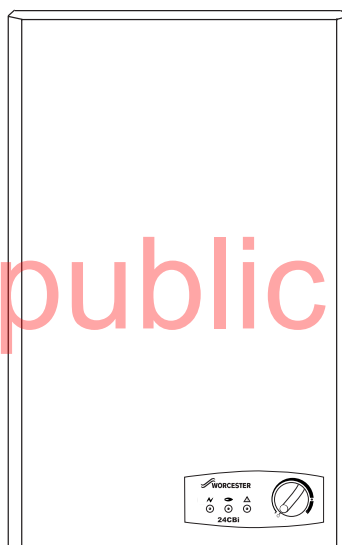


# 15CBi / 24CBi

WALL MOUNTED BOILERS FOR CENTRAL HEATING  
and Indirect supply of domestic hot water

## INSTALLATION AND SERVICING INSTRUCTIONS



Not for public release

This appliance is for use with Natural Gas or LPG (Cat II 2H3P).

15CBi GC NUMBER 41 311 47 (N.G.) 24CBi GC NUMBER 41 311 48 (N.G.)



### APPLIANCE OUTPUTS

Natural Gas

24CBi

Minimum 14.7 kW

Maximum 23.4 kW

15CBi

Minimum 9.0 kW

Maximum 14.7 kW



IMPORTANT: THESE INSTRUCTIONS APPLY IN THE UK ONLY

AND MUST BE LEFT WITH THE USER OR AT THE GAS METER

Read the instructions before starting work - they have been written to make  
the installation easier and prevent hold-ups.

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## 1. Installation Regulations

### 1.1 Gas Safety (Installation & Use) Regulations 1998.

It is the law that all gas appliances are installed by a competent person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your interest, and that of safety, to ensure compliance with the law.

1.2 The manufacturers notes must not be taken, in any way, as overriding statutory obligations.

1.3 The compliance with a British Standard or European Norm does not, in itself, confer immunity from legal obligations.

1.4 The installation of the appliance must be in accordance with the relevant requirements of the Gas Safety Regulations, current IEE Regulations, Building Regulations, Building Standards (Scotland) and local water bye-laws.

1.5 The installation should follow the recommendations of the following British Standards unless otherwise indicated and to any other relevant standards.

BS5440:1 - Flues and ventilation for gas appliances: Flues  
 BS5440:2 - Flues and ventilation for gas appliances: Air supply.  
 BS5449 - Central heating for domestic premises.  
 BS5546:1 - Installation of gas hot water supplies.  
 BS6700 - Domestic water supply (when relevant).  
 BS6798 - Installation of gas fired hot water boilers.  
 BS6891 - Low pressure gas pipework installations up to 28mm (R1).  
 BS7593 - Water treatment.

1.6 The appliance and/or components must conform, where applicable, to all relevant Directives.

1.7 In accordance with COSHH the appliance does not contain any substances which are harmful to health.

1.8 Product Liability regulations indicate that, in certain circumstances, the installer can be held responsible, not only for mistakes on his part but also for damage resulting from the use of faulty materials. We advise that to avoid any risk, only quality approved branded fittings are used.

1.9 These instructions cover, as far as possible, the foreseeable situations which may arise. Contact Worcester Heat Systems Technical Department, Telephone: 0990 266241, for advice on specific installations.

## 2. Introduction

**(benchmark)** The Benchmark initiative is the new code of practice to encourage the correct installation, commissioning and servicing of domestic central heating boilers and system equipment.

The 'log-book' is a vital document that must be completed by the installer at the time of installation and handed to the householder. It confirms that the boiler has been installed and commissioned according to the manufacturers instructions.

Without the completion of the log-book, manufacturers may refuse to respond to a call-out from a householder, who will be advised that he or she must call back the installer, who has not fulfilled his obligations to record the information required by the initiative.

### 2.1 General Information

The appliance is set to give the mid-range output of 19.05kW [24CBi] or maximum output of 14.65kW [15CBi].

### 2.2 Electrical Supply

230V - 50Hz. Load 125 watts. External fuse 5A, Internal fuse F1 - 4A.

### 2.3 Gas supply

The 24CBi appliance requires a maximum of 2.76 m<sup>3</sup>/h of natural gas (G20).

The 15CBi appliance requires a maximum of 1.74 m<sup>3</sup>/h of natural gas (G20).

The installation and the connection of the gas supply to the appliance must be in accordance with BS6891.

The meter or regulator should deliver a dynamic pressure of 20 mbar (G20) at the appliance, which is equivalent to about 18.5 mbar at the gas valve inlet pressure test point.

### 2.4 Installation

The appliance is suitable for indoor installation and for use with a fully pumped open vent or sealed system with an indirect cylinder. A direct cylinder is not acceptable.

If the appliance is fitted in a cupboard or a compartment is built around it after installation, then the structure must conform with the requirements of BS6798. The spaces specified for servicing **must** be maintained. Refer to Section 6.

### 2.5 Flue

The flue, with an external turret, can be to the right, left or rear.

A vertical flue system is available.

A rear flue upto 375mm in length can be connected from within the casing. An internal flue fitting kit is available for flues with an external turret. This should be used if access to the terminal is a problem.

### 2.6 Controls

A control knob adjusts the boiler temperature, switches the boiler ON or to STANDBY and acts as a lock-out reset.

### 2.7 System

**(benchmark)** All dirt must be flushed from any system to be connected to the appliance. Refer to Fig. 5,6 and 7.

A system by-pass is required which can take the form of a single uncontrolled radiator located at least 2m from the boiler - usually in the bathroom.

The connections in any system must withstand a pressure of up to 3 bar.

Radiator valves must conform to BS2767:10:1977.

#### 2.8 Domestic Hot Water

Single feed direct cylinders are **NOT** suitable and must not be used.

A HW cylinder must be of the indirect coil type and suitable for working at a gauge pressure of, at least, 0.35bar above the relief valve setting (Sealed System).

Where a storage system will not have a vent to atmosphere the installation must comply with Building Regulations and Water Company bye-laws. If connecting to an existing system the local authority should be informed.

#### 2.9 Safety

The appliance must not be operated with the inner casing cover removed.

The gas and electricity supplies must be turned off before servicing or working on the appliance.

The casing is earthed through a push-on connector at the base.

When the casing is refitted this connection **MUST** be remade

#### 2.10 Operation

##### Central Heating

A demand for heat will ignite the burner. The temperature is controlled by the integral sensor. At the end of the demand the burner will go out and the pump will continue to run for up to 4 minutes and the fan for 1 minute to dissipate the residual heat.

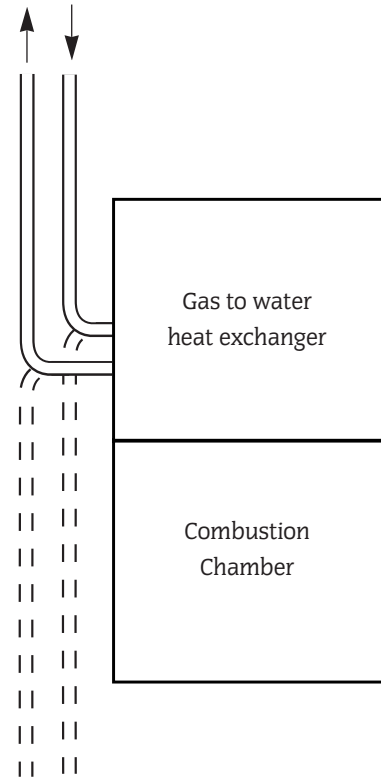
##### Domestic Hot Water:

The supply of domestic hot water depends upon the type of hot water equipment installed and the control system.

The use of unvented cylinders must be in accordance with the manufacturers instructions and relevant to British Standards

**Fig. 1. Water flow diagram.**

Flow and Return pipes



Alternative position  
of Flow and Return pipes

**NOTE:** Flow pipe is at the rear in the alternative position.

**NOTE:** When changing from a top connection to one at the bottom the pipe functions are reversed.

Top flow pipe becomes the bottom return pipe.

Top return pipe becomes the bottom flow pipe.

Not for public release

### 3. Technical Data

The data plate is fixed to the inner casing cover.

**Table 1. 15CBi**

NOMINAL BOILER RATINGS (10 Minutes After Lighting)			
BOILER ADJUSTED FOR G20 (Natural Gas)			
OUTPUT	INPUT (Net)	BURNER PRESSURE	GAS RATE
kW	kW	m bar.	m <sup>3</sup> /h
9	10.23	4.9	1.08
11.83	13.29	8.3	1.41
14.65	16.28	12.8	1.74

Factory set at maximum input

Natural Gas: Net Input = Gross Input x 0.901

**NOTE:** FOR PROPANE VERSION REFER TO A SEPARATE LEAFLET

**Table 1. 24CBi**

NOMINAL BOILER RATINGS (10 Minutes After Lighting)			
BOILER ADJUSTED FOR G20 (Natural Gas)			
OUTPUT	INPUT (Net)	BURNER PRESSURE	GAS RATE
kW	kW	m bar.	m <sup>3</sup> /h
14.65	16.84	5.0	1.78
19.05	21.52	8.6	2.27
23.44	26.05	12.8	2.76

Factory set at mid-range input

**Table 2.**

FLUE DETAILS		
HORIZONTAL FLUE		mm
WALL HOLE DIAMETER	EXTERNAL FIX	110
	INTERNAL FIX	150
STANDARD FLUE	MINIMUM LENGTH	425
	MAXIMUM LENGTH	725
EXTENDED FLUE	MAXIMUM LENGTH	2500
INTERNAL FLUE - REAR ONLY WITHIN CABINET	MINIMUM LENGTH	220
	MAXIMUM LENGTH	375
FLUE ASSEMBLY DIAMETER		100
VERTICAL FLUE	MINIMUM LENGTH	1100
	MAXIMUM LENGTH	2600

**NOTE:** FOR VERTICAL FLUE REFER TO A SEPARATE LEAFLET FOR INFORMATION

**Table 3 15CBi**

HYDRAULIC RESISTANCE			
BOILER OUTPUT kW	RESISTANCE Metres	MIN. FLOW RATE L/min.	FLOW/RETURN DIFFERENTIAL °C
9.0	0.06	6.5	20
	0.12	11.7	11
15.0	0.32	19.1	11

**NOTE:** Pump is fitted externally

**Table 3 24CBi**

HYDRAULIC RESISTANCE			
BOILER OUTPUT kW	RESISTANCE Metres	MIN. FLOW RATE L/min.	FLOW/RETURN DIFFERENTIAL °C
15.0	0.09	10.5	20
	0.32	19.1	11
24.0	0.75	30.5	11

**Table 4**

MECHANICAL SPECIFICATIONS	
FLOW - COMPRESSION	22mm
RETURN - COMPRESSION	22mm
GAS INLET	Rp 1/2
CASING HEIGHT	600mm
CASING WIDTH	390mm
CASING DEPTH	260mm
WEIGHT - LIFT	15CBi 28kg 24CBi 33.5kg
WEIGHT - PACKAGED	15CBi 41kg 24CBi 47kg

Table 5

PERFORMANCE SPECIFICATIONS				
PRIMARY WATER CAPACITY		<b>15CBi</b>	1.6 litres	<b>24CBi</b> 2.1 litres
MAXIMUM FLOW TEMPERATURE		82°C (nom)		
MAXIMUM CENTRAL HEATING SYSTEM SET PRESSURE (Sealed System)		2.5 bar		
MINIMUM CENTRAL HEATING SYSTEM SET PRESSURE (Sealed System)		0.5 bar		
OUTPUT TO CENTRAL HEATING NATURAL GAS (G20)		<b>15CBi</b>	9.0 - 14.7kw	<b>24CBi</b> 14.7 - 23.4kw
NOx CLASSIFICATION FOR BOTH 15 & 24CBi		Class 1		
SEDBUK NUMBER AND BAND		<b>15CBi</b>	76.6% E	<b>24CBi</b> 76.9% E

Table 6

GAS SUPPLY SYSTEM - BASED ON NG (G20)				
TOTAL LENGTH OF GAS SUPPLY PIPE (COPPER) metres				
3	6	9	12	
MAXIMUM GAS DISCHARGE RATE - PRESSURE DROP 1mbar m <sup>3</sup> /h				PIPE DIAMETER mm
8.7	5.8	4.6	3.9	22
18.0	12.0	9.4	8.0	28

Table 7

CLEARANCES (mm)		
	INSTALLATION	SERVICE
ABOVE APPLIANCE - INTERNAL REAR FLUE	30	30
ABOVE APPLIANCE - EXTERNAL FLUE TURRET	180	180
IN FRONT OF APPLIANCE	600	600
BENEATH APPLIANCE	200	200
RIGHT HAND SIDE	5	5
LEFT HAND SIDE	5	5 **

\* Improved access - 50mm is recommended

\*\* Minimum clearance when fitted to an adjacent wall is 100mm

Table 8

SEALED SYSTEM CAPACITY - 10 litre vessel			
TOTAL SYSTEM VOLUME litres			
INITIAL PRESSURE bar	INITIAL CHARGE PRESSURE bar		
	0.5	1.0	1.5
1.0	72	92	N/A
1.5	39	53	64

## 4. Siting The Appliance

The appliance may be installed in any room subject to the requirements of the current IEE regulations and, in Scotland, the relevant electrical provisions of the Building Regulations with respect to the installation of appliances in rooms containing baths or showers.

If the appliance is installed in a room containing a bath or shower, any switch or appliance control using mains electricity must NOT be able to be touched by a person using the bath or shower.

The appliance is NOT suitable for external installation.

The wall must be able to support the weight of the appliance. Refer to Table 4.

The specified clearances must be available for installation and servicing. Refer to Table 7 and Fig.2.

The appliance can be installed in a cupboard/compartment to be used for airing clothes providing that the requirements of BS6798 and BS5440/2 are followed.

The clearance between the front of the appliance and the cupboard/compartment door should be not less than 25mm.

Fig. 3. Appliance pipework connections

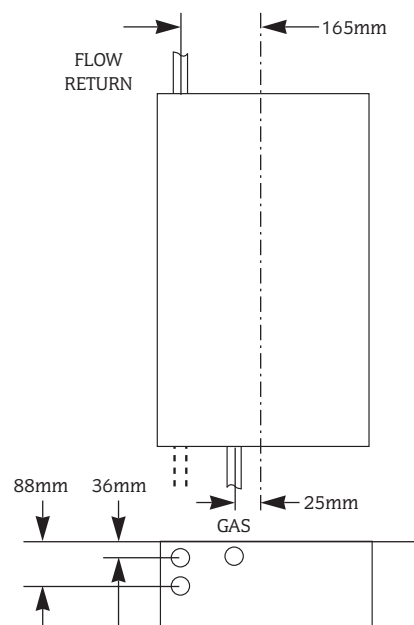
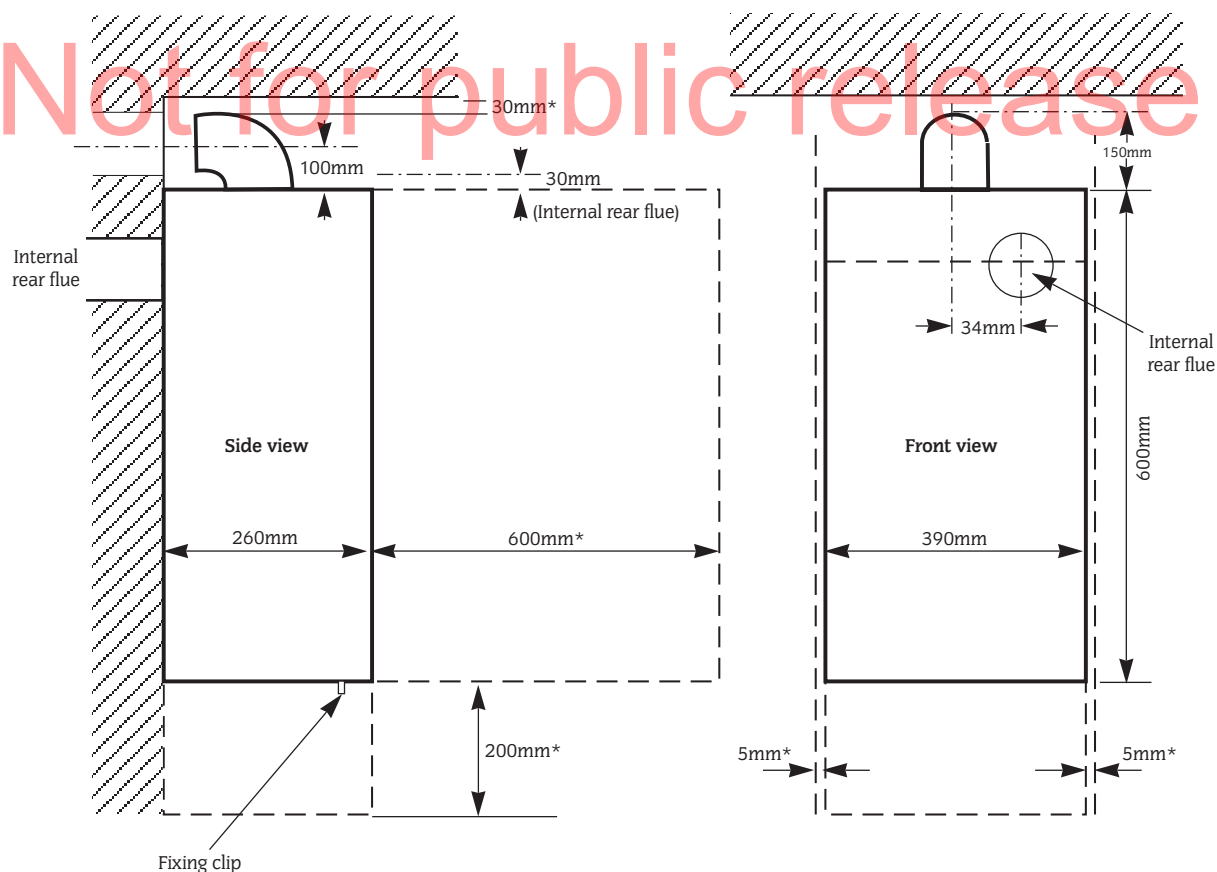


Fig. 2. Appliance casing dimensions and required clearances.



\* Space required for installation and servicing. Refer to Table 7

## 5. Flue terminal positions

The flue system must be installed following the requirements of BS5440:1.

The standard flue kit length is 425 - 725mm. Extension kits for flues up to 2.5m are available.

A rear flue suitable for walls from 220 - 375mm thick is available which can be contained within the boiler casing.

The terminal must not cause an obstruction nor the combustion products a nuisance.

If the terminal is within 1m of a plastic or painted gutter or within 500mm of painted eaves then an aluminium shield at least 750mm long should be fitted to the underside of the gutter or painted surface.

If the terminal is less than 2m above a surface to which people have access then a guard must be fitted. The guard must be evenly spaced about the terminal and fixed with plated screws. A guard Type K2 can be obtained from Tower Flue Components, Vale Rise, Tonbridge, TN9 1TB.

It is essential that products of combustion cannot re-enter the building. Refer to Fig 4.

## 6. Air Supply

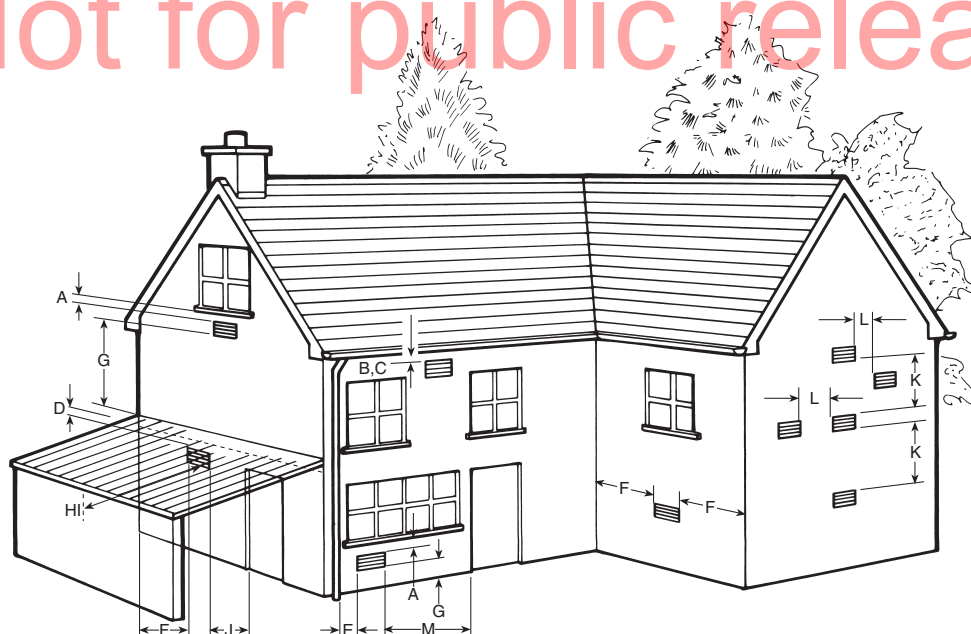
**A separate vent for combustion air is not required.**

If the appliance is installed in a cupboard or compartment then permanent air vents are required in the compartment, one at a high level and one at a low level. Both high and low level air vents must communicate with the same room or must both be on the same wall to the outside air. The minimum requirements are:

Model	Position of vent	Air from room	Air from outside
24CBi	High	261cm <sup>2</sup>	130cm <sup>2</sup>
	Low	261cm <sup>2</sup>	130cm <sup>2</sup>
15CBi	High	162cm <sup>2</sup>	81cm <sup>2</sup>
	Low	162cm <sup>2</sup>	81cm <sup>2</sup>

If the boiler is fitted between kitchen units and a decorative door panel is fitted then the top and bottom of the space must be left open.

Fig. 4. Siting of the flue terminal.



TERMINAL POSITION	MIN. DISTANCE	TERMINAL POSITION	MIN. DISTANCE
A- directly below an openable window or other opening e.g. air brick.	300mm (12in.)	I- From a terminal facing a terminal	1200mm (47in.)
B- Below gutters, soil pipes or drain pipes.	75mm (3in.)	J- From an opening in a car port (e.g. door window) into dwelling.	1200mm (47in.)
C- Below eaves.	25mm (1in.)	K- Vertically from a terminal on the same wall.	150mm (6in.)
D- Below balconies or car port roof.	25mm (1in.)	L- Horizontally from a terminal on the same wall.	300mm (12in.)
E- From vertical drain pipes and soil pipes.	25mm (1in.)	M- From door, window or air vent (achieve where possible).	150mm (6in.)
F- From internal or external corners.	25mm (1in.)		
G- Above ground, roof or balcony level.	300mm (12in.)		
H- From a surface facing a terminal.	600mm (24in.)		

## 7. System

The system must comply with requirements of BS6798 and BS5449.

General:

The appliance is only suitable for connection to indirect fully pumped sealed and open vent systems. The minimum static head is 1.2m and the maximum is 30m.

The pump **MUST** be wired to the boiler control to ensure that the pump-overflow function operates to prevent the risk of overheating and hence nuisance shutdown.

The controls must be wired to ensure that the boiler does not cycle when electronically controlled zone valves are closed.

A by-pass is required if the controls i.e. 2-port valves, can result in the closure of the CH and DHW circuits when the boiler is hot.

If mechanically operated thermostatically controlled valves are fitted then a by-pass located at least 2m from the boiler is required. An uncontrolled bathroom radiator can provide this function.

A bypass is generally unnecessary on a system using a 3 way diverter valve as one port will be open to flow at all times. This will be satisfactory for the pump over run requirement. However if TRV's are used throughout then a bypass or open radiator will be necessary.

Sealed System:

A sealed system must include an expansion vessel, pressure relief valve and pressure gauge - these are available as proprietary kits, the sealed system expansion vessel and fittings must be connected at the neutral point of the system on the entry to the pump. A pump and diverter valves are also required as appropriate to the system. Refer to Fig 5,6,7.

The sealed system must be filled through a WRc approved filling kit. Refer to Fig.8.

The appliance must not be operated without the system being full of water and correctly pressurised.

All connections in the system must withstand a pressure of up to 3 bar.

The system and the appliance must be properly vented. Repeated venting loses water from the system and usually indicates that there is a leak.

## 8. Domestic Hot Water

It is **NOT** suitable for direct water supply.

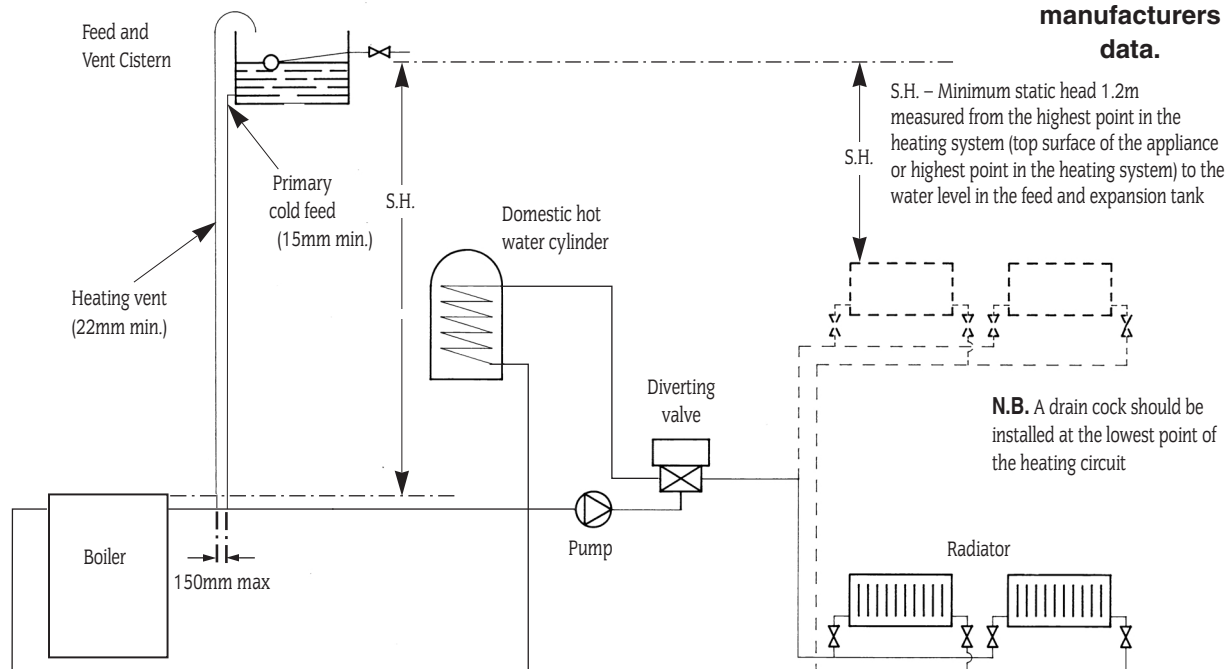
Do not connect to a direct cylinder.

The CBI can be connected to any indirect cylinder, i.e unvented or thermal store, all the benefits of a "dry loft" and mains pressure hot water can be realised. Contact Worcester Heat Systems Technical Helpline. 0990 266241.

Cylinder

Indirect coil type or a direct cylinder with an immersion calorifier that is suitable for a pressure of 0.35bar above the setting of the pressure relief valve. Single feed indirect cylinders are **NOT** suitable for sealed systems. any connection to the mains water supply must conform to the relevant Building and Water Regulations and be approved by the local Water company.

Fig. 5. System layout if using Honeywell 'Y' plan





**Please refer to  
Fig. 10. and the  
controls  
manufacturers  
data.**



Please refer to Fig. 10. and the controls manufacturers data.



## 9. Gas Supply

The local gas supplier must be contacted to check the suitability of the appliance to local gas supply conditions before connecting the appliance.

The 24CBi appliance requires a maximum of 2.76m<sup>3</sup>/h of natural gas (G20). Refer to Table 1.

The 15CBi appliance requires a maximum of 1.74m<sup>3</sup>/h of natural gas (G20). Refer to Table 1.

A natural gas appliance must be connected to a governed meter.

The installation of the gas supply to the appliance must be in accordance with BS6891.

The meter and the pipework to the appliance must be checked, preferably by the gas supplier, to ensure that a dynamic pressure of 20mbar for natural gas is available at the appliance [equivalent to about 18.5mbar at the gas valve inlet pressure connection] and that the gas flow is adequate for all the installed gas appliances.

## 10. Electrical

Mains supply: 230V 50 Hz 125watts. External fuse 5A. Internal fuse (F1) 4A. Spare internal fuse is supplied with the appliance.

The appliance must be earthed and it must be possible to completely isolate the appliance.

The mains cable must be 0.75mm<sup>2</sup> (24x0.20 mm) to BS6500 - Table 15 or 16.

The mains cable must be connected through the connector plug to the terminal marked 'PERMANENT LIVE' (red or brown lead), N (black or blue lead) and the Earth stud (green or green/yellow lead) and secured with the cable clamp. The lead must pass through the bracket. Refer to Fig.9. The pump must be connected through the connector plug to the pump L and N connections. Refer to Fig. 9,10, 11.

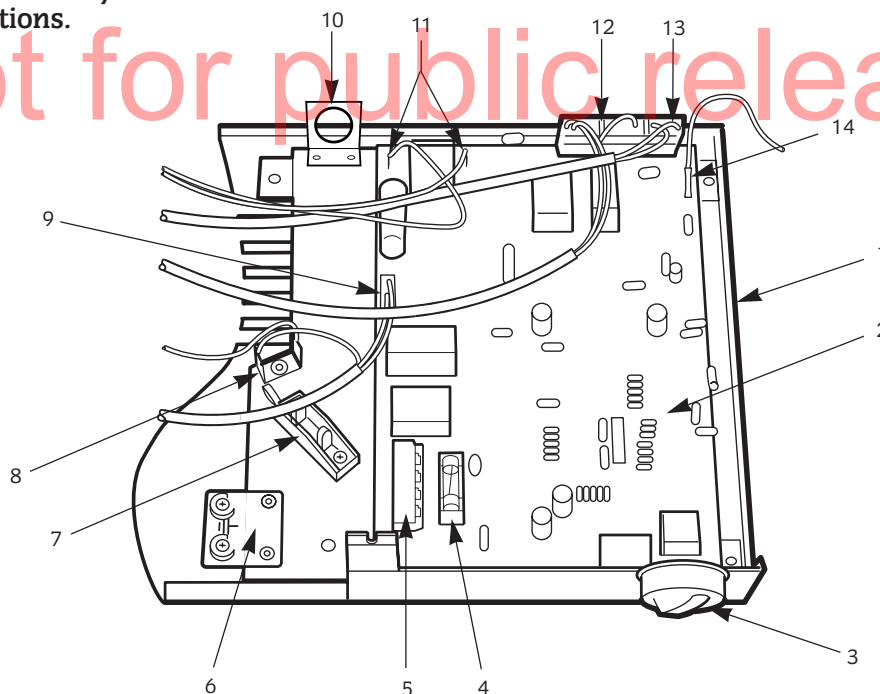
The connection to the permanent mains must be from the system junction box, itself supplied by a 5A fused three-pin plug and unswitched socket outlet (both complying with BS1363) or a double pole isolator with a contact separation of 3mm in all poles and supplying the appliance and controls only.

Frost protection of the boiler is provided on the control board.

A frost thermostat should be considered where parts of the system are remote from the appliance. For any frost thermostat function, the boiler temperature control knob must not be set to the 'OFF' position. The frost thermostat must be fitted to the system junction box in accordance with the proprietary instructions.

Safety Check: If there is an electrical fault after installation check for fuse failure, short circuits, incorrect polarity of connections, earth continuity or resistance to earth.

Fig.9 . Mains electricity and controls connections.



- |                                     |   |
|-------------------------------------|---|
| 1. Base plate                       | 9. Gas valve connection   |
| 2. Control board                    | 10. Mains lead bracket  |
| 3. Control knob                     | 11. Spark electrode connection  |
| 4. Fuse 4A                          | 12. Air pressure switch, temperature sensor, overheat thermostat connection |
| 5. External control connector block | 13. Fan connection  |
| 6. Earth screw                      | 14. Flame sense connection  |
| 7. Cable clamp                      |   |
| 8. Internal earth connection        |   |

Fig.10. Boiler wiring diagram

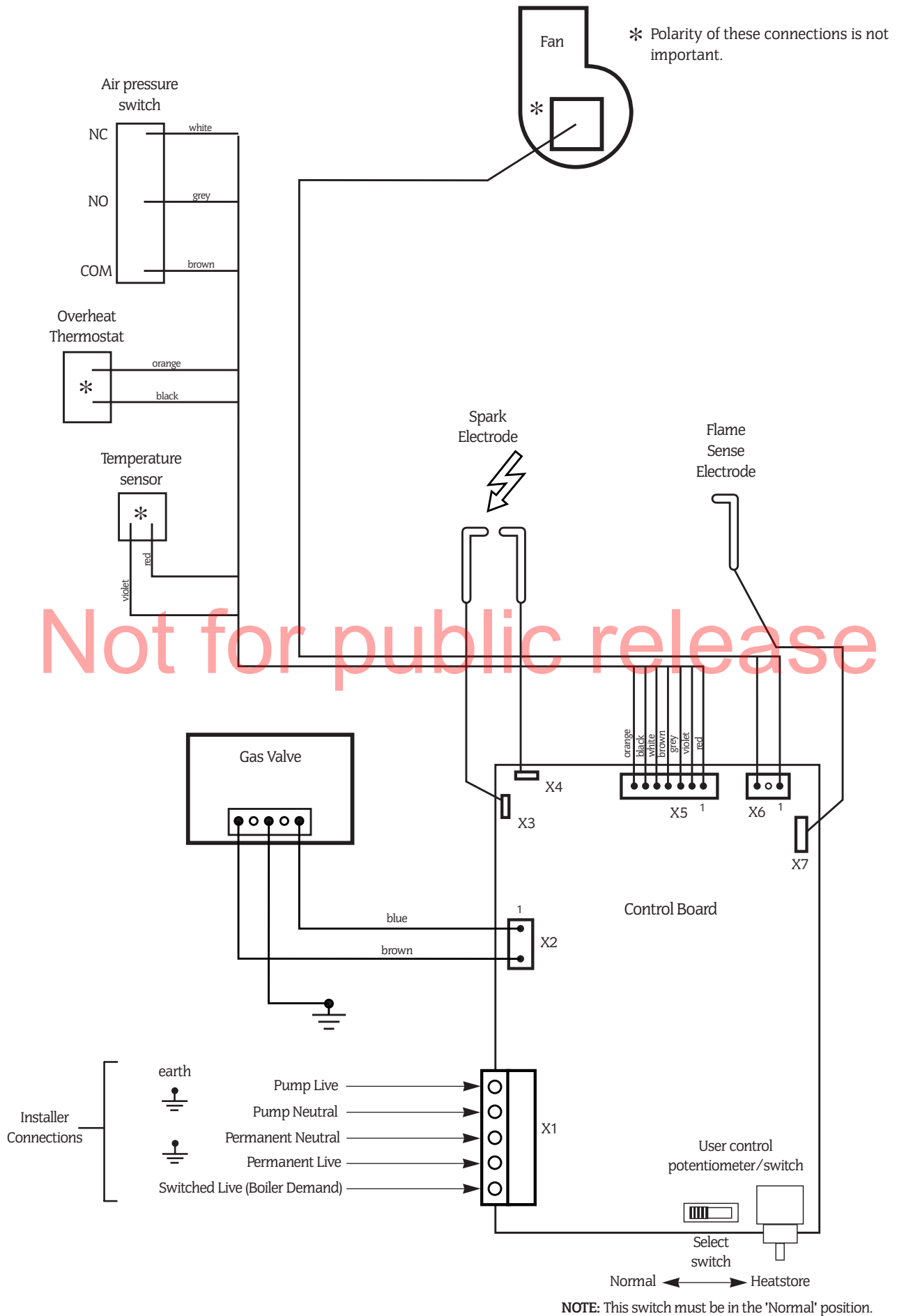
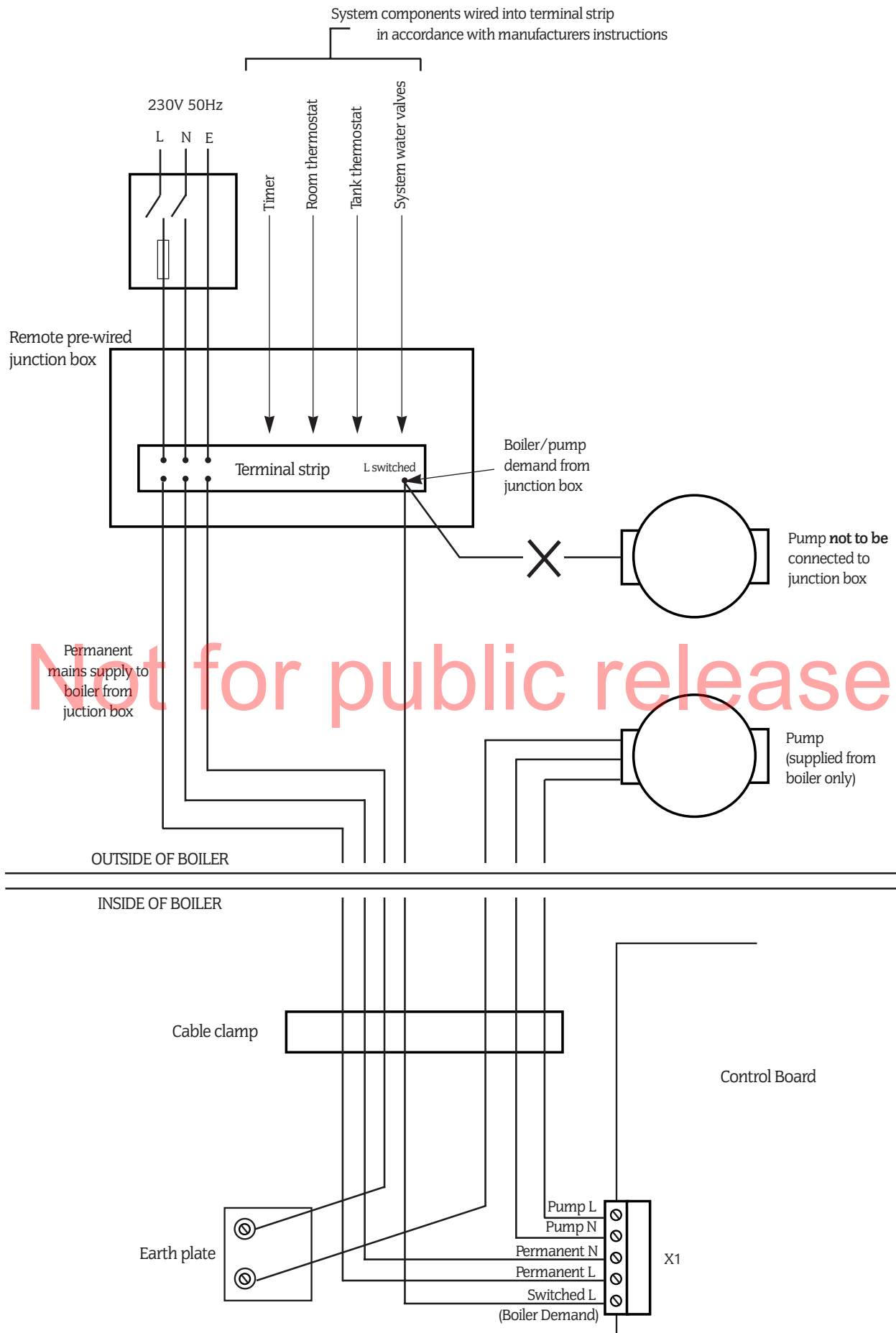


Fig.11 . System wiring diagram



## 11. Installing The Appliance

**NOTE:** READ THIS SECTION FULLY BEFORE COMMENCING THE INSTALLATION

### 11.1 Unpacking

Check the contents against the packing list.

Remove the wall mounting template, the mounting plate assembly and the external flue turret connector and restrictors.

### 11.2 Site Preparation

Check that the correct position for the appliance has been chosen and that the wall is sound, flat and will support the weight of the appliance. Refer to Sections 4 & 5 and Tables 4 and 8.

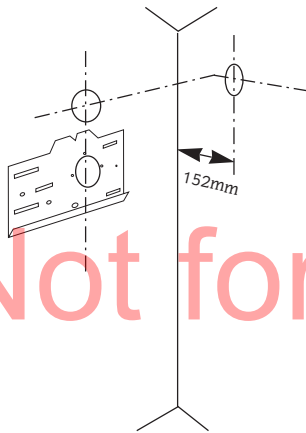
### 11.3 Fixing Holes and Flue Opening

Hold the template to the wall. Check that the template is level. Mark the position of the fixing holes and the flue opening. Refer to Fig 12. Mark the position of the bottom fixing point for a screw or optional security bolt.

**NOTE:** If access to the flue terminal may be a problem a internal fitment kit is available but must only be fitted with an external flue turret kit.

Drill the 5 fixing holes 60mm deep for the No. 12 size plugs.

**Fig. 12 . Fixing the wall mounting plate.**



To fit an external flue turret kit refer to Section 11.7.

To fit a vertical flue kit refer to Section 11.7.2/3. and the booklet supplied with the kit.

### 11.4. Installation of the Internal Rear Flue Kit

**NOTE:** This kit should not be fitted when there is an access problem to the terminal.

**No extensions or bends should be fitted to this option.**

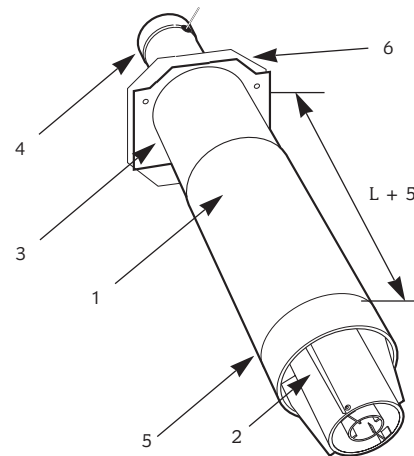
#### 11.4.1 Flue Preparation

- (i) Drill the hole for the flue at 110mm diameter.
- (ii) Fix the wall-mounting plate - do not fully tighten the screws.
- (iii) Measure the wall thickness L - Min 220mm, Max 375mm.
- (iv) Adjust the telescopic flue assembly to a length L + 5mm and secure with the screw supplied. Refer to Fig. 13.
- (v) Apply the plastic tape onto the duct in contact with the wall.
- (vi) Remove the inner flue duct (with the fixing bar).
- (vii) Push the duct assembly through the wall mounting plate and wall. Tighten the wall mounting plate screws after checking that the plate is horizontal.

#### 11.4.2 Boiler Preparation

- (i) Remove the appliance casing by removing the screw at the centre base. Disconnect the earth connection at the base and lift off.

**Fig. 13 . Flue assembly - Internal Rear**



- |                             |                                 |
|-----------------------------|---------------------------------|
| 1. Telescopic flue assembly | 4. Flue tube with fixing bar    |
| 2. Terminal                 | 5. Indents                      |
| 3. Flange                   | 6. Gasket - fitted to innercase |

- (ii) Release the four screws and remove the inner casing cover.
- (iii) Release the two wing-nuts and remove the combustion chamber front panel. The stainless steel baffle, secured by a wire clip, may be left in place. The cover is located into notches at the base of the side plates.
- (iv) Disconnect the fan electrical terminals and the sensing tube from the fan and slide the flue hood/fan assembly from the boiler.
- (v) From the literature pack select the self adhesive gasket and stick around the rear flue opening on the outside of the casing ensuring that the fixing holes are not blocked.
- (vi) Lift the boiler onto the wall mounting plate and level with the leveling screws. Refer to Sections 11.5 and 11.6 for more details.

#### 11.4.3 Installation of Flue onto Boiler

- (i) Pull the flue into position so that the holes in the flange line up with those in the case

**NOTE:** A flue restrictor must be fitted when the boiler is on the wall.

- |  |                         |       |
|--|-------------------------|-------|
|  | 15Cbi                   | 24Cbi |
|  | 76 X 60.5 (Rectangular) | 80mm  |
- (ii) Place the correct restrictor in position over the flue opening and using the screws provided fix through the inner casing into the flue system.
  - (iii) Slide the shortened, if necessary, flue tube with fixing bar into the flue.
  - (iv) Slide the fluehood and fan assembly back into position and reconnect the fan electrical terminals and sensing tubes. Refer to Fig 33a. Replace stainless steel baffle, if removed, combustion chamber front panel and 'J' bolts. Refer to Sections 11.5 and 11.6 then move on to Section 11.13 Completion of Installation.

### 11.5 Gas and Water Connection

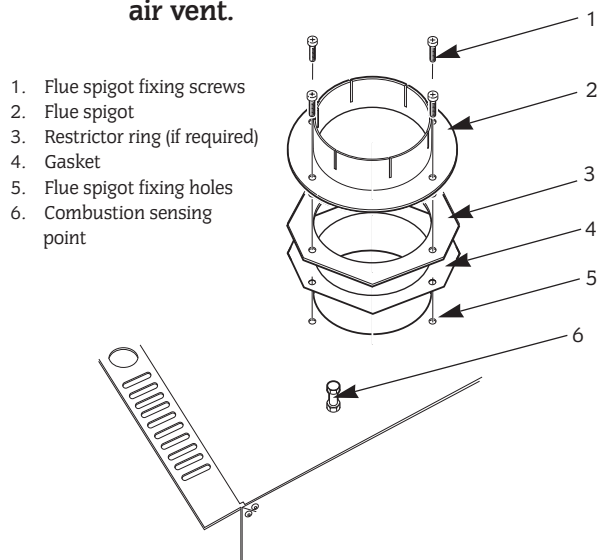
Connect the boiler gas supply pipe.

The boiler is supplied for flow and return connection at the top. If a bottom connection is required then pull out the clips, remove and refit the pipes. refer to Fig. 30.

**NOTE:** When changing the connections the pipe functions are reversed -

Top flow becomes the bottom return  
Top return becomes bottom flow

**Fig.14. Flue turret fixing and automatic air vent.**



A drain point should be fitted close to the appliance if bottom connections are made.  
The gas inlet connection nut and olive are supplied in the literature pack.  
Details of the position are shown in Fig 3.

#### 11.6 Install the Boiler

**benchmark**

**IMPORTANT:** Thoroughly flush the system before connecting the boiler.

Lift the boiler onto the wall mounting plate and fit the (optional) security bolt at the base of the boiler.

Level the boiler using the two screws at the base of the back panel. Connect the gas supply using the nut and olive supplied.

Connect the flow and return pipes. It is important that the flow and return pipes are not fixed near to the boiler using clips that put a strain on the connections.

**Always consider the possible need to disconnect and remove the boiler.**

#### 11.7 Installation of External Flue Turret Kit.

##### 11.7.1 Flue Preparation

Drill the hole for the flue at Ø110mm unless an internal fitment kit is used in which case a Ø150mm hole is required.

The method of installation of the flue system may be varied to suit the actual site conditions. The instructions for connecting and fixing the ducts must, however, be strictly followed.

Remove all packing material from the flue components.

The standard telescopic flue assembly is suitable for flues from 425mm up to 725mm measured from the centre-line of the boiler flue outlet to the outer face of the wall. Refer to Fig. 17.

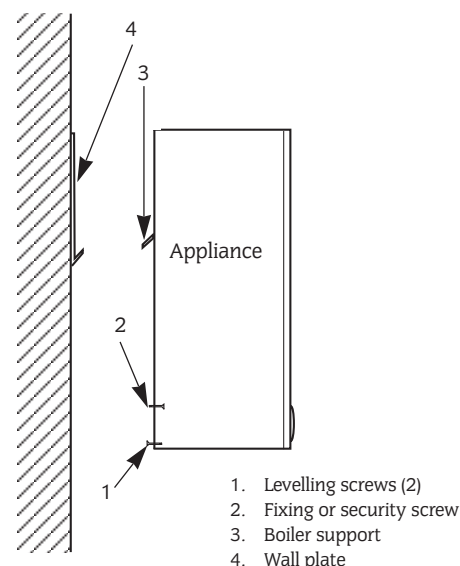
If  $L > 725\text{mm}$  then extension duct kit/s will be required - each kit extends the flue by 750mm up to a maximum of 2.5m. See table below.

EXTENSION	MAXIMUM FLUE LENGTH mm
1	1475
2	2225
3	2500

Refer to Section 11.8. and 11.9 for details of measurements and fitting of the flue kits.

Refer to Section 11.10 if an internal fitment kit is used.

**Fig. 15 . Fixing the appliance to the wall mounting plate.**



##### 11.7.2 Boiler Preparation

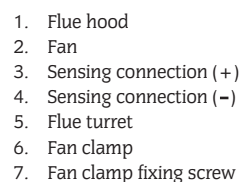
- Remove the appliance casing by loosening the screw at the centre base. Disconnect the earth connection at the base and lift off.
- Release the four screws and remove the inner casing cover.
- Release the two wing-nuts and remove the combustion chamber front panel. The stainless steel baffel, secured by a wire clip, may be left in place. the cover is located into notches at the base of the side plates.
- Disconnect the fan electrical terminals and sensing tube from the fan and slide the fluehood /fan assembly from the boiler.
- Remove the cover plate from the top of the inner casing and refit onto the rear flue opening ensuring a good seal.
- From the literature pack select the self adhesive gasket and stick around the top flue opening on the outside of the casing ensuring that the fixing holes are not blocked.
- Fix the flue spigot and restrictor (if the flue is less than 1m in length) to the top of the inner casing. refer to Fig.14.

IMPORTANT:	External Turret Restrictors	
	15CBi	24CBi
Horizontal	Multi Hole upto 1m only	86 upto 1m only
Vertical	79 with terminal only	89 with terminal only

Refer to Sections 11.5 and 11.6 for installation of boiler onto wall.

- (i) Remove the fan from the fan/fluehood assembly by removing the two fan flange fixing screws and also releasing the fan clamping bracket.
- (ii) The pressure tube extension connectors can be discarded from the unit.
- (iii) Refit the fluehood only, back into the boiler in the opposite direction to before ensuring that the fluehood hits the stops at the rear and the rear combustion chamber is slotted underneath. See Fig.17.
- (iv) With the fluehood on the boiler refit the fan by:
  - (a) Un-hitching the fan lead from the top clip.
  - (b) With the fan in close proximity to the fluehood re-attach the fan electrical terminals to the fan. The polarity of the connection to the fan motor is not important.
  - (c) Refit the fan onto the fluehood. The rear flange should slide into the clips at the rear of the fluehood.
  - (d) The fan should then slide upwards to enable the fan clamp to be fitted and tightened in position.

4. Inner casing cover
2. Control knob
3. Indicator lights
4. Casing fixing clip
5. Base/controls assembly fixing screw
6. Gas valve
7. Viewing window
8. Temperature sensor and Overheat thermostat
9. Air pressure switch
10. Flow pipe
11. Return pipe
12. Combustion test point
13. Inner casing cover fixing screws (4)
14. Outer case earth tag.





### 11.8 Measure and Cut the Ducts.

**General:** Cut the ducts as necessary, ensuring that the ducts are square and free from burrs. Always check the dimensions before cutting.

Measure the distance L. Refer to Fig.20 and 21.

The standard flue can be telescopically adjusted to any length between 425mm and 725mm.

Fix the flue assembly together using the self-tapping screws provided. Refer to Fig.18.

It will only be necessary to cut the standard assembly if  $L < 425\text{mm}$ . Cut the flue turret assembly and the terminal assembly by the same amount i.e  $L = 350$  - remove 75mm from each assembly.

Minimum side flue length = 335mm (accommodating a 10mm Service clearance and a 100mm wall)

Minimum rear flue length = 296mm (accommodating a 100mm wall)

If L is between	1175 - 1475mm	(1 extension)
	1925 - 2225mm	(2 extension)

it is not necessary to cut the ducts

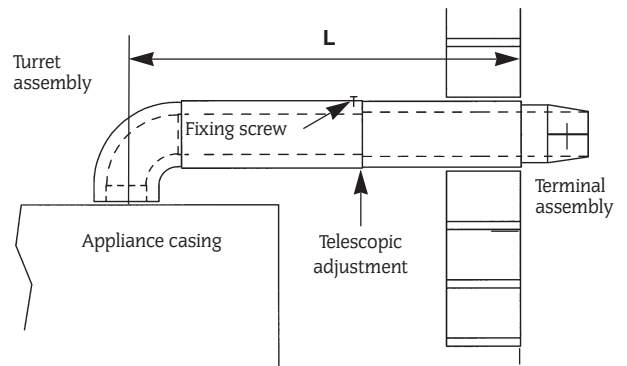
If L is between	725 - 1175mm	(1 extension)
	1475 - 1925mm	(2 extension)
	2225 - 2500mm	(3 extension)

90° and 45° bends are available. A maximum of two 45° bends or one 90° bend may be used in addition to the first bend on the flue turret.

A 90° bend is equivalent to 1m of straight duct.

A 45° bend is equivalent to 0.5m of straight duct.

**Fig.18 . Standard flue assembly.**



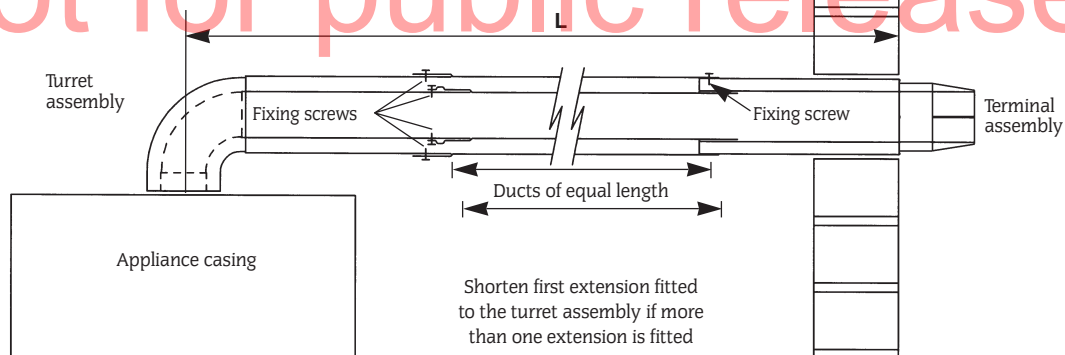
it is necessary to shorten the assembly by cutting the first extension duct assembly i.e.  $L = 1000\text{mm}$  - remove 175mm from the air and flue ducts.

**NOTE:** Extension duct measurements do not include the socketed end. Unless specifically instructed the socketed end must not be removed.

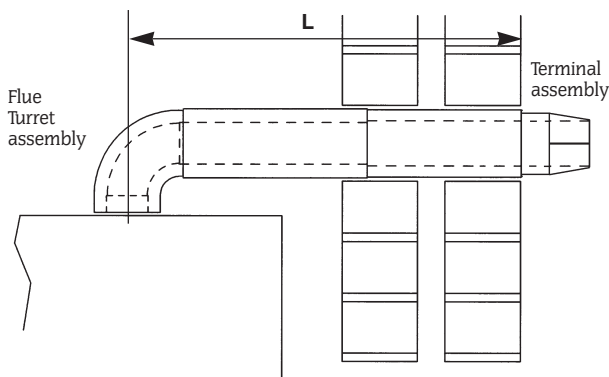
Fix the flue ducts together before fixing the surrounding air duct, the cut ducts fit into the flue assembly.

**11.9. Fitting the Flue Assembly with Access to the Terminal.**  
Prepare the flue duct assembly as described in Section 11.8.

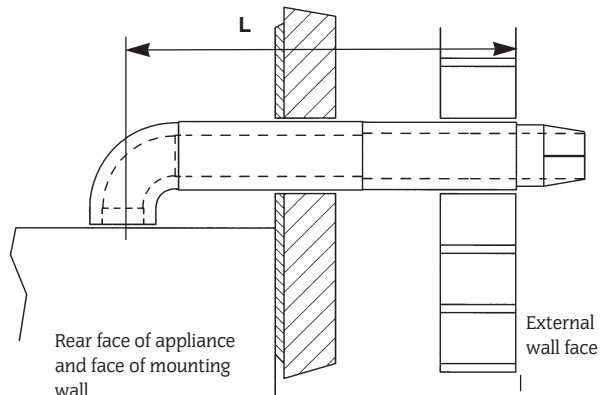
**Fig.19 . Extension Duct.**



**Fig.20. Flue duct length (side flue).**



**Fig.21 . Flue duct length (rear flue).**





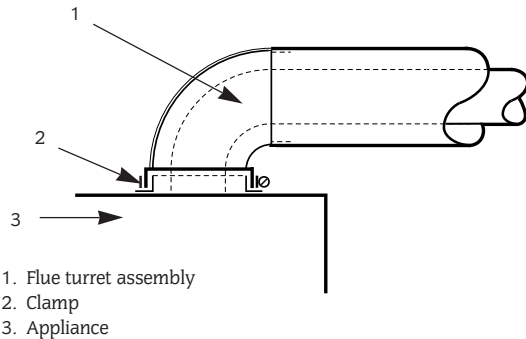
Apply the plastic tape to the air duct in contact with the external brickwork.

From inside push the assembly through the wall. Align the flue turret and push fully onto the spigot on the appliance. Tighten the clamping ring. Refer to Fig.22.

Make good the internal wall face and the external brickwork or rendering.

Replace the inner casing.

**Fig.22 . Flue Turret Fixing .**



#### 11.10 Fitting of the Flue Assembly without access to the Terminal.

The rubber gasket kit is available from Worcester Heat Systems. NOTE: A larger diameter opening ( $\varnothing 150\text{mm}$ ) in the wall is required. Refer to Table 2.

Prepare the flue assembly as described in Section 11.8.

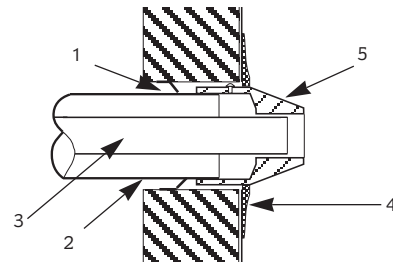
Fit the rubber sealing gasket centrally onto the terminal assembly and tighten the clamp. Refer to Fig. 23.

Apply the plastic tape to the air duct in contact with the external brickwork.

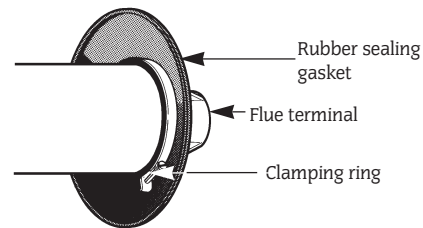
From inside push the assembly through the wall so that the gasket flange is against the outer face. Refer to Fig. 23.

It may be necessary to adjust the legs of the flue centering ring. Align the flue turret and push fully onto the socket on the appliance. Tighten the clamping ring. Refer to Fig 22.

**Fig.23 . Terminal assembly for internal fitting of the flue.**



- |                        |                          |
|------------------------|--------------------------|
| 1. Flue centering ring | 4. Rubber sealing gasket |
| 2. Air duct            | 5. Flue Terminal         |
| 3. Flue duct           |                          |



Seal the gap around the duct at the inner wall face with the flexible seal provided and make good.

Replace the inner casing.

#### 11.11 Flue Bends.

90° and 45° bends are available. A maximum of two 45° bends or one 90° bend may be used in addition to the first bend on the flue turret.

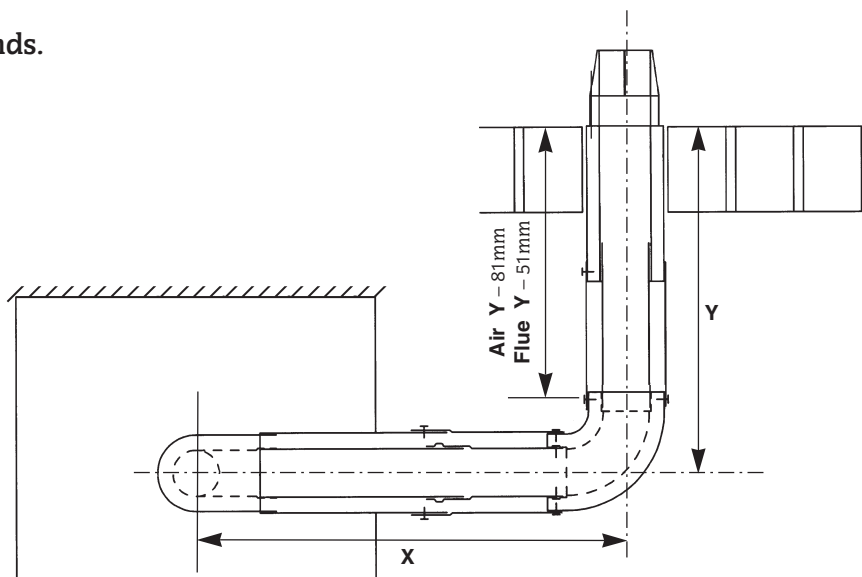
A 90° bend is equivalent to 1m of straight duct.

A 45° bend is equivalent to 0.5m of straight duct.

Measure the lengths X and Y. Refer to Fig.24.

The maximum value of X using the turret assembly only is 506mm. Reduce the ducts to the appropriate length i.e. X = 406mm, cut 100mm from the air duct and 120mm (to cover the entry into the 45° or 90° elbow) from the flue duct. Refer to Fig.24.

**Fig. 24. Flue bends.**



The final section, dimension Y, of the flue system must include a section of plain duct assembly i.e. an extension assembly with the sockets removed. Reduce the final section, including the terminal assembly, by the appropriate amount i.e. Air duct Y - 81mm and the flue duct Y - 51mm. Refer to Fig.24.

If  $Y < 425\text{mm}$  it will be necessary to cut the air and flue ducts of the extension to a plain length of 100mm and reduce the length of the terminal assembly i.e  $Y = 350\text{mm}$  - remove 75mm from the terminal assembly.

If Y in 425 - 725mm it is not necessary to cut the terminal assembly or use a second extension duct as the length can be set telescopically.

If  $Y > 725\text{mm}$  then two extension duct assemblies will be required, the first assembly being cut to length as plain tubes.

If more than two extension ducts are needed in any section to achieve the required length then the final section of the assembly must not be less than 325mm without cutting the terminal assembly.

NOTE: The flue duct of the final extension must be 30mm longer than the air duct.

Each section must be connected to the previous section of the flue bend by fixing the flue ducts together and then similarly fixing the air ducts which engage the elbows.

Fit the assembly as described in Section 11.9, 11.10 as appropriate.

Make good the internal and external brickwork or rendering.

#### 11.12 Vertical Adapter for Horizontal Flues.

An adapter is available for an initial short section of vertical flue. Refer to Fig. 26.

Measure and cut the flue as described in Section 11.11.

The first, vertical, section (equivalent to dimension X) is measured from the top of the boiler casing. Cut the vertical section of the extension duct to 167mm less than the measured distance. Do not remove the socketed ends.

The minimum measured distance is 167mm.

Seal the air duct to the turret using silicone sealant.

#### 11.13 Completion of the Installation.

Check that all the gas and water connections have been tightened.

Refit fan to boiler with the rear flange sliding into the clips at the back of the flue hood.

Re-connect the electrical connections and the sensing tubes. Refer to Fig. 34 and 34a.

Tighten the clamp. Refer to Fig.34.

Lower the base plate/control panel. Refer to Fig.32.

The permanent mains and switched live supply to the boiler must come from the system junction box. Refer to Fig.11. A 4 core cable is recommended.

Feed the 4 core cable and the pump cables through the bracket and secure in the cable clamp. Refer to Fig. 27.

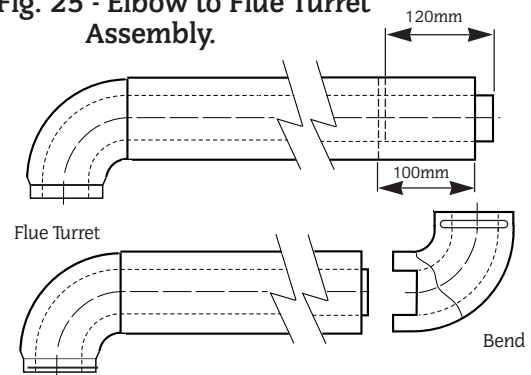
Fit all the supply and pump wires to the 5 way plug before fitting the plug to the socket on the board. This will avoid stress to the board when using a screwdriver. Refer to Fig.11. for the connections.

Check that all the cables cannot touch the inner casing.

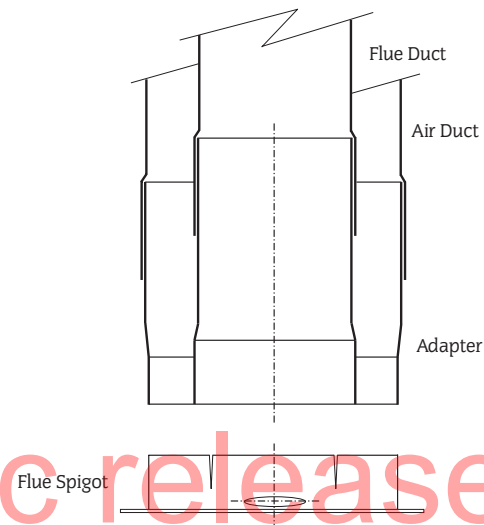
Test for gas soundness as described in BS6891.

If the appliance is not commissioned immediately, refit the combustion cover, inner casing cover, base/controls assembly and the casing. Re-connect the earth connection at the base of the casing. Check that the gas and electricity services have been turned off.

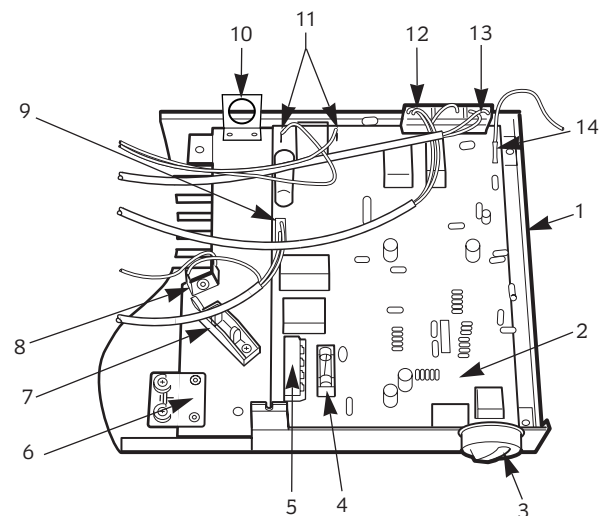
**Fig. 25 - Elbow to Flue Turret Assembly.**



**Fig.26 Vertical Adapter.**



**Fig.27 . Mains electricity and controls connections.**



- |                                     |   |
|-------------------------------------|---|
| 1. Base plate                       | 10. Mains lead bracket  |
| 2. Control board                    | 11. Spark electrode connection  |
| 3. Control knob                     | 12. Air pressure switch, temperature sensor, overheat thermostat connection |
| 4. Fuse 4A                          | 13. Fan connection  |
| 5. External control connector block | 14. Flame sense connection  |
| 6. Earth screw                      |   |
| 7. Cable clamp                      |   |
| 8. Internal earth connection        |   |
| 9. Gas valve connection             |   |

## 12. Commissioning The Appliance

**Benchmark** Water Treatment: For optimum performance after installation, this boiler and its associated central heating system should be flushed in accordance with the guidelines given in BS7593: 1992 – Treatment of water in domestic hot water heating systems. Full instructions are supplied with proprietary cleansers sold for this purpose. If an inhibitor is to be used after flushing, it should be used in accordance with the manufacturers instructions. Suitable flushing agents and inhibitors are available from Betz Dearborn on 0151 4209563 or Fernox on 01799 550811.

12.1 Loosen the screw, disconnect the earth and lift off the casing. Check that the electricity and gas supplies to the appliance are turned off and that all the water connections throughout the system are tight.

Open any system valves.

Open all the radiator valves. Remove any air vent caps.

If a sealed system has been installed then fill through a WRC approved filling kit to a pressure of 2.5bar.

Check for water soundness throughout the system.

Vent each radiator in turn.

Remove the cap from the pump and turn the shaft about half a turn. Replace the cap.

Check that the relief valve (sealed system) operates by turning the knob anti-clockwise until it releases.

12.2 Set the Expansion Vessel Pressure - Sealed System

The charge pressure of an expansion vessel is usually 0.5bar, which is equivalent to a static head of 5m [17ft].

The charge pressure must not be less than the static head at the point of connection. The expansion vessel must be charged to 0.3bar less than the initial system design pressure.

Note: 1bar = 10.2m = 33.5ft of water.

12.3 Set the System Pressure

Fill the system until the pressure gauge is at 2.5bar and check for leaks. Release water through the relief valve until the required system pressure is obtained, up to a maximum of 1.5bar.

Set the pointer on the pressure gauge to record the set system pressure. If the pressure indicated on the gauge is greater than 2.65bar when operating at the maximum central heating temperature, the expansion vessel is too small and a larger vessel must be fitted. The boiler with a 10 litre expansion vessel can accommodate a sealed system volume of about 90 litres. Refer to BS7074 Part 1, BS5449 and Table 9.

12.4 Clock/Programmer

Any controls fitted to the system should be set up at this stage.

12.5 Check that the gas and electricity supplies are turned off. Connect a pressure gauge to the burner pressure test point on the gas valve. Refer to Fig. 28.

12.6 Light the Boiler

Set the temperature control knob to maximum and any clocks or programmer to operate continuously.

The gas supply pipe will be purged by the boiler.

The control will work as follows:

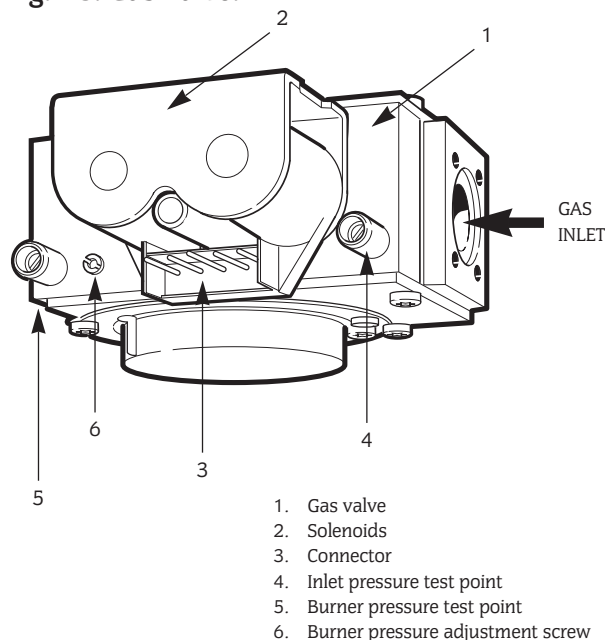
- (i) Pre-purge (air) for approximately 20 seconds.
- (ii) Spark and gas for approximately 5 seconds
- (iii) Pre-purge (air) for approximately 10 seconds

**The boiler will attempt to light a maximum of 5 times before going to lockout. To reset the product turn the control knob fully anti-clockwise and back.**

**NOTE:** The burner pressure is factory set and may be reset to match the system requirements. If, after checking that the supply pressure is sufficient i.e. 18.5 mb approx [NG] at the gas valve inlet pressure test point, the required pressure cannot be obtained then contact Worcester Heat Systems Service Department.

Reset the pressure as necessary by adjusting the screw on the gas valve. Refer to Table 1 and Fig.28.

Fig. 28. Gas Valve.



12.7 Domestic Hot Water

Check that all external controls are calling for heat and that the flow pipe to the cylinder is hot after a short period. Check that the cylinder thermostat, if fitted, is set to about 55°C.

12.8 Central Heating

Check that all the radiators heat up evenly. If necessary carefully vent.

12.9 Balance the system to give the correct temperature differential. Refer to Table 3. Refer to Section 7. for bypass requirements

12.10 Set the room thermostat to minimum and check that the burner goes out. Reset the room thermostat and the burner will re-light. Turn off the gas service cock at the boiler. The burner will go out but, after a short pause, the appliance will make 5 attempts to restart sparking for 5 seconds and then 'lock-out'. After 60 seconds carefully open the gas service cock at the boiler, operate the reset control and observe the burner re-light and follow the normal sequence of operation. Refer to Fig. 29.

Turn off the gas service cock at the boiler and the electricity supply to the appliance.

Drain the system while the appliance is hot.

Refill, vent and re-pressurise the system (Sealed System) adding a suitable proprietary inhibitor. Further information is available from WHS Technical Information Dept, Telephone 0990 266241.

12.11 Completion of Commissioning

Disconnect the pressure gauge from the gas valve and tighten the test point screw.

Restart the appliance and check for gas soundness around the test point screw.

Fix the red arrow on the data plate to show the boiler setting. If the setting has been altered this should be re-sealed by a dab of paint to stop un-authorized adjustment.

Refit the casing, reconnect the earth and tighten the clip.

If the appliance is to be passed over to the user immediately then set any controls to the users requirements.

If the appliance is to be left inoperative in frosty conditions then set a programmer, if fitted, to continuous and the appliance to operate at a low temperature under the control of a frost thermostat, if fitted to protect remote parts of the system.

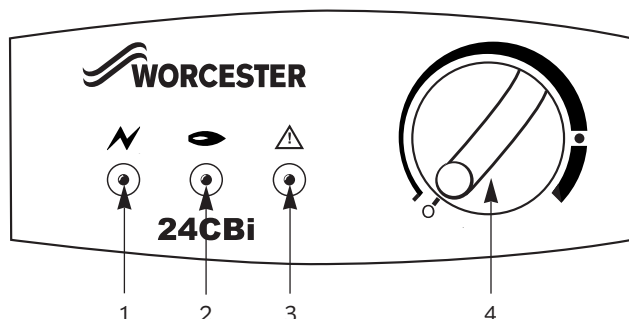
The boiler has its own integral frost protection which will also protect a compact system.

If there is any possibility of the appliance being left totally unused in freezing conditions then switch off the gas and electricity and drain the appliance and the system.

Complete the Benchmark Log-book.

## 13. Instructions To The User

Fig. 29. User controls.



1. Boiler demand
2. Burner ON
3. Lock-out
4. Temperature control knob / ON-STANDBY / Lock-out reset



13.1 Hand over the User Booklet and the Benchmark Log-book and explain how to operate the appliance safely and efficiently.

13.3 Tell the user what to do if the appliance is not to be used in very cold conditions.

13.4 Tell the user what to do if the system (Sealed System) pressure falls.

13.5 Explain that regular servicing, of a maximum of 12 months between services, will maintain the safe and efficient operation and extend the life of the appliance. WHS can offer a comprehensive maintenance contract.

13.6 Tell the user that any work on the appliance must only be carried-out by a competent person.

## 14. Inspection And Service

14.1 The extent of the service will be determined by the operating condition of the appliance. It is the law that any service work is carried-out by a competent person.

### 14.2 Inspection

Check that the terminal and the terminal guard, if fitted, are clear and undamaged.

If the appliance is in a compartment or cupboard check that the specified clearances are clear. Refer to Table 8.

Check all the joints and connections in the system and remake any that show signs of leakage. Refill and re-pressurise (Sealed System) as described in Section 12-Commissioning.

Operate the appliance and take note of any irregularities. Refer to Section 18-Fault Finding.

Check the combustion performance

Lift off the cap from the sample point on the top of the boiler and connect the meter. Refer to Fig 30/30a.

With the appliance at maximum rate and stable expect readings of about 6.5% - 7.4% CO<sub>2</sub> and 0.004% - 0.007% CO.

**Refit the sample point cap after the test.**

Always test for gas soundness after the service has been completed. Disconnect the electrical supply at the mains and turn off the gas supply at the gas service cock on the appliance before starting any service procedures.

### 14.3 Component Access

Remove some or all of the following parts to gain access to components.

**Casing.** Loosen the screw, disconnect the earth connection at the base and lift off. Refer to Fig 16.

**Base/Control Assembly.** Unscrew the single screw and lower. Refer to Fig 16.

**Inner Casing.** Loosen but do not remove the bottom centre screw. Unscrew the four screws and remove. Refer to Fig 16.

**Combustion Chamber Cover.** Loosen but do not remove the two wing-nuts and remove the chamber cover.

**NOTE: 15CBI** The right hand side bolt and bracket must be removed.

Unhook the J bolts. It is located in notches at the base of the side plates. Refer to Fig 30.

**Fan - Internal Rear Flue.** Remove the combustion chamber cover. Carefully pull off the electrical connections and the tubes from the air flow detector. Slide out the fan and flue hood assembly. Ensure that the replaced hood passes under the lip at the rear of the appliance.

**Fan - External Flue.** Remove the combustion chamber cover. Carefully pull off the electrical connections and the tubes from the air flow detector. Loosen the two clamps to remove the fan . Refer to Fig 34.

**Flue Hood - External Flue.** Remove the fan, see above. Remove the combustion chamber cover and withdraw the hood. Ensure that the replaced hood passes under the lip at the rear of the appliance.

**Burner Blade Assembly.** Remove the combustion chamber cover. Undo the screw at the right hand end of the burner. Carefully pull-off the connections to the spark electrode. Slide the burner blade assembly off the injector and remove. Carefully pull off the flame sense electrode lead. Refer to Fig 33/33a.

### 14.4 Component Cleaning

Do not use a brush with metal bristles to clean components.

Clean the fan taking care not to block air flow detector.

Clean the burner to ensure that the blades are clear. Do not use a metal probe to clean the injector.

Clean the electrodes and check the alignment. Replace if there is any sign of deterioration.

Clean the heat exchanger from top and bottom after covering the burner injector. To clean the heat exchanger flueways remove the stainless steel baffles from the appliance - the rear combustion chamber can be tilted for better access. The front and rear flueways can be cleaned with a brush being careful to protect the rear combustion chamber insulation. The inner flueway can be cleaned with a scraper.

Check the combustion chamber insulation and replace if there is any sign of damage or deterioration. Refer to Section 15.4.11. Carefully refit any components removed and check that all screws are tight and the connections properly re-made with the appropriate gaskets/O-rings/seals.

Re-commission, as necessary, for correct operation to the users requirements. Refer to Section 12 Commissioning.

## 15. Replacement Of Parts

**Important:** Turn off the gas and electricity supplies and drain, where necessary, before replacing any components.

**15.1** Always check for gas soundness where relevant and carry-out functional checks as described in Section 12-Commissioning. Any O-ring, gasket or seal that appears damaged must be replaced.

### 15.2 Component Access

Refer to Section 14.3 Inspection and Servicing for access to components.

### 15.3 Draining the Appliance

Isolate the appliance.

Remove the casing. Refer to Section 14.3.

Fit a tube to the drain connection from the system (top connection only) and open the tap. Refer to Fig 31. Close the tap when the flow has stopped.

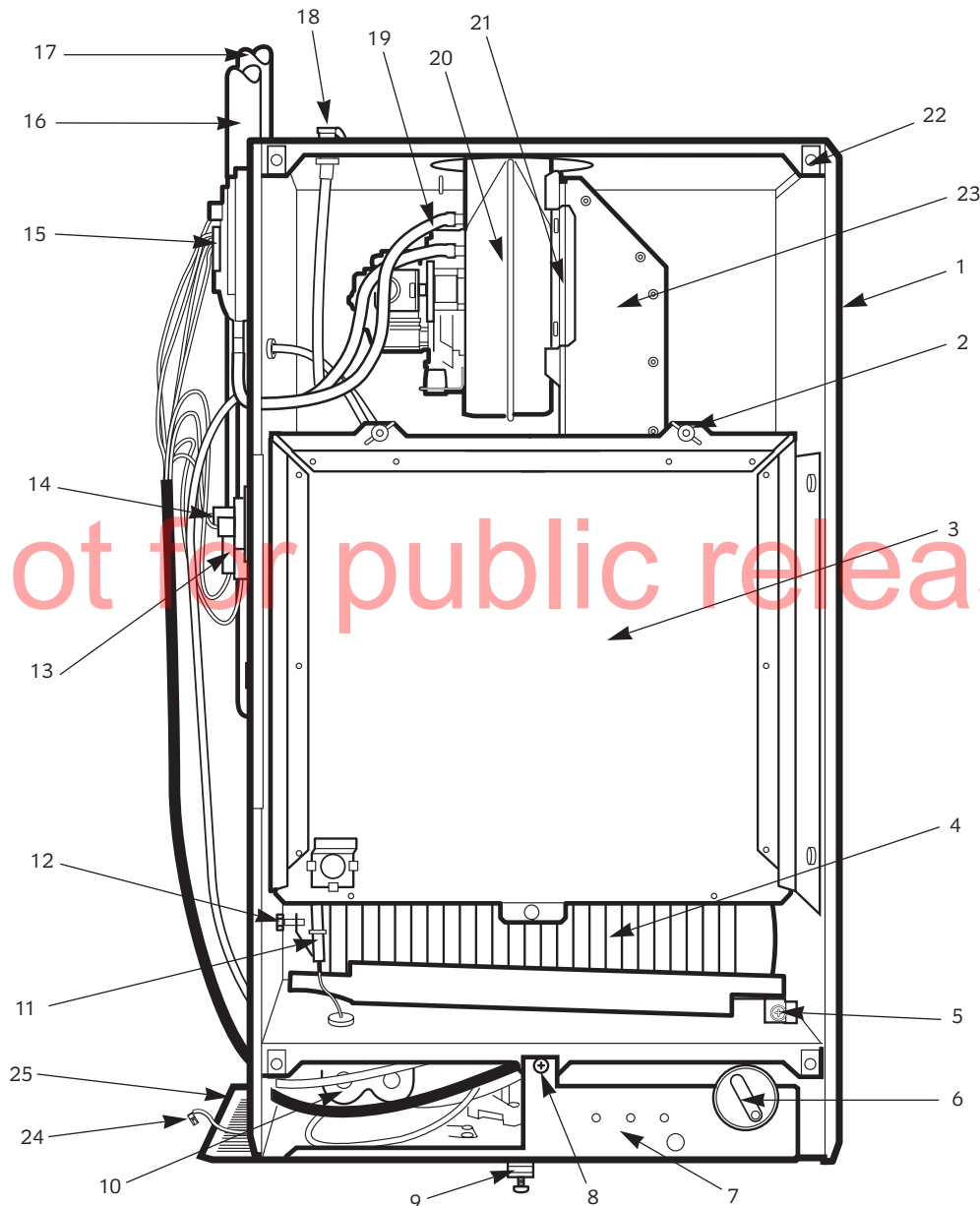
**IMPORTANT:** A small quantity of water will remain in some components. Protect any electrical components when removing items that might retain water.

### 15.4 Component Replacement

Replace any components removed from the appliance in the reverse order using new gaskets/O-rings/sealant/heat transfer paste where necessary. Always check that any electrical connections are correctly made and that all screws are tight.

**Fig. 30. Inner Casing and control**

**24CBi**



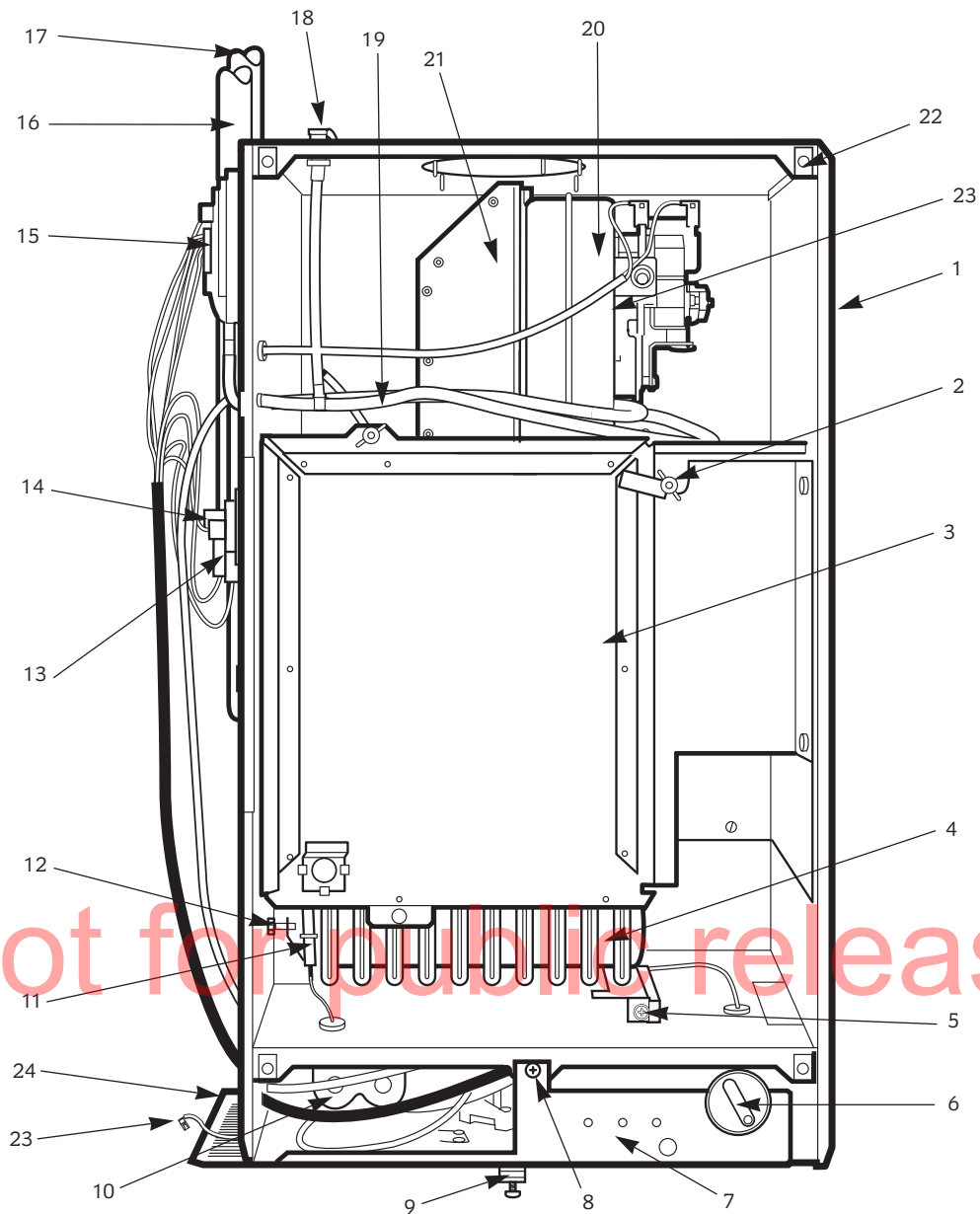
1. Inner case
2. J bolts and wing nuts (2)
3. Combustion chamber cover
4. Burner
5. Burner fixing screw
6. Control knob
7. Indicator lights
8. Base/controls fixing screw
9. Cabinet fixing screw
10. Gas valve
11. Spark electrode
12. Burner injector
13. Temperature sensor

14. Overheat thermostat
15. Air pressure switch
16. Flow pipe
17. Return pipe
18. Combustion test point
19. Sensing tubes
20. Fan
21. Fan clamp (2 screws)
22. Inner case cover fixing points (4)
23. Flue hood
24. Outer case earth tag
25. Side cover plate



Fig. 30a. Inner Casing and control

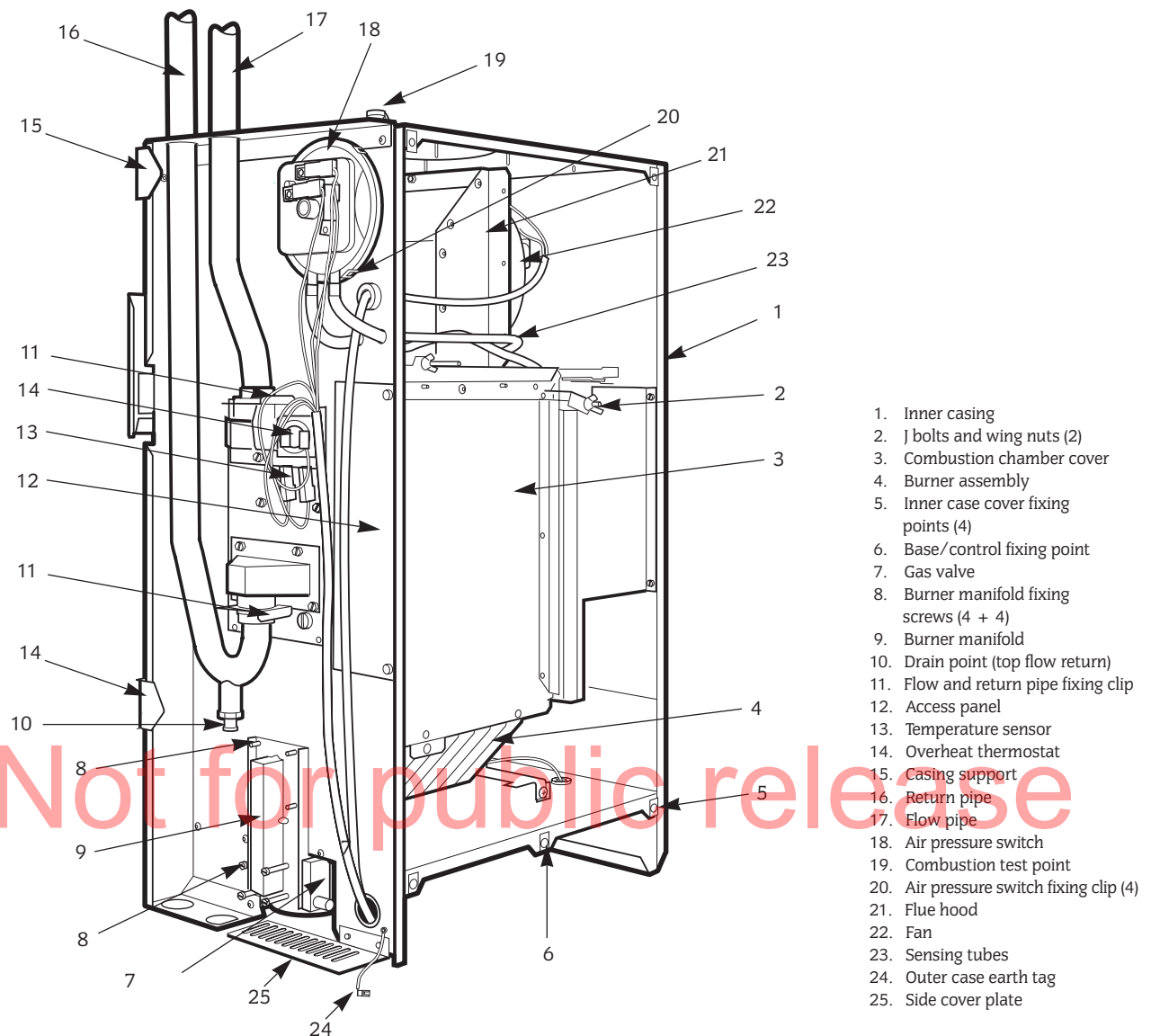
15CBi



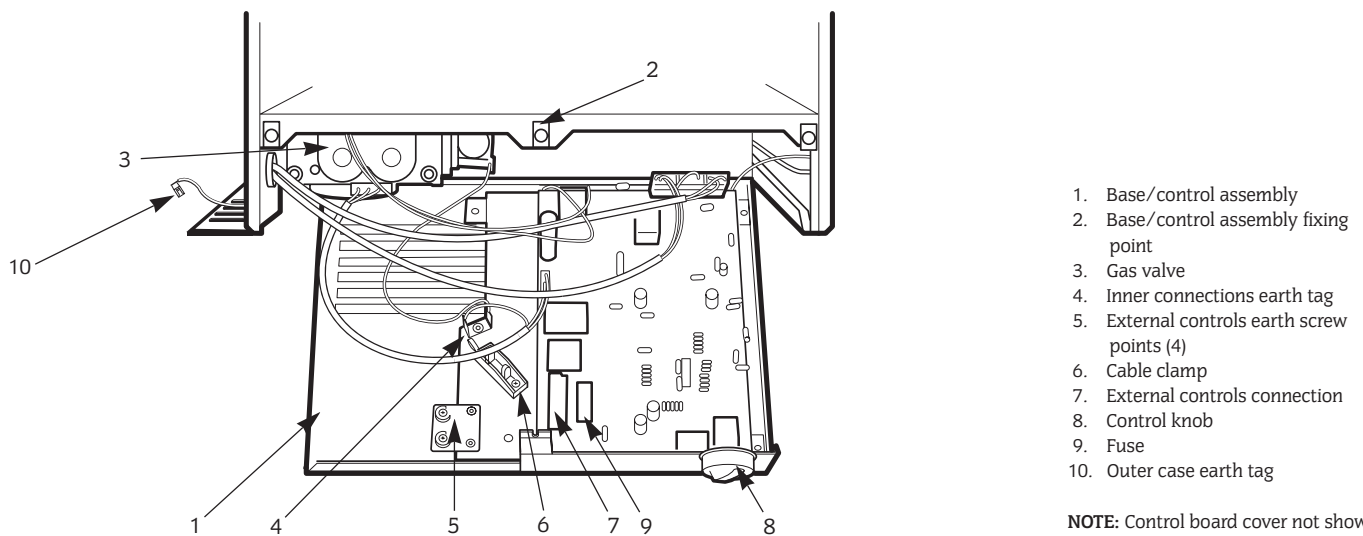
1. Inner case
2. J bolts and wing nuts (2)
3. Combustion chamber cover
4. Burner
5. Burner fixing screw
6. Control knob
7. Indicator lights
8. Base/controls fixing screw
9. Cabinet fixing screw
10. Gas valve
11. Spark electrode
12. Burner injector

13. Temperature sensor
14. Overheat thermostat
15. Air pressure switch
16. Flow pipe
17. Return pipe
18. Combustion test point
19. Sensing tubes
20. Fan
21. Flue hood
22. Inner case cover fixing points (4)
23. Outer case earth tag
24. Side cover plate

**Fig. 31 . Inner Casing - Gas and Electric Controls. 15CBi shown.**



**Fig. 32 . Base/Control Board Assembly**



**NOTE:** Control board cover not shown.

#### 15.4.1 Gas Valve

**NOTE:** If the left hand clearance is  $>50\text{mm}$  then the gas valve can be replaced with the burner and combustion chamber cover in place by unscrewing the four extended screws at the manifold on the outside of the inner casing.

Check that the gas supply is isolated

Remove the inner casing cover, the combustion chamber cover and the burner blade assembly. Refer to Section 14.3.

Unscrew and lower the base plate/control assembly.

Unplug the electrical connection at the gas valve.

Unscrew and remove the cover plate adjacent to the manifold.

Undo the four screws securing the gas cock to the valve. Take care not to damage the control panel.

Undo the four pozi head screws to remove the gas valve and burner manifold assembly.

Unscrew the four screws to separate the gas valve from the manifold.

Use new O-rings when replacing the valve.

Set the Gas Valve:

Connect a pressure gauge to the burner pressure test point on the valve. Refer to Fig. 28.

Switch on the gas and electricity supplies. Check for gas soundness at the gas valve inlet.

Refer to Section 12- Commissioning for the method of checking the pressures.

Check for gas soundness at the gas valve outlet.

Adjust the gas valve to obtain the required pressure. Refer to the data plate on the cabinet where required pressure will be indicated.

The adjustment screw must be sealed to stop unauthorized adjustment.

The adjustment screw must be sealed by a dab of paint to stop unauthorized adjustment.

Switch off the appliance, disconnect the pressure gauge and tighten the test point screw. Refer to Fig. 28.

Check for gas soundness.

#### 15.4.2 Spark Electrode

Remove the inner casing cover and the combustion chamber cover.

Carefully pull off the leads at the electrodes. Remove the burner blade assembly. Refer to Section 14.3.

Unscrew and remove the electrode assembly. Refer to Fig. 33 and 33a.

#### 15.4.3 Flame Sense Electrode

Remove the inner casing cover and the combustion chamber cover.

Pull off the connections to the spark electrode. Carefully remove the burner blade assembly. Refer to Section 15.4.4.

Carefully pull off the lead from the electrode.

Unscrew and remove the electrode assembly. Refer to Fig. 33 and 33a.

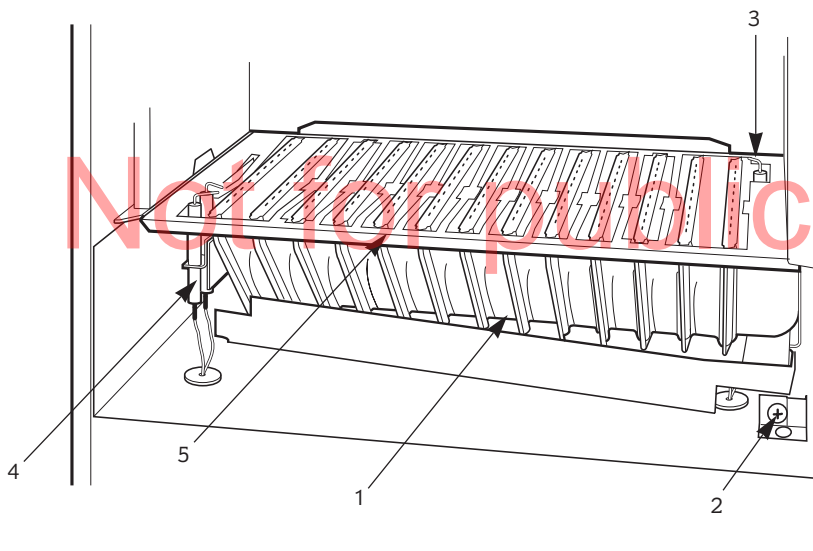
Ensure that the new electrode is at the correct height above the burner blade.

#### 15.4.4 Burner Blade Assembly

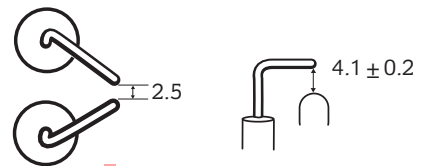
Remove the inner casing cover and the combustion chamber cover.

Remove the burner blade assembly. Refer to Section 14.3.

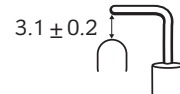
Fig. 33 . Burner Blade Assembly 24CBi



#### Spark Electrode Gaps

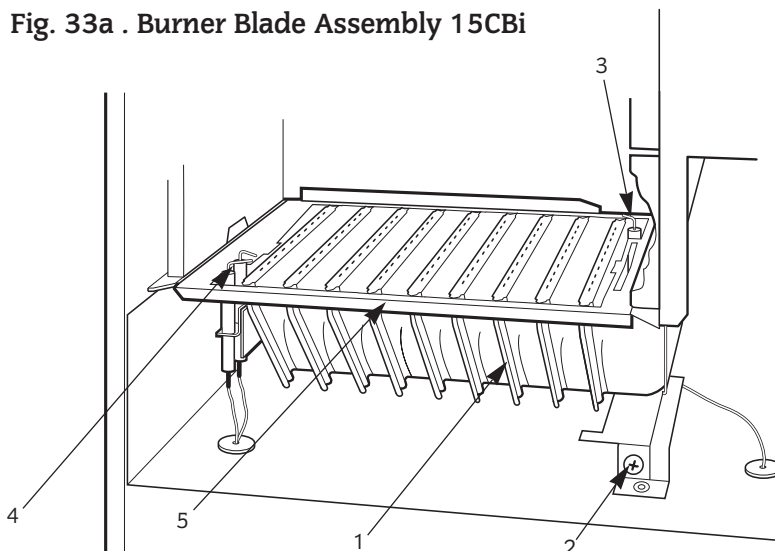


#### Flame Sense Electrode Gap

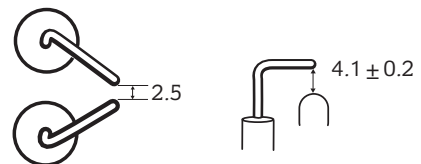


1. Burner blade assembly
2. Burner fixing screw
3. Flame sense electrode
4. Spark electrode
5. Burner baffle (not removable from the burner)

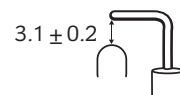
Fig. 33a . Burner Blade Assembly 15CBi



#### Spark Electrode Gaps



#### Flame Sense Electrode Gap



1. Burner blade assembly
2. Burner fixing screw
3. Flame sense electrode
4. Spark electrode
5. Burner baffle (not removable from the burner)



#### 15.4.5 Control Board

Lower the base plate/control assembly and carefully disconnect the plug-in connector and all the electrical connections. Refer to Fig. 30.

Release the five clips and lift out the control board. Refer to Fig. 32.

Pull out and replace, if necessary, a failed fuse.

#### 15.4.6 Fan

Remove the inner casing and combustion chamber cover .

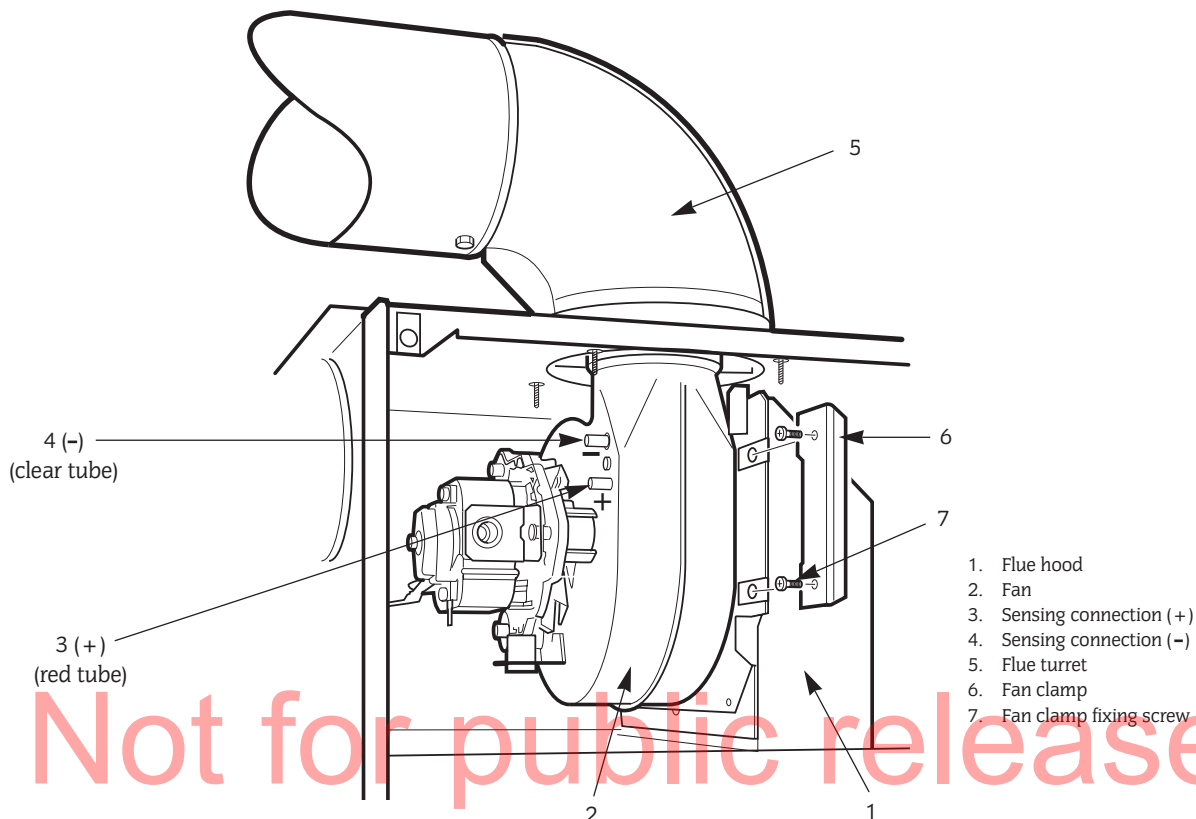
Remove the fan as described in Section 14.3 Inspection and Servicing.

Ensure that all the connections are correctly made to the new fan. Refer to Fig. 34 and 34a.

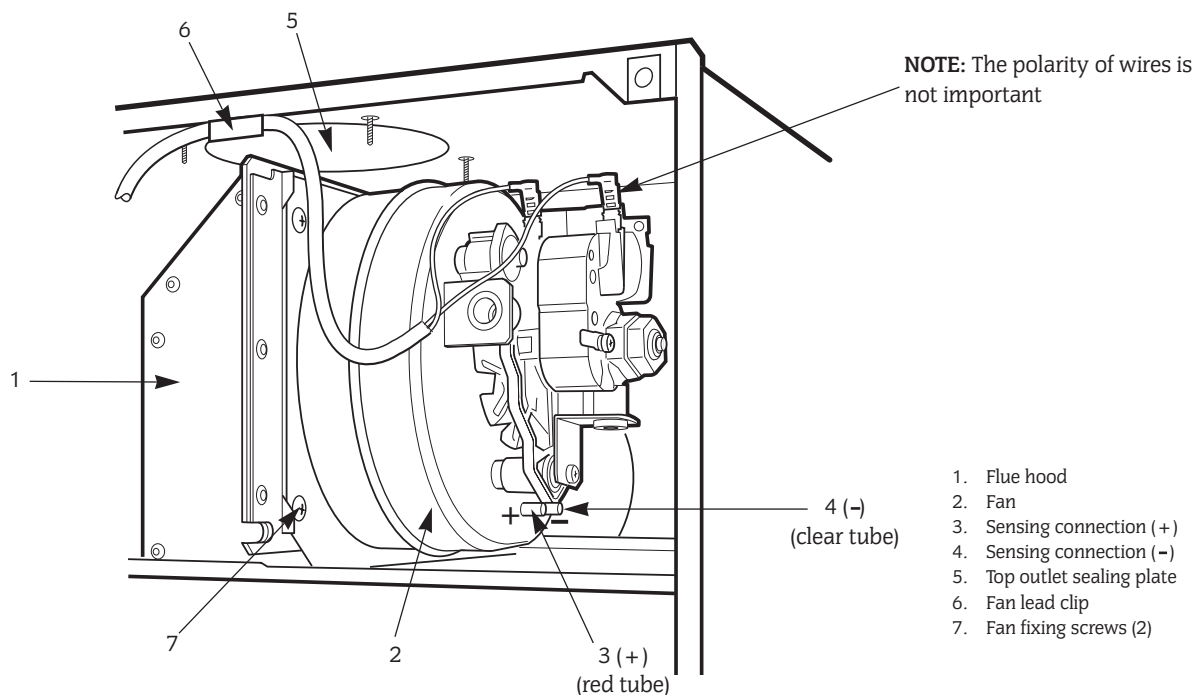
Do not use any sealant on the fan/flue duct connection.

Polarity of fan wires onto fan is not important.

**Fig. 34 . Fan/Flue hood Assembly with Vertical Flue**



**Fig. 34a . Fan/Flue hood Assembly with Rear (Internal) Flue**



#### 15.4.7 Air Flow Sensor

Remove the fan as described in 15.3.13. Unscrew and withdraw, through the fan outlet, the air flow sensor. Refer to Fig .34 and 34a.

The detector is 'handed' - do not force it into place.

#### 15.4.8 Temperature Sensor

Remove the access panel to give improved access with minimum side clearance.

Carefully pull-off the connections.

Remove grommit.

Pull off the clip and remove the sensor. Refer to Fig .35.

When replacing component ensure heat sink compound is added around contact area.

#### 15.4.9 Overheat Thermostat

Remove the access panel to give improved access with minimum side clearance.

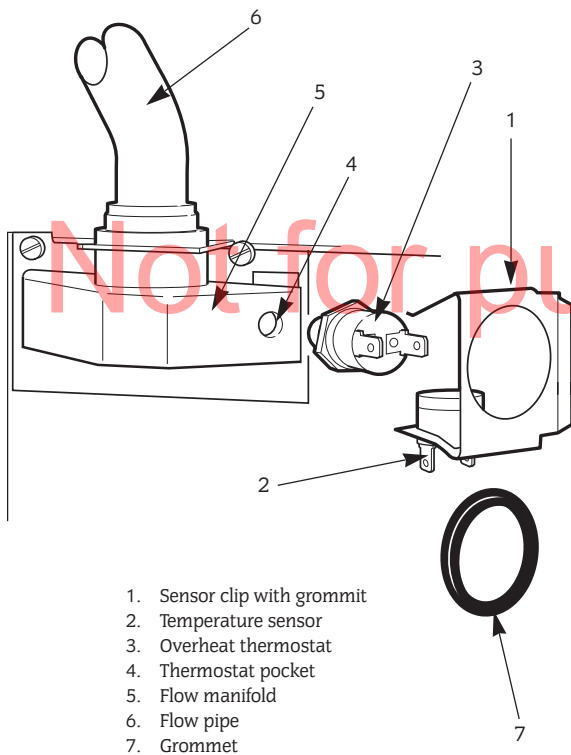
Carefully pull-off the connections.

Remove grommit.

Unscrew and remove the sensor.

When replacing component ensure heat sink compound is added around contact area.

**Fig. 35. Sensor and Overheat Thermostat**



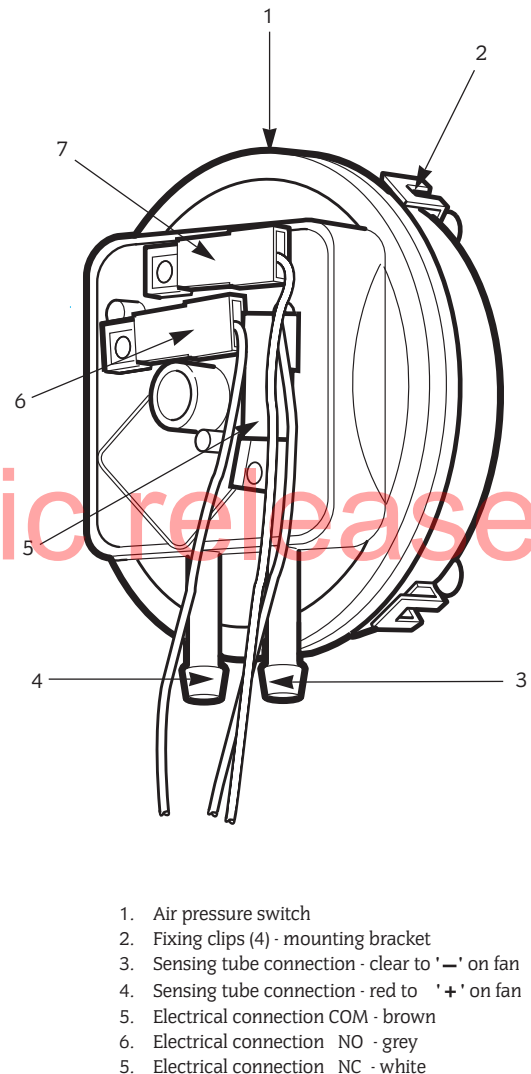
#### 15.4.10 Air Pressure Switch

Carefully disconnect the air (note the position of each tube) and electrical connections to the switch. Unclip and remove the switch if there is more than 50mm clearance. Refer to Fig.36.

If there is minimum clearance then remove the inner casing cover and release the two screws. Remove the air pressure switch and mounting bracket complete.

Ensure that the connections are correctly made on the replacement switch. Red tube to the connection marked (–) and the clear tube to the connection marked (+).

**Fig. 36. Air Pressure Switch**



#### 15.4.11 Combustion Chamber Insulation

The insulation pads are manufactured from a material in accordance with COSHH.

Remove the casing, inner casing cover and combustion chamber cover.

**Front Insulation:** Unscrew the clamp at the top of the combustion chamber cover to replace insulation.

**Side Insulation:** Release the clip and slide out the insulation.

**Rear Insulation:** Remove the burner blade assembly and cover the burner injector.

Remove the fan and flue hood assembly.

Remove the side insulation pads.

Unscrew the combustion chamber rear panel and lower after raising to allow the fixing point to come in front of the securing bracket.

Cut the rear insulation board to remove it from the boiler.

Cut the replacement board so that the joint will be behind the heat exchanger.

Slide in the top section followed by the bottom section.

Refer to Fig.37.

#### 15.4.12 Heat Exchanger

Shut off the gas and electricity supplies.

Drain the appliance.

Protect the electrical components.

**NOTE:** Some water will remain in the heat exchanger.

Remove the casing, inner casing cover, combustion chamber cover, fan and flue hood assembly, burner blade assembly and the access plate at the left hand side of the inner casing.

Pull off the leads from the sensor and overheat thermostats. Pull off the clip to remove the sensor, unscrew the overheat thermostat.

Pull out the clips securing the flow and return pipes and remove them from the manifolds. It will be necessary to disconnect the pipes from the system adjacent to the boiler.

Unscrew the slotted hex head screw at the base of the combustion chamber rear panel.

Slide the panel upwards and unscrew the two screws exposed at the right and left hand sides at the rear.

Unscrew the four hex head screws, two at each side, securing the steel side plates to the inner casing.

Lower the combustion chamber rear panel by pulling the lower fixing point in front of the securing bracket.

Unscrew the two M6 nuts whilst supporting the heat exchanger (it will weigh 18 - 24kg).

Lift out the heat exchanger assembly complete with side plates and manifolds. Take care as the combustion chamber rear panel is now unattached.

**NOTE:** Some water will have remained in the assembly.

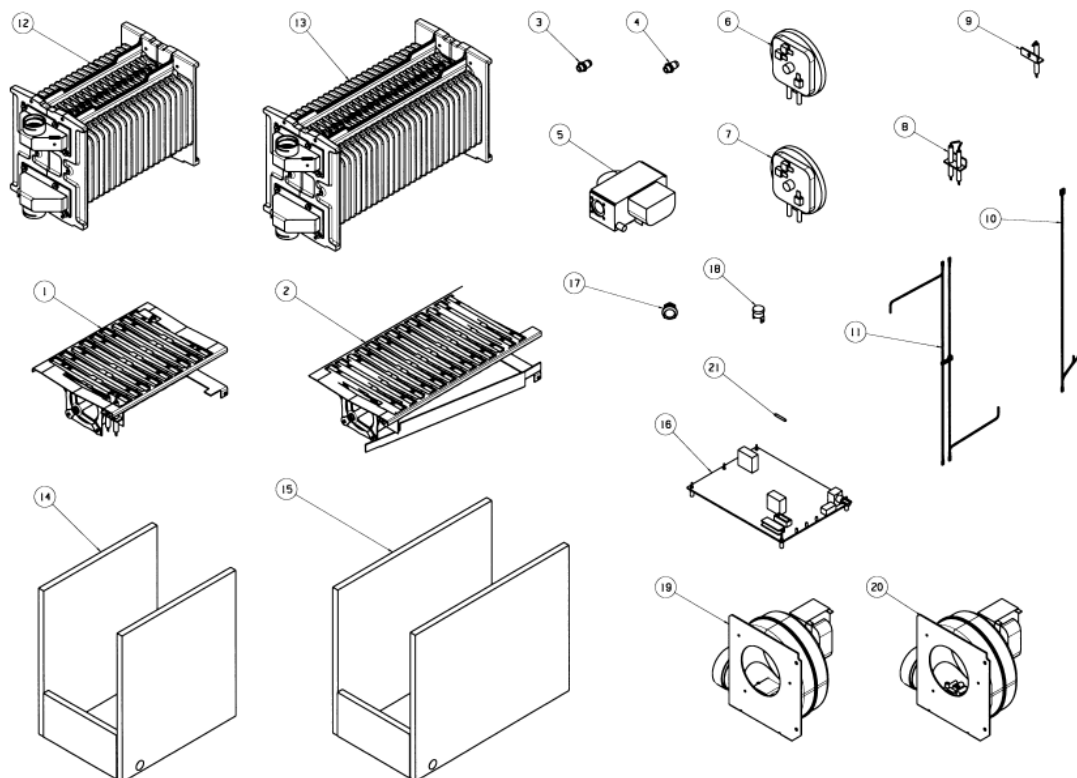
Transfer the side plates to the new heat exchanger.

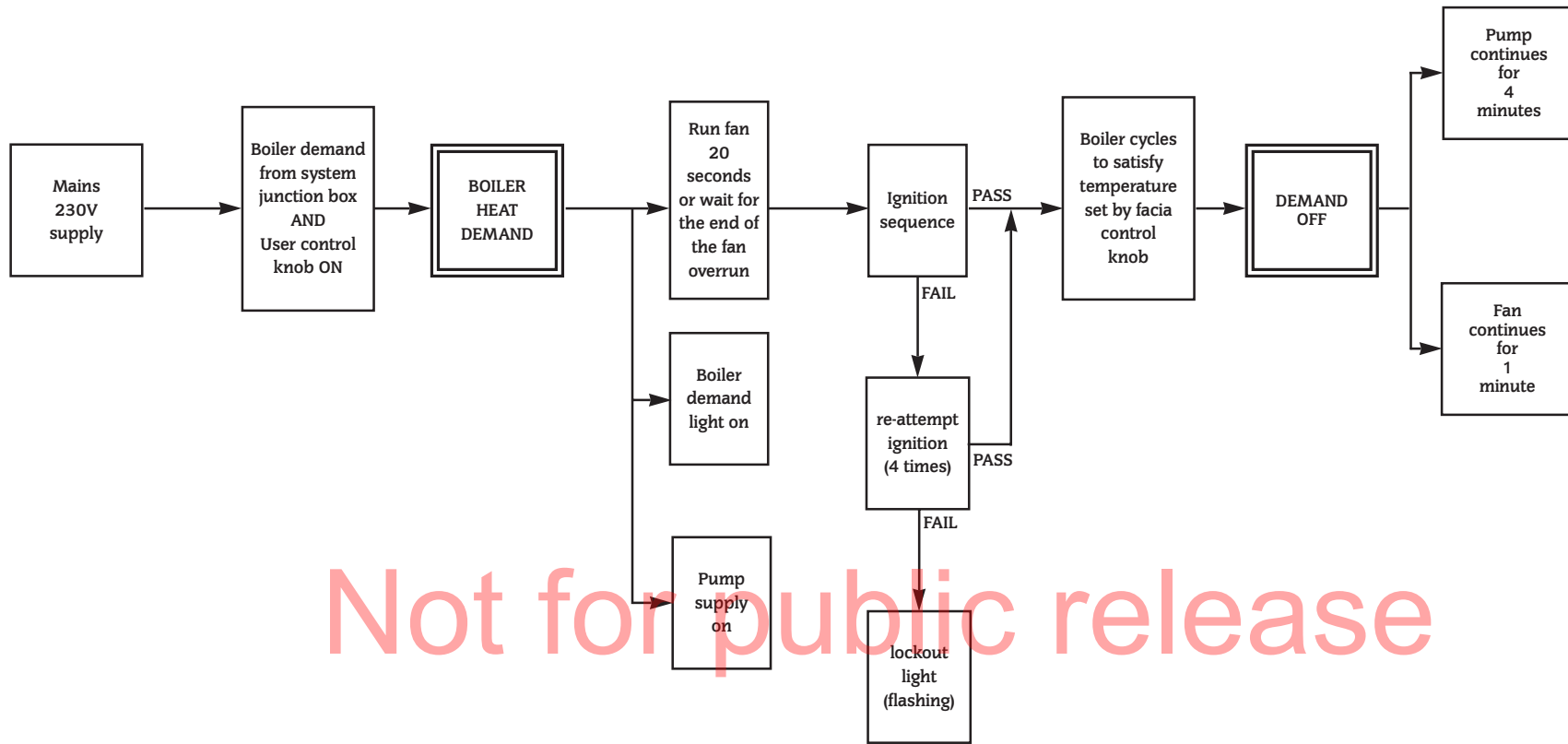
Fit the new heat exchanger in the reverse order.

Re-commission the appliance. Refer to Section 12.

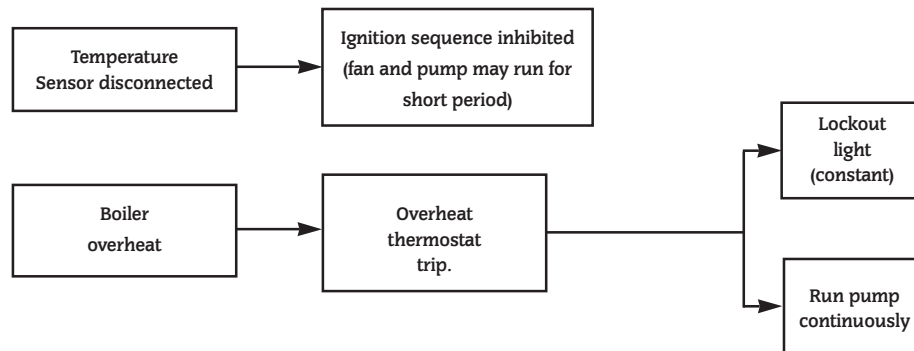
## 16. Short Parts List

Key No.	G.C. No.	Part	Manufacturer's Reference	Qty	WHS Part No.
1	E60-473	Burner Assembly NG 15CBi		1	8716 121 773 0
2	E60-474	Burner Assembly NG 24CBi		1	8716 121 767 0
3	E60-475	Injector Burner 3.4mm NG 15CBi		1	8716 157 116 0
4	E60-476	Injector Burner 4.3mm NG 24CBi		1	8716 157 115 0
5	E60-477	Gas Valve NG		1	8716 156 769 0
6	E60-478	Air Pressure Switch 15CBi		1	8716 146 165 0
7	E60-479	Air Pressure Switch 24CBi		1	8716 146 163 0
8	E60-480	Spark Electrode Assembly		1	8716 142 140 0
9	E60-481	Sensor Electrode Assembly		1	8716 142 139 0
10	E60-482	Spark Electrode Lead		1	8716 121 805 0
11	E60-483	Sensor Electrode Lead		1	8716 142 137 0
12	E60-484	Heat Exchanger Assembly 15CBi		1	8716 121 699 0
13	E60-485	Heat Exchanger Assembly 24CBi		1	8716 121 700 0
14	E60-486	Insulation Kit 15CBi		1	7 716 101 854 0
15	E60-487	Insulation Kit 24CBi		1	7 716 101 796 0
16	E60-492	Control Board PCB		1	8716 146 332 0
17	E60-493	Overheat Thermostat		1	8716 142 399 0
18	375 696	Primary/Domestic Thermister Sensor Kit		1	8716 142 302 0
19	E60-498	Fan Assembly 15CBi		1	8716 146 466 0
20	E60-499	Fan Assembly 24CBi		1	8716 146 465 0
21	E60-500	Fuse 4A Fast blow 20 X 5mm		10	8716 156 008 0
22	E60-503	O-Ring Kit HT/Exchanger		1	8716 101797 0
23	E60-504	Gas Section Sealing Kit		1	8716 101 798 0





### Protection Systems



## 18. Fault Finding

**NOTE:** This fault finding information is for guidance only. Worcester Heat systems cannot be held responsible for costs incurred by persons not deemed to be competent.

The electronic control for this boiler incorporates three lights: Boiler demand, flame on and lockout. These form the basis for this fault finding guide.

To use this guide, select box below which represents the light situation during your fault, then refer to the appropriate following section. This guide assumes a component failure has occurred following a period of normal running. It is not intended to solve installation errors.

### PRELIMINARY CHECKS

Preliminary electrical system checks are the first electrical checks to be carried out during a fault-finding procedure. On completion of the Service/Fault-finding task which has required the breaking and remaking of electrical connections, check (a) EARTH CONTINUITY, (b) SHORT CIRCUIT CHECK, (c) POLARITY and (d) RESISTANCE TO EARTH.

### LIGHT SITUATION DURING FAULT

WITH A SYSTEM BOILER DEMAND AND USER CONTROL SET TO MAXIMUM:

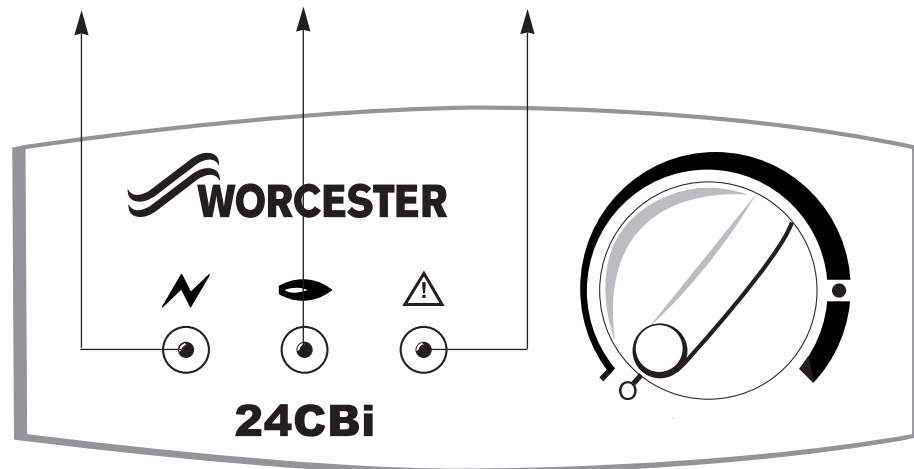
No lights at all	FAULT POINT A
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Demand light only	FAULT POINT B
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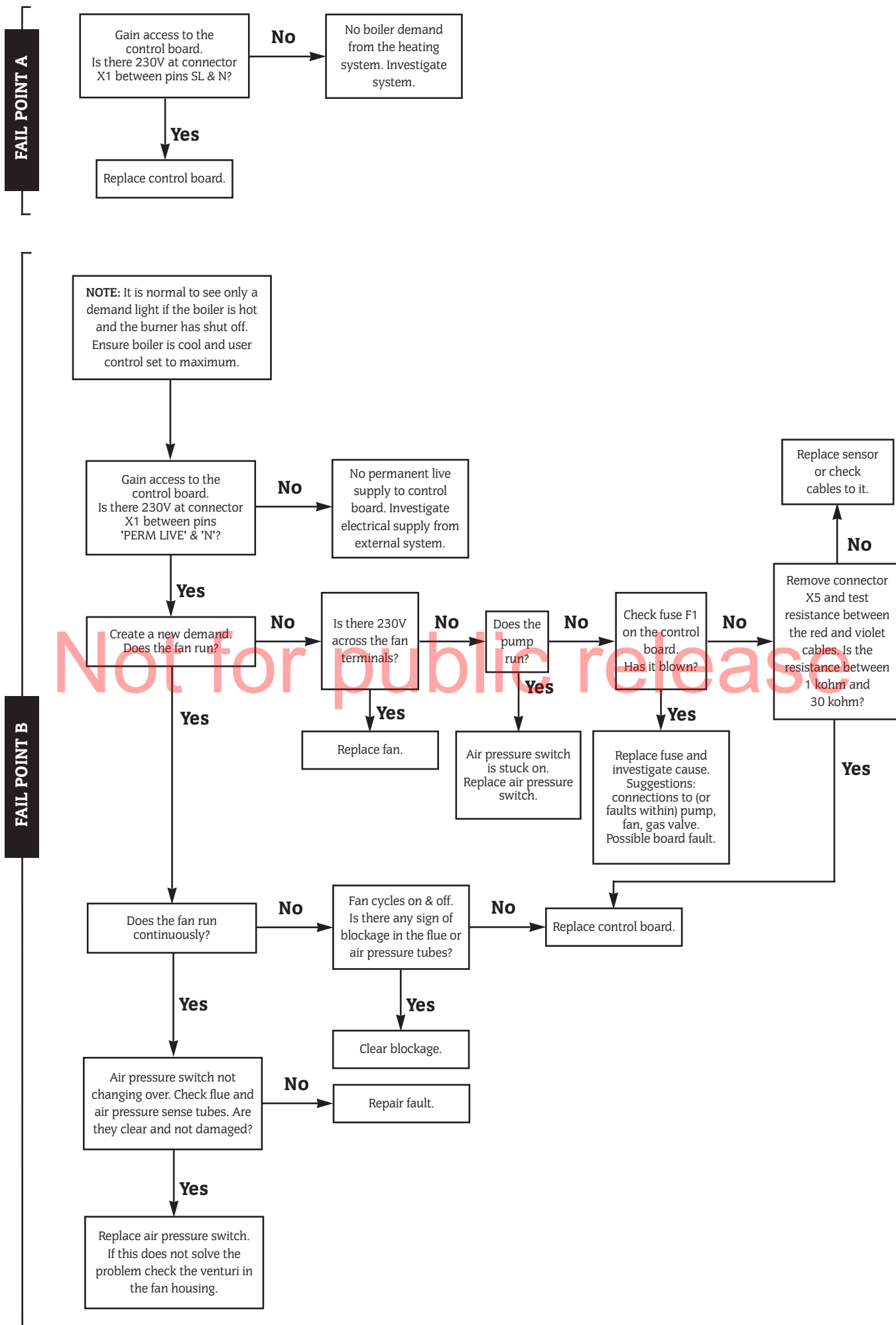
Burner light only	FAULT POINT C
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on or off	off	lockout light on constantly	FAULT POINT D
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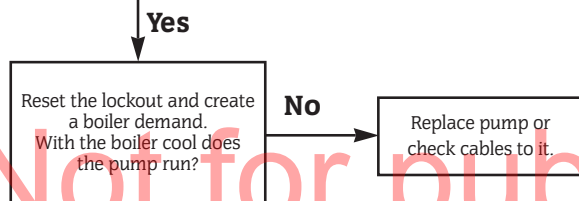
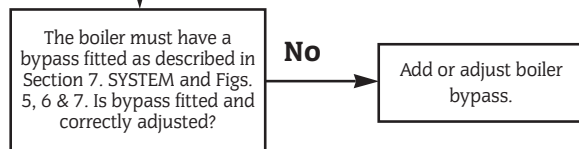
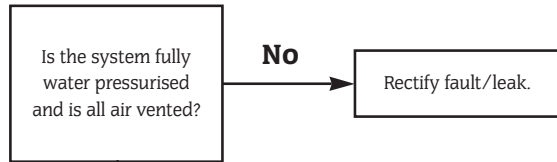
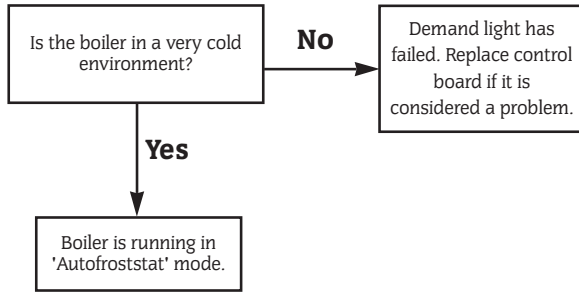
on or off	off	lockout light flashing	FAULT POINT E
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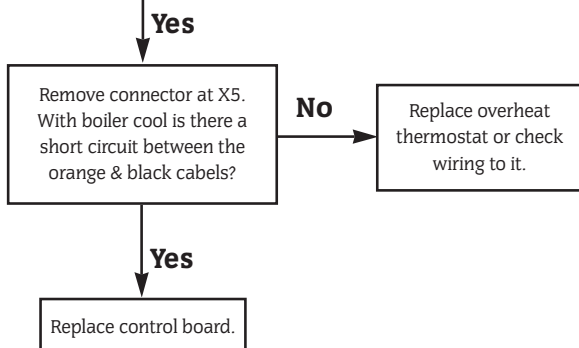
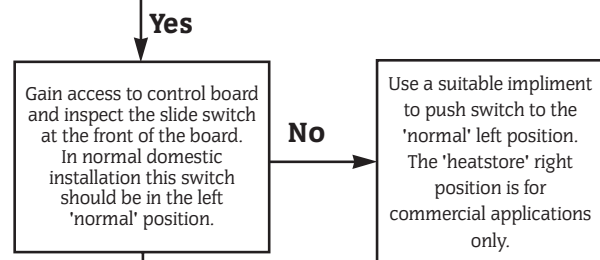
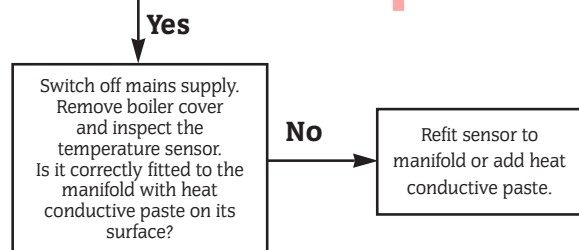
Other faults not covered by above	FAULT POINT F
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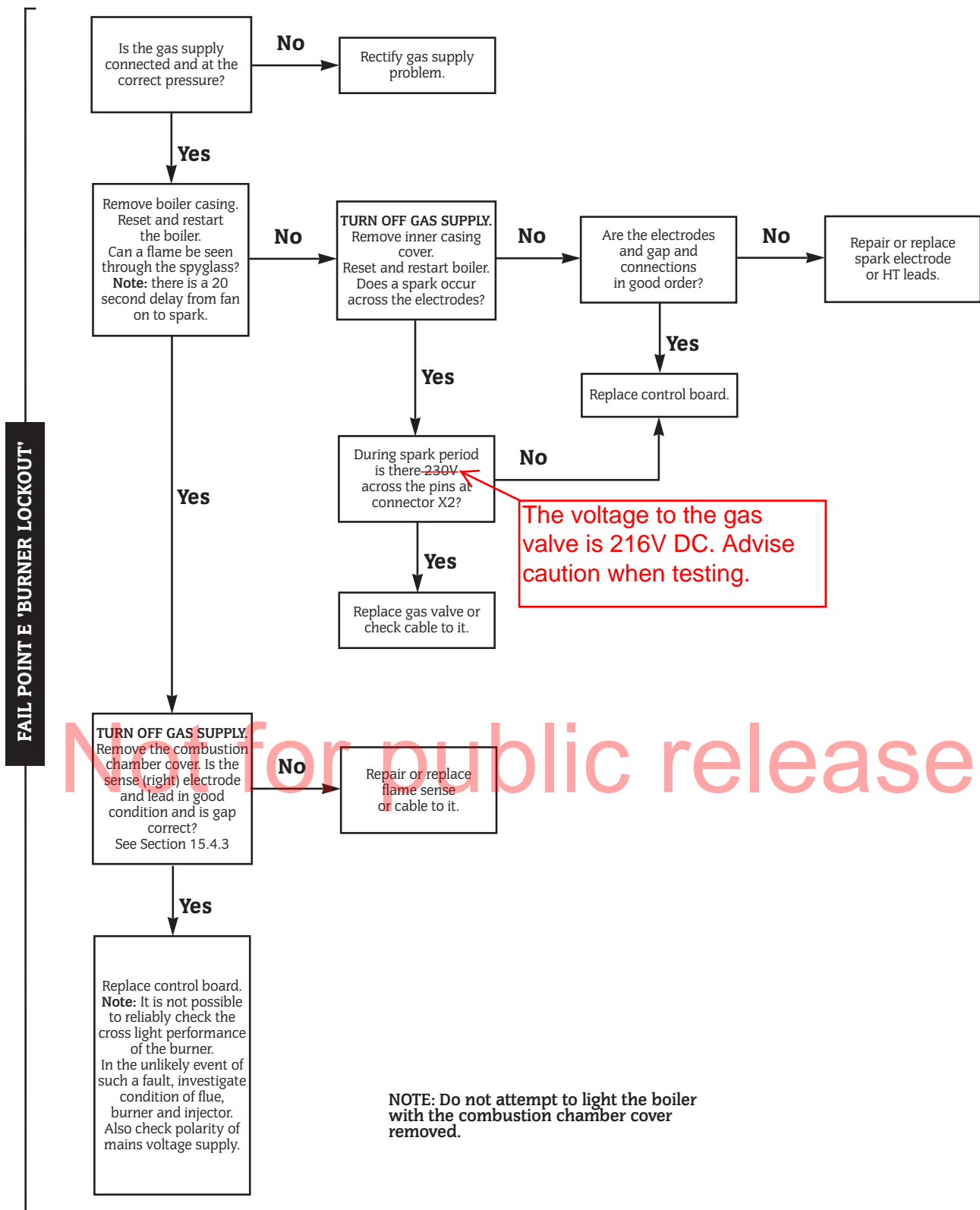
# FAIL POINT C

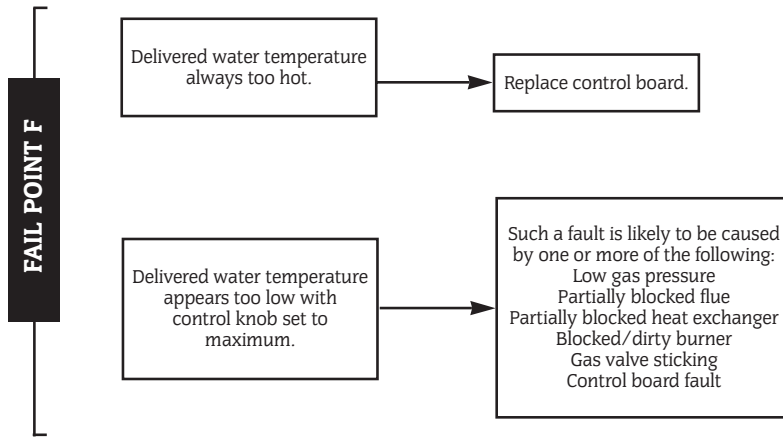


# FAIL POINT D









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## Notes

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