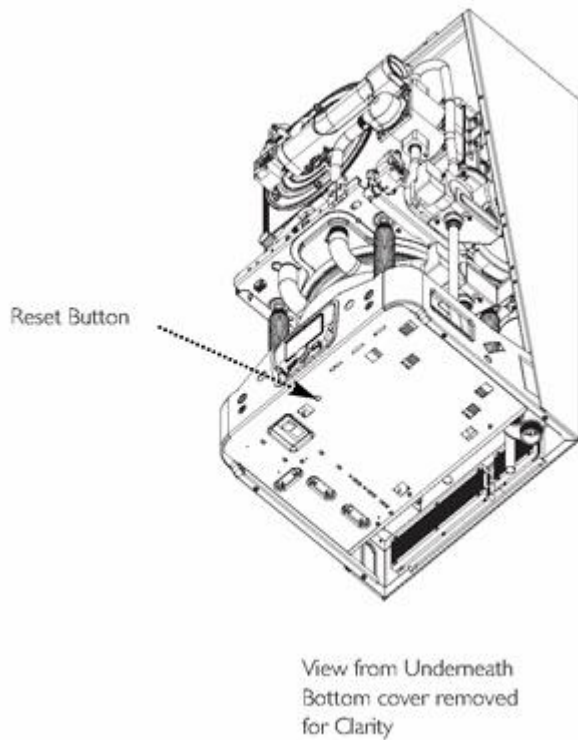


Fig. 81

17.9 Initial Fault Finding Checks

1. Check that gas, water and electrical supplies are available at the boiler.
2. Electrical supply = 230V ~ 50 Hz.
3. If sealed system check that CH water system is pressurised to 0.5 bar minimum when the boiler is cold.
4. The preferred minimum gas pressure is 20 mbar.
5. Carry out electrical system checks, i.e. Earth Continuity, Resistance to Earth, Short Circuit and Polarity with a suitable meter.

NOTE: These checks must be repeated after any servicing or fault finding.

6. Ensure all external controls are calling for heat and check all external and internal fuses. Before any servicing or replacement of parts, ensure the gas and electrical supplies are isolated.

SAFETY NOTE: Before removing the front cover; the correct shut down sequence must be followed for your own safety.

Before servicing, ensure that the boiler is cool with the engine head below 120°C - otherwise there is a risk of electric shock even with the supplies disconnected.

The head temperature may be accessed via the THINK Controller. Press the MENU Button. Turn the

Selector Button to highlight 'Information'. Press the Button to select. Turn Selector Button until 'head temp actual value' is shown.

Ensure that both the gas and electrical supplies to the appliance are isolated - wait a minimum of 6 minutes 30 seconds before any work is started - again there is a risk of electric shock even with the supplies disconnected.

page 81

17.10 Fault Finding Solutions

If the display on the THINK Controller does not appear to be working properly go to fault finding [Section A](#), otherwise follow the guidance below.

Reset the appliance (see [Section 17.3](#) - [17.5](#)) - if the error code persists further investigation is required. The error codes have been split into groups: -

Errors 10 to 99 & 121,122 except 20 & 40 go to [section B](#)

Errors 20, 40, 157, 257, 258, 259, 301, 302, 303 & 304 & 396 to 399 go to [section C](#)

Errors 114 & 158 go to [section D](#)

Errors 261 & 262 go to [section E](#)

Errors 253, 254, 263, 264, 265, 309, 310, 311 & 319, 394, 395, 422 & 423 go to [section F](#)

Errors 266 & 267 go to [section G](#)

Errors 268 & 269 go to [section H](#)

Errors 164, 270, 274, 278, 400 & 428 go to [section I](#)

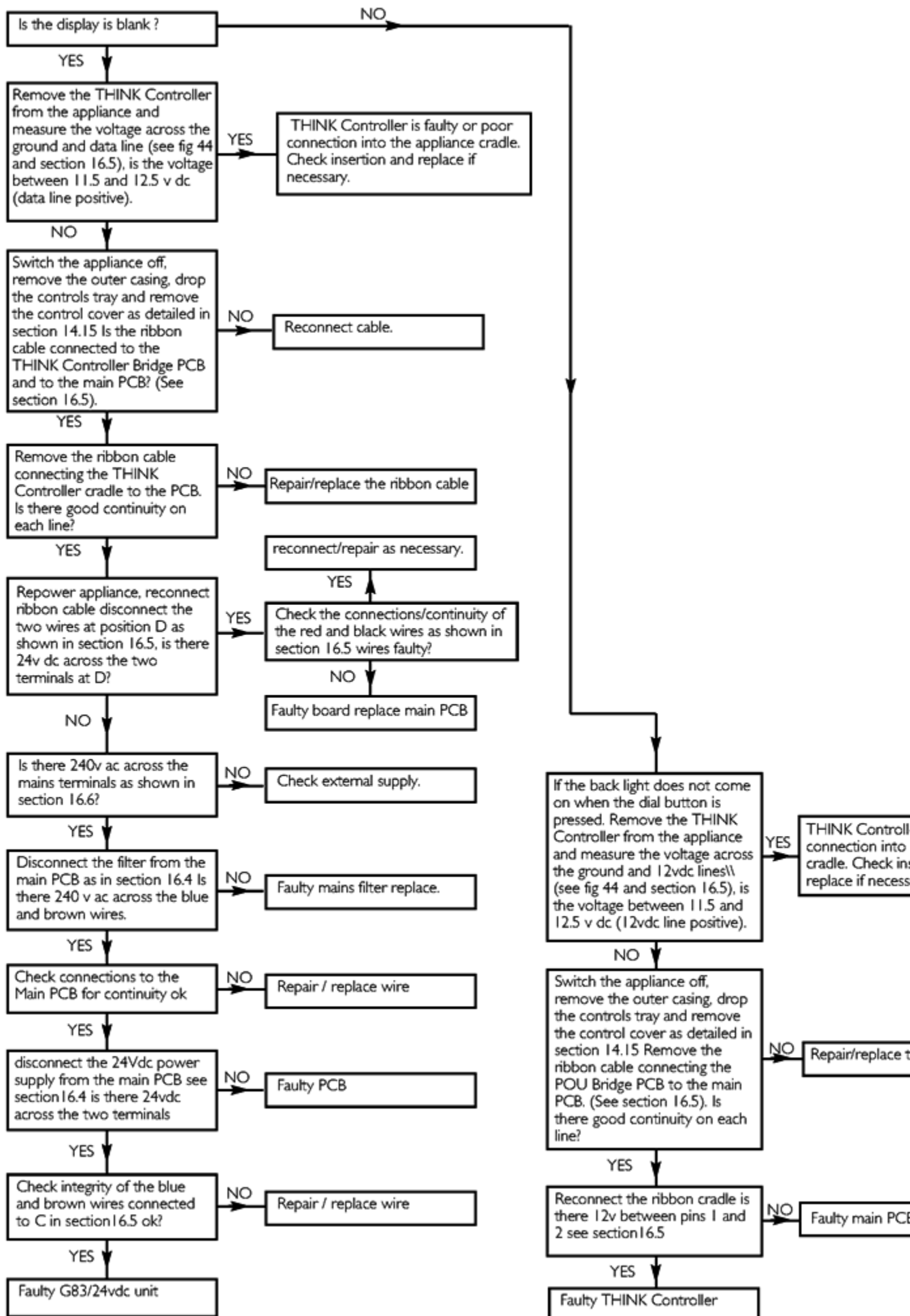
Error 284 go to [section J](#)

For errors 280,281,282,283 & 285 see [section 18.0](#) **Engine Fault Finding**

For errors 286 to 308 see [sections K](#) to [O](#)

Refer to [section 16](#) Electrical connections for the positions of the terminals and components.

Section A - THINK Controller



Section B - PCB

Error codes 10 through 99 (except for 20, 30, 32 and 40) are linked to installation and the commissioning of the appliance and as such are linked to the system setup, you should contact the householder (or installer) for the system details and refer to the commissioning [section 11](#) to aid resolution of any problems.

The sensors used should give a resistance of 10k Ohms at 25 degrees C except for the outside sensor which is 1k Ohms at 25 degree C. Only those sensors wired back to the appliance can be checked, RF units are sealed and cannot be repaired. If there appears to be a problem with a remote unit, check the condition of the battery.

If this does not resolve the problem - the unit may not be bound to the appliance properly - see the section on the installation and binding of the RF components to the appliance, [section 10.17](#). Hold the RF unit next to the aerial and repeat the binding process. If the problem persists check the connection of the aerial back to the main PCB - if other units appear to be bound and operational replace the RF unit.

Error 50 - See DHW Cylinder Sensor Instructions and above comments.

Error codes 28, 54, 85, 91, 92, 95, 96, 97, 121 and 122 are associated with on board electronic problems and will require a new PCB.

Error 83 External room connections incorrect - see [Fig. Section 16.6 - External Connections](#) and [Section 10.13](#).

Error 84 THINK Controller - needs reassigning power down - see [Section 10.12](#).

Errors 128, 146, 150, 154, are used for OCI611 remote diagnostics. If displayed, change the PCB.

Error 97, check the 6 way BCU connections first before replacing the MCB. This error may occur with faulty connections/wiring along with errors 114 and 158 see [section D](#).

Error 102 Battery back up - the battery is on the PCB and not replaceable - if problem persists PCB will need changing.

Section C - Temperature control

Error 40 on installation may mean that the instructions in [Section 11.2](#) have not been carried out.

Errors 20, 40, 257 these errors relate to sensor sensors measuring the flow, return and ambient conditions of the appliance. The thermistors should measure 10k Ohms

at 25 deg. C. Check for either open or short circuit; acceptance limits are 32k ohms (0 deg. C) and 230 ohms (140 deg C). These components connect back to the 24 way 'milligrd'* connector on the MCB.

Error 127 Legionella temperature. The Legionella temperature - 65 deg C has not been achieved within the last 48 hours. This is advisory only the appliance will continue to operate normally. If a large DHW demand coincides with the Legionella period it could stop the cylinder temperature from reaching 65 deg C. Any hour long period at this temperature will remove the error code whether during a Legionella period or not.

Error 157 the over heat thermostat is normally closed; the opening temperature is 98 +/- 3 deg C. This is a user reset error but if no reset is possible a permanent open circuit is implied check for this condition from the connections on the Burner control units (BCUs).

Error 258 this error implies an ambient sensor has over heated inside the appliance, the most likely cause is a faulty seal between the engine and the engine burner. Check the integrity of the seal and the thermal insulation around both the engine burner and the supplementary heat exchanger. Check that the sensor is held in the correct position - see [fig 2](#).

Error 259 this error implies a sensor on the main PCB has over heated; a user reset should clear the fault once the board has cooled. If the problem reoccurs in the absence of other associated errors the board should be replaced.

Error 301 Engine Head has overheated - if problem persists call for service.

Error 302, 303, 304, 396, 397, 398 and 399, these errors relate to the thermocouples used to monitor the head temperature of the Stirling engine. Check for continuity at the connector mounted on engine support bracket see [Fig. AA](#) and the milligrd* connection to the board. If the connections are good and a thermocouple is found to be open circuit replace the thermocouple.

A User reset can only be made when the fault is rectified.

***Note:** Continuity from the milligrd connector may be checked by carefully removing the connector and inserting a fine wire (a small resistor leg is ideal) into the corresponding connection see [section 16.2](#).

Section D

Errors 114 and 158, these errors are associated with looped connections on the 6 way connectors on the BCUs - test for continuity in the loops, the main PCB will have to be replaced if the problem persists.

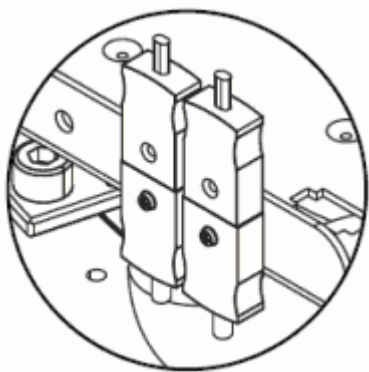


Fig. AA

page 83

Section E - Loss of flame or condensate drain blocked

Perform a user reset if the appliance will not relight, inspect the condensate trap for signs of blockage. If the trap is full remove the bottom connection to see if the water drains. Rectify the trap/pipe work as necessary.

If the problem does not appear to be related to the condensate trap follow the procedure below: -

Check that the gas supply is at the correct supply pressure i.e. 20-25 mbar, at the gas valve pressure test point and that the gas has been purged through.

Ensure that all joints in the gas train are sound that the silicon air sense tubes are connected from the venturis to the correct gas valve sensing port see [Fig 72](#) and [Section 14.17](#). Also if the supplementary heat exchanger has been replaced/removed check that the clamping collar is gas tight. See [Fig. 67](#).

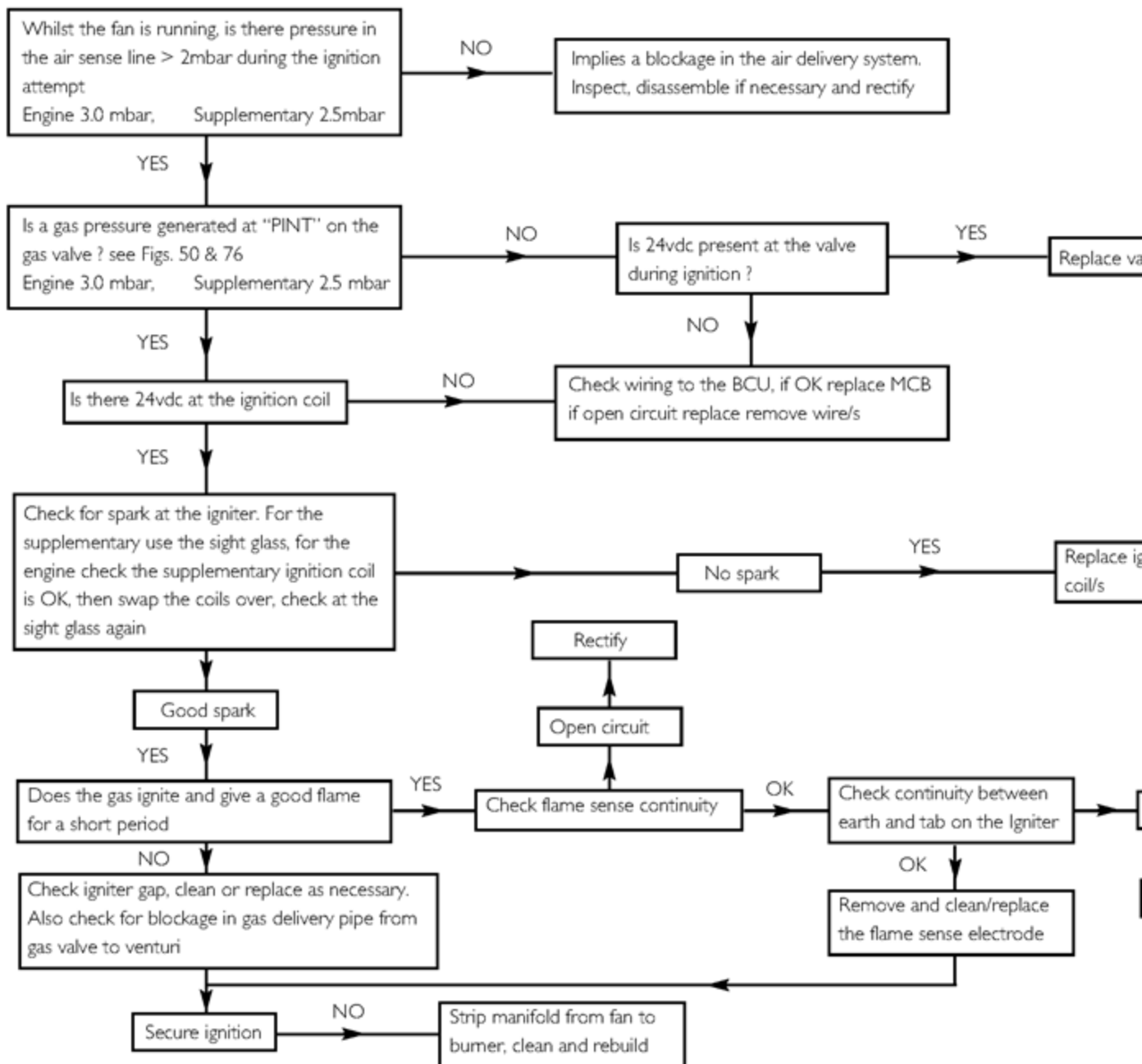
Check all the electrical connections: - gas valves, igniters and flame sense for soundness and 'cross' connections.

(The wiring harness and components have been designed to limit the possibility of inter-connecting the engine and supplementary ignition circuits, ensure all connections are made before starting any fault finding.)

Repeated 425 error, check and clean air straighteners as in [Section 14.6](#).

Do a user reset and check during the ignition cycle for: -

NOTE: BCU refers to either of the two burner control units mounted on the main PCB (MCB)



Section F Burner control and power monitoring

Error codes 263, 264, 394, 395, 422 and 423 are due to communication problems between the main board and the burner control units. If the error does not auto reset power down, if the error persists replace the PCB.

Error codes 253, 254, 265, 309, 310 and 311 are concerned with grid connection and power monitoring and will require a new PCB if the error persists.

Section G Fan calibration and speed

Check electrical connections to the fan and back to the 14 way connector on the main PCB. Error 267, auto reset - power down, if problem persists replace the fan. Error 266, perform a service reset. If the problem persists replace the fan.

Section H Spool valve calibration

Check electrical connections to the spool valve motor and back to the 14 way connector on the main PCB.

Perform a service reset. If the problem persists down power first then service reset. If the problem persists release the motor from its mounting by undoing the 3 screws and check to see if the error will reset. If the motor runs free of the spool valve the spool valve may be jammed, if there is no movement replace the spool valve.

Section I Water flow

Error 400: Reverse flow conditions, the return temperature has been less than the boiler flow for 3 minutes. Check the pump flow direction.

On initial commissioning of the appliance check that the flow and return pipes to the system are as in [Fig. 2](#) and [section 9.3](#) Service connections.

Error 164 shows that the minimum flow rate of 4 l/min has not been achieved after 12 seconds, if after a further 4 minutes the flow switch has still not been closed error 274 will be displayed. As error 164 is an auto reset if at any time within the 4 minutes the flow switch is closed the appliance operation will be restored. The most likely reason for this error is air in the system, it is therefore important to purge the system thoroughly. A permanent 164 error indicates that the switch is stuck open.

If the return temperature sensor has not been connected - see [Figs. 48](#) - Ensure the 3 transit brackets have been removed.

If the pump is not running, check for 230v at Pump Live - Check Fuse [Section 16.6](#).

Error 428 shows that the flow sensor has not detected 7 L/min, the engine burner will be prevented from running and the appliance will continue to run on the supplementary only. Check that the automatic by-pass has been set up correctly.

Error 270, 278 and 421 are caused by either a rapid rise in temperature or excessive temperature differential across the heat exchanger; either very low flow - close to 4 L/min or air in the system is indicated. Check the wiring back to the main PCB. In either case Check the pump/speed setting and that any isolation valves are open; ensure the system is purged of air and that there is an adequate by-pass.

Section J

Error 284 the water cooled seal thermostat has operated - a condition that indicates that the flexible seal connecting the engine to the engine burner is damaged or is not in place. If this is not the case check the wiring for continuity back to the 24 way 'milligrid' connector via the 6 way Molex connection see pages 48 and 50. If an open circuit persists back to either of the thermostats they should be replaced.

Section K

Errors 286 and 289 indicate that the engine has overheated. The engine will take some time to cool down so performing a service reset may not be successful straight away use one of the thermocouples mounted next to the flow switch to ascertain the stilling head temperature. If the engine appears not to have overheated or the error will not reset check the engine thermostat circuits through the 6 way Molex connection. See also [Section O](#).

Section L

Error 305 indicates either an open circuit in the power train which may not reset or the engine failed to deliver a certain level of current 0.1A within 60 seconds when the engine was connected to the grid. Check the wiring harness and connections to the main PCB, if the problem persists contact the technical help line.

Section M

Error 308 indicates an open circuit condition in the power train when the engine connects to the grid in the stop resistor circuit. Check the stop/start resistor values for 15 Ohms. If open circuit replace, if OK and the fault persists, the engine may need to be replaced contact the technical helpline for advice.

Section N

Error 287 and 300 implies that the Main PCB did not disconnect as the engine head was cooling down. If the problem persists the Main PCB will need replacing.

Section O

Error 288 check loop in milligrid connection across pins 3 (see [Section 16.2](#)).

Errors 289 to 296 fault connected with the water cooled thermostat/connections and another. Check the milligrid plug is pushed home properly and the 6 way

Molex connection see [section 16.2](#) and [16.5](#) (E) Perform a service reset if the error persists. Check the continuity of the water cooled thermostat circuit through the 6 way Molex connector. Once the water cooled thermostat error has been resolved a further error code may be displayed.

18.0 Engine Fault Finding

NOTE: Section 18 Engine Fault Finding - should only be carried out by Service Engineers who have been given specific training.

Safety Precautions

1. The MEC V1 Linear Free Piston Stirling Engine Generator (LFPSE) is intended solely for use with purpose designed micro CHP appliances using the MEC approved control Boards (such as RVC32.410 range from Siemens Switzerland Ltd) and Grid Interface Controller (such as the Siemens AVS76 G83/ENS control board). MEC accepts no responsibility for operation with an unapproved control system.
2. **WARNING:** Do not handle electrical connections during operation, whilst hot or during cool down.
3. **WARNING:** The LFPSE remains dangerously hot after the burner is turned off and may continue to generate electricity until it cools. Wait one hour after turning the engine burner off or ensure the head temperature is below 50°C before touching any part of the engine. Care **MUST** be taken as parts will still be hot long after the burner is extinguished.
4. **WARNING:** the lower dome (back end) of the engine can reach 105°C.
5. **WARNING:** Do not disconnect electrical connections between the LFPSE and the controls until the heater head thermocouple on the engine reads less than 50 °C. Before performing maintenance on the appliance, wait a minimum of one hour following shut down of the engine burner to allow the LFPSE to cool sufficiently. If the LFPSE is hot, it has the potential to run and generate electricity, resulting in a possible electric shock hazard.
6. **WARNING:** The LFPSE Contains Magnets and emits 6 mT magnetic field strength and should not be handled by people with medical implants such as Pacemakers.
7. There are NO user serviceable parts inside the engine.
8. The LFPSE weighs approximately 48 kg. Follow proper lifting and handling procedures. It **MUST** only be lifted using the bottom absorber bracket or support feet. It should only be stored on the bottom absorber bracket or support feet. Under no circumstances should it be handled by the shroud or the burner seal plate. Mechanical lifting aids should be used.
9. Do not drop the LFPSE.
10. Always maintain LFPSE at or below stated design specifications (section 4).
11. Never strike, weld or drill the vessel, or any component part of the LFPSE.
12. Never attempt to open the vessel. The vessel contains helium gas at high pressure.

Capacitor and Control PCB are fundamental part of Microgen Engine system.

13. Protect wires and wire routing against fatigue caused by vibration of the LFPS E. Engine power wire failure can result in the LFPSE pistons over-stroking. The alternator power wires and capacitor must be connected using 'locking Faston' connectors to prevent inadvertent disconnection of these critical connections.

14. You Must only operate the LFPSE with a MEC approved 44 microfarad 660 V motor run

page 86

Section P

Error 280 Inner Iron
Over Temperature
AUTO Reset

Press the menu button to reveal 'Information'. Press & hold left & right buttons for 5 seconds to reveal 'End User'. Turn the Selector Button to highlight 'Commissioning' and press. Scroll to 'fault' and press Button – check appliance error history. Has the 280 error occurred more than once?

YES

Refer to Section 16.2 and illustration of the engine. Secure a thermocouple to the centre of the dome at the bottom of the engine. Run the engine until it is generating 1000W. Does the temperature reach 100°C?

YES

Checks to water flow & condition required:-
Could result in a non engine issue

NO

Isolate appliance. Refer to Section 2.0 figure 2 component 33, drain cock. Adjacent is a 6 way white connector. Unplug and check all pins and connections. Are they in good condition and fitted correctly?

YES

Refer to Section 16.2 check 2nd pair of wires up from bottom of connector on diagram: White & Blue. Is there continuity across them?

YES

NO

NO

Replace Main PCB retest appliance. Run the appliance to generate 1000W for 5 minutes. Is the appliance now ok?

NO

F
ap
ge
ap

C
bet
co
PCB

Error 281 Dynamic Absorber
Overtravel
SERVICE RESET

Isolate product. See Section 7.8 Fig 13a. Check over travel switches located either side of the bottom of the engine.
Is there damage?

NO

Are the switch connections and wiring in good order?

YES

See Section 16.2. Check continuity across pair of white and grey wires 4 up from bottom of connector on diagram. Is this open circuit (OL)?

YES

Check wiring between over travel switches and control PCB.
Is there damage?

NO

YES

Repair wiring or loom connection.
Refer to Section 2.0 figure 2A
component 29 – Service Reset
Button, Press and hold for 3
seconds. Does problem reoccur?

YES

Isolate product. See Section 7.7

Error 282 G83/ens/GIM
AUTO RESET

Press the menu button to reveal 'Information'. Press & hold left & right buttons for 5 seconds to reveal 'End User'. Turn the Selector Button to highlight 'Commissioning' and press. Scroll to 'fault' and press Button – check appliance error history. Is the G83 error occurring more than 10 times a month?

NO

YES

Does the G83 error clear after 3 minutes?

NO

YES

Put the appliance into standby (See User's Guide Section 1.0). Check the incoming mains voltage at LNE connection. Is it between 207V AC and 264V AC?

YES

Turn the appliance on. Once the engine has connected to the grid (it can be heard running) check the incoming mains voltage. Does it remain

NO

Isolate appliance. Refer to Section 16.5. Check connections circled A & E between main PCB and G83. Are they in good condition and connected as in Section 16.5? The connections are polarity sensitive.

NO

YES

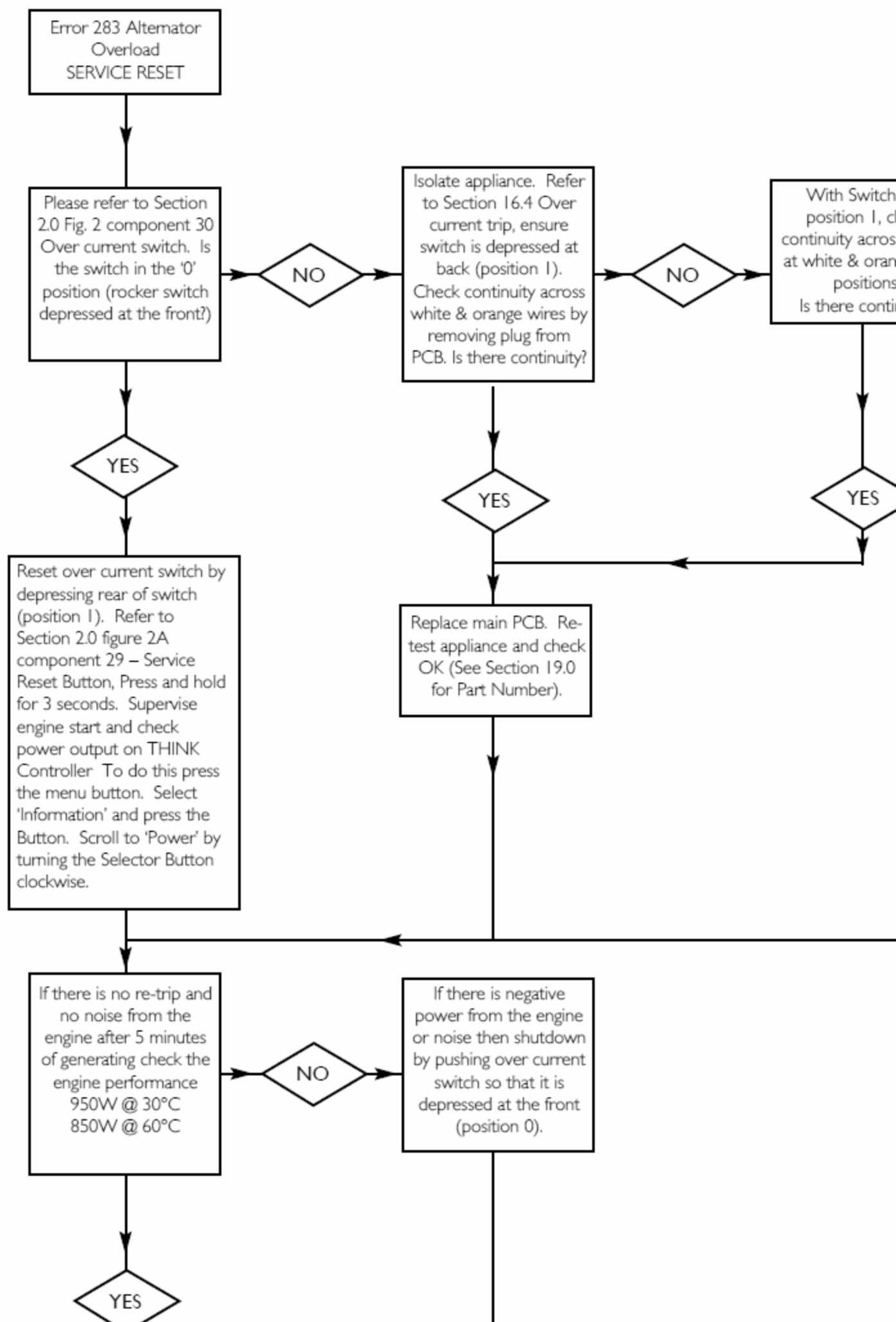
Refer to Section 16.5, Remove connector circled A. Turn appliance ON. Is there 24V DC across the 2 pins in the connector?

NO

YES

Possible G83 PCB fault. Replace and test (See Section 19.0 for Part Number).

Section P



Error 285 Alternator Short
Circuit
AUTO RESET

Press the menu button to reveal 'Information'. Press & hold left & right buttons for 5 seconds to reveal 'End User'. Turn the Selector Button to highlight 'Commissioning' and press. Scroll to 'fault' and press Button – check appliance error history. Has the 285 error occurred more than once?

YES

Isolate the appliance and wait for 6.5 minutes for the capacitor to discharge. Check that the engine Head Temperature is below 100°C by connecting an engine thermocouple into a reader.

Refer to Section 16.4, disconnect the red and black wires from the engine. These are located down the left hand side of the appliance between the engine and the case. Check the resistance across the 2 connectors from the engine. Is it open circuit?

YES

NO

Refer to Section 2.0 figure 2A component 29. Service reset button, perform a service reset if required by holding this button for 3 seconds. Has the appliance reset with no further errors?

YES

Appliance Satisfactory

NO

NO

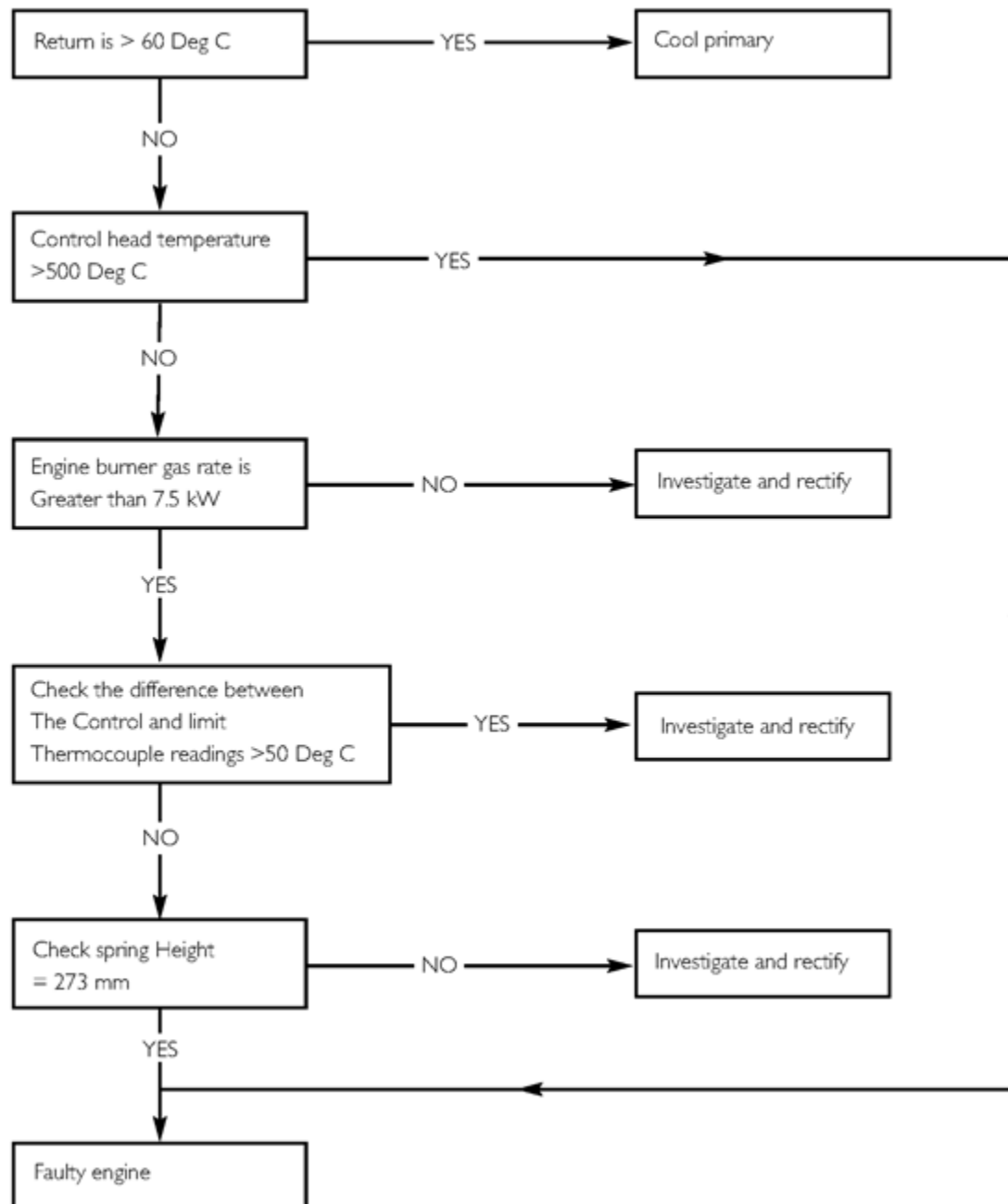
Less than 4.0 Ohms

YES

NO

Section Q

Engine developing less than 950W after 15 minutes running at maximum rate.



19.0 Short Parts List

Short Parts List

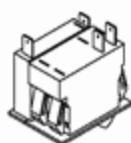
Key No.	Description	Manufacturers Part No.
A	Capacitor	5132948
B	Stepper Motor Kit	5132949
C	Overload Switch	5132950
D	Water Flow Sensor Kit	7210310
E	Gas Valve Kit	5132952
F	Fan Assembly Kit	5132953
G	Thermostat Overheat Kit	5132954
H	Sensor Kit	5132955
J	Spark Generator Kit	5132956
K	Burner Supplementary Kit	5132957
L	Ignition Electrode Recuperator Kit	5132958
M	Sensor Recuperator Kit	5132959
N	Ignition Electrode Supplementary Kit	5132960
O	Sensor Supplementary Kit	5132961
P	Control PCB Kit	721089201
	Control PCB Kit (LPG)	721089301
Q	G83 PCB Kit	5132963
R	Condensate Trap Assembly Kit	5132964
S	THINK Controller	5134228



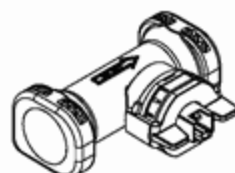
A



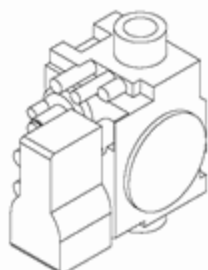
B



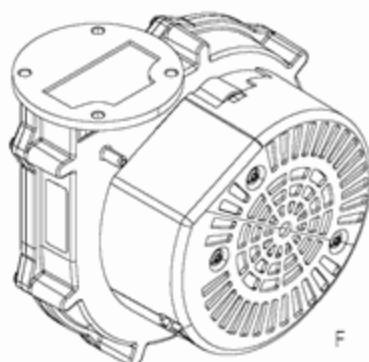
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D



E



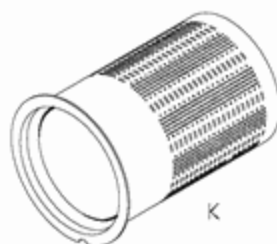
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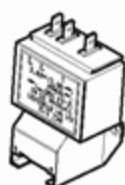
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H



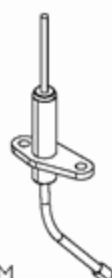
K



J



L



M



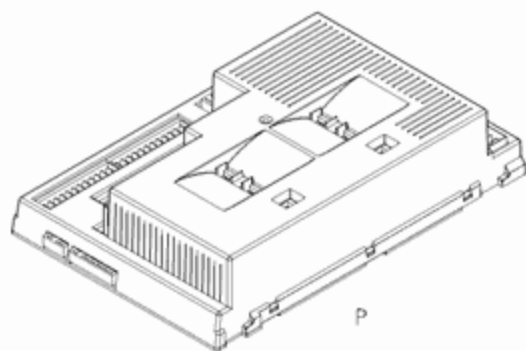
N



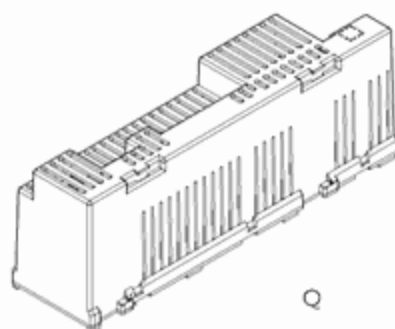
O



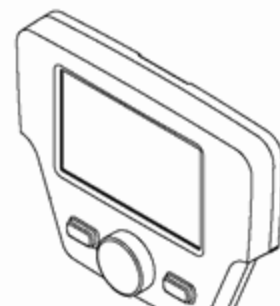
R



P



Q



page 93

page 94

page 95

page 96

MICRO CHP SYSTEM COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the Micro CHP as a means of demonstrating compliance with appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer Name	Telephone Number
Address	
Micro CHP Make and Model	
Micro CHP Serial Number	
Product MCS Number	
Commissioned by (print name)	Gas Safe Reg. No.
Company Name	Telephone No.
Company Address	
Commissioning Date	

To be completed by the customer on receipt of a Building Regulations Compliance Certificate*:

Building Regulations Notification Number (if applicable)

INSTALLATION DETAILS

Gas Installer Name	Gas Safe Register Number
Company	
Electrician Name	Part P Register Number
Company	
Microgeneration Certification Scheme Number [1]	
Micro CHP unit type :	☐ Stirling engine ☐ Fuel Cell ☐ ORC

CONTROLS Tick the appropriate boxes if applicable

Time & Temperature Control to Heating	Room Thermostat & Programmer/Timer ☐	Programmable Roomstat ☐	Load/Weather Compensation ☐	Optimum Start Control ☐
Time & Temperature Control to Hot Water		Load Compensation ☐	Cylinder Thermostat & Programmer/Timer ☐	Combination Boiler ☐
Heating Zone Valves			Fitted ☐	Not Required ☐
Hot Water Zone Valves			Fitted ☐	Not Required ☐
Thermostatic Radiator Valves			Fitted ☐	Not Required ☐
Automatic Bypass System			Fitted ☐	Not Required ☐
Micro CHP Interlock				Provided ☐

ELECTRICS

Small Scale Embedded Generator (SSE6) Installation commissioning confirmation form completed?	Y ☐ N ☐
Connecting Circuit Type?	Separate dedicated circuit ☐ Existing ☐
All safety labels have been applied (main incoming fuse, meter, consumer unit, isolator, Micro CHP unit, pump)	

ALL SYSTEMS

The system has been flushed and cleaned in accordance with BS7593 and Micro CHP manufacturer's instructions	Y ☐ N ☐
What system cleaner was used?	
What inhibitor was used?	
Has water test been conducted? Yes ☐ No ☐ Result:	
The condensate drain has been installed in accordance with the manufacturer's instructions and/or BS5546/BS6798	Y ☐ N ☐
The flue has been installed in accordance with the manufacturer's instructions and/or BS5440-1	Y ☐ N ☐
Unit ventilation is in accordance with the manufacturer's instructions and/or BS5440-2	Y ☐ N ☐

CENTRAL HEATING MODE: MEASURE AND RECORD

Gas Rate	m ³ /hr	OR
Burner Operating Pressure (if applicable) ☐ Main ☐ Aux ☐ Both	mbar	OR Gas Inlet Pressure
Central Heating Flow Temperature		

COMBINATION BOILERS ONLY

Is the installation in a hard water area (above 200ppm)?

If YES, has a water scale reducer been fitted?

What type of scale reducer has been fitted?

Cold Water Inlet Temperature

Hot Water has been checked at all outlets

☐ Yes

Temperature

Water Flow Rate

Are the above within the manufacturer's stated tolerances?

ALL INSTALLATIONS

If required by the manufacturer, record the following O₂ CO₂ % OR CO ppm OR CO/CO₂

The heating and hot water system complies with the appropriate Building Regulations

The Micro CHP and associated products have been installed and commissioned in accordance with the manufacturer's instructions

The generator system complies with engineering recommendation G 83/1

The efficient operation of system and its controls have been demonstrated to and understood by the customer

The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer

Have the servicing and warranty requirements been explained to the customer?

Has the customer been advised to notify their electricity supplier?

Heating Plant Emission Rate

Dwelling Emission Rate

The performance of Micro-cogeneration systems is difficult to predict with certainty due to the variability of customer expectations and usage and the subsequent effect on both electricity supply and demand. This estimate is based upon the best available information but is given as guidance only and should not be considered as a guarantee.

Commissioning Engineer's Signature

Customer's Signature

(To confirm demonstration of equipment and receipt of appliance instructions)

Generator Meter Serial Number

Installation Date



* All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

[1] May be required to claim grants and feed in tariff.

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Service Record

It is recommended that your heating system is serviced regularly and that the appropriate Service Interval Record is completed.

Service Provider

Before completing the appropriate Service Interval Record below, please ensure you have carried out the service as described in the manufacturer's instructions.

Always use the manufacturer's specified spare part when replacing controls.

Service 1 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 3 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 5 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 7 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 9 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 2 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 4 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 6 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 8 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

Service 10 Date: _____Energy Efficiency Checklist completed? ☐ Yes ☐ No

Engineer Name: _____

Company Name: _____

Telephone No. _____

Gas Safe Register Number: _____

Comments: _____

Signature: _____

All descriptions and illustrations provided in this leaflet have been carefully prepared but we reserve the right to make changes and improvements in our products which may affect the accuracy of the information contained in this leaflet. All goods are sold subject to our standard Conditions of Sale which are available on request.

BAXI

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PART OF BDR THERMEA

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