

# The LBF Range

High efficiency gas fired water heaters

## Installation, Commissioning and Maintenance Instructions

### Models:

LBF81

LBF121

LBF151

LBF171

LBF221

LBF301

LBF401



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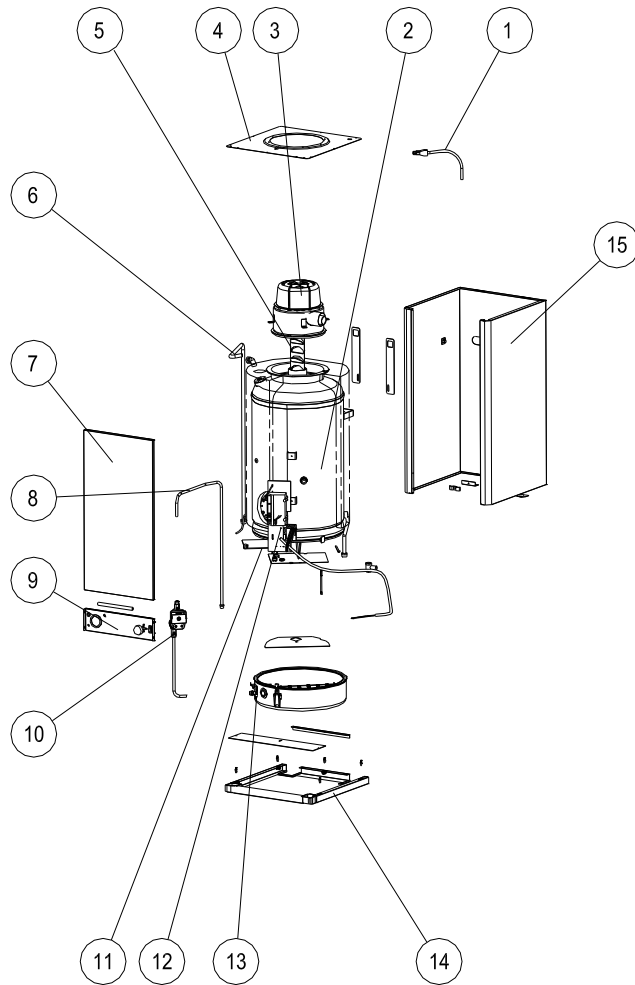
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## 1.0 INTRODUCTION

- The Lochinvar LBF range is a wall mounted or floor standing (dependent upon model) direct gas-fired high efficiency water heater.
- The burner is initiated by a full electronic ignition sequence control that incorporates a spark ignition and a flame rectification device for supervision of the flame.
- This equipment is intended for use on Group H Natural Gas (2<sup>nd</sup> Family) and LPG propane (3<sup>rd</sup> Family). The information relating to propane firing is to be found in **Section 12: LPG FUEL**. This equipment **MUST NOT** use gas other than that for which it has been designed and adjusted.
- This equipment must be installed by a competent person, registered with a H.S.E. approved body. All installations must conform to the relevant Gas Safety and Building Regulations. Health & Safety requirements must also be taken into account when installing any equipment. Failure to comply with the above may lead to prosecution.
- If the equipment is to be connected to an unvented (pressurised) system, care must be taken to ensure all extra safety requirements are satisfied should a high or low-pressure condition occur in the system.
- The equipment is designed for direct connection to a flue system.
- **Ancillary Options:**

<u>Item Description</u>	<u>Part Number</u>
Unvented Water System Kit – LBF-81/121	WH11
Unvented Water System Kit – LBF-151/171	WH10
Unvented Water System Kit – LBF-221/301	WH15
Unvented Water System Kit – LBF-401	WH16
De-stratification Pump Kit	WH9
Relay for Flame Failure/High Temperature Indication	RLY2716
Correx Electrical Anode Protection – LBF-151/171	CKT9005
Correx Electrical Anode Protection – LBF-221/301/401	CKT9005
Flue System Components	Refer to <b>Section 8.0: FLUE SYSTEM</b>
LPG Conversion Kit	Refer to <b>Section 13.0: LPG FUEL</b>

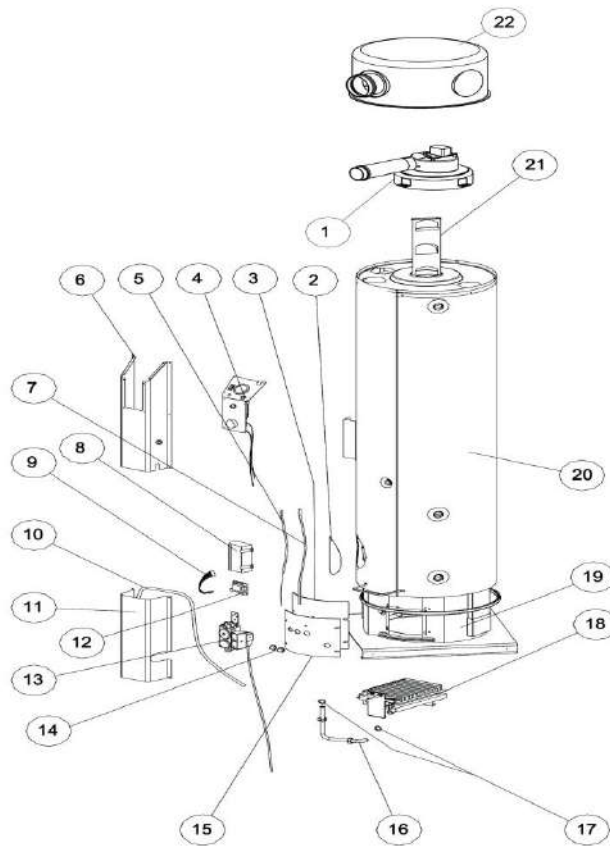
## 2.0 PRINCIPAL PARTS



**FIGURE 2.1 LBF81/121 PRINCIPAL PARTS**

1	Flue hood cable
2	Storage vessel
3	Flue hood
4	Upper casing
5	Flue baffle
6	Hot outlet tube
7	Front casing
8	Gas inlet pipe
9	Control panel
10	Gas valve
11	Power connection PCB
12	Ignition sequence controller
13	Burner assembly
14	Lower casing
15	Side casing

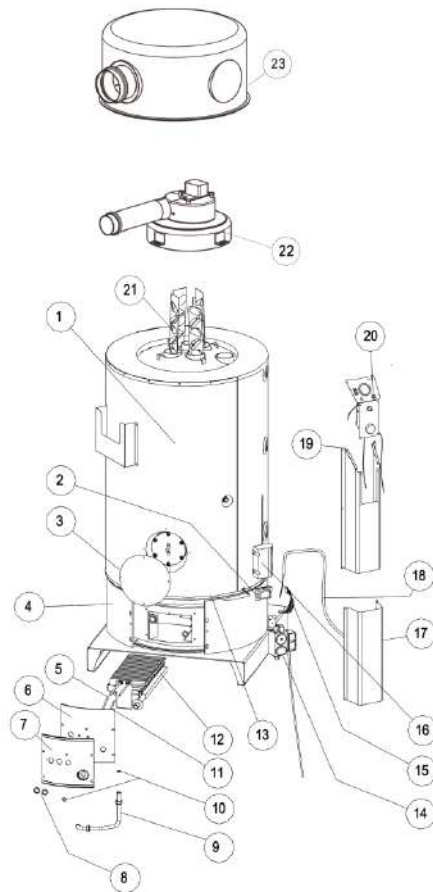
**TABLE 2.1 LBF81/121 PRINCIPAL PARTS**



**FIGURE 2.2 LBF151/171 PRINCIPAL PARTS**

1	Fan assembly	12	Power connection PCB
2	Inspection door cover	13	Gas valve
3	Burner door gasket	14	Electrode grommets
4	Control panel	15	Burner door
5	Ignition electrode cable (white)	16	Gas pipe
6	Upper cover	17	Gas pipe gaskets
7	Flame sense electrode (red)	18	Burner assembly
8	Ignition sequence controller	19	Combustion chamber casing
9	Ignition sequence controller cable	20	Storage vessel
10	Power supply cable	21	Flue baffle
11	Lower cover	22	Flue hood

**TABLE 2.2 LBF151/171 PRINCIPAL PARTS**



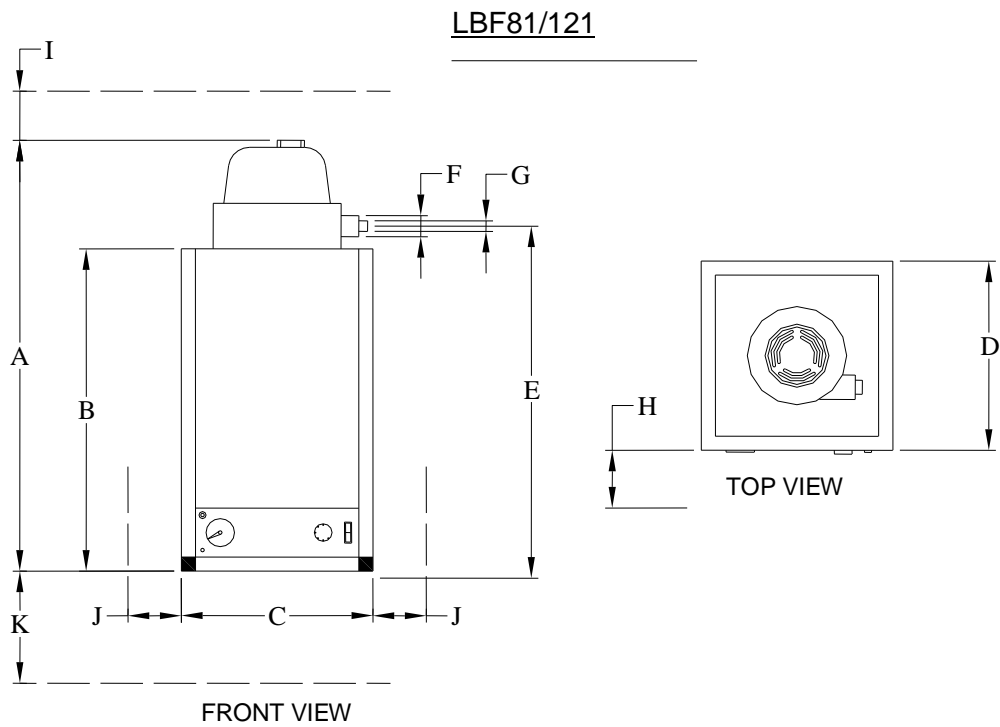
**FIGURE 2.3 LBF221 - 401 PRINCIPAL PARTS**

1	Storage vessel	13	Outer jacket finish
2	Power connection PCB	14	Gas valve
3	Inspection door cover	15	Ignition sequence controller cable
4	Combustion chamber casing	16	Ignition sequence controller
5	Ignition electrode cable (white)	17	Lower cover
6	Burner door gasket	18	Power supply cable
7	Burner door	19	Upper cover
8	Electrode grommets	20	Control panel
9	Gas pipe	21	Flue Baffles
10	Gas pipe gaskets	22	Fan Assembly
11	Flame sense electrode cable (red)	23	Flue Hood
12	Burner assembly		

**TABLE 2.3 LBF221 – 401 PRINCIPAL PARTS**

A replacement parts list is available to download from the Lochinvar website; please visit [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)

## 2.1 DIMENSIONAL DRAWINGS

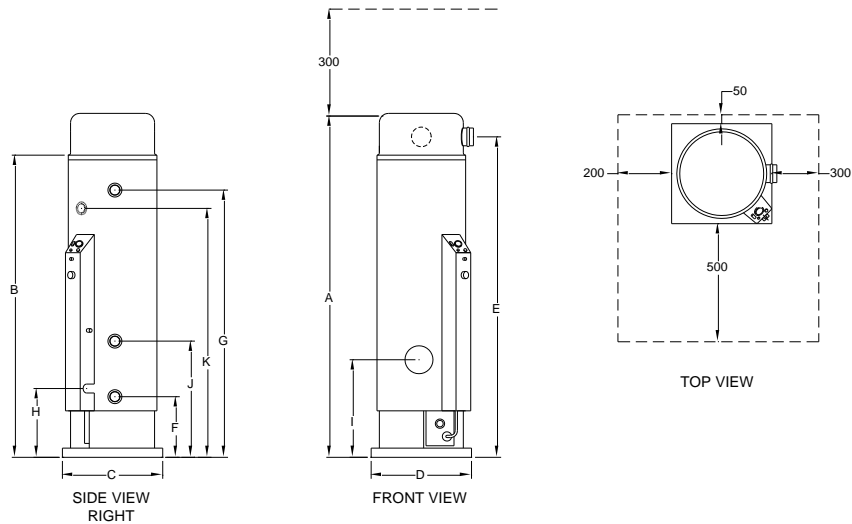


**FIGURE 2.4 DIMENSIONS LBF81/121**

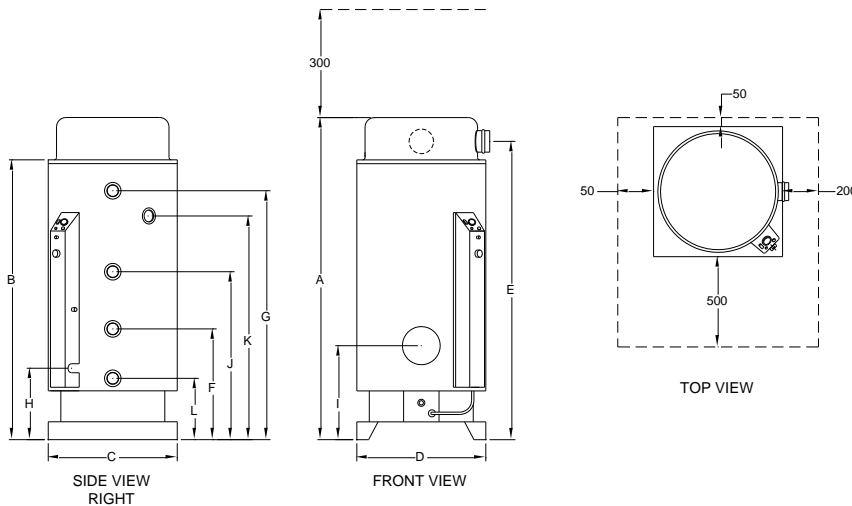
		<b>LBF81</b>	<b>LBF121</b>
<b>A</b>	Overall Height Of Heater	1040	1400
<b>B</b>	Height without Flue Hood	850	1210
<b>C</b>	Width	450	450
<b>D</b>	Depth	460	460
<b>E</b>	Centre Line Of Flue Outlet	895	1255
<b>F</b>	Diameter Of Outer Flue	100	100
<b>G</b>	Diameter Of Inner Flue	60	60
<b>H</b>	Service Clearance From Front	500	500
<b>I</b>	Service Clearance From Above	200	200
<b>J</b>	Service Clearance From Sides	50	50
<b>K</b>	Service Clearance From Below	200	200

**TABLE 2.4 DIMENSIONS LBF81/121**





**FIGURE 2.5 DIMENSIONS LBF151/171**



**FIGURE 2.6 DIMENSIONS LBF-221/301/401**

		<b>LBF151</b>	<b>LBF171</b>	<b>LBF221</b>	<b>LBF301</b>	<b>LBF401</b>
A	Overall Height	1905	2105	1560	1912	2275
B	Height Without Flue Hood	1680	1880	1335	1687	2035
C	Depth	520	520	720	720	720
D	Width	520	520	720	720	720
E	Center Line of Flue Outlet	1790	1990	1445	1795	2145
F	Cold Water Inlet	395	395	570	570	570
G	Hot Water Outlet	1625	1825	1285	1640	1985
H	Gas Supply	432	432	475	475	475
I	Inspection Flange	460	465	570	570	570
J	HWS Return	720	720	960	960	1135
K	Relief Valve Tapping	1470	1670	1485	1835	1835
L	Drain Valve	N/A	N/A	405	405	403

**TABLE 2.5 DIMENSIONS LBF151/171/221/301/401**

### 3.0 TECHNICAL DATA

Model Number	LBF81	LBF121	LBF151	LBF171	LBF221	LBF301	LBF401
<b>GENERAL DATA</b>							
Input (gross) – kW	5.6	5.6	20.0	21.1	27.8	32.2	32.2
Input (net) – kW	5.0	5.0	18.0	19.0	25.0	29.0	29.0
Recovery Rate (44° ΔT) – l/hr	88	88	314	325	474	535	520
Recovery Rate (50° ΔT) – l/hr	77	77	276	286	417	471	458
Heat generator seasonal efficiency – %	80.4	80.4	80.4	78.7	87.4	85.0	82.7
Weight (Empty) – kg	49	74	128	141	220	265	309
NO <sub>x</sub> (corrected to 0% O <sub>2</sub> ) PPM	57	108	64	78	130	92	72
NO <sub>x</sub> (corrected to 0% O <sub>2</sub> ) mg/KWh	100	190	113	138	229	162	126
<b>GAS DATA-G20</b>							
Nominal gas inlet pressure-mbar	21						
Maximum gas inlet pressure- mbar	25						
Minimum gas inlet pressure-mbar	17.5						
Burner pressure mbar	11	11	10.3	10.5	10.0	12.2	12.2
Injector Size mm	2.0	2.0	1.20	1.25	1.25	1.25	1.25
Gas flow rate- m <sup>3</sup> /hr	0.52	0.52	1.85	1.96	2.58	2.99	2.99
Gas Inlet connection size- "BSP	3/8	3/8	1/2	1/2	1/2	1/2	1/2
<b>GAS DATA-G31</b>							
Nominal gas inlet pressure-mbar	37						
Maximum gas inlet pressure- mbar	45						
Minimum gas inlet pressure-mbar	30						
Burner pressure mbar	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Injector Size mm	1.15	1.15	0.70	0.70	0.65	0.72	0.75
Gas flow rate- m <sup>3</sup> /hr	0.39	0.39	0.75	0.79	1.05	1.21	1.21
Gas Inlet connection size- "BSP	3/8	3/8	1/2	1/2	1/2	1/2	1/2
<b>WATER DATA</b>							
Storage capacity- litres	75	115	145	160	220	300	390
Water connections "BSP	1/2	1/2	3/4	3/4	1 1/4	1 1/4	1 1/4
System return connection - "BSP	N/A	N/A	3/4	3/4	1	1	1
Maximum water pressure (PMS) - bar	6						
Maximum water temp- °C	74						
<b>FLUE DATA TYPE C<sub>12</sub>, C<sub>32</sub> (concentric)</b>							
Nominal flue diameter-mm	38/60	38/60	60/100	60/100	60/100	60/100	60/100
Maximum flue gas temp- °C	99	88	109	95	109	115	97
Maximum equivalent length-m (Horizontal)	3.0						
Maximum equivalent length-m (Vertical)	2.0						
Equivalent length 90° bend – m	1.0						
Equivalent length 45° bend – m	0.5						
<b>FLUE DATA TYPE C<sub>52</sub> (twin-pipe)</b>							
Nominal flue diameter-mm	38/60	38/60	80/80	80/80	80/80	80/80	80/80
Maximum flue gas temp- °C	99	88	109	95	109	115	97
Maximum equivalent length-m (air duct)	6.0						
Maximum equivalent length-m (exhaust)	6.0						
Equivalent length 90° bend – m	1.0						
Equivalent length 45° bend – m	0.5						

TABLE 3.1 TECHNICAL DATA

## 4.0 GENERAL REQUIREMENTS

The Lochinvar LBF range water heater has been designed to operate trouble free for many years. These instructions should be followed closely to obtain the maximum usage and efficiency of the equipment. **PLEASE** read the instructions fully before installing or using the appliance.

### 4.1 RELATED DOCUMENTS

It is law that all gas appliances are installed by competent persons, in accordance with The Gas Safety (Installation and Use) Regulations 1998. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to ensure that this law is complied with.

The installation of the equipment **MUST** be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the bylaws of the local water undertaking. The installation should also be in accordance with any relevant requirements of the local gas distributor and local authority.

In addition the installation should follow the relevant guidance offered in the following documents. It is not practical to list all relevant information but emphasis is placed on the following documents, as failure to comply with the guidance given will almost certainly result in an unsatisfactory installation:

<b>BS 5440-1: 2008</b>	Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases) <b>Part 1:</b> Specification for installation and maintenance of flues
<b>BS 5440-2: 2009</b>	Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (2nd and 3rd family gases) <b>Part 2:</b> Specification for installation and maintenance of ventilation for gas appliances
<b>BS 6700: 2006</b>	Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages
<b>BS 7074: 1989</b> sealed systems	Application, selection and installation of expansion vessels and ancillary equipment <b>Parts 1 and 2</b> for
<b>BS 7671: 2008</b>	Requirements for electrical installations, I.E.E. wiring regulations seventeenth edition
<b>CP 342:</b> <b>Part 2 1974</b>	Code of practice for centralised hot water supply - buildings other than dwellings
<b>IGE/UP/1:</b> <b>Edition 2</b>	Installation pipework on industrial and commercial premises
<b>IGE/UP/2:</b> premises	Gas installation pipework, boosters and compressors on industrial and commercial <b>Edition 2</b>
<b>IGE/UP/4:</b> <b>Edition 2</b>	Commissioning of gas-fired plant on industrial and commercial premises
<b>Gas Safety (Installation and Use) Regulations 1998 (England, Scotland &amp; Wales)</b>	
<b>CIBSE: Guide parts A, B and C</b>	
<b>H.S.E. guidance</b> <b>Note PM5:</b>	Automatically controlled steam and hot water boilers
<b>HSE Approved Code of Practice L8</b> <b>Department of Health memorandum HTM 04-01</b> <i>Manufacturer's notes must not be taken in any way as overriding statutory obligations.</i>	

## 5.0 WATER QUALITY

Water supply quality may adversely affect the efficiency and performance of water heaters and hot water systems. The situation can intensify where higher temperatures or demands exist.

When installing the Lochinvar LBF in hard water areas, it is recommended that a water treatment specialist be consulted.

### 5.1 ELECTRICAL ANODE PROTECTION SYSTEM

The Lochinvar **LBF151 - 401** can be factory fitted with a Correx electrical anode protection system. The purpose of this system is to protect the water tank from electrolytic attack by passing a small current from an electrode immersed in the water to the internal surface of the vessel.

Whilst this system protects the unit from electrolytic attack, it should be noted that this is **not** a scale inhibiting or reducing device.

When the protection system is working correctly, a green light should be visible on the control panel situated on the front of the appliance. If an error occurs, this lamp will flash red. Remedial action should be taken as a matter of urgency if such a situation arises.

**It is a requirement of the Correx system that the unit is connected to a PERMANENT UNINTERRUPTIBLE 230V POWER SUPPLY. There must be no switches, including time controllers in the electrical system other than the main isolator. Incorrect installation of the electrical supply will invalidate the warranty of the appliance.**

## 6.0 LOCATION

### 6.1 PLANT ROOM REQUIREMENTS

The Lochinvar LBF range may only be installed in a room that complies with the appropriate ventilation requirements.

The Lochinvar LBF range can be used as a type C<sub>12</sub>, C<sub>32</sub>, C<sub>52</sub> appliance. Due to its room sealed design, ventilation allowances for combustion air are not necessary. If the appliance is to be installed in a compartment or a hot environment, ventilation for cooling purposes must be fitted. For further guidance, please refer to **Section 9: AIR SUPPLY** or to **BS5440-2**.

### 6.2 GENERAL REQUIREMENTS

Corrosion of the flue ways and flue system may occur if air for combustion contains certain chemical vapours. Such corrosion may result in poor combustion and create a risk of asphyxiation. Aerosol propellants, cleaning solvents, refrigerator and air conditioning refrigerants, swimming pool chemicals, calcium and sodium chloride, waxes and process chemicals are corrosive. Products of this sort should not be stored near the water heater or outside by the air intake. The fitting of this equipment in a situation where aerosols or other chemicals may be entrained into the combustion air will invalidate the warranty.

The equipment must be installed on a level, non-combustible surface that is capable of adequately supporting its weight (when filled with water) and any ancillary equipment. The operation of the equipment must not cause the temperature of any combustible material in the vicinity of the equipment and its flue to exceed 65°C. If such a situation is unavoidable, appropriate insulation should be provided.

Locate the equipment so that if the appliance or any connecting pipework should leak, water damage will not occur. When such locations cannot be avoided it is recommended that a suitable drain pan be installed under the equipment. The pan should be adequately drained but must not restrict the ventilation airflow.

### 6.3 CLEARANCES

The location chosen for the equipment must permit the provision of a satisfactory flue system and, where necessary, an adequate air supply. The location must also provide adequate space for servicing and air circulation around each unit. This includes any electrical trunking laid across the floor and to the appliance.

See **Table 2.4 and 2.5** for clearances. See **Table 8.1** for details on flue terminal locations.

## 7.0 GAS SUPPLY

The Lochinvar LBF range is suitable for use on second and third family gasses 2H - G20 - 20mbar and 3P - G31 - 37mbar. Details relating to Natural Gas (2H) appear below; **for details relating to Propane (3P) please refer to Section 13: LPG FUEL.**

## **7.1 SERVICE PIPES**

The local gas distributor must be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas. An existing service pipe must not be used without prior consultation with the local gas distributor.

## **7.2 METERS**

A new gas meter will be connected to the service pipe by the local gas distributor contractor. An existing gas meter should be checked, preferably by the gas distributor, to ensure that it is adequate to deal with the rate of gas supply required.

## **7.3 GAS SUPPLY PIPES**

Supply pipes must be fitted in accordance with **IGE/UP/2**. Pipework from the meter to the equipment must be of adequate size. The complete installation must be purged and tested as described in **IGE/UP/1**. Refer to **Section 13: LPG FUEL** for information on LPG pipework installation guidance.

## **7.4 BOOSTED SUPPLIES**

Where it is necessary to employ a gas pressure booster, the controls must include a low-pressure cut-off switch at the booster inlet. The local gas distributor must be consulted before a gas pressure booster is fitted.

## **7.5 PLANT-ROOM CONTROL VALVE**

A manual valve for plant-room isolation must be fitted in the gas supply line. It must be clearly identified and readily accessible for operation, preferably by an exit.

## **7.6 EQUIPMENT GAS SYSTEM LEAK CHECK**

An approved gas-inlet appliance isolating valve and union should be installed for each unit in a convenient and safe position and be clearly marked. Ensure that the gas-inlet appliance isolating valve is in the OFF position. Although the equipment receives a gas leak check and gas train component integrity check prior to leaving the factory, transit and installation may cause disturbance to unions, fittings and components. During commissioning a further test for tightness should be carried out on the equipment gas pipework and components.

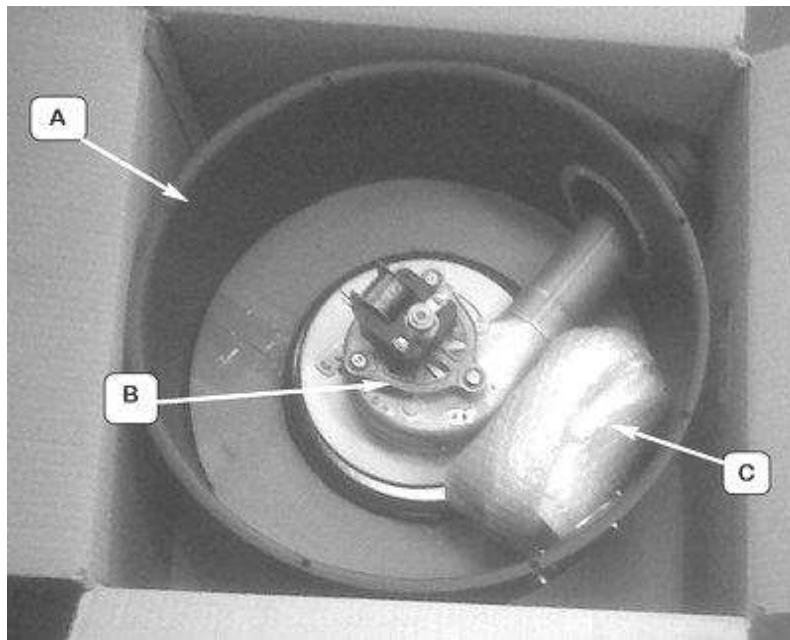
Care must be taken not to allow leak detection fluid on or near any electrical parts or connections.

## 8.0 FLUE HOOD ASSEMBLY LBF151 - LBF401

### 8.1 UNPACKING THE FLUE HOOD

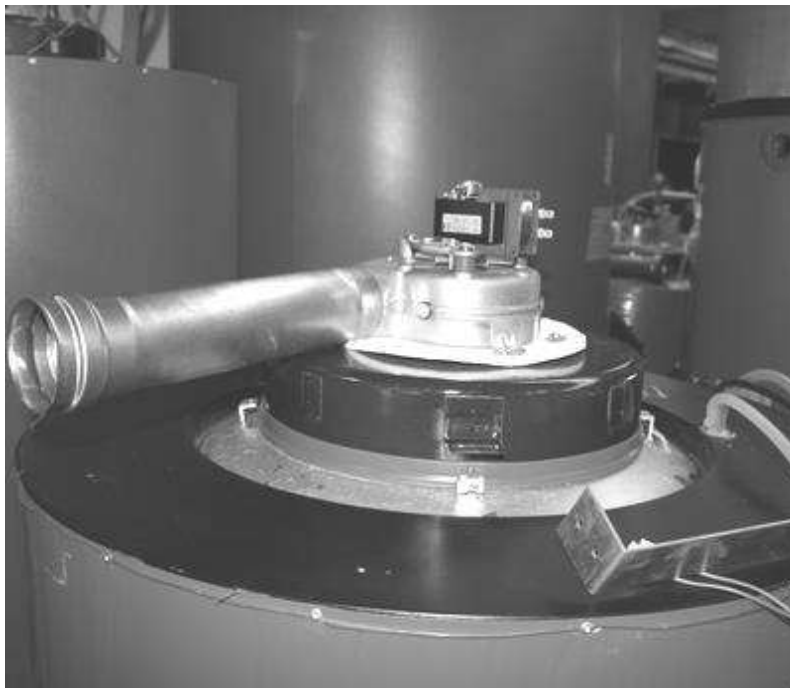
The flue hood is delivered with the water heater in a separate box that contains:

- A. Flue hood casing in black painted aluminium
- B. fan assembly
- C. Ø 60/100 Transition piece with flue sampling point,  
Plastic bag with fixing screws

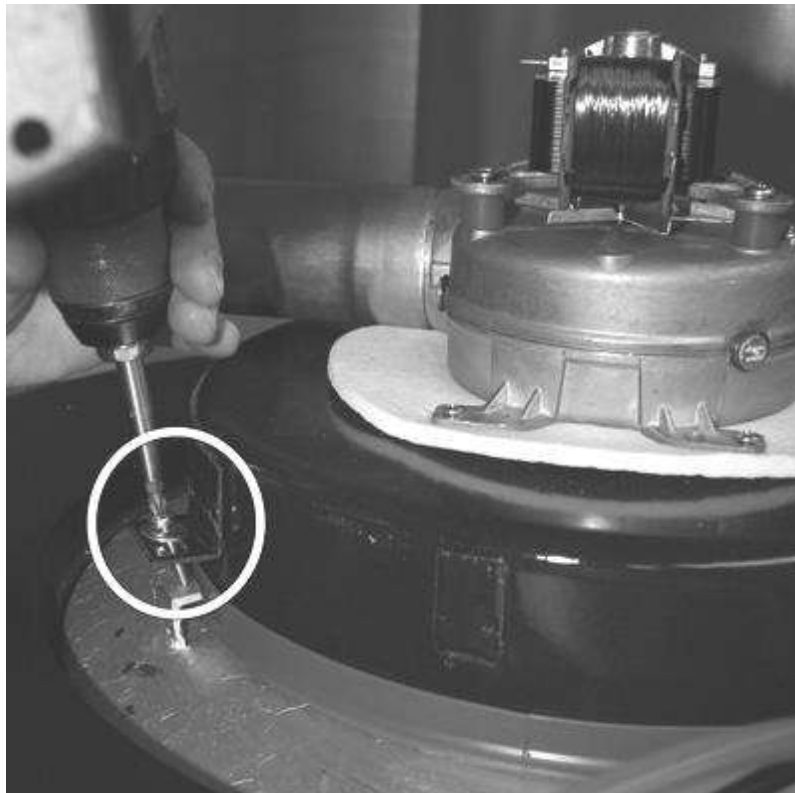


### 8.2 FLUE HOOD INSTALLATION

Place the fan assembly on the top of the water heater, pointing the Ø 60 flue outlet in the desired direction



Fix the fan in position with the screws contained in the box.



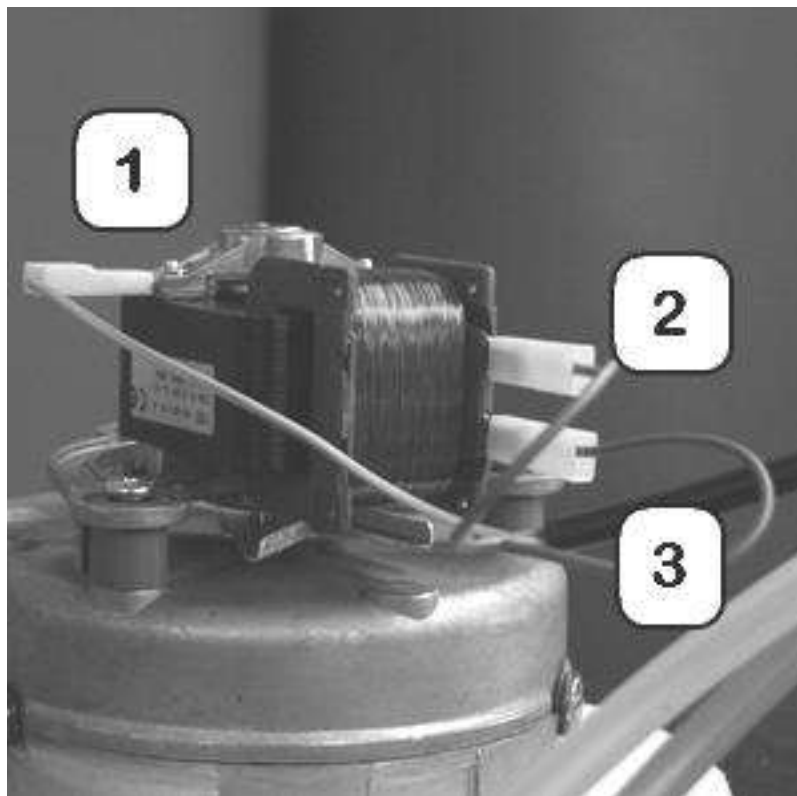
Fix the bracket with the hole for cables vertically.



Feed the air pressure switch hoses through the bracket.



Connect the motor supply cable, pos. 2 and 3. Connect the earth cable, pos. 1



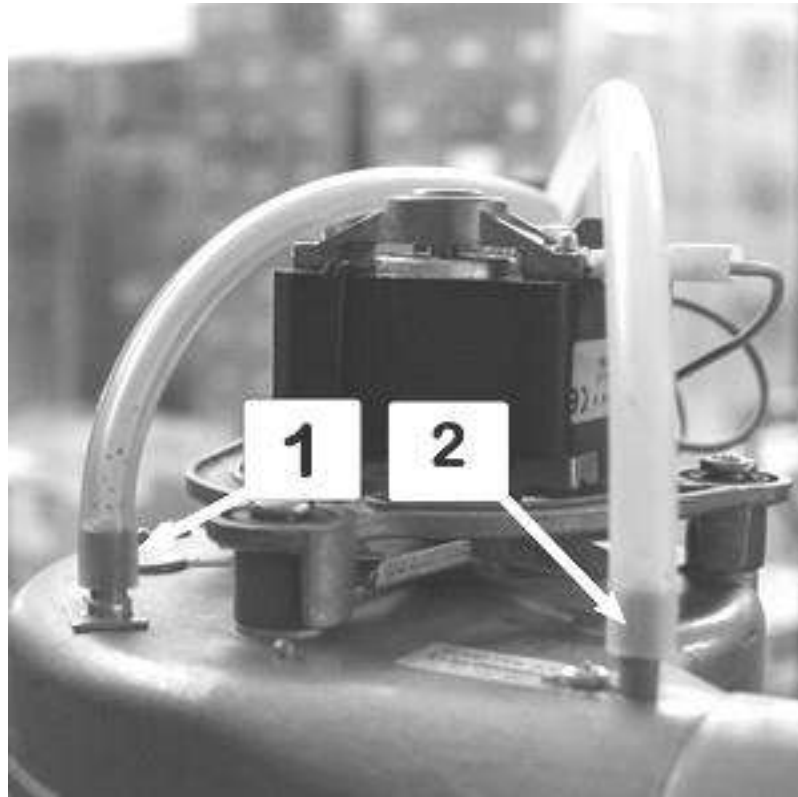


Connect the two tubes to the pressure points.

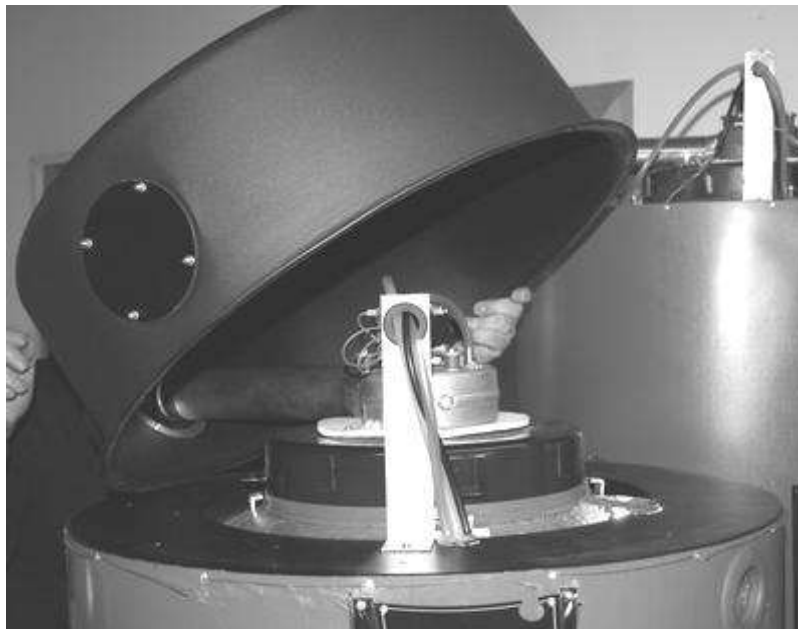
**IMPORTANT:**

Pink tube → pressure point 1 (the metal one)

Clear tube → pressure point 2 (the plastic one)



Place the black flue hood casing on the heater.



Centre the Flue hood casing by means of the 4 spacers on the top of the heater:



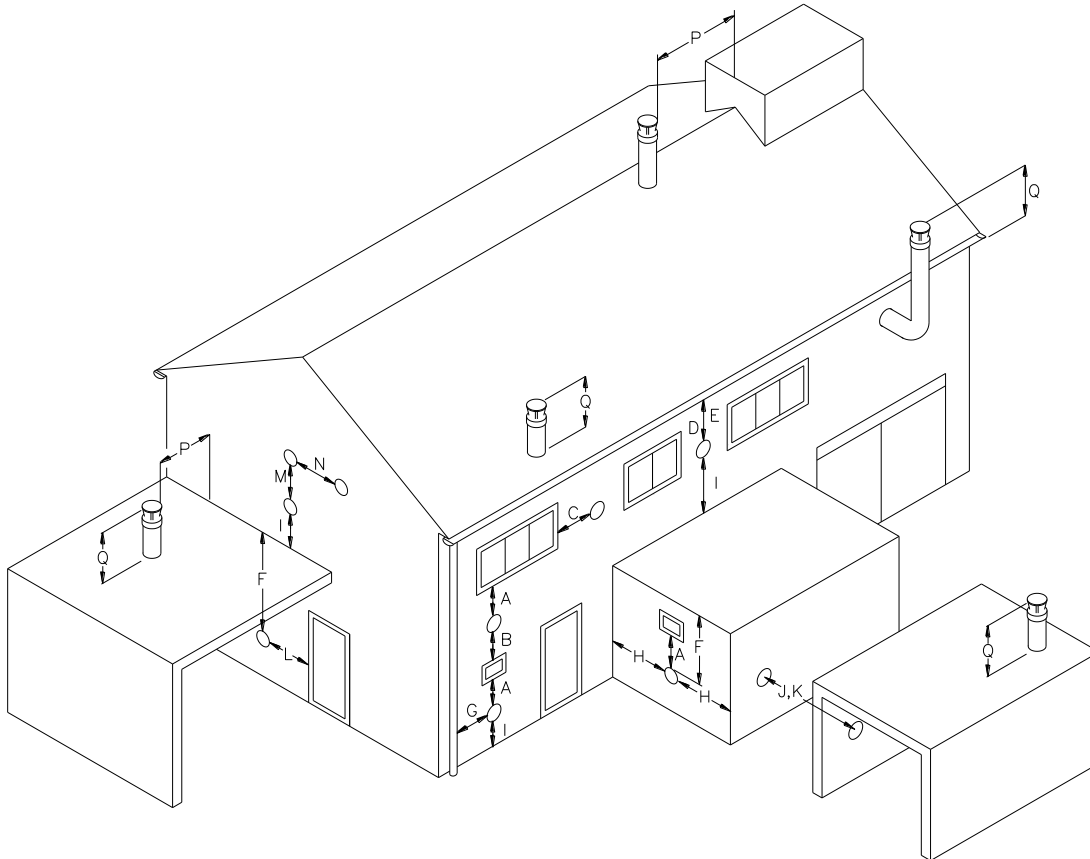
Connect the Transition piece with sampling point



Fix the black flue hood casing to the heater using the screws supplied in the box.



## 9.0 FLUE SYSTEM



**FIGURE 8.1: FLUE TERMINAL POSITIONS**

Location	Description	Minimum distance
A	Directly below an opening, air brick, opening windows etc.	300
B	Above an opening, air brick, opening windows etc.	300
C	Horizontally to an opening, air brick, opening windows etc.	300
D	Below a gutter or sanitary pipework	75
E	Below the eaves	200
F	Below a balcony or car port roof	200
G	From a vertical drain or soil pipe	150
H	From an internal or external corner	300
I	Above ground, roof or balcony level	300
J	From a surface facing the terminal	600
K	From a terminal facing the terminal	1200
L	From an opening in the car port (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
P	From a vertical structure on the roof	300
Q	Above intersection with the roof	300

**TABLE 8.1 FLUE TERMINAL MINIMUM DISTANCES**

### 9.1 FLUE SYSTEM GENERAL REQUIREMENTS

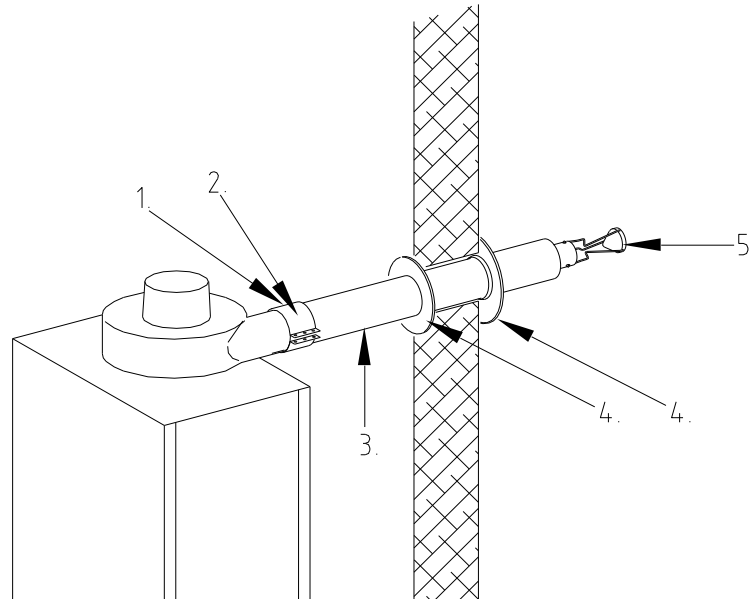
Detailed recommendations for the flue system are given in **BS5440-1**. The following notes are intended to give general guidance only.

### 9.2 APPROVED FLUE SYSTEM

This appliance is approved for use with a purpose designed adaptive room sealed flue system; the appropriate kits are available from Lochinvar Limited

### 9.3 CONCENTRIC FLUE SYSTEM

#### 9.3.1 HORIZONTAL CONCENTRIC FLUE FITTING DETAILS LBF81/121



**FIGURE 8.2 HORIZONTAL CONCENTRIC FLUE KIT FOR LBF81/121**

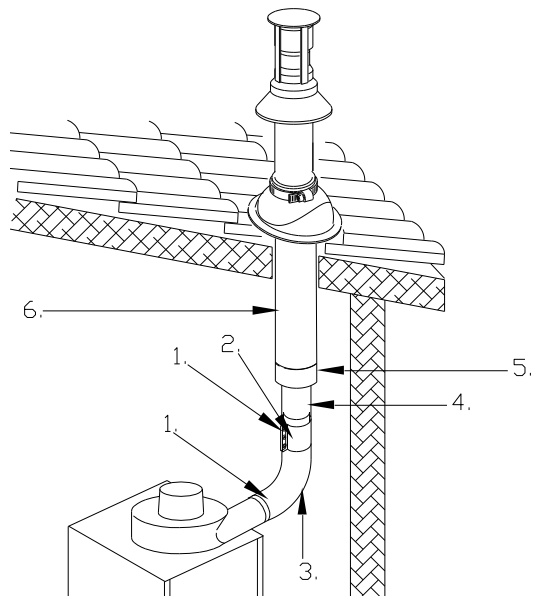
Kit Part Number	Description
ASKITSO	1000mm Horizontal Concentric Flue Kit
<b>Kit Components</b>	
1	38mm Clamp With Gasket (Not Visible)
2	60mm Clamp With Gasket
3	38/60 Flue Length
4	Wall Covers
5	Terminal

Additional Components	Description
ASPC100	38/60 Extension (Adjustable 1000mm)
ASDC609	38/60 90° Concentric Bend
ASDC604	38/60 45° Concentric Bend

**TABLE 8.2 HORIZONTAL CONCENTRIC FLUE KIT AND COMPONENTS**

1. Determine the location of the flue terminal, taking into account minimum distances as detailed in **Figure 8.1**, **Table 8.1** and the relevant British Standards.
  2. Taking care to protect the appliance from debris and dust, drill a hole in the desired location. The diameter of the hole should be no more than 10mm greater than the diameter of the terminal.
  3. Determine the required length of the flue pipe (item 3 in **Figure 8.2**) and cut as necessary.
- NOTE:** When determining the required length, the extension pipe must protrude by a minimum of 150mm.
- NOTE:** Once cut; remove all burrs and sharp edges.
4. Insert the flue pipe into the drilled hole. The terminal section should be installed with a slight fall to outside (Max. 10mm per metre) to prevent the ingress of water.
  5. Position the internal and external wall covers (item 4 in **Figure 8.2**) onto the flue pipe.
  6. If any additional flue components are required to connect onto the horizontal terminal these should be measured, cut accordingly and fitted using the 38mm and 60mm clamps and gaskets included with the additional components.
  7. If no additional components are required fit the flue pipe to the flue hood, position the 38mm clamp and gasket and the 60mm clamp and gasket on to the flue pipe.
  8. Secure the flue pipe by first sliding the 38mm clamp and gasket over the exhaust connection. Now slide the 60mm gasket and clamp into position and tighten the retaining screws.
  9. With all components in position, tighten any support brackets used.

### 9.3.2 VERTICAL CONCENTRIC FLUE FITTING DETAILS LBF81/121



**FIGURE 8.3 VERTICAL CONCENTRIC FLUE KIT FOR LBF81/121**

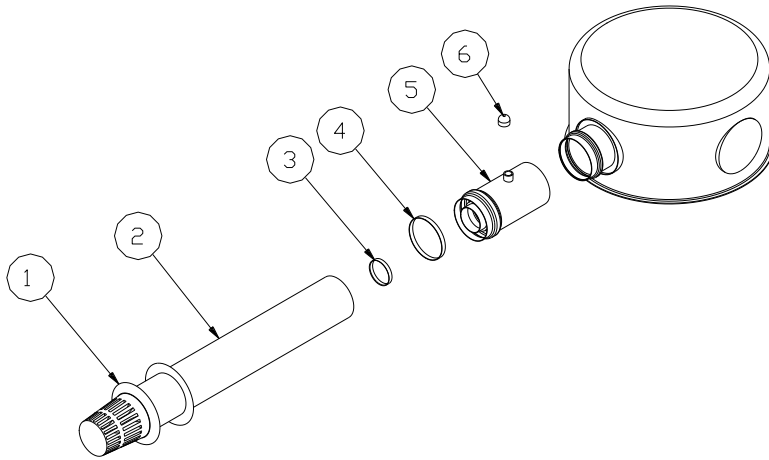
Kit Part Number	Description
ASKITSV	1000mm Vertical Concentric Flue Kit
<b>Kit Components</b>	
1	38mm Clamp With Gasket (Not Visible)
2	60mm Clamp With Gasket
3	38/60 90° Concentric Bend
4	38/60mm Extension Piece(38mm section not Visible)
5	100/60 Duct Adaptor
6	38/100 – 1m Vertical Terminal

Additional Components	Description
ASPC100	38/60 Extension (Adjustable 1000mm)

**TABLE 8.3 VERTICAL CONCENTRIC FLUE KIT AND COMPONENTS LBF-81/121**

1. Determine the desired location for the flue terminal, taking into account minimum distances as detailed in **Figure 8.1**, **Table 8.1** and the relevant British Standards.
  2. Taking care to protect the appliance from debris and dust, drill a hole in the desired location. The diameter of the hole should be no more than 10mm greater than the diameter of the air supply pipe of the terminal.
- NOTE:** The hole should be drilled from the outside to ensure that no damage is done to the roofing material. Extra care should be taken to ensure that the hole is drilled vertically.
3. Install the roof flashing and secure as appropriate.
  4. Carefully insert the roof terminal through the roof flashing and hole in the roof.
- NOTE:** When inserting the roof terminal do not support or turn the terminal using the cap.
5. Ensure the terminal is vertical using a spirit level.
  6. Fit the support bracket around the terminal and secure using appropriate fixings. Do not tighten the support bracket.
  7. Fit the 90° concentric bend to the flue hood by first sliding the 38mm clamp and gasket over the exhaust connection and then pushing the elbow on to the 60mm air connection.
  8. If an additional length of flue pipe is required to connect to the vertical terminal this should be measured, cut accordingly and fitted using the 38mm and 60mm clamps and gaskets included with the additional length.
  9. If no additional components are required measure and cut the terminal accordingly and insert into the 100/60mm duct adaptor (item 5 in **Figure 8.3**) followed by the 38/60mm extension piece (item 4 in **Figure 8.3**) and then finally fit to the 90° bend.
  10. With all components in position, tighten any support brackets used.

### 9.3.3 HORIZONTAL CONCENTRIC FLUE FITTING DETAILS LBF151 – 401



**FIGURE 8.4 HORIZONTAL CONCENTRIC FLUE KITS FOR LBF151-401**

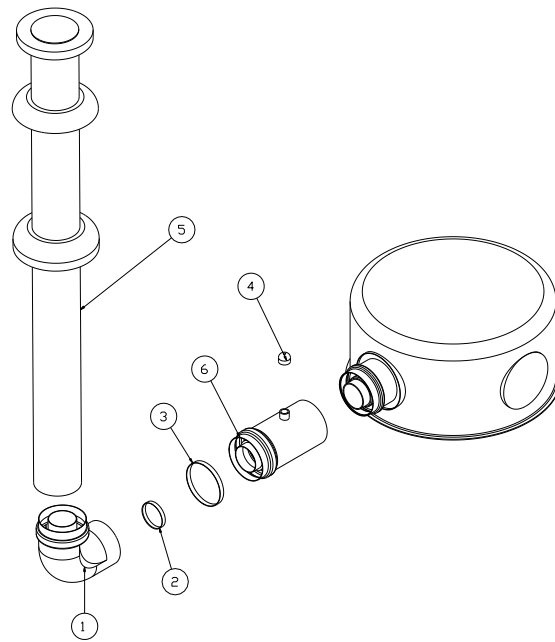
Kit Part Number	Description
AKIT 01	1000mm Horizontal Concentric Flue Kit
<b>Kit Components</b>	
1	Wall Cover
2	Terminal Length
3	60mm Flue seal
4	100mm Air Duct seal
5	Transition piece with sampling point
6	Sampling point cap

Additional Components	Description
AIPC10	60/100 Extension (Adjustable 1000mm)
AICC45	60/100 45° Concentric Bend
AICC90	60/100 90° Concentric Bend

**TABLE 8.4 HORIZONTAL CONCENTRIC FLUE KIT AND COMPONENTS LBF-151-401**

- Determine the location of the flue terminal, taking into account minimum distances as detailed in **Figure 8.1**, **Table 8.1** and the relevant British Standards.
- Taking care to protect the appliance from debris and dust, drill a hole in the desired location. The diameter of the hole should be no more than 10mm greater than the diameter of the terminal.
- Determine the required length of the flue pipe (item 3 in **Figure 8.4**) and cut as necessary.  
**NOTE:** When determining the required length, the extension pipe must protrude by a minimum of 150mm.
- NOTE:** Ensure that the terminal end (item 5 in **Figure 8.4**) is correctly positioned so as the row of air inlet openings are clearly visible.
- NOTE:** Once cut; remove all burrs and sharp edges.
- Insert the flue pipe into the drilled hole. The terminal section should be installed with a slight fall to outside (Max. 10mm per metre) to prevent the ingress of water.
- Position the internal and external wall covers (item 4 in **Figure 8.4**) onto the flue pipe.
- If any additional flue components are required to connect onto the horizontal terminal these should be measured and cut accordingly. Due to the close tolerances in the flue system, it may be necessary to use a twisting action to fit the joints together. No lubrication other than water should be used.
- If no additional components are required fit the supplied transition piece (with sampling point) to the flue hood. The Terminal length can then be inserted.
- With all components in position, tighten any support brackets used.

### 9.3.4 VERTICAL CONCENTRIC FLUE FITTING DETAILS LBF151 – 401



**FIGURE 8.5 VERTICAL CONCENTRIC FLUE KIT AKIT03 FOR LBF151-401**

Kit Part Number	Description
AKIT03	1000mm Vertical Concentric Flue Kit
<b>Kit Components</b>	
1	60/100mm 90° Concentric Bend
2	60mm Flue seal
3	100mm Air Duct seal
4	Flue Gas Sampling Point Cap
5	60/100mm – 1m Vertical Terminal
6	60/100mm Transition piece with Sampling Point

Additional Components	Description
AIPC10	60/100 Extension (Adjustable 1000mm)

1. Determine the desired location for the flue terminal, taking into account minimum distances as detailed in **Figure 8.1, Table 8.1** and the relevant British Standards.
2. Taking care to protect the appliance from debris and dust, drill a hole in the desired location. The diameter of the hole should be no more than 10mm greater than the diameter of the air supply pipe of the terminal.

**NOTE:** The hole should be drilled from the outside to ensure that no damage is done to the roofing material. Extra care should be taken to ensure that the hole is drilled vertically.

3. Install the roof flashing and secure as appropriate.
4. Carefully insert the roof terminal through the roof flashing and hole in the roof.

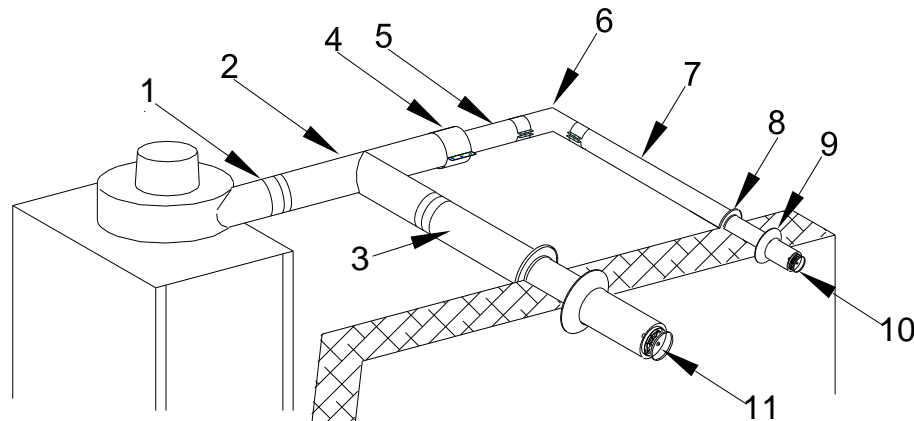
**NOTE:** When inserting the roof terminal do not support or turn the terminal using the cap.

5. Ensure the terminal is vertical using a spirit level.
6. Fit the support bracket around the terminal and secure using appropriate fixings. Do not tighten the support bracket.
7. Fit the supplied transition piece (with sampling point) to the flue hood. Fit the 90° concentric bend to the transition piece
8. If an additional length of flue pipe is required to connect to the vertical terminal this should be measured and cut accordingly. Due to the close tolerances in the flue system, it may be necessary to use a twisting action to fit the joints together. No lubrication other than water should be used
9. If no additional components are required measure and cut the Terminal length accordingly and insert into the 90° bend.
10. With all components in position, tighten any support brackets used.



## 9.4 TWIN PIPE FLUE SYSTEM

### 9.4.1 HORIZONTAL TWIN PIPE FLUE FITTING DETAILS LBF81/121



**FIGURE 8.6 HORIZONTAL TWIN PIPE FLUE KIT FOR LBF81/121**

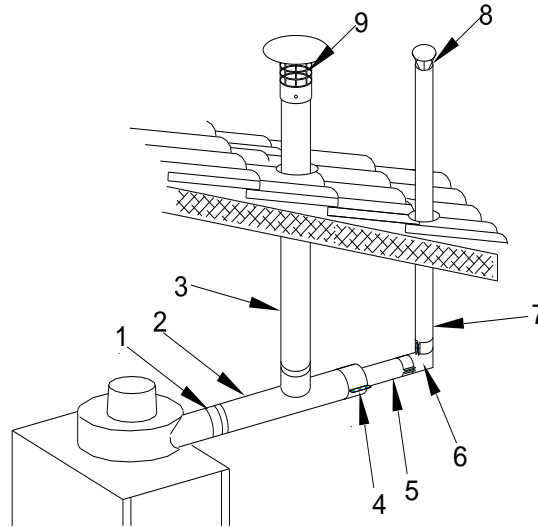
Kit Part Number	Description
ASKITSS	Twin Pipe Flue Kit
<b>Kit Components</b>	
1	38mm Clamp With Gasket (not visible)
2	Concentric Adaptor
3	60mm Terminal
4	60mm/38mm Adaptor And Clamp
5	38mm Flue Length
6	38mm 90°Bend
7	38mm Terminal
8	Internal Wall Covers
9	External Wall Covers
10	38mm Terminal End
11	60mm Terminal End

Additional Components	Description
ASPR38	38mm Extension (Adjustable 100mm)
ASPR60	60mm Extension (Adjustable 100mm)
ASCV384	38mm 45°Bend
ASCV389	38mm 90°Bend
ASCV604	60mm 45°Bend
ASCV609	60mm 90°Bend

**TABLE 8.6 HORIZONTAL TWIN PIPE FLUE KIT AND COMPONENTS LBF81/121**

- Determine the location of the flue terminal and air intake, taking into account minimum distances as detailed in **Figure 8.1**, **Table 8.1** and the relevant British Standards.
- NOTE:** When installing the water heater as a Type C<sub>53</sub> appliance, the terminals **must not** be installed on opposite sides of the building.
- Taking care to protect the appliance from debris and dust, drill holes in the desired locations. The diameter of the hole should be no more than 10mm greater than the diameter of the terminal.
  - Determine the required length of the extension pipes (items 7 & 3 in **Figure 8.6**) and cut as necessary.
- NOTE:** When determining the required lengths, the outlet extension pipe must protrude by a minimum of 150mm and the air inlet a minimum of 10mm.
- NOTE:** Once cut; remove all burrs and sharp edges.
- Insert the extension pipes into the drilled holes. The terminal sections should be installed level or with a fall to outside (Max. 10mm per metre) to prevent the ingress of water.
  - Fit the relevant air intake and flue outlet terminal end fittings, securing with the supplied screws.
  - Position the internal and external wall covers (items 8 & 9 in **Figure 8.6**) onto each terminal.
  - Measure, cut accordingly and fit the 38mm flue length (item 5 in **Figure 8.6**) to the flue hood assembly using the 38mm gasket and clamp provided.
  - Slide the 60mm/38mm concentric adaptor (item 2 in **Figure 8.6**) over the 38mm pipe and push fit onto the flue hood. Tighten the adaptor clamp bracket (item 4 in **Figure 8.6**) over the 38mm pipe.
  - Fit the 38mm 90° bend (item 6 in **Figure 8.6**) onto the 38mm flue length, secure the elbow by using the 38mm gaskets and clamps provided.
  - If additional lengths of flue pipe are required to connect to the terminals these should be measured, cut accordingly and fitted. If no additional components are required fit the flue lengths to the 38mm elbow and the 60mm connection on the concentric adaptor.
  - With all components in position, tighten any support brackets used.

## 9.4.2 VERTICAL TWIN PIPE FLUE FITTING DETAILS LBF81/121



**FIGURE 8.7 VERTICAL TWIN PIPE FLUE KIT FOR LBF81/121**

Kit Part Number	Description
ASKITSS	Twin Pipe Flue Kit
<b>Kit Components</b>	
1	38mm Clamp With Gasket (not visible)
2	Concentric Adaptor
3	60mm Vertical Terminal
4	60mm/38mm Adaptor And Clamp
5	38mm Flue Length
6	38mm 90°Bend
7	38mm Vertical Terminal
8	38mm Terminal End
<b>Vertical Terminal Required</b>	
10-6VX (item 9)	60mm Terminal End (not supplied in kit)

Additional Components	Description
ASPR38	38mm Extension (Adjustable 100mm)
ASPR60	60mm Extension (Adjustable 100mm)
ASCV384	38mm 45°Bend
ASCV389	38mm 90°Bend
ASCV604	60mm 45°Bend
ASCV609	60mm 90°Bend

**TABLE 8.7 VERTICAL TWIN PIPE FLUE KIT AND COMPONENTS LBF81/121**

- Determine the desired location for the flue terminal and air intake, taking into account minimum distances as detailed in **Figure 8.1**, **Table 8.1** and the relevant British Standards.
- Taking care to protect the appliance from debris and dust, drill both holes in the desired location. The diameter of the holes should be no more than 10mm greater than the diameter of both the air supply and outlet pipes.

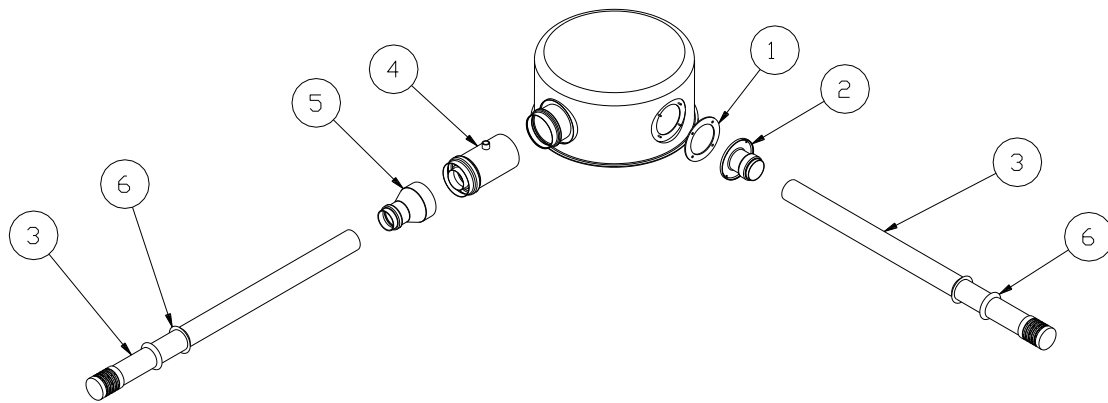
**NOTE:** The holes should be drilled from the outside to ensure that no damage is done to the roofing material. Extra care should be taken to ensure that the hole is drilled vertically.

- Install the roof flashing and secure as appropriate.
- Carefully insert the roof terminals (items 3&7 in **Figure 8.7**) through the roof flashings. Fit the terminal end caps secure using appropriate fixings (items 8&9 in **Figure 8.7**)

**NOTE:** When inserting the roof terminals do not support or turn the terminals using the caps.

- Ensure the terminal is vertical using a spirit level.
- Measure, cut accordingly and fit the 38mm flue length (item 5 in **Figure 8.7**) to the flue hood assembly using the 38mm gasket and clamp provided.
- Slide the 60mm/38mm concentric adaptor (item 2 in **Figure 8.7**) over the 38mm pipe and push fit onto the flue hood.
- Fit the 38mm 90° bend (item 6 in **Figure 8.7**) onto the 38mm flue length, secure the elbow by using the 38mm gaskets and clamps provided.
- If additional lengths of flue pipe are required to connect to the terminals these should be measured, cut accordingly and fitted. If no additional components are required fit the flue lengths to the 38mm elbow and the 60mm connection on the concentric adaptor.
- With all components in position, tighten any support brackets used.

### 9.4.3 HORIZONTAL TWIN PIPE FLUE FITTING DETAILS LBF151 – 401



**FIGURE 8.8 HORIZONTAL TWIN PIPE FLUE KIT FOR LBF151 – 401**

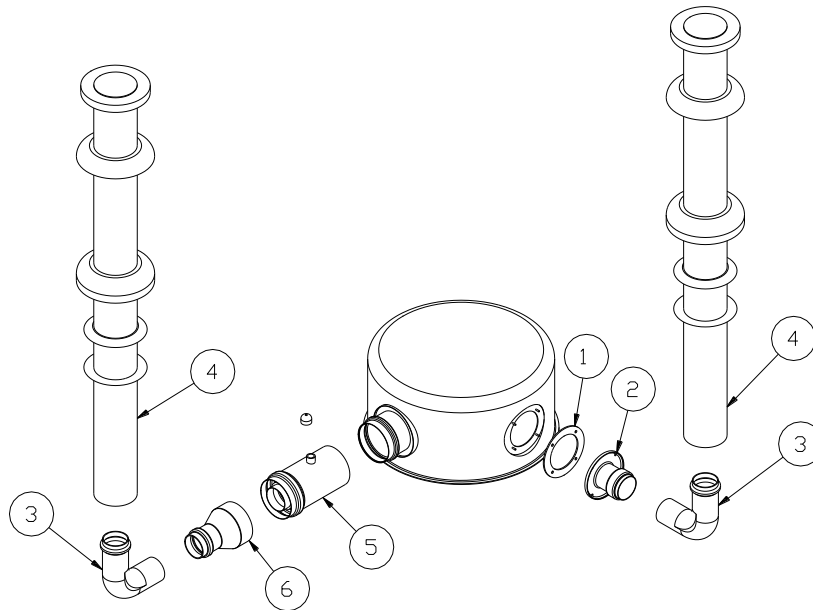
Kit Part Number	Description
AKIT 02	Horizontal Twin Pipe Flue Kit
<b>Kit Components</b>	
1	Air Transition Piece Gasket
2	Air Transition Piece
3	80mm Air & Flue Duct Lengths
4	60/100mm Transition piece with Sampling Point
5	100/80mm Air Duct Closure Piece
6	Wall Covers
Not Shown	Air Restriction Plates (see Section 8.6.1)

Additional Components	Description
A.I.CV804	80mm 45°M/F Bend
A.I.CV809	80 mm 90°M/F Bend
A.I.PR80	80mm Extension (M/F 1000mm)

**TABLE 8.8 HORIZONTAL TWIN PIPE FLUE KIT AND COMPONENTS LBF-151 - 401**

1. Determine the location of the flue terminal and air intake, taking into account minimum distances as detailed in **Figure 8.1, Table 8.1** and the relevant British Standards.
  2. Taking care to protect the appliance from debris and dust, drill holes in the desired locations. The diameter of the holes should be no more than 10mm greater than the diameter of the relevant terminal.
  3. Determine the required length of the extension pipe (item 3 in **Figure 8.8**) and cut as necessary.
- NOTE:** When determining the required length, the extension pipe must protrude by a minimum of 150mm.
- NOTE:** Once cut; remove all burrs and sharp edges.
4. Insert the extension pipe into the drilled hole. The terminal sections should be installed with a slight fall to outside (Max. 10mm per metre) to prevent the ingress of water.
  5. Fill the void between the extension pipe and wall with water resistant sealant.
  6. Repeat the above procedure for the air supply, noting the minimum protrusion is reduced to 10mm.
  7. Fit the relevant air intake and flue outlet terminal end fittings. .
  8. Position the internal and external wall covers (item 6 in **Figure 8.8**) onto each terminal length.
  9. Fit the supplied transition piece (with sampling point) (item 4 in **Figure 8.8**) and the air duct closure piece (item 5 in **Figure 8.8**) to the flue hood.
  10. Remove the blanking plate on side of the flue hood and fit the air intake transition piece and gasket (items 1 & 2 in **Figure 8.8**), taking into account the information in **Section 9.6.1: AIR RESTRICTION PLATE**. Fit a 90° bend to the transition piece if the flue and air terminals are required on the same wall.
  11. If an additional length of flue pipe is required to connect to the terminal lengths, these should be measured and cut accordingly. Due to the close tolerances in the flue system, it may be necessary to use a twisting action to fit the joints together. No lubrication other than water should be used
  12. If no additional components are required, measure and cut the terminal lengths accordingly and insert them into the flue hood assembly
  13. With all components in position, tighten any support brackets used.

#### 9.4.4 VERTICAL TWIN PIPE FLUE FITTING DETAILS LBF151 – 401



**FIGURE 8.9 VERTICAL TWIN PIPE FLUE FOR LBF151 - 401**

Kit Part Number	Description
AKIT 02	Horizontal Twin Pipe Flue Kit
<b>Required components from AKIT 02</b>	
1	Air Transition Piece Gasket
2	Air Transition Piece
6	100/80mm Air Duct closure piece
Not Shown	Air Restriction Plate (see 8.8.1)
<b>Additional components required</b>	
5	60/100mm Concentric Transition piece From Flue hood box
A45-810R (item no.4)	Vertical Terminal

<b>Additional components required</b>	
A.I.CV809 (item no 3)	80 mm 90°M/F Bend
<b>Additional components</b>	
A.I.PR80	80mm Extension (M/F 1000mm)
A.I.CV804 (not shown)	80mm 45°M/F Bend

**TABLE 8.9 VERTICAL TWIN PIPE FLUE AND COMPONENTS LBF151 -401**

1. Determine the desired location for the flue terminal and air intake, taking into account minimum distances as detailed in **Figure 8.1**, **Table 8.1** and the relevant British Standards.
  2. Taking care to protect the appliance from debris and dust, drill the holes in the desired locations. The diameter of the holes should be no more than 10mm greater than the diameter of the lower section of the vertical terminal.
- NOTE:** The holes should be drilled from the outside to ensure that no damage is done to the roofing material. Extra care should be taken to ensure that the hole is drilled vertically.
3. Install the roof flashing and secure as appropriate.
  4. Carefully insert the roof terminal through the roof flashing.
- NOTE:** When inserting the roof terminal do not support or turn the terminal using the cap.
5. Ensure the terminal is vertical using a spirit level.
  6. Fit the support bracket around the terminal and secure using appropriate fixings. Do not tighten the support bracket.
  7. Fit the supplied transition piece (with sampling point) (item 5 in **Figure 8.9**) and the air duct closure piece (item 6 in **Figure 8.9**) to the flue hood.
  8. Remove the blanking plate on side of the flue hood and fit the air intake transition piece and gasket (items 1 & 2 in **Figure 8.9**), taking into account the information in **Section 9.6.1: AIR RESTRICTION PLATE**.
  9. If additional lengths of flue pipe are required to connect to the terminal lengths, these should be measured and cut accordingly. Due to the close tolerances in the flue system, it may be necessary to use a twisting action to fit the joints together. No lubrication other than water should be used.
  10. Install the remainder of the flue and air intake system working progressively away from the flue hood. With all components in position, tighten any support brackets used.

## 9.5 MAXIMUM FLUE LENGTH - CONCENTRIC

When using the concentric flue system the maximum flue length for all models is 3 metres for horizontal termination and 2 metres for vertical termination. For each 45° bend, 0.5 metres should be deducted from the total length. For each 90° bend 1.0 metre should be deducted from the total length.

**NOTE:** The maximum flue run includes the length of the terminal.

## 9.6 MAXIMUM FLUE LENGTH – TWIN-PIPE

When using the twin-pipe flue system, the maximum flue length is 6 metres for both the inlet and exhaust pipe. For each 45° bend, 0.5 metres should be deducted from the total length. For each 90° bend 1.0 metre should be deducted from the total length.

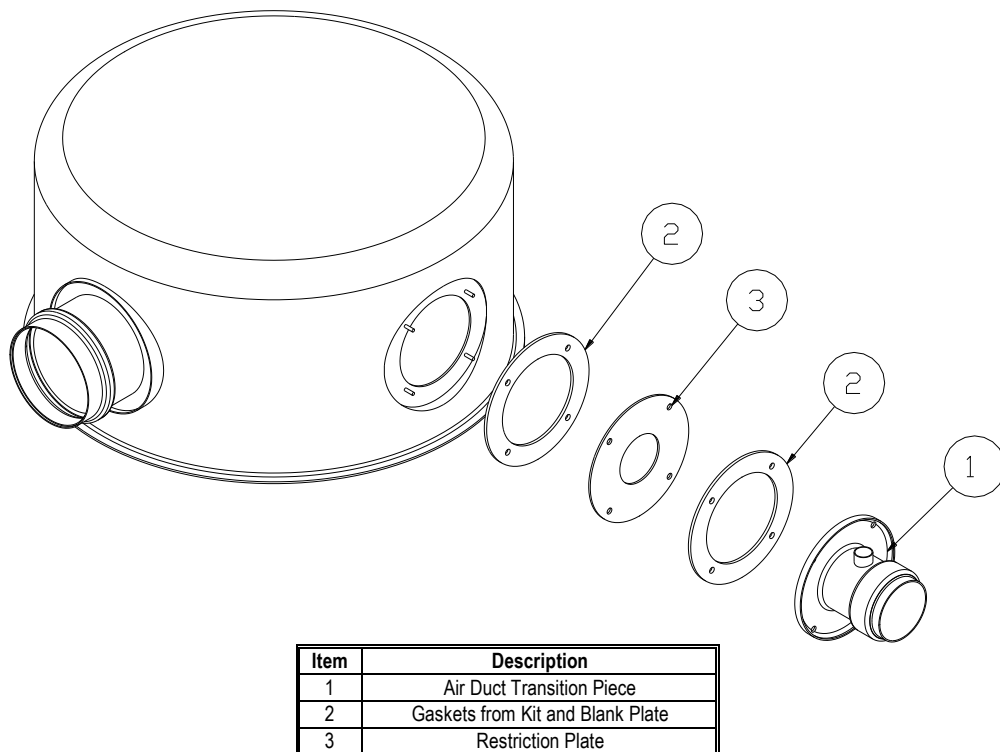
**NOTE:** This is the maximum length for each pipe and not an aggregate for the two, for example a 3 metre inlet cannot be combined with a 9 metre exhaust.

### 9.6.1 AIR RESTRICTION PLATE

The following restriction plate should be inserted if required:

- LBF151/171 No Restriction Plate required.
- LBF221 Ø 52mm Restriction Plate required.
- LBF301 Ø 52mm Restriction Plate required if air and exhaust ducts less than 3m (no restriction plate is needed for ducts over 3m).
- LBF401 No Restriction Plate required.

The air restriction plates are supplied with the twin-pipe flue system and should be fitted as shown in **Figure 8.10**.



**FIGURE 8.10 POSITION OF AIR RESTRICTION PLATE**

## 9.7 FLUE DISCHARGE

The flue system must ensure safe and efficient operation of the equipment to which it is attached, protect the combustion process from wind effects and disperse the products of combustion to open external air.

The flue must terminate in a freely exposed position and be so situated as to prevent the products of combustion entering any opening in a building.

For further information on terminal locations, please refer to **Figure 8.1**.

## 9.8 FLUE HOOD POSITION

On top of each appliance are 4 holes for fixing the flue hood onto the top of the heater, these allow four possible flue hood positions each at 90° from each other. If an intermediate position is required new holes should be drilled in the relevant locations.

## 9.9 FLUE TERMINAL GUARDING

If a horizontal flue terminal is to be fitted less than 2 metres from ground level or in a location where it can be touched from a window, door or balcony, a terminal guard must be fitted.

The guard should be installed centrally around the terminal ensuring a gap of at least 50mm between the guard and terminal is maintained.

## 10.0 AIR SUPPLY

The following information is based on single water heater installations only. If more than one water heater is being used, **BS5440-2** should be consulted to calculate the necessary requirements.

### 10.1 COMBUSTION VENTILATION

Ventilation for combustion is not necessary as the combustion air is ducted directly from outside.

### 10.2 COOLING VENTILATION

When the appliance is installed in a compartment or an enclosure, cooling ventilation should be provided as follows:

Model	Input (Gross) kW	Input (Net) kW	Enclosure/Compartment (Direct to Outside)		Enclosure/Compartment (To Internal Space)	
			High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )	High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )
<b>LBF81</b>	5.6	5.0	25	25	50	50
<b>LBF121</b>	5.6	5.0	25	25	50	50
<b>LBF151</b>	20.0	18.0	90	90	180	180
<b>LBF171</b>	21.1	19.0	95	95	190	190
<b>LBF221</b>	27.8	25.0	125	125	250	250
<b>LBF301</b>	32.2	29.0	145	145	290	290
<b>LBF401</b>	32.2	29.0	145	145	290	290

**TABLE 9.1 COOLING VENTILATION REQUIREMENTS**

## 11.0 WATER CONNECTIONS

### 11.1 GENERAL

Water connection locations are shown in **Section 2.1: DIMENSIONAL DRAWINGS**. The size of the water connections are given in **Table 3.1**.

The maximum length of hot water draw-off dead legs, when a secondary return is not fitted shall be in accordance with **CP342**.

All circulating/distribution pipework should be covered with suitable insulation.

Ideally, individual valves should be fitted to each unit to enable isolation from the system. The arrangement must be in accordance with the requirements of **BS6700**.

#### 11.1.1 SYSTEM DE-STRATIFICATION

In a vessel containing water at different temperatures the hotter water will tend to accumulate at the top with progressively cooler water further down; this layering effect is called stratification. The design of storage water heaters allows heat transfer throughout the volume of water and therefore the stratification effect can lead to overheating in the hotter areas at the top of the vessel. Where cooler pockets occur in the stored volume, there is also a risk of the incubation of Legionella and other waterborne bacteria.

A de-stratification pump kit is available from Lochinvar Limited as an ancillary option. The de-stratification kit works by using a pump to circulate water from the top of the vessel to the bottom of the vessel. This action ensures that the water held in the unit is maintained at a consistent temperature throughout. By achieving a uniformed stored water temperature of at least 60°C, the risk of any bacterial contamination is virtually eliminated.

Systems that have a building loop incorporated onto the vessel may not require a de-stratification kit, as the circulation around the building from the top of the vessel back to the bottom should provide sufficient mixing.

Lochinvar has developed this kit to meet the stringent recommendations of both the **HSE Approved Code of Practice L8** and **Department of Health memorandum HTM 04-01** relating to the control of Legionella. For full compliance, a timer should be used to operate the pump for a period of at least 1 hour each day.

Where the pump is used to prevent overheating, it should run throughout the operational period of the water heater.

### 11.2 OPEN VENTED SYSTEM ARRANGEMENT

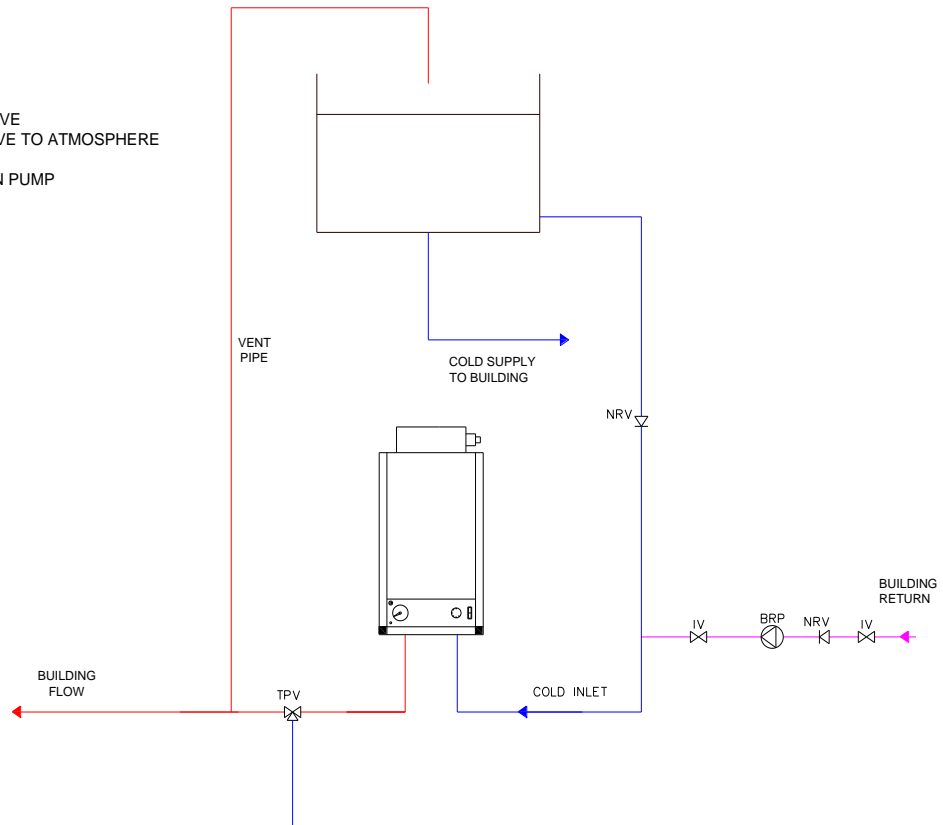
The Lochinvar LBF range can be used in an open vented arrangement provided that a vent pipe in accordance with **CP 342**, or **BS6700** as appropriate is fitted. For typical installation schematic drawings, refer to **Figure 10.1 & Figure 10.2**.

### 11.3 UNVENTED SYSTEM ARRANGEMENT

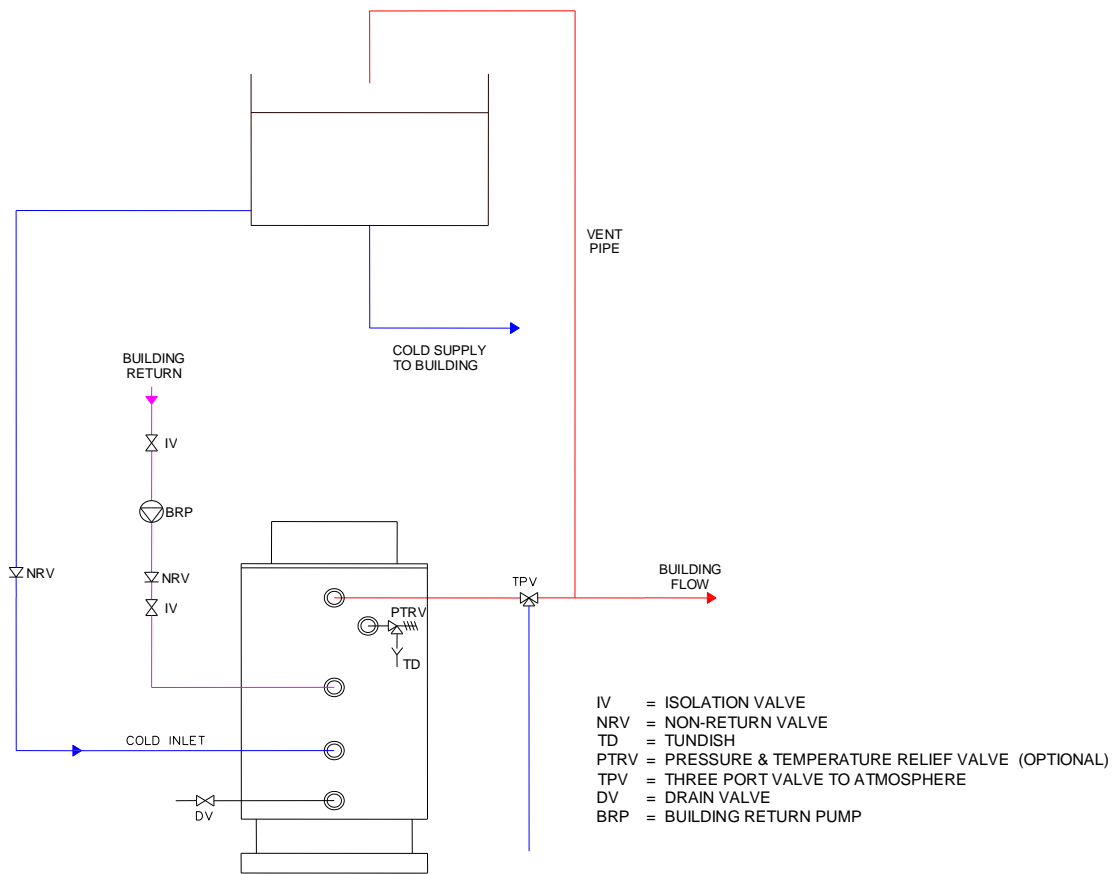
**NOTE: IT IS STRONGLY RECOMMENDED THAT UNVENTED HOT WATER SYSTEMS BE INSTALLED BY AN APPROVED INSTALLER.**

If the Lochinvar LBF range is to be used in an unvented arrangement, the system should follow the guidance given in **BS6700** and must comply with **The Building Regulations 2000: Part G3**. A kit of components that have been suitably sized for the unvented operation of the appliance is available from Lochinvar Limited. For typical installation schematic drawings, refer to **Figure 10.3 & Figure 10.4**.

- IV = ISOLATION VALVE
- NRV = NON-RETURN VALVE
- TPV = THREE PORT VALVE TO ATMOSPHERE
- DV = DRAIN VALVE
- BRP = BUILDING RETURN PUMP



**FIGURE 10.1 VENTED PIPEWORK ARRANGEMENT LBF81/121**



**FIGURE 10.2 VENTED PIPEWORK ARRANGEMENT LBF151 - 401**

- IV = ISOLATION VALVE
- NRV = NON-RETURN VALVE
- TD = TUNDISH
- PTRV = PRESSURE & TEMPERATURE RELIEF VALVE (OPTIONAL)
- TPV = THREE PORT VALVE TO ATMOSPHERE
- DV = DRAIN VALVE
- BRP = BUILDING RETURN PUMP



- IV = ISOLATION VALVE
- PRV = PRESSURE REDUCING VALVE
- NRV = NON-RETURN VALVE
- EV = EXPANSION VALVE
- TD = TUNDISH
- LSV = LOCKSHIELD VALVE
- EXV = EXPANSION VESSEL
- PTRV = PRESSURE & TEMPERATURE RELIEF VALVE
- DV = DRAIN VALVE
- BRP = BUILDING RETURN PUMP

\* = OPTIONAL EXPANSION VESSEL IF SYSTEM VOLUME REQUIRES

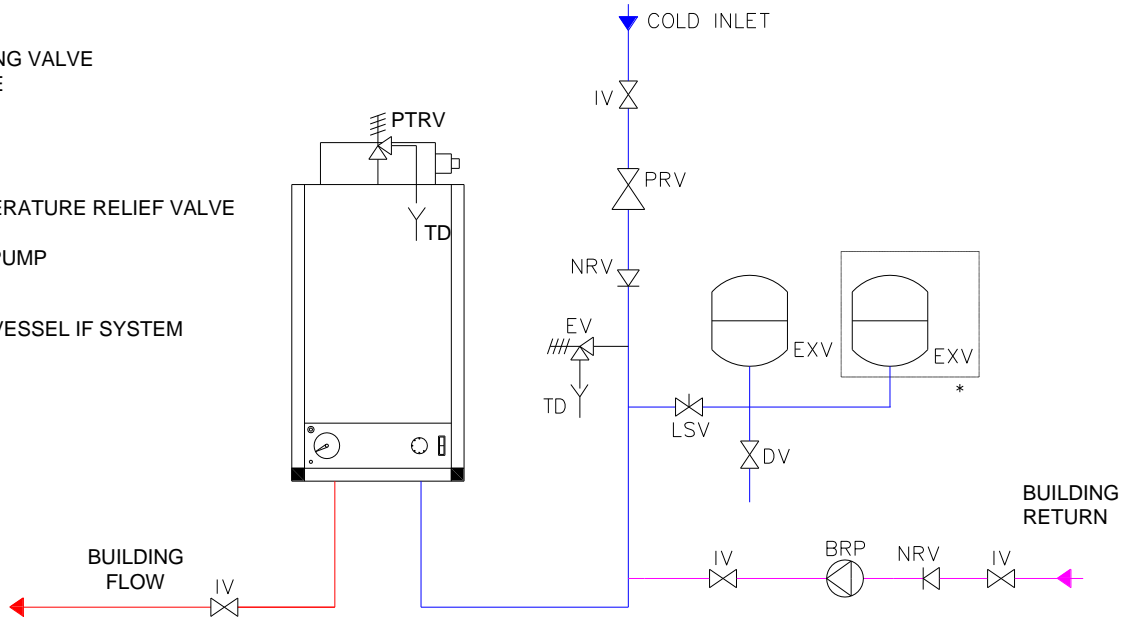
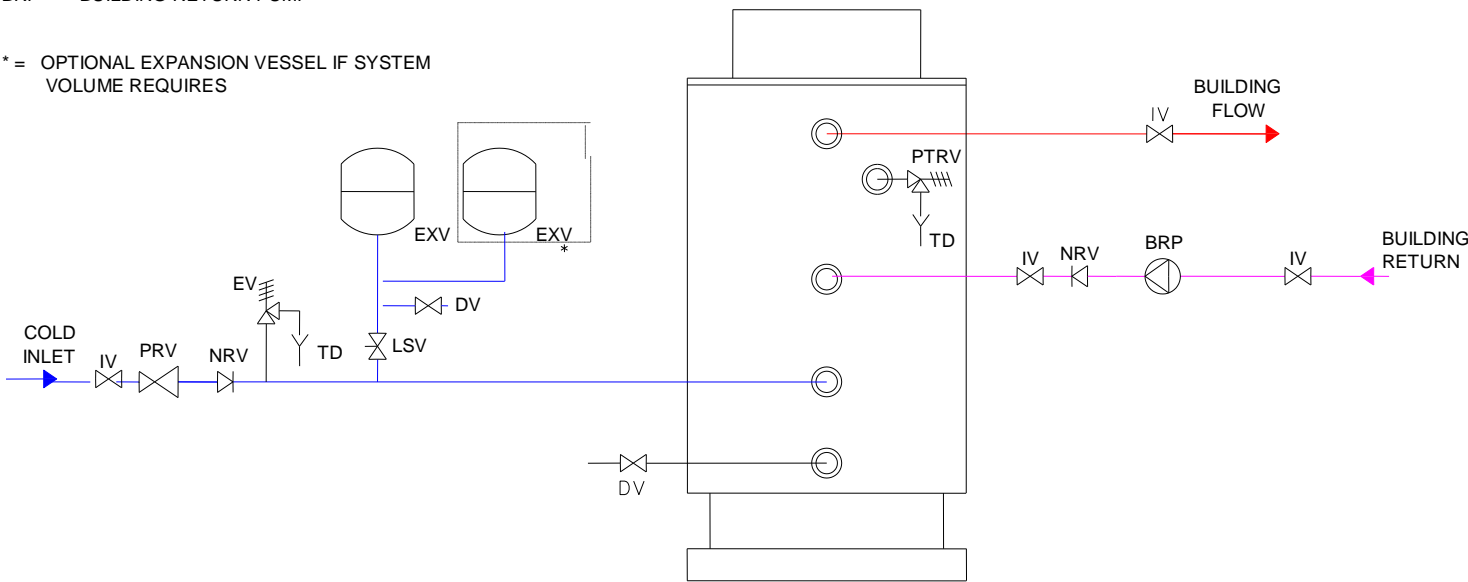


FIGURE 10.3

- IV = ISOLATION VALVE
- PRV = PRESSURE REDUCING VALVE
- NRV = NON-RETURN VALVE
- EV = EXPANSION VALVE
- TD = TUNDISH
- LSV = LOCKSHIELD VALVE
- EXV = EXPANSION VESSEL
- PTRV = PRESSURE & TEMPERATURE RELIEF VALVE
- DV = DRAIN VALVE
- BRP = BUILDING RETURN PUMP

\* = OPTIONAL EXPANSION VESSEL IF SYSTEM VOLUME REQUIRES



UNVENTED PIPEWORK ARRANGEMENT LBF81/121

FIGURE 10.4 UNVENTED PIPEWORK ARRANGEMENT LBF151 - 401

### 11.3.1 EXPANSION VESSEL SIZING

The following information is based on an inlet pressure of 3.5 bar. If a different inlet pressure is to be used, please consult **BS6700**.

$$V V = \frac{S V * e}{0.45}$$

Where:

- V V = Vessel Volume  
 S V = System Volume  
 e = Coefficient of Expansion (See **Table 10.1**)

Stored Temp. °C	60	65	70	75
e	0.017	0.020	0.023	0.026

**TABLE 10.1 COEFFICIENT OF EXPANSION OF WATER AT 3.5 BAR INLET PRESSURE**

### 12.0 ELECTRICAL SUPPLY

Wiring external to the equipment must be installed in accordance with the I.E.E. Regulations and any local regulations that apply.

Model	Normal Supply Voltage	External Fuse Rating	Power Consumption
LBF81	230V AC 50 Hz 1 PH	6.0 A	26 W
LBF121			26 W
LBF151			67 W
LBF171			67 W
LBF221			67 W
LBF301			67 W
LBF401			67 W

**TABLE 11.1 ELECTRICAL SUPPLY REQUIREMENTS**

**WARNING: THIS APPLIANCE MUST BE EARTHED**

*A suitably competent person MUST check wiring. Normal supply required is 230 VAC, single phase, 50 Hz. An isolator with a contact separation of at least 3mm in all poles should be sited close to the equipment and must only serve that equipment. The double pole switch must be readily accessible under all conditions.*

### 12.1 ELECTRICAL CONNECTION

Access to the electrical connections is via the control panel. The appliance is supplied with a length of three-core cable for connection to the mains electrical supply. If wiring in conduit is preferred, the cable and gland made into the unit should be removed. Wiring should be completed in heat-resistant cable with a minimum cross sectional area of 1mm<sup>2</sup>.

The site wiring terminal rail is marked with Live, Neutral and Earth connections. External fuses should be rated at 6A. Correct polarity must be observed for correct operation of the ignition control system.

## 12.2 EXTERNAL CONTROLS

To achieve time control over the water heater, the main power supply to the appliance should be interrupted.

**It is essential that the Correx non-sacrificial anode protection system has an independent power supply if time control is required.**

The water heater can give a 240 VAC output to indicate flame failure and burner on conditions. The LBF151 – LBF401 can also give a high temperature limit indication.

The outputs can be found on the power supply PCB and are marked as follows:

- SV = Burner on
- TS = High temperature limit (Where applicable)
- SB = Flame failure

Relays to convert these outputs into volt-free contacts are available as ancillary options; the part number for the relay is RLY2716 and one relay will be required for each option.

## 12.3 ARC WELDING PRECAUTIONS

The appliance must be isolated from the mains electricity supply in the event of electric arc welding being carried out on any connecting pipework.

## 12.4 ANCILLARY EQUIPMENT

Any allied circulating pump should have a separate power source with suitably sized overload protection.

## 12.5 WIRING DIAGRAMS

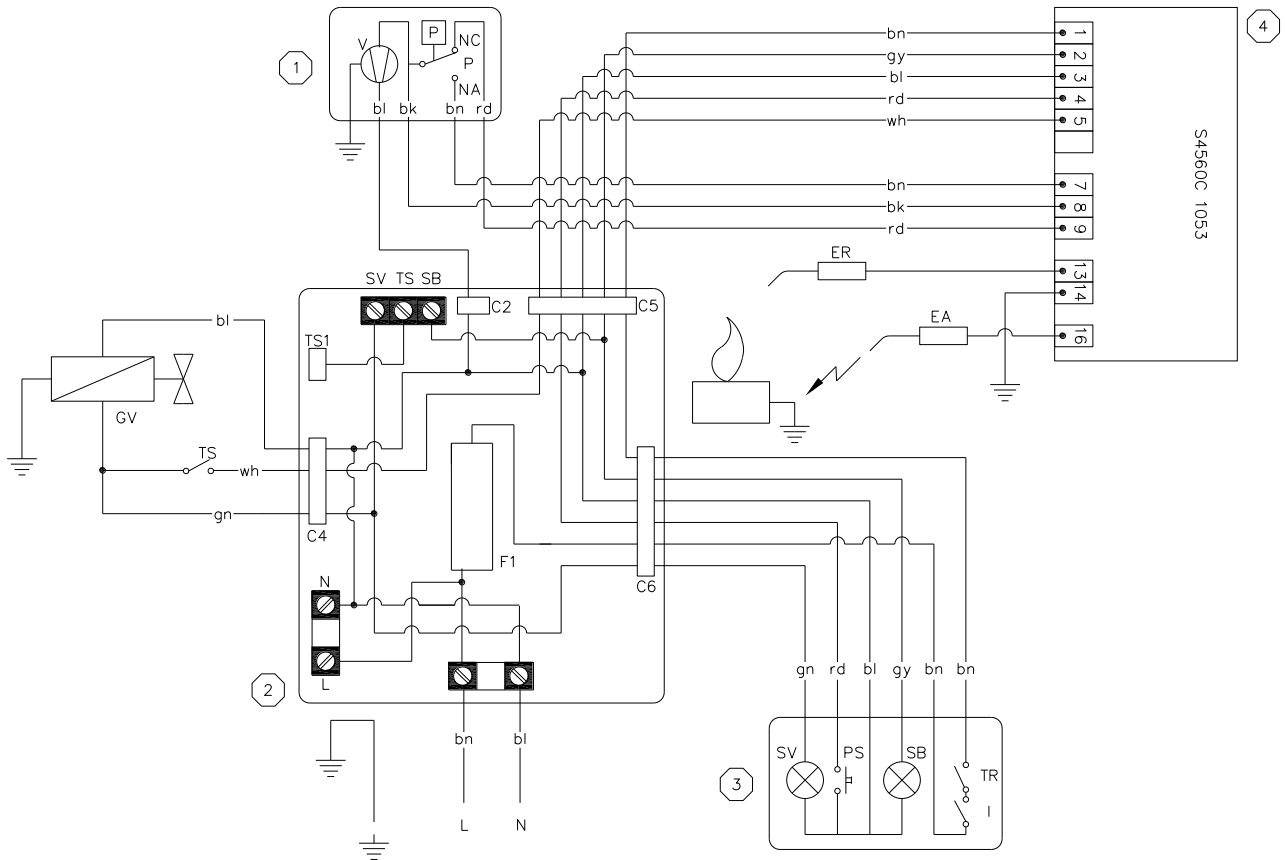


FIGURE 11.1 WIRING DIAGRAM LBF81/121

COMPONENTS	GROUPS	COLOUR OF CABLES
I ON – OFF switch	1. Flue hood	wh white
TR Adjustable thermostat	2. Power connection PCB	bl blue
TS Limit thermostat	3. Instrument control panel	gy grey
SV Green burner (on) light	4. Ignition sequence controller	bn brown
V Fan		bk black
GV Gas valve		rd red
SB Lock-out light		gn green
PS Reset push-button		
P Differential pressure switch		
ER Flame sense electrode		
EA Ignition electrode		
F1 Fuse (2 A)		

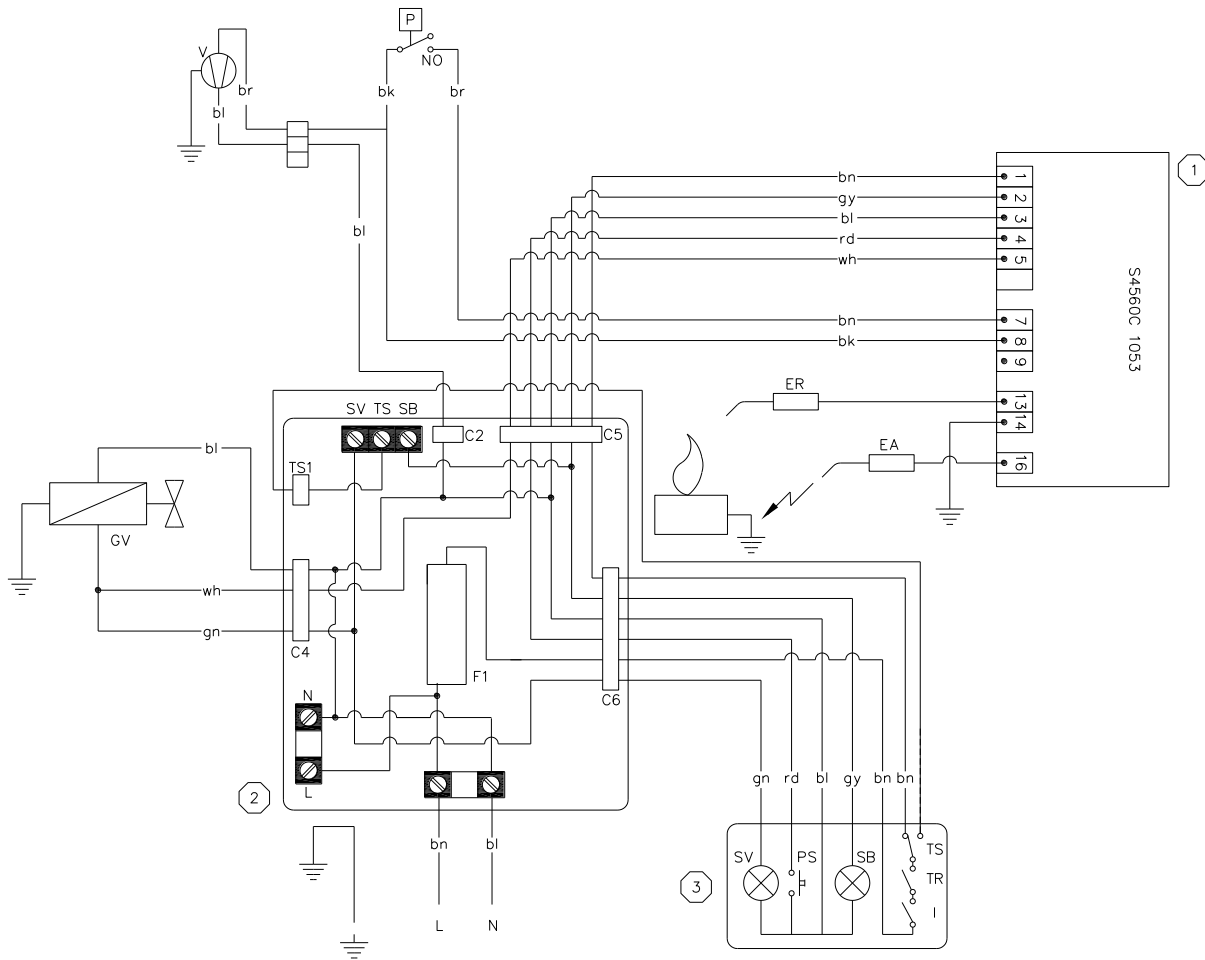


FIGURE 11.2 WIRING DIAGRAM LBF151 - 401

GROUPS	COMPONENTS	COLOUR OF CABLES
1. Ignition sequence controller	EA: ignition electrode	wh: white
2. Connection PCB	ER: flame detection electrode	bl: blue
3. Instrument control panel	F: line trap	gy: grey
	FB: fuse for printed circuit (2A)	bn: brown
	I: On/Off switch	bk: black
	P: differential pressure switch	rd: red
	PS: reset push-button	gn: green
	SB: lock-out light	
	SV: green burner (on) light	
	TR: adjustable thermostat	
	TS: limit thermostat	
	V: fan	
	VG: double gas electro-valve	

TABLE 11.2 WIRING DIAGRAM LEGEND

## 13.0 COMMISSIONING AND TESTING

### 13.1 ELECTRICAL INSTALLATION

Notes on the requirements for electrical installation are provided in **Section 11: ELECTRICAL SUPPLY**. A schematic drawing of the control circuit is shown in **Figures 11.1 & 11.2**.

### 13.2 GAS INSTALLATION

For design see **Section 7: GAS SUPPLY**. See **Figures 2.4, 2.5 & 2.6** for details on the position of the gas connection.

### 13.3 WATER CONNECTIONS

For design see **Section 10: WATER CONNECTIONS**

***The system should be thoroughly flushed out with cold water without any circulating pump in position. Ensure all the valves are open.***

If a return pump is to be fitted, it should be fitted before the system is filled and air locks cleared. Check the system for leaks and repair as necessary. If the system is configured in an unvented arrangement, check the expansion vessel cushion pressure.

### 13.4 COMMISSIONING THE EQUIPMENT

#### 13.4.1 GENERAL CHECKS PRIOR TO LIGHTING

**A person deemed competent MUST be responsible for the commissioning of this equipment. Before attempting to commission any equipment, ensure that personnel involved are aware of what action is about to be taken and begin by making the following checks:**

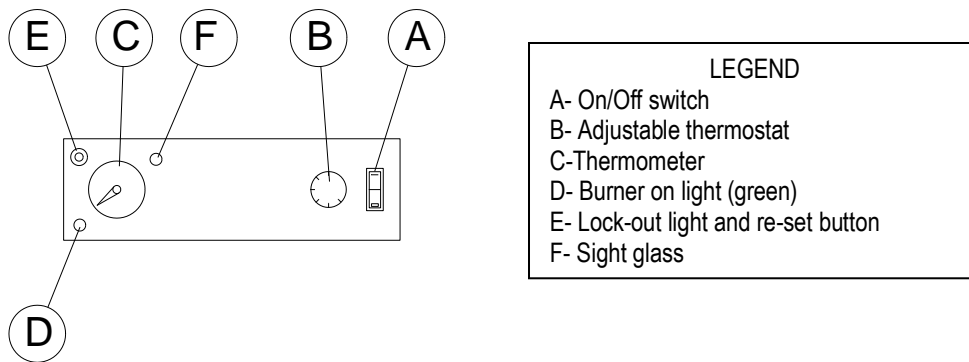
1. Flueway passages are clear and the termination complies with **Table 8.1**.
2. Ensure that the flue run is within the maximum length specified within **Table 3.1**.
3. Adequate ventilation exists in the plant room (if necessary).
4. The system is fully charged with water, ready to receive heat. All necessary valves are open and the building return pump (if fitted) is circulating water.
5. The gas supply pipework is clear of any loose matter, tested for soundness and purged.

#### 13.4.2 EQUIPMENT CHECKS PRIOR TO LIGHTING

**This unit has been designed for a nominal gas inlet pressure of 20 mbar when used on natural gas. Information relating to propane firing can be found in Section 13: LPG FUEL**

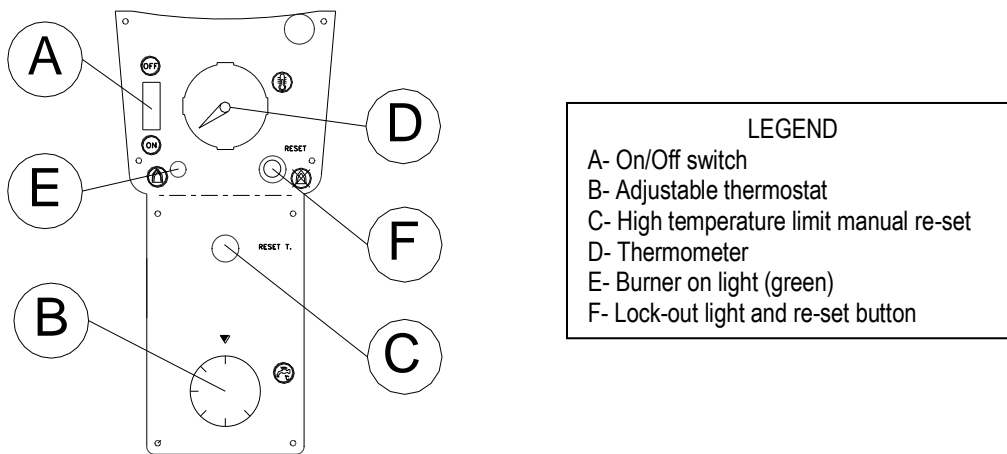
1. Gas supply is connected but turned to the "off" position. Any unions or fittings are correctly tightened, test points are closed and the flame sense electrode lead is connected correctly. Ensure the ceramic sheath around the flame sense electrode is not cracked or broken.
2. Ensure electricity supply is connected and that the thermostat bulbs are fully located into their pocket. Reset the overheat limit switch by firmly pressing the pin.

### 13.4.3 CONTROL PANEL



LEGEND	
A-	On/Off switch
B-	Adjustable thermostat
C-	Thermometer
D-	Burner on light (green)
E-	Lock-out light and re-set button
F-	Sight glass

FIGURE 12.1 LBF81/121 CONTROL PANEL



LEGEND	
A-	On/Off switch
B-	Adjustable thermostat
C-	High temperature limit manual re-set
D-	Thermometer
E-	Burner on light (green)
F-	Lock-out light and re-set button

FIGURE 12.2 LBF151 – 401 CONTROL PANEL

### 13.4.4 PROCEDURE FOR INITIAL LIGHTING

**IF THE UNIT IS TO OPERATE ON LPG REFER TO SECTION 13: LPG FUEL BEFORE PROCEEDING**

1. Ensure that the gas-inlet appliance isolating valve, provided by the installer, is in the “off” position.
2. Press the power rocker switch, positioned on the front of the appliance next to the control thermostat, to bring the equipment on. See **Figure 12.1** or **12.2** for location.
3. Set the control thermostat to a value above that of the stored water.
4. The combustion fan should start and purge the combustion chamber. The spark generator should create a spark and the gas solenoid should open. As the gas-inlet appliance isolating valve is closed the appliance should go to a flame failure condition within 10 seconds this will be indicated by a red lock-out light on the control panel.
5. If the above occurs correctly, open the gas-inlet appliance isolating valve and reset the unit by depressing the red lock-out light on the control panel and a new ignition cycle will begin.
6. The combustion fan will repeat the pre-purge procedure and attempt to light. Once a flame is established, the green ‘Burner On’ lamp, located on the control panel, will illuminate.
7. Allow the system to reach temperature to check operation of control thermostat.
8. Once the thermostat has been satisfied, check that the flame has been extinguished.

### 13.4.5 GAS PRESSURE ADJUSTMENT

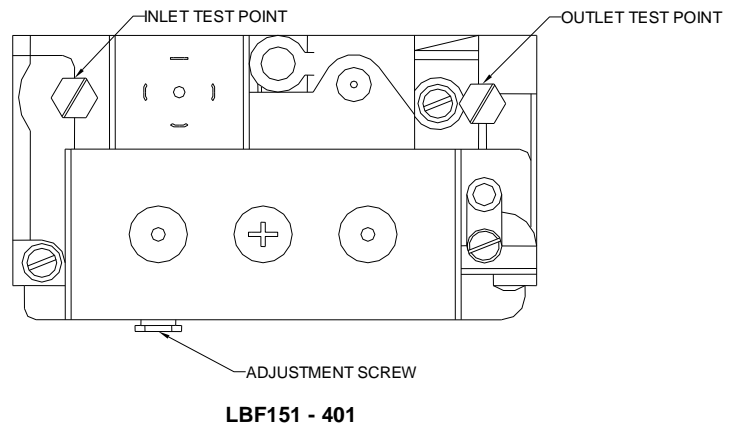
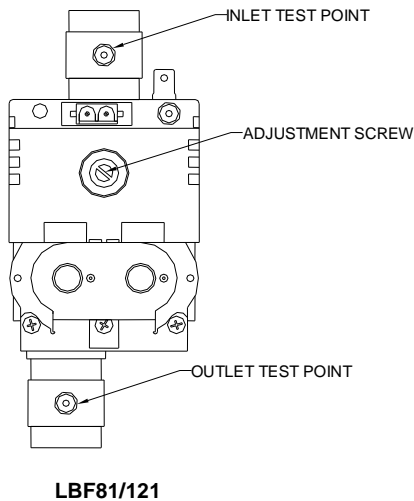
1. After the burner has operated for approximately 10 minutes, switch off the equipment.
2. Open the pressure test point on the inlet side of the gas valve, attach a manometer and check the standing gas-inlet pressure. See **Figure 12.3** or **12.4** for location.
3. Relight the appliance and check the operating gas-inlet pressure.

**NOTE:** The equipment has been designed to conform to the requirements of the Gas Appliance (Safety) Regulations (1992). For Natural Gas the gas pressure governor control system is configured for a nominal gas inlet pressure of 20 mbar, with a maximum inlet pressure of 25 mbar. Information relating to propane firing can be found in **Section 13: LPG FUEL**.

4. Switch off the appliance, remove manometer and close pressure test point.
5. Open the pressure test point on the outlet side of the gas valve and attach a manometer.
6. Relight the appliance and check the burner pressure according to the model.
7. If required, the burner pressure can be corrected by removing the dust cap with a large slotted screwdriver and the adjusting screw turned clockwise to increase burner pressure or counter-clockwise to decrease burner pressure. Details of the correct burner pressure can be found in **Table 3.1**.

**NOTE:** If the dust cap is removed, once reinstalled it should be marked with an anti-tamper indicator.

8. Carry out a combustion analysis. **Record all readings for future reference on a relevant commissioning sheet.**



**FIGURE 12.3 GAS VALVES**



### 13.5 TEMPERATURE ADJUSTMENT PROCEDURE

The temperature selector knob of the operator thermostat will be adjusted to its lowest setting when dispatched from the factory. The control thermostat setting should be adjusted to ensure that the water is stored at 60°C and distributed at 50°C within 1 (one) minute at all outlets. Care is needed to avoid much higher temperatures because of the risk of scalding. At 50°C the risk of scalding is small for most people, but the risk increases rapidly with higher temperatures and for longer exposure times. The risk to young children and to those with a sensory or mobility loss will be greater. Where a significant scalding risk has been identified, the use of thermostatic mixing valves on baths and showers should be considered to reduce temperature, these need to be placed as close to the point of use as possible.

### 14.0 LPG FUEL

**NOTE! IT IS STRONGLY RECOMMENDED THAT, ON LPG INSTALLATIONS, GAS DETECTION EQUIPMENT IS FITTED. THIS EQUIPMENT SHOULD BE POSITIONED NEAR THE APPLIANCE AND AT LOW LEVEL. IT IS ALSO IMPORTANT THAT THE SPACE HOUSING THE APPLIANCE IS ADEQUATELY VENTILATED AT HIGH AND LOW LEVEL. THIS APPLIANCE MUST NOT BE LOCATED BELOW GROUND E.G. IN A CELLAR.**

### 14.1 RELATED DOCUMENTS

In addition to those documents listed in **Section 4.1: RELATED DOCUMENTS** within the main body of the installer's guide the gas installation should also comply with the guidance offered in the following documents.

**BS 5482-1: 2005** Code of practice for domestic butane and propane gas burning installations.  
**Part 1:** Installations at permanent dwellings, residential park homes and commercial premises, with installation pipework sizes not exceeding dn25 for steel and dn28 for corrugated stainless steel or copper.

### 14.2 GAS PRESSURE GOVERNOR

**Each appliance requires an inline pressure governor to be installed in the gas supply pipework, in order to set the burner pressure.**

The inline governor should be located in a convenient position near to the appliance.

### 14.3 CONVERSION TO LPG

This process must be carried out in the order stated. Failure to follow the following procedure may lead to non-warrantable damage to the water heater. The conversion **MUST** be carried out by a competent person certified for work on LPG fuel.

In the event of any seal or gasket being broken it is essential that the seal or gasket be replaced. Contact Lochinvar Limited for replacement seals and gaskets.

To convert the appliance, the correct kit should be selected from the following table:

Part Number	Model
AKGPLC	LBF81 - 121
AKGPL15	LBF151
AKGPL17	LBF171
AKGPL2	LBF221
AKGPL34	LBF301 - 401

TABLE 13.1 GAS CONVERSION KITS

#### 14.3.1 LBF81 – 121

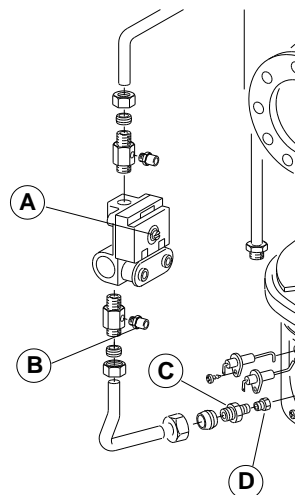


FIGURE 12.1 GAS SUPPLY CONVERSION – LBF81/121

1. Check that the diameter of the injector contained in the kit is correct for the appliance (see **Table 3.1**).
2. Close the gas-inlet appliance isolating valve and isolate the electrical supply.
3. Unscrew the injector holder (Item C in **Figure 13.1**) with a suitable hexagonal spanner.
4. Undo the injector (Item D in **Figure 13.1**) and replace it with the one contained in the kit.
5. Refit the injector holder and reconnect any pipework disturbed in the removal process.
6. Unscrew the dust cap (Item A in **Figure 13.1**) and turn the pressure governor screw clockwise until it stops.
7. Replace the dust cap (Item A in **Figure 13.1**). Once reinstalled the dust cap should be marked with an anti-tamper indicator.
8. Loosen the test point screw (Item B in **Figure 13.1**) and attach a manometer. Start up the water heater and adjust the inline governor to give a pressure at the burner of 28.0 mbar.
9. Position the label contained in the conversion kit on the gas valve (over the existing label), in order to identify that it has been set for LPG G31.
10. Test for gas soundness and inspect all joints with leak detection fluid.

### 14.3.2 LBF151 – 401

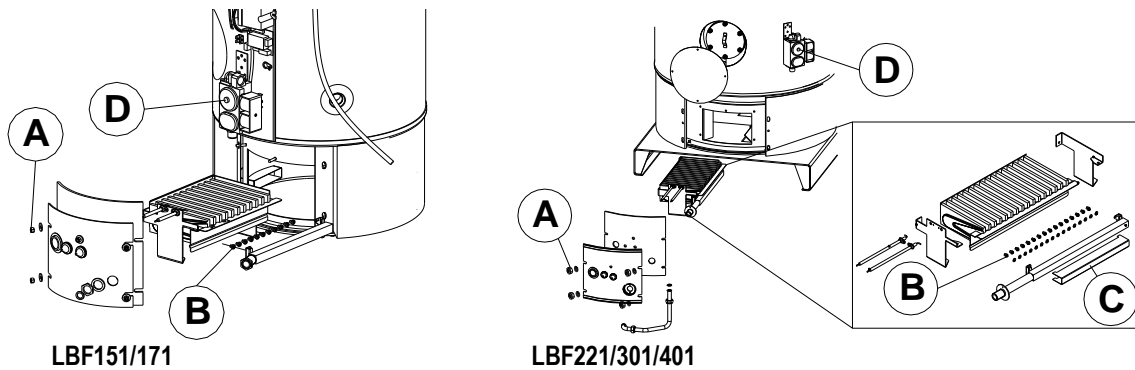


FIGURE 13.2 GAS SUPPLY CONVERSION

1. Check that the diameter of the injector contained in the kit is correct for the appliance (see **Table 3.1**).
2. Close the gas-inlet appliance isolating valve and isolate the electrical supply.
3. Remove the burner by first detaching the gas pipe and the electrode cables and then undoing the retaining nuts (Item A in **Figure 13.2**).
4. Withdraw the burner assembly from the appliance and detach the inlet manifold.
5. Unscrew the injectors (Item B in **Figure 13.2**) and replace them with the ones contained in the kit. Fully tighten the injectors to ensure gas soundness.
6. For models LBF221, 301 & 401 fit the air regulator plate (Item C in **Figure 13.2**) to the inlet manifold.
7. Remove the dust cap (Item D in **Figure 13.2**) and turn the pressure governor screw clockwise until it stops.
8. Replace the dust cap (Item D in **Figure 13.2**). Once reinstalled the dust cap should be marked with an anti-tamper indicator.
9. Loosen the outlet test point screw (see **Figure 12.3**) and attach a manometer. Start up the water heater and adjust the inline governor to give a pressure at the burner of 28.0 mbar.
10. Position the label contained in the conversion kit on the gas valve (over the existing label), in order to identify that it has been set for LPG G31.
11. Test for gas soundness and inspect all joints with leak detection fluid.

### 14.4 LPG COMMISSIONING AND TESTING

The commissioning procedure of the LBF range on LPG-Propane (3<sup>rd</sup> Family) 3P is similar to that on Natural Gas (2<sup>nd</sup> Family) 2H. The design and installation details described in **Section 11: COMMISSIONING AND TESTING** of the installer's guide should be followed.

## 15.0 MAINTENANCE

### 15.1 GENERAL

#### **KEEP APPLIANCE AREA CLEAR AND FREE FROM COMBUSTIBLE MATERIALS AND FLAMMABLE VAPORS AND LIQUIDS.**

A competent person should check and ensure that the flue system, ventilation to the plant room, safety valve, drain, pressure gauge etc. are in a serviceable and working condition and still comply with the relevant standards and codes of practice, as detailed in **Section 3.1 RELATED DOCUMENTS**.

Servicing is recommended at intervals no greater than 12 months to ensure trouble free operation. Even if the maintenance schedule for the storage vessel is determined to be less than annually, it is important that all controls and safety features are checked for correct operation on an annual basis.

Measuring flue gas CO<sub>2</sub> and flue gas temperatures will give an indication of the state of the flue and burner. Results of the flue gas analysis should be compared with previously measured values to establish possible loss of efficiency.

### 15.2 MAINTENANCE SCHEDULE

Waterborne impurities consist of the particles of soil and sand, which can settle out and form a layer of sediment on the bottom of the tank. The amount of calcium carbonate (scale) released from water is in direct proportion to water temperature and usage. The higher the water temperature or water usage, the more scale deposits are dropped out of the water.

Scale accumulation not only reduces the life of the equipment but also reduces efficiency of the water heater and increases fuel consumption. The usage of water softening equipment greatly reduces the hardness of the water. However, this equipment does not always remove all of the hardness (scale). For this reason it is recommended that a regular schedule of de-scaling be maintained.

The depth of the build-up should be measured after 3 months of operation to determine whether maintenance is required. The heater will have about 76mm (3 inches) of scale build-up when the level of scale has reached the bottom of the cleanout opening or about 25mm (1 inch) of scale build-up if it has reached the drain valve opening. A schedule for de-scaling should be set up, based on the amount of time it would take for a 13mm (1/2-inch) build-up of scale. If insufficient scale has built up on the base of the vessel, then the vessel should be cleared and a longer period left before checking again to determine the required service interval.

### 15.3 DRAINING WATER HEATER SYSTEM

The water heater must be drained if it is to be shut down and exposed to freezing temperatures. Maintenance and service procedures may also require draining the water heater.

1. Turn off the water heater electrical isolator.
2. Connect a hose to the drain valve.
3. Locate hose's discharge in an area where hot water will not cause any damage or injury.
4. Close the cold water inlet valve to water heater.
5. Open a nearby hot water outlet to vent the system.
6. Open the heater drain valve.
7. If the water heater is being drained for an extended shutdown, it is suggested the drain valve be left open during this period.

## 15.4 REMOVING SCALE AND SEDIMENT

1. Drain the heater. Refer to **Section 14.3: DRAINING WATER HEATER SYSTEM**.
2. Remove the front cover for LBF81/121 or the outer cover plate from lower side of water heater jacket for all other models.
3. Remove the cleanout cover and gasket from cleanout opening.
4. Remove scale or sediment using care not to damage the vitreous enamel lining.
5. Inspect cleanout plate gasket and replace if necessary.
6. Install gasket and cleanout plate. Draw plate up square by tightening the retaining nuts evenly.

## 15.5 SACRIFICIAL MAGNESIUM ANODES

If the Correx non-sacrificial anode protection system is used, there is no requirement to check the condition of the anodes.

The tank is protected against corrosion by means of sacrificial anode(s) fitted in the front of the storage vessel. The rate at which the anode(s) are eroded is dependent on the quality of the water; therefore it is essential that the anodes are inspected **at least once a year**.

**NOTE:** Where a water softener is used, the conditioned water may reduce the serviceable life of the tank. The condition of the anodes must therefore be checked more frequently.

### 15.5.1 ANODE REMOVAL LBF81/121

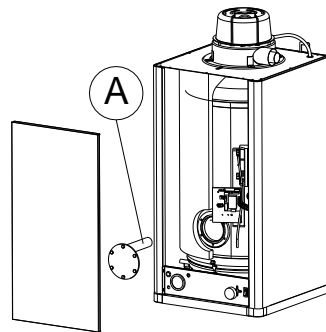


FIGURE 13.1 LBF81/121 ANODE LOCATION

1. Drain the water heater. Refer to **Section 14.3: DRAINING WATER HEATER SYSTEM**.
2. Remove the front cover and locate the cleanout opening.
3. Remove the cleanout cover, the anode (Item A in **Figure 14.1**) is located on the rear of this cover.
4. Inspect the condition of the anode.

**NOTE:** If the anode has reduced in size by more than 40% at any point along its length or if it is severely pitted, a new anode should be fitted. Particular attention should be paid to the ends of each anode to ensure excessive localised depletion has not occurred. Where the anode is covered with particles it should be cleaned.

5. The reassembly procedure is the reverse of removal, ensuring a water tight joint is achieved on the cleanout cover.

### 15.5.2 ANODE REMOVAL LBF151/171

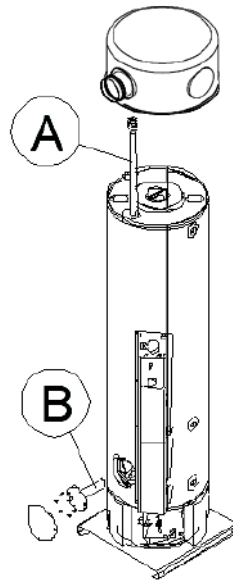


FIGURE 14.2 LBF151/171 ANODE LOCATION

1. Drain the water heater. Refer to **Section 14.3: DRAINING WATER HEATER SYSTEM.**
2. Ensure the flue is adequately supported. Remove the flue hood assembly
3. The retaining plug for the upper anode should be visible from above the appliance.
4. Remove the anode (Item A in **Figure 14.2**) and check its condition.

**NOTE:** If the anode has reduced in size by more than 40% at any point along its length or if it is severely pitted, a new anode should be fitted. Particular attention should be paid to the ends of each anode to ensure excessive localised depletion has not occurred. Where the anode is covered with particles it should be cleaned.

5. Locate the cleanout opening and remove outer cover and then the internal plate
6. The lower anode (Item B in **Figure 14.2**) is located on the rear of the internal plate, inspect condition of the lower anode.
7. The reassembly procedure is the reverse of removal, ensuring a water tight joint is achieved on the cleanout cover.

### 15.5.3 ANODE REMOVAL LBF221 – 401

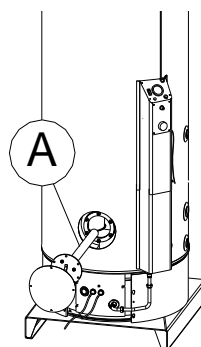


FIGURE 14.3 LBF221 – 401 ANODE LOCATION

1. Drain the water heater. Refer to **Section 14.3: DRAINING WATER HEATER SYSTEM.**
2. Locate the cleanout opening and remove outer cover and then the internal plate
3. The anode (Item A in **Figure 14.3**) is located on the rear of the internal plate, inspect condition of the lower anode.

**NOTE:** If the anode has reduced in size by more than 40% at any point along its length or if it is severely pitted, a new anode should be fitted. Particular attention should be paid to the ends of each anode to ensure excessive localised depletion has not occurred. Where the anode is covered with particles it should be cleaned.

4. The reassembly procedure is the reverse of removal, ensuring a water tight joint is achieved on the cleanout cover.

## 15.6 REFILLING THE WATER HEATER

1. Close the drain valve. Open a hot water fixture to allow air to escape. Open the cold water supply to water heater and allow the tank to fill.
2. Follow the lighting instructions as detailed in **Section 12.4.4: PROCEDURE FOR INITIAL LIGHTING**
3. Check for water leakage.
4. Install the front cover for LBF81/121 or the outer cover plate from lower side of water heater jacket for all other models.

## 15.7 BURNER REMOVAL AND CLEANING

If it has been determined that the flame picture is unacceptable, the burner can be removed and cleaned using the following procedures:

### 15.7.1 LBF81 & LBF121

1. If the appliance is firing, either turn down the thermostat or switch the power button to the off position.
2. Isolate the electrical and gas supplies to the heater.
3. Allow the appliance to cool down.
4. Remove the front cover.
5. Remove the control panel.
6. Disconnect the wiring to the ignition and flame sense electrodes, noting the correct locations for each.
7. Remove the outer base cover from the appliance.
8. Remove the inner base cover by removing the retaining nut, 1 x screw and 2 x locating studs.
9. Detach the gas pipe from the burner assembly.
10. Unclip the burner assembly from the storage vessel body and remove from the appliance.
11. With the burner assembly away from the heater, the burner can be gently cleaned with the brush attachment of a vacuum cleaner.
12. Clean the ignition and flame sense electrodes before reassembling the appliance.

The reassembly procedure is the reverse of the above taking care to ensure the burner seal is intact or replaced as necessary.

### 15.7.2 LBF151 – LBF401

1. If the appliance is firing, either turn down the thermostat or switch the power button to the off position.
2. Isolate the electrical and gas supplies to the appliance.
3. Allow the appliance to cool down.
4. Detach the gas pipe from the burner assembly.
5. Disconnect the wiring to the ignition and flame sense electrodes, noting the correct locations for each.
6. Remove the 5 retaining nuts on the burner door then slide out complete burner assembly.
7. With the burner assembly away from the heater, the burner can be gently cleaned with the brush attachment of a vacuum cleaner.
8. Clean the ignition and flame sense electrodes before reassembling the appliance.

The reassembly procedure is the reverse of the above taking care to ensure the burner door seal is intact or replaced as necessary.

## **15.8 OTHER CHECKS**

### **15.8.1 RELIEF VALVE**

At least once a year, the temperature and pressure relief valve and safety valve should be checked to ensure that they are in operating condition. To check each valve, lift the lever or turn the screw cap at the end of the valve several times. The valve should operate freely and seat properly.

If water does not flow, remove and inspect for obstructions or corrosion. Replace with a new valve of the recommended size as necessary.

## **15.9 FLUE SYSTEM**

Examine the exhaust and ventilation system at least once a year. Points of inspection are as follows:

1. Check for obstructions and/or deterioration of flue pipe and terminal. Replace immediately where needed.
2. Check the terminal for any foreign material and remove as necessary.
3. Check all flue system connections for leakage and re-seal as required.
4. Check that ventilation grilles comply with current regulations (where applicable).

### **15.9.1 CORREX ELECTRICAL ANODE PROTECTION SYSTEM**

When the protection system is working correctly, a green light should be visible on the Correx unit. If an error occurs, this lamp will flash red. Remedial action should be taken as a matter of urgency if such a situation arises.

The Correx system passes and monitors an electrical current flow through the water. If this current flow becomes too high or too low, a fault is indicated. Factors that may cause incorrect current flow include:

- Short-circuiting of the cables between the potentiostat and electrodes.
- Poor conductivity between the electrode cables and electrode connection tabs.
- Poor conductivity between the electrode connection tabs and electrode PCB.
- Poor conductivity between the storage vessel and earth tab.
- Poor conductivity between the earth tab and earth cable.
- Deposits forming on the electrodes.

## **16.0 USER INSTRUCTIONS**

Once the installation and commissioning is complete, the equipment owner or their representative should be made aware of the lighting and operating instructions. A practical demonstration should be given describing each functional step. Incorrect use may result in injury and will also invalidate the warranty. The Installation, Commissioning and Maintenance Instructions should be handed over and kept in a safe place for easy reference. It is strongly recommended that the users read and understand the separate User Guide

## **17.0 WARRANTY**

Full warranty terms and conditions are available at [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)



## 18.0 ErP SPECIFICATION DATA SHEET

Water Heater Type:		LBF81	LBF121	LBF151	LBF171	LBF221	LBF301	LBF401
Manufacturer	<b>Lochinvar Limited</b>							
Load Profile		M	L	XL	XXL	XXL	XXL	XXL
Efficiency class		B	B	B	B	B	B	B
Energy Efficiency	%	52%	63%	70%	69%	63%	69%	79%
Daily Electricity Consumption	Qelec	0.164	0.097	0.204	0.079	0.078	0.172	0.484
Daily Fuel Consumption	Qfuel	12.635	20.287	29.722	35.133	39.047	39.03	29.937
Mixed water V40 @40°C	litre	84	174	211	330	347	313	586
Emmissions of Nitrogen Oxides (EN15502)	mg/kwh	100	190	113	138	229	162	126
Sound Power Level (EN 15036-1:2006)	LWA(db)	45	45	51	51	51	51	51







## IMPORTANT INFORMATION

These instructions must be read and understood before installing, commissioning, operating or maintaining the equipment.





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These instructions must be read and understood before installing, commissioning, operating or maintaining the equipment.



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*Lochinvar Ltd reserves the right to change specifications without prior notice*

Water Heater Type:								Lochinvar Limited							
Water Heater Type:		LBF81		LBF121		LBF151		LBF171		LBF221		LBF301		LBF401	
Manufacturer															
Load Profile	M	L	XL	XXL	XXL	XXL	XXL	XXL	XXL	XXL	XXL	XXL	XXL	XXL	XXL
Efficiency class	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Energy Efficiency	52%	63%	70%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	79%
Daily Electricity Consumption	0.164	0.097	0.204	0.079	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.484
Daily Fuel Consumption	12.635	20.287	29.722	35.133	39.047	39.047	39.047	39.047	39.047	39.047	39.047	39.047	39.047	39.047	29.937
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Emissions of Nitrogen Oxides (EN15502)	mg/kwh	100	190	113	138	229	229	229	229	229	229	229	229	229	126
Sound Power Level (EN 15036-1:2006)	LWA(db)	45	45	45	45	45	45	45	45	45	45	45	45	45	51

## 2.0 EFP SPECIFICATION DATA SHEET

If the LBF water heater should go to a flame failure condition, **reset the unit by depressing the red lock-out light on the control panel** and a new ignition cycle will begin.

The combustion fan will pre-purge and attempt to light. Once a flame is established, the green 'Burner On' lamp, located on the control panel, will illuminate. Should the water heater lock out again, a competent engineer should be called to investigate the cause of the fault.

### 1.8 FLAME FAILURE LOCKOUT

- The area in which the appliance is installed should not be used to store any other materials.
- Blocking these air vents may lead to severe injury, serious property damage or death.
- When installed in a compartment, the appliance compartment must be ventilated in accordance with relevant standards.

### 1.7 AIR SUPPLY

The LBF water heater has no built in frost protection system. Adequate protection must be provided to prevent the water heater being exposed to freezing temperatures.

### 1.6 FROST PROTECTION

A competent person should check and ensure that the flue system, ventilation to the plant room, safety valve, drain, pressure gauge etc. are in a serviceable and working condition and still comply with the relevant standards and codes of practice, as detailed in the Installation, Commissioning and Maintenance Instructions.

Even if the maintenance schedule for the storage vessel is determined to be less than annually, it is important that all controls and safety features are checked for correct operation on an annual basis. The sacrificial magnesium anodes must be inspected at least once a year unless the Correx non-sacrificial anode protection system is used, in which case there is no requirement to check the condition of the sacrificial anodes.

Service intervals should be determined during the first months of operation. Details of this procedure can be found in the Installation Commissioning and Maintenance Instructions for the appliance. If these instructions are not available, a copy should be obtained from Lochinvar's website [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk) or by using the contact details on the back cover of this document.

### 1.5 MAINTENANCE

## 1.0 USER GUIDE

## 1.1 GENERAL REQUIREMENTS

- This equipment must be installed by a competent person, registered with a H.S.E. approved body. All installations must conform to the relevant Gas Safety and Building regulations. Health & safety requirements must also be taken into account when installing any equipment.
- A competent person must also undertake any alterations that require the gas train or flue system to be broken.
- Any interference with a sealed component is forbidden.
- Failure to comply with the above may lead to prosecution.
- Incorrect use may result in injury and will also invalidate the warranty
- The area around the viewing window may become hot during operation. Care should be used to prevent direct contact with the viewing window and its immediate surroundings.

## 1.2 PROCEDURE FOR LIGHTING

1. Ensure that the gas-inlet appliance isolating valve is in the "off" position.
2. Press the power rocker switch, positioned on the front of the appliance next to the control thermostat, to bring the equipment on.
3. Set the control thermostat to a value above that of the stored water.
4. The combustion fan should start and purge the combustion chamber. The spark generator should create a spark and the gas solenoid should open. As the gas-inlet appliance isolating valve is closed the appliance should go to a flame failure condition within 10 seconds this will be indicated by a red lock-out light on the control panel.
5. If the above occurs correctly, open the gas-inlet appliance isolating valve and reset the unit by depressing the red lock-out light on the control panel and a new ignition cycle will begin.
6. The combustion fan will repeat the pre-purge procedure and attempt to light. Once a flame is established, the green 'Burner On' lamp, located on the control panel, will illuminate.

## 1.3 PROCEDURE FOR SHUTTING DOWN

To take the appliance out of service, the power rocker switch should be switched to the off position. If the appliance is to be shut down for a long period of time, the gas supply should be isolated at the gas-inlet appliance isolating valve.

## 1.4 TEMPERATURE ADJUSTMENT PROCEDURE

The setpoint can be adjusted using the dial thermostat on the control panel and monitored using the temperature gauge.

The setpoint should be adjusted to ensure that the water is stored at 60°C and distributed at 50°C within 1 (one) minute at all outlets. Care is needed to avoid much higher temperatures because of the risk of scalding. At 50°C the risk of scalding is small for most people, but the risk increases rapidly with higher temperatures and for longer exposure times. The risk to young children and to those with a sensory or mobility loss will be greater. Where a significant scalding risk has been identified, the use of thermostatic mixing valves on baths and showers should be considered to reduce temperature, these need to be placed as close to the point of use as possible.



**Models:**  
LBF81  
LBF121  
LBF151  
LBF171  
LBF221  
LBF301  
LBF401

The LBF Range  
High Efficiency Gas fired water  
heaters  
User Instructions