



Reno

HEAT ONLY



High Efficiency Heat Only Boilers

Installation, Maintenance & Service Instructions

Natural Gas G20:

HE16H - GC No: 41-416-07
from Serial No. 78000294

HE25H - GC No: 41-416-03
from Serial No. 70001122

HE31H - GC No: 41-416-06
from Serial No. 75000194

Propane G31 Variants:

HE16HP - GC No: 41-416-11
from Serial No. 79000105

HE25HP - GC No: 41-416-13
from Serial No. 73000115

HE31HP - GC No: 41-416-10
from Serial No. 85000109



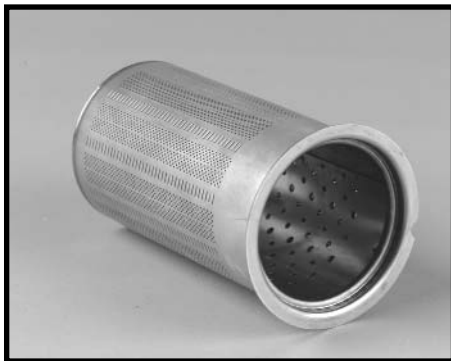
The Johnson & Starley Reno range has an energy rating A on a scale of A to G.

For more information see www.boilers.org.uk

This is a certification mark.

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THE BENCHMARK SCHEME

In order to comply with Building Regulations Part L (Part J in Scotland) the boiler MUST be fitted in accordance with the manufacturer's instructions.

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

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



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Johnson & Starley reserves the right to change specification without prior notice.

1. IMPORTANT INFORMATION

IT IS A STATUTORY REQUIREMENT THAT ALL GAS APPLIANCES ARE INSTALLED BY COMPETENT PERSONS, (i.e. GAS SAFE REGISTERED INSTALLERS. GAS SAFE MEMBERSHIP ENQUIRIES - 0800 408 5500) IN ACCORDANCE WITH THE GAS SAFETY (INSTALLATION AND USE) REGULATIONS (CURRENT EDITION). FAILURE TO COMPLY WITH THESE REGULATIONS MAY LEAD TO PROSECUTION.

This appliance has been Tested and Certified in order to meet the necessary European Directives and comply with the latest Building Regulations, including the efficiency requirements of the SEDBUK scheme.

Efficiency of Hot Water Boilers Directive 92/42/EEC

Gas Appliance Directive 90/396/EEC

Low Voltage Directive 93/68/EEC

Electromagnetic Compatibility Directive 92/31/EEC

No modifications to this appliance should be done unless they are fully approved by the manufacturer.

The installation of this appliance must be carried out by a competent person and must be in accordance with the current rules in force at the time of installation, in the country of destination.

The manufacturers instructions supplied must not be taken as overriding any statutory requirements.

The weight of this appliance exceeds that recommended for a one-man lift. It will therefore be necessary to gain assistance at times during the installation procedure.

It should be noted that this appliance may contain sharp edges. In order to prevent injury, care MUST be taken when handling the appliance! We advise the engineer to wear suitable P.P.E.

A two year manufacturers warranty applies to this appliance.

GAS LEAKS. DO NOT OPERATE ANY ELECTRICAL SWITCHES, OR USE A NAKED FLAME. TURN OFF THE GAS SUPPLY. VENTILATE THE AREA BY OPENING DOORS AND WINDOWS. CALL THE NATIONAL GAS EMERGENCY SERVICE ON 0800 111 999.

2. APPLIANCE DESCRIPTION

The appliance is a high efficiency boiler that is designed to provide the user with both central heating and domestic hot water. Its design is such that it is room sealed, taking combustion air from outside and expelling the products of combustion to the outside again. The heat exchanger is constructed of stainless steel, which is corrosion free.

Flueing options ensure that the appliance can be installed in many locations within a building and a schematic diagram (2-2) shows the water flow through the boiler.

The appliance is controlled by fully featured microprocessor based electronics that monitor each of the operational procedures. An LED display indicates the operational state of the appliance which starts with the full sequence automatic ignition and continues with monitoring the demand requirements.

Should any fault occur the appliance will be shutdown to a safe condition with the fault code being displayed on the LED panel.

2.1 Appliance Safety Devices

Frost Protection

The microprocessor based controls within the appliance monitor the water temperature in order to protect from freezing. To ensure that this function is active the main switch on the appliance should be left on and the gas supply also left on.

This does not protect remote areas of the heating system, which should be protected by other means (e.g. an independent frost thermostat that is linked back to the appliance).

Overheating Safety

There are a number of overheat safety devices on the appliance. Should any of these operate (see the fault codes table in section 6.1) you should call a service engineer or the installer

Electrical Supply Failure

In the event of electrical voltage supply failure, the appliance will stop operating but remain in a safe condition. When the electrical supply is resumed, the appliance will start from its safe off condition and continue to operate in the normal manner under the control of the system components. Should the appliance fail to resume, turn the temp.control to the RESET position until the fault clears. Normal operation should then continue.

2.2 Technical Data

	HE16H	HE25H	HE31H
Maximum Lift Weight	27.0Kg	27.0Kg	28.0 Kg
Gas Connection	15 mm copper		
Heating flow and return	22 mm copper		
Condensate Drain	3/4 inch plastic overflow pipe		
Electrical supply	230V		
Electrical rating	95W		
IP classification	IP 40		
External fuse rating	3 A		
Heating system minimum head	3 metre		

**Table 2-1
General Data**

			Nat Gas G20					
			Maximum			Minimum		
CH Input Qm			16H	25H	31H	16H	25H	31H
	Net	kW	16.3	25.5	30.7	3.81	7.14	9.18
	Gross	kW	18.1	28.3	34.0	4.23	7.92	10.1
Gas Consumption		m ³ /h	1.7	2.6	3.16	0.40	0.74	0.85
CH Output P	Non Condensing	kW	16.0	25.0	30.0	4.08	7.0	9.0
	Condensing	kW	17.8	27.85	32.6	3.75	7.76	9.8
SEASONAL EFFICIENCY (SEDBUK)			'A'					
NOX CLASSIFICATION			Class 5					
CENTRAL HEATING SET POINT TEMP RANGE			20-82°C					

			LPG G31					
			Maximum			Minimum		
CH Input Qm			16H	25H	31H	16H	25H	31H
	Net	kW	16.3	26.06	30.7	3.81	7.29	9.18
	Gross	kW	17.7	28.3	33.3	4.14	7.92	9.97
Gas Consumption		m ³ /h	0.67	1.06	1.25	0.16	0.30	0.38
CH Output P	Non Condensing	kW	16.0	25.0	30.0	3.75	7.0	9.0
	Condensing	kW	17.2	27.85	32.6	4.02	7.76	9.8
SEASONAL EFFICIENCY (SEDBUK)			'A'					
NOX CLASSIFICATION			Class 5					
CENTRAL HEATING SET POINT TEMP RANGE			20-82°C					

**Table 2-2
Performance Data (Central Heating)**

		Nat Gas G20						LPG G31					
		16H	25H	31H	16H	25H	31H	16H	25H	31H	16H	25H	31H
		Maximum			Minimum			Maximum			Minimum		
Burner CO2 (%)	Case off	9.5*	9.3*	9.5*	8.5**	8.4**	8.5**	10.1*	10.2*	10.2*	9.2**	9.4**	9.2**
	Case on	9.8*	9.5*	9.8*	8.8**	8.6**	8.8**	10.3*	10.4*	10.5*	9.4**	9.6**	9.5**
		* = +0.5						** = Ref Only					
Offset (Pascal)		-3.0 (Minus three)**											

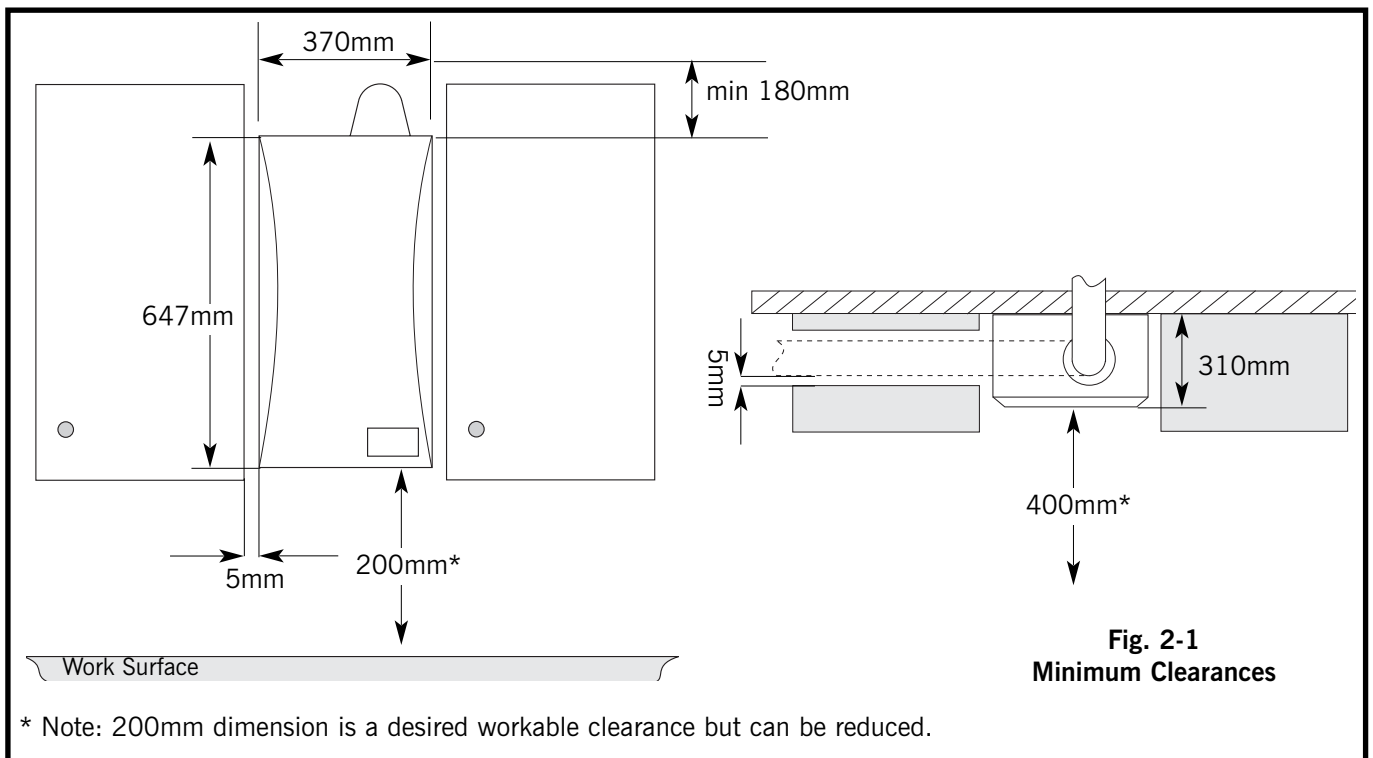
**Table 2-3
Performance Data**

Please Note:

Natural Gas (G20) consumption is calculated using gross CV of 38.7 MJ/m³ or 34.9 MJ/m³ net.

LPG (G31) consumption is calculated using gross CV of 95.6 MJ/m³ or 88.0 MJ/m³ net.

2.3 Dimensions and Clearances:



It is recommended that where the appliance is located in a kitchen, or next to other combustible materials, a gap of 5mm be left on either side and where the flue run is through a void in kitchen units, again a minimum gap of 5mm should be left.

***NOTE** - These are recommended clearances when servicing the appliance.

2.4 General Information

Appliance Classification

The appliance is certified as a type C13 C33 C53. As such it can only be installed with the flue components specified within this document. The flue types are:

- Horizontal and vertical balanced flue using concentric ducts.
- Air entry and flue exit in zones of different pressure using twin (separate) flue and air ducts.

Gas Categories:

The appliance is certified as a CAT II 2H 3P appliance. This allows conversion between Natural gas (G20) and LPG (G31). Their supply pressures are 20 mbar and 37 mbar respectively.

For natural gas to LPG conversion, kit number NG30 (complete with instructions) is available.

For LPG to natural gas conversion, kit number LPG30 (complete with instructions) is available.

Statutory Requirements:

The appliance must be installed in accordance with the current editions of:

- Building Standards (Scotland)(Consolidation) Regulations.
- Building Regulations
- Gas Safety (Installation and Use) Regulations (as amended)
- BS 7671 Institute of Electrical Engineers (I.E.E) Wiring Regulations
- BS 6891 Installation of Low Pressure Gas Pipework of up to 28mm (R1) in domestic premises (2nd family gases).
- BS 5440 Pt.1 (Flues for Gas Appliances)
- BS 5440 Pt.2 (Air Supply for Gas Appliances)
- Model and Local Authority Byelaws
- BS 5546 Installation of Domestic Hot Water Supplies.

Gas Supply:

The gas installation must be completed in accordance with the relevant standards (BS 6891).

The supply must be capable of providing a steady inlet working pressure to the appliance of 20 mbar at a rate of 2.7 m³/h (Calculated with a Gas CV of 38.7MJ/m³)

The installation must be tested for gas tightness using suitable methods. The pipework should also be purged of air in accordance with the above standard.

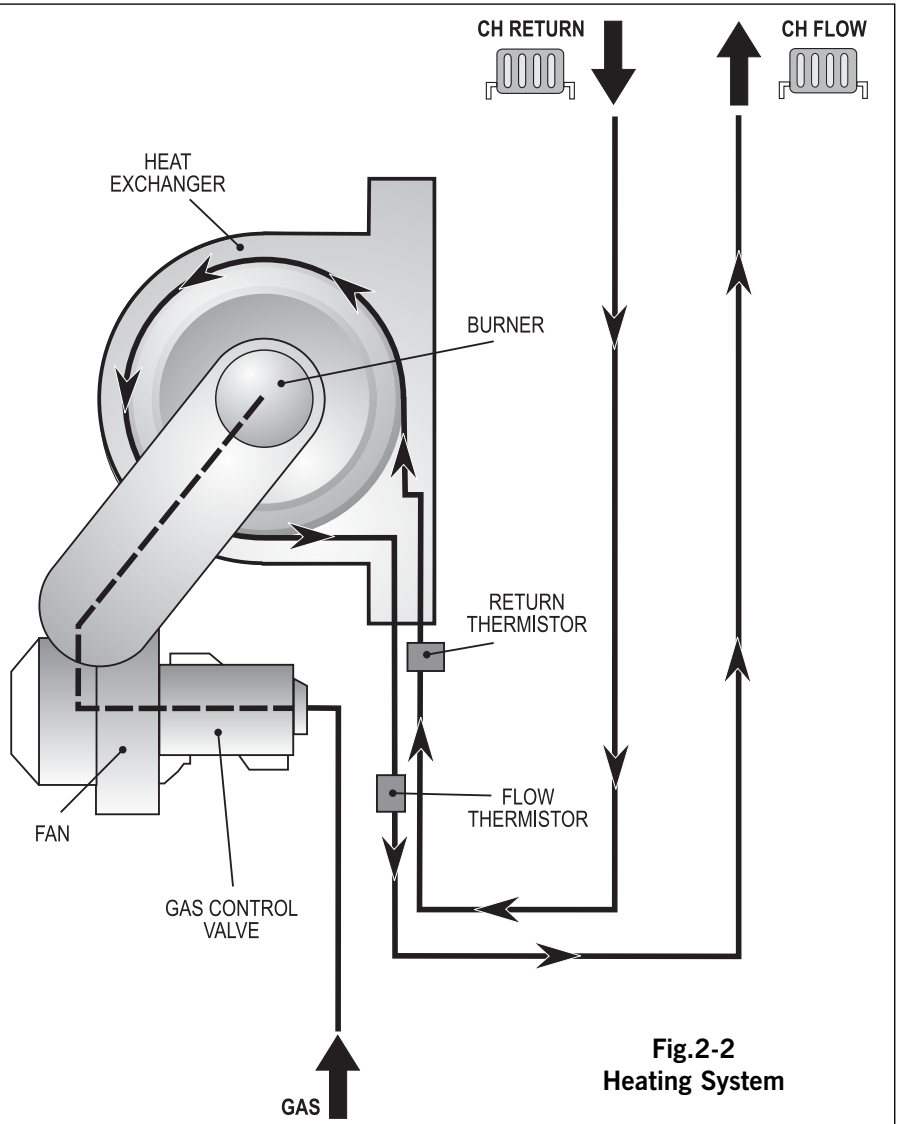
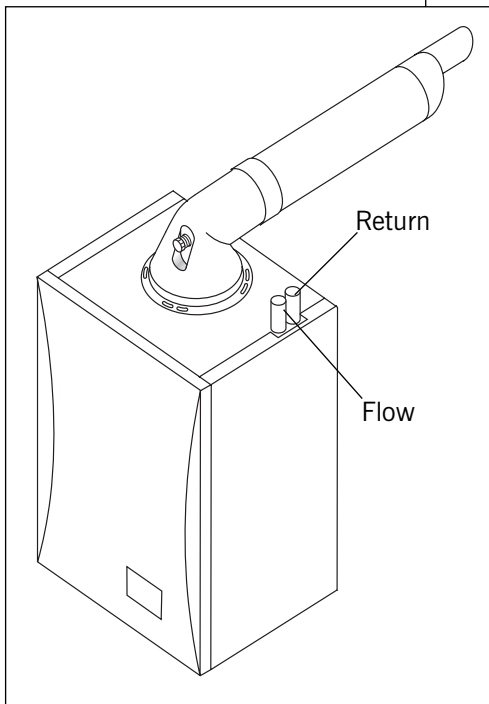
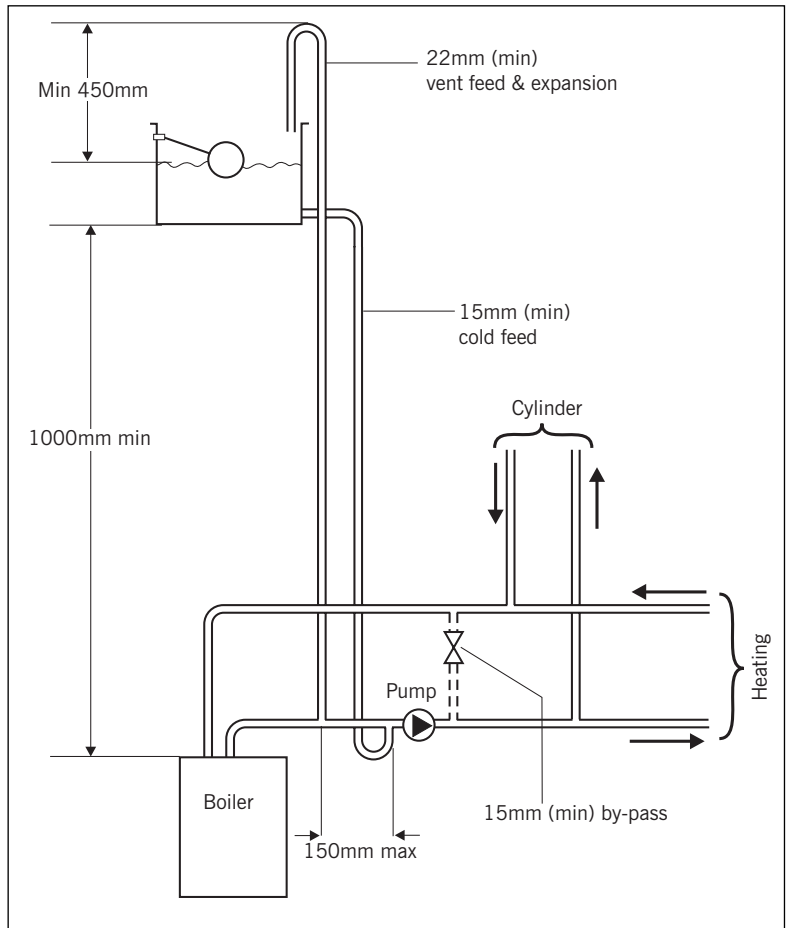


Fig.2-2 Heating System

Additional Control Options:

Should an outside temperature compensation system be required, Opentherm kits are available direct from Johnson & Starley. (Part No.1000-0019720)

2.5 Appliance Location:

The appliance is not suitable for external installation unless it is protected from the elements by a suitable enclosure. The enclosure must provide the required clearances for installation, servicing and maintenance as well as the correct level of ventilation. The selected position should allow for a suitable flue system to be installed.

When installed in a timber frame building guidance should be taken from the gas industry publication IGE/UP-7 (Guide for Gas Installations in Timber Frame Housing).

BS 6798 gives details of the essential features for a compartment or cupboard where a gas appliance is to be installed. An existing cupboard may require modification.

If the appliance is installed in a room containing a bath or shower it is important to locate the electrical switch in a position where it cannot be touched by anyone using the bath or shower. The current IEE Wiring Regulations (BS 7671) for England and the electrical provision of the Building Regulations for Scotland gives details.

Room ventilation for the appliance is not necessary as the appliance draws its combustion air from outside of the building and cupboard or compartment ventilation is not necessary providing that the minimum clearances are maintained. However, reference should be made to BS 5440 Pt.2

2.6 Heating System Requirements:

A typical system is shown at fig. 2.2 which incorporates radiators, an automatic by-pass valve and a drain facility that must be provided at the lowest point in the system to allow complete drain down. The installation should be designed to operate with a flow temperature of up to 90° C.

Pump

The pump should be fitted on the flow side of the boiler and have isolating valves each side to allow removal without draining the system. A variable duty pump should be set to give a temperature difference of no greater than 20° C between flow and return with the thermostat set at maximum (around 82°C) and a flow rate as shown in table 2.4. Reference should also be made to 2.4 for the pressure loss of the boiler and consideration MUST be given to the fact that high resistance microbore systems may require a higher duty pump.

Pipework Sizing: In order to keep the noise of the system to a minimum, the velocity of water should be kept below 1.5 m/s and it should be noted that the appliance is designed to operate with a temperature differential of 20°C between flow and return. The maximum flow rate is 0.19 kg/s (HE16H) 0.3 kg/s (HE25H) and 0.38 kg/s (HE31H) which through a 22mm pipe gives a velocity of 0.75 m/s (HE16H) 1.00 m/s. (HE25H) and 1.25 m/s (HE31H) Therefore, the recommended minimum pipe size for the main carcass is 22mm..

Sealed Water Systems: The installation must comply with the appropriate requirements of the current issue of BS 4814, BS 5449, BS 6759, BS 6798 and BS 7074 part 1 and 2. See table 2-5 below.

Water Treatment: It is important that the system is flushed thoroughly before the appliance is left to operate (as recommended in BS 7593) in order to maintain an efficiently operating heating system. For replacement installations, the system MUST be flushed with the old boiler in situ, in order to prevent the Reno becoming a trap for system debris. Once the system has been flushed, an inhibitor (suitable for stainless steel heat exchangers should be added. Appropriate inhibitors are available, for example Sentinel and Fernox.

Failure to carry out the above procedure will invalidate the guarantee!

NOTE: Water supplied from a water softener MUST NOT be used unless a specially formulated corrosion inhibitor is added (see BS 6798)

Controls: As a minimum it is recommended that a 2 channel timer and room thermostat is installed to control the appliance. Thermostatic radiator valves may be fitted to the system but must not be fitted in the room where the room thermostat is fitted. There must be at least one radiator installed with lock shield valves that should not be closed. Further guidance can be obtained from the Domestic Heating and Hot Water Guide to the building regulations and GPG 302

NOTE: a differential pressure bypass valve MUST be installed to maintain the following minimum flow rates:

12 L/min - HE16H

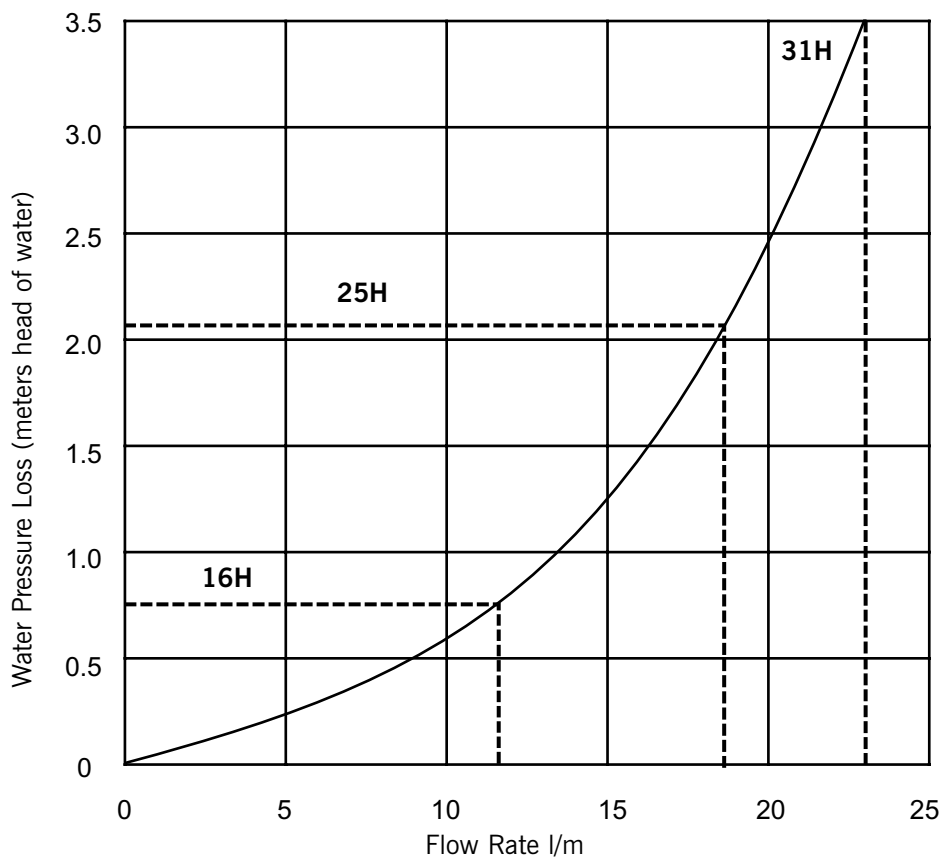
18 L/min - HE25H

23 L/min - HE31H

(20° differential at maximum heat input)

2.7 Domestic Hot Water System Requirements:

Domestic hot water circuits and their components must be in accordance with the relevant standards and water supply regulations. Further guidance and recommendations can be found in the building regulations G17 to 24 and R17 to 24.



**Table 2-4
Pressure Loss**

Safety valve setting (bar)	3.0		
Vessel charge and initial system pressure (bar)	0.5	1.0	1.5
Total water content of system (litres)	Vessel Volume		
25	2.1	2.7	3.9
50	4.2	5.4	7.8
75	6.3	8.2	11.7
100	8.3	10.9	15.6
125	10.4	13.6	19.5
150	12.5	16.3	23.4

Table 2-5

3. FITTING

3.1 Unpacking the Appliance:

The appliance is supplied packaged in a single carton which contains the wall fixing plate, template, boiler and controls.

Caution: this appliance exceeds the recommended weight for a one-man lift as detailed in the Manual Handling Operations, 1992 Regulations.

With the carton on its back, cut the tape securing the top of the carton and open so that the contents can be removed. Remove and unpack the Installation Instructions, the boiler can then be lifted from the carton.

3.2 Preparing the Wall:

Ensuring the wall is flat, unpack the wall template from its protective sleeve and place it on the wall giving consideration to: the flue position; water/gas connection positions and clearances. Use the plumb line on the template to ensure it is square! Mark the positions on the wall of the flue and the fixing points. Using a 105 mm core drill make the hole through the wall in the correct place. Installations that are made from within the building only will require a 125 mm diameter hole in order to fit the flue system. Using a 7mm bit, drill a total of 5 fixing holes and insert the rawplugs. Remove the template.

Contents of Carton

- Wall Fixing Plate
- Paper Template
- Rawplug/Screw Pack
- Boiler Assembly
- Installation Instructions (inc. Benchmark Logbook) & User Guide
- Guarantee Card

Table.3-1

3.3 Wall Fixing Plate:

Place the wall fixing plate on the wall, ensuring it is level and secure it with the screws provided. It is advisable to fit additional isolation valves at the top of the appliances to allow complete removal of the appliance. Once the heating system connections are complete the system can be filled, checked for soundness and flushed. See COMMISSIONING section.

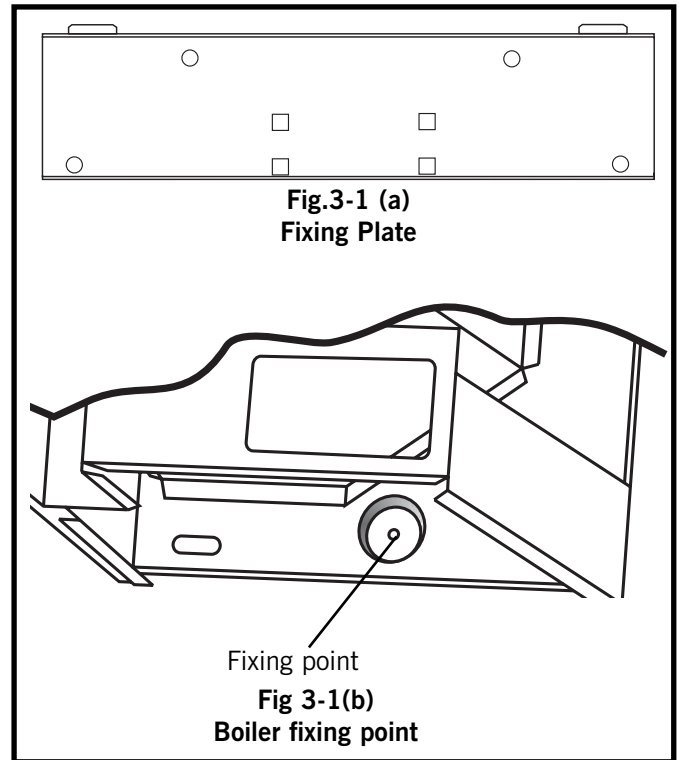
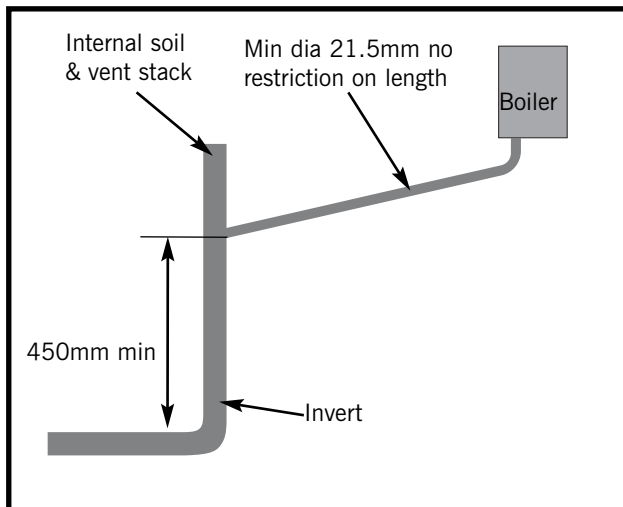
3.4 Fitting the Appliance:

It is important to note that this appliance exceeds the recommended weight for a one-man lift as detailed in the Manual Handling Operations, 1992 Regulations. Remove the finger guard from the bottom of the boiler (secured with 2 fixing screws), lift the appliance onto the wall fixing plate and locate the unit on the two lugs on the top of the fixing plate. The boiler then drops into place and is secured with a single fixing screw at the bottom of the boiler. (see fig.3-1(b)) The finger guard can now be re-fitted to the bottom of the appliance.

3.5 Condensate Drain:

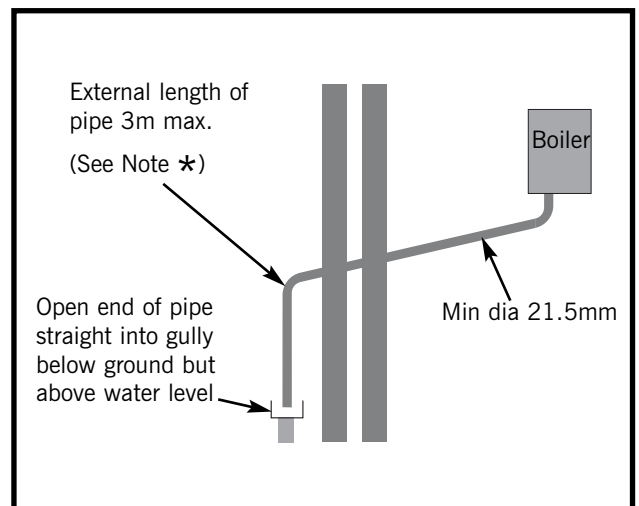
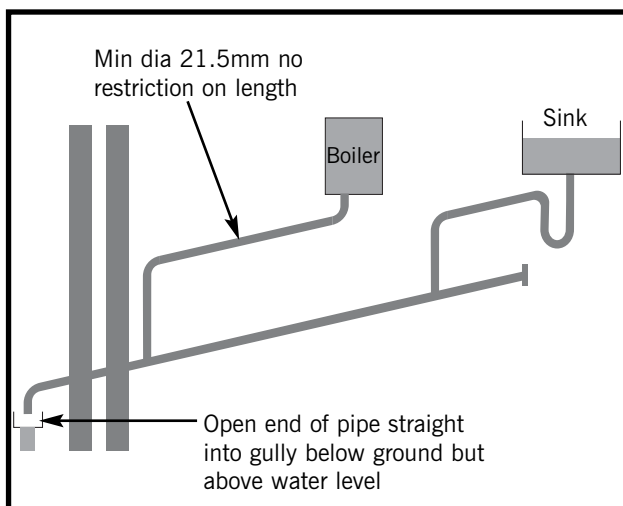
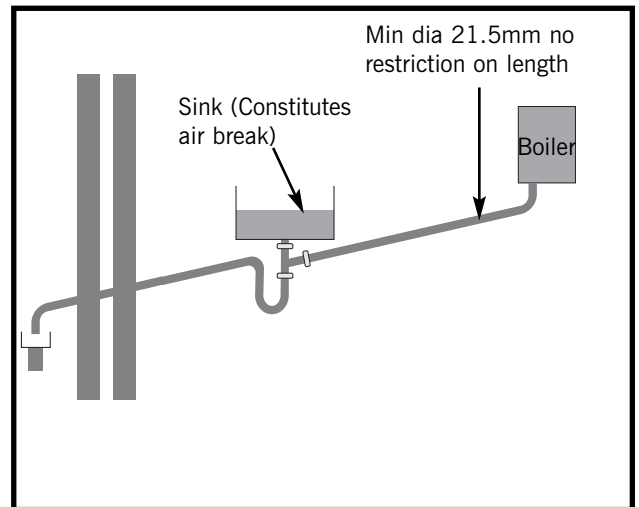
The condensate drain utilises plastic 21.5mm push fit or adhesive overflow pipes and fittings. It should be piped to drain, preferably within the building, maintaining a 44mm in 1m fall away from the appliance. If the drain is routed to outside it should be to a drain or soak away. Protection from freezing in cold weather conditions is also advisable.

Typical Condensate Drain Arrangements:



NOTE:

★ External runs exceeding 3 metres the discharge pipe should be increased to 32mm diameter for complete peace of mind.



NB the boiler has a built in condensate trap and it **MUST** be noted that fitting an additional trap to the configurations shown above, may have an edverse effect on the evacuation of condensate from the boiler.

3.6 Preparing & Installing The Flue Components (100/60 Concentric):

With the appliance fitted to the wall and the gas and water connections complete.

IMPORTANT NOTE: Before carrying out procedure ensure seal has not been dislodged from top of heat exchanger.

Horizontal Flues:

Fit the turret to the appliance with the outlet in the correct direction. Measure the distance between the turret centre line and the outside wall face where the terminal is to be fitted. Using fig. 3.2 assemble and if necessary cut the flue to the correct length and ensure any seals are made correctly. If fitting from outside the building assemble the outer wall-sealing disc onto the flue to its correct position. Insert the flue from outside. Fit the inner wall-sealing disc. Using the clamp arrangement join the flue to the turret, ensuring all the seals are made correctly. The terminal must be installed with the flue outlet at the top. Brackets are provided for extended flues to locate and fix the flue in position should they be necessary.

Vertical Flues.

Flat roof: Measure the distance between the appliance top and the outer surface of the flat roof.

Pitched roof: Measure the distance between the appliance top and the outer surface of the pitched roof at a point that is central to the flue. Where necessary cut the flue to the correct length, ensuring that seals are made correctly.

It is advisable to assemble the roof flashing onto the vertical terminal and inset this from outside the building. Continue to assemble the remaining flue components and connect to the appliance using the vertical adaptor. Finally make a good seal between the roof and the flashing piece. Brackets are provided to locate and fix the flue in position should they be necessary.

FOR FULL DETAILS OF FLUE COMPONENTS, PLEASE REFER TO ZZ1191

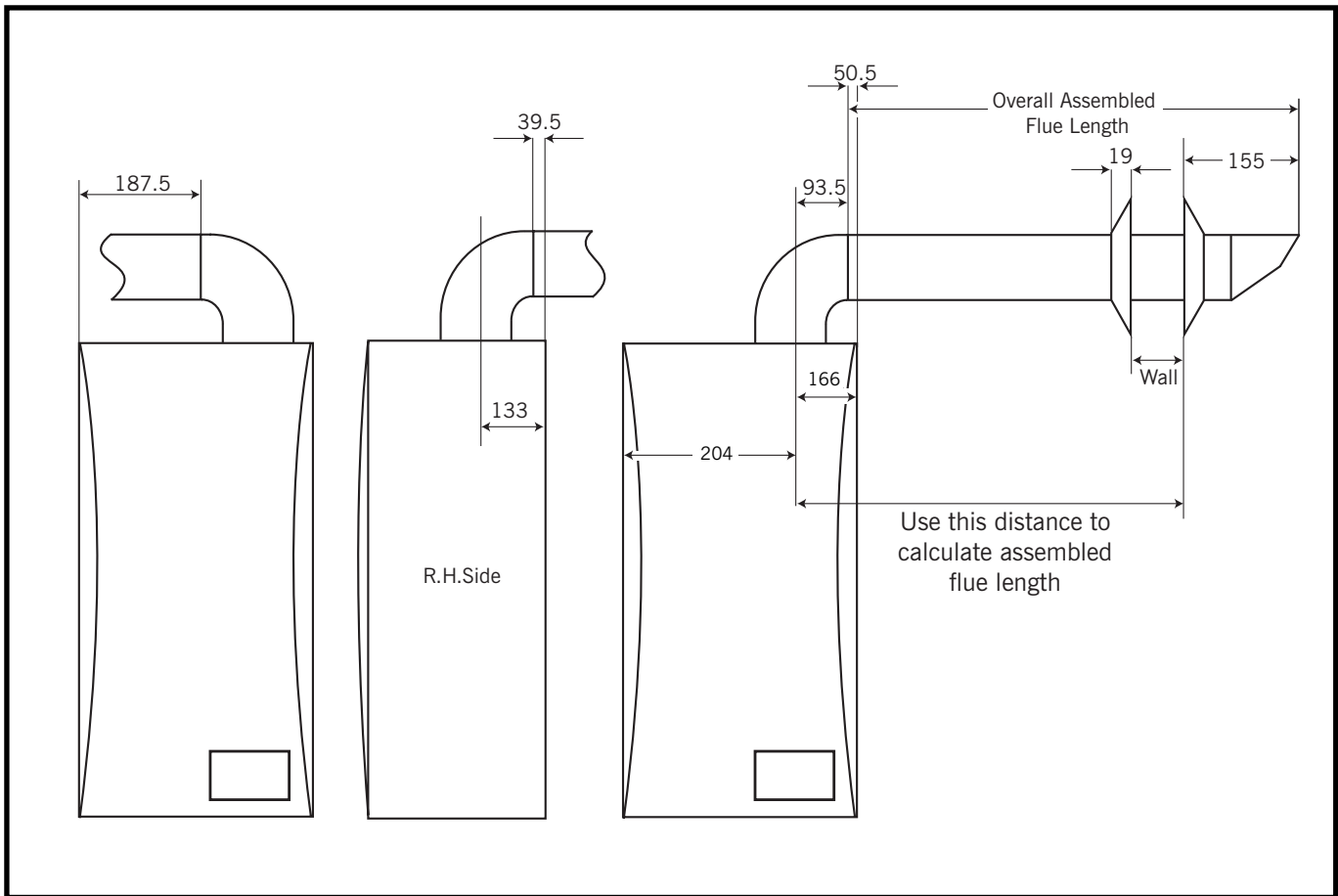


Fig. 3-2

$$\text{Overall Assembled Flue Length} = \text{Measured Distance} - 93.5\text{mm} + 155\text{mm}$$

3.8 Flue Terminal Location:

Both the horizontal and vertical terminals must be positioned on the outside of the building and the free passage of air must be available at all times. It is not recommended to position the terminal close to projections especially under a balcony or near to a drainpipe.

Ensure that combustion products cannot enter the building where the heater is installed or near to any other building where doors or windows may be open.

Recommended terminal positions for both horizontal and vertical flues are shown and flue components and installation options are also detailed.

For the installation of a vertical flue either a flat or pitched roof with an angle of between 25° and 50° should be used.

Gas industry publication: "Guide for Gas Installations in Timber Framed Housing DM2", or your local gas region, MUST be consulted when installing the appliance into a timber-framed building.

Where the lowest part of the flue terminal is located less than 2 metres above the ground, a balcony or above a flat roof across which there is access, the terminal MUST be fitted with a guard (part No:1000-0019710) which is available from Johnson & Starley. The distance between the guard and the nearest part of the terminal must not be less than 50 mm.

3.9 Flue Components & Fitting Options (60/100 Concentric Flue System):

The appliance can be purchased with a standard flue kit that includes: horizontal terminal; turret and fitting kit. Details of optional flue components are listed in table 3-5 along with their resistance in Pascals in order that flue length calculations can be made.

Horizontal and vertical concentric flues (60/100 diameter) with balanced terminals and vertical and horizontal flues (twin 80 diameter) with the flue and air inlet terminals terminating at least 500 mm apart may be installed on this appliance.

Note: If a twin duct system is to be used (type C5) then the air inlet and flue outlet must not be on the opposite sides of the building.

If an extended horizontal flue is being used (any flue length longer than the standard kit) it must have a continuous fall back towards the appliance of 2.5°. This ensures that condensate runs back into the appliance from the flue system. Reference should be made to table 3.5 for relevant part numbers

The maximum length of flue permissible is calculated using the component pressure drop and examples are given in table 3-5 which include the maximum lengths at 95% of input.

The minimum 60/100 concentric horizontal flue length measured from the centre line of the turret to the outside of the wall is 247mm.

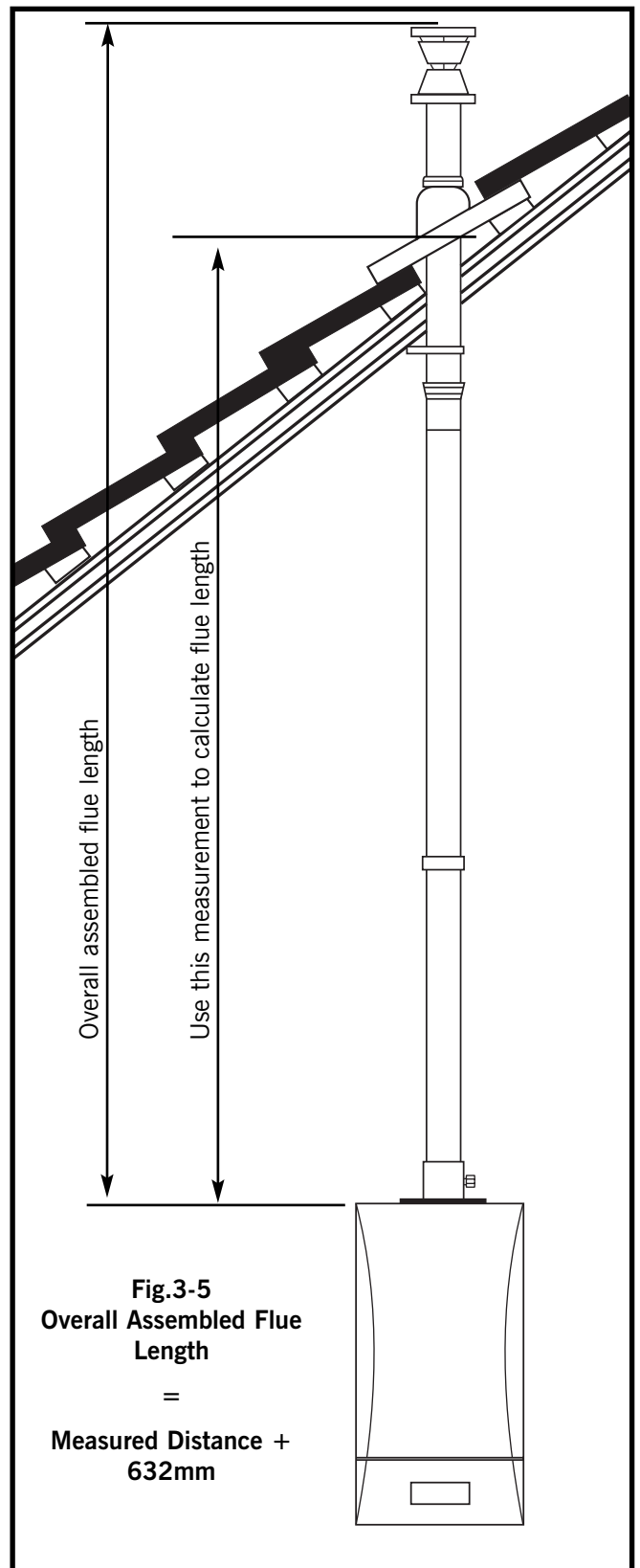
The minimum vertical flue length is 0.7m from the top of the appliance case to the top of the terminal.

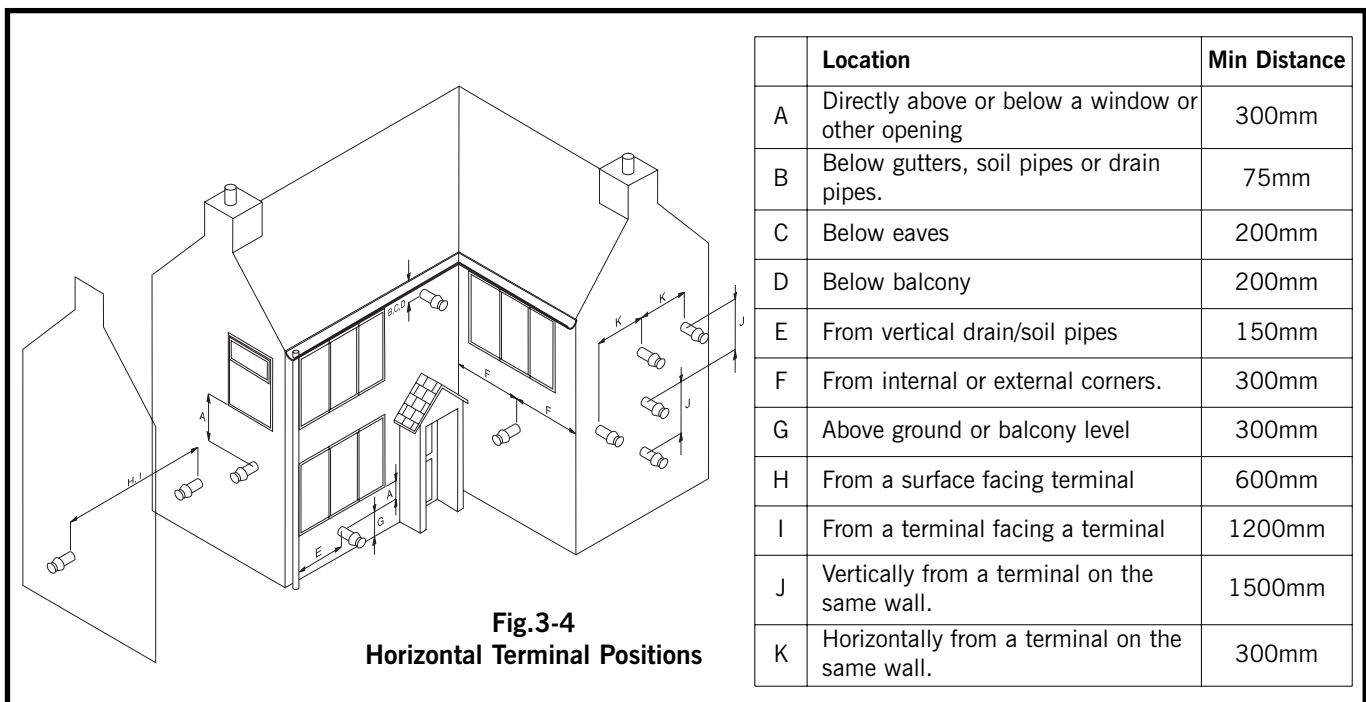
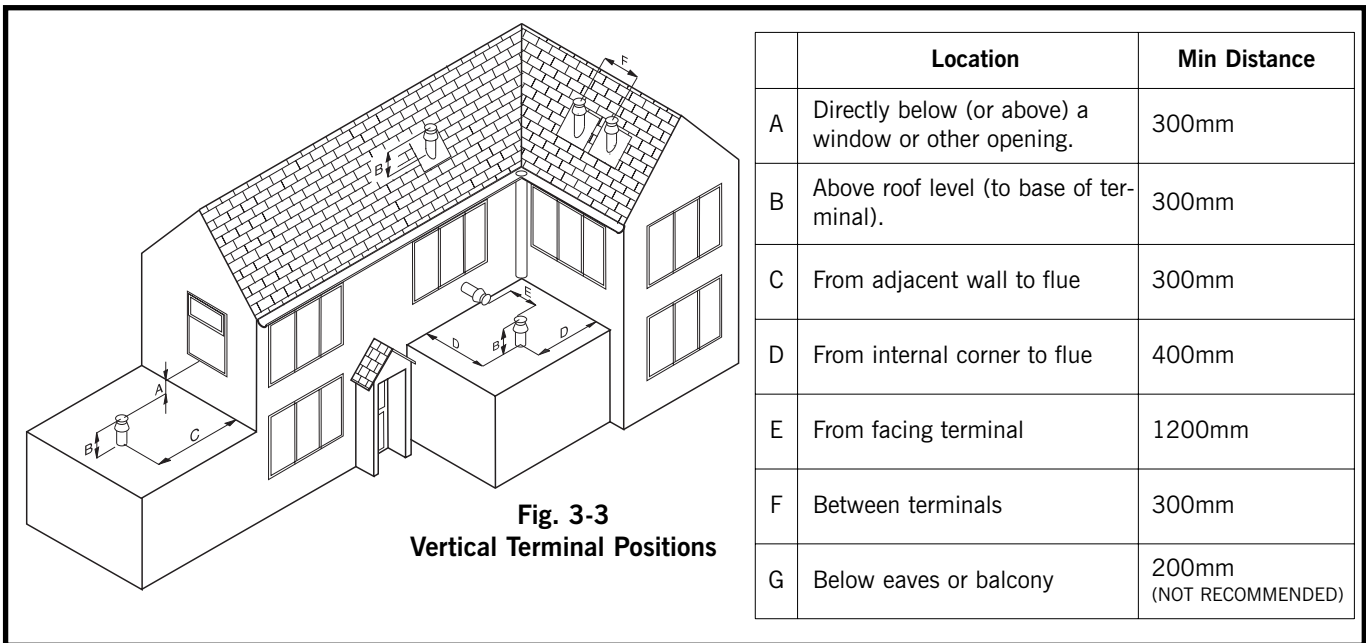
The minimum combined 80 twin flue length is 600mm.

Longer flues may be fitted, however the input of the appliance will be reduced accordingly.

Elbows may be fitted within the flue system with a corresponding reduction in overall flue length based on the component pressure drop. Reference should be made to tables 3-3 to 3-5)

It is recommended the terminals are not sited within 2 m of an opening in an adjacent building or within 2m of the boundary facing the terminal if the plume is likely to cause a nuisance to a neighbour, e.g. discharging over a walkway



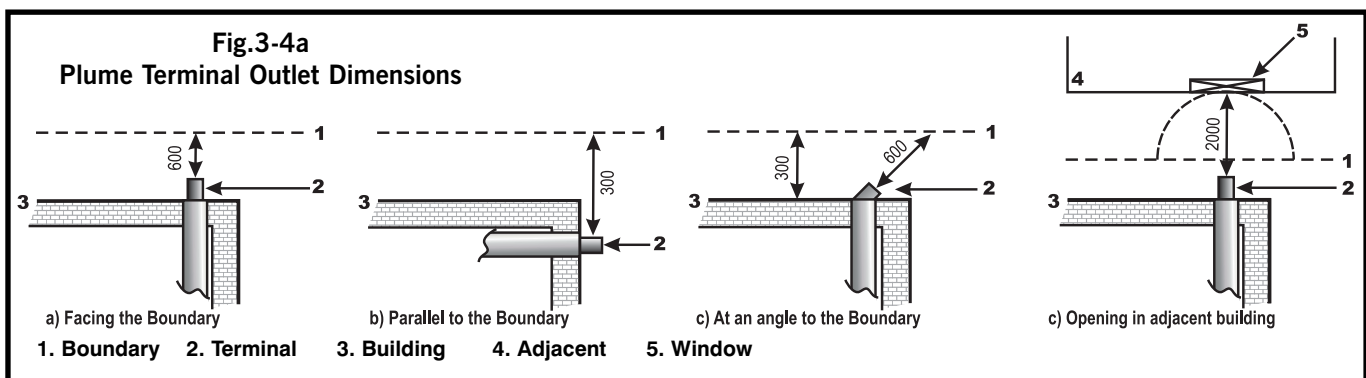


3.10 Plume Terminal Outlets

A flue duct outlet of an appliance should be at least 600mm from the boundary line when facing it and at least 300mm from the boundary line when running parallel to it. (see Fig 3.4a)

NOTE: When the flow of products is at an angle to the boundary, the 600mm dimension may be measured in the direction of the flow, as long as the terminal is not less than 300mm from the boundary.

It is recommended the terminals are not sited within 2 m of an opening in an adjacent building or within 2m of the boundary facing the terminal if the plume is likely to cause a nuisance to a neighbour, e.g discharging over a walkway or patio.



Typical Concentric Flue Configurations

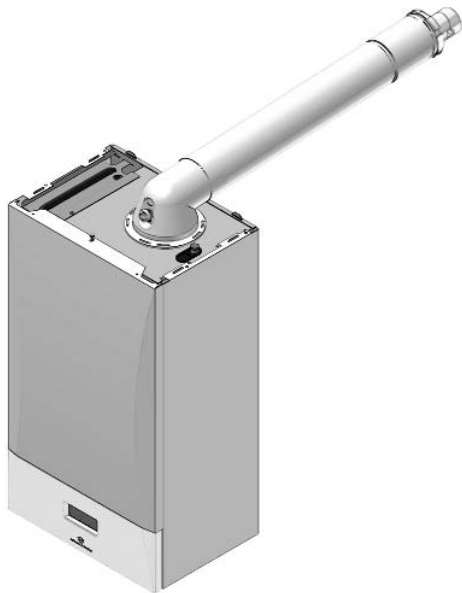


Fig.3-7
Horizontal Rear Flue
(Standard Flue Kit)

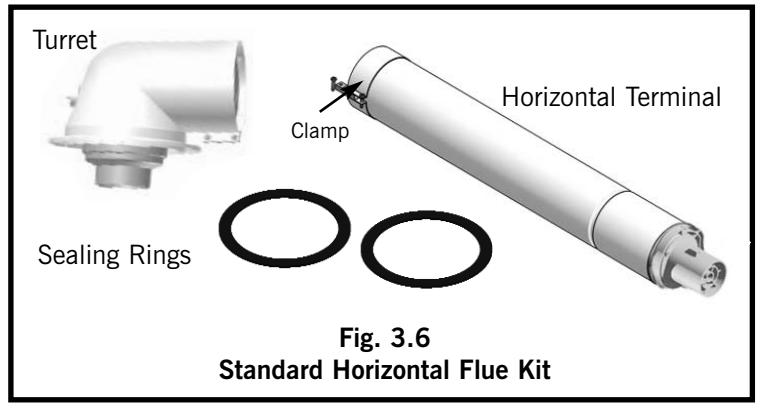


Fig. 3.6
Standard Horizontal Flue Kit

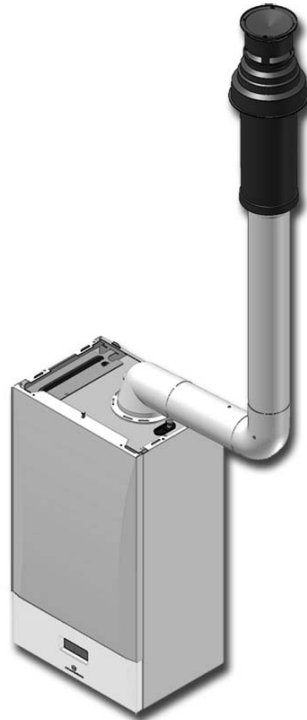


Fig.3-8
Offset Vertical Flue
(may be offset to the rear, left or right)

Turret
500 mm Extension
90° Elbow
Vertical Terminal

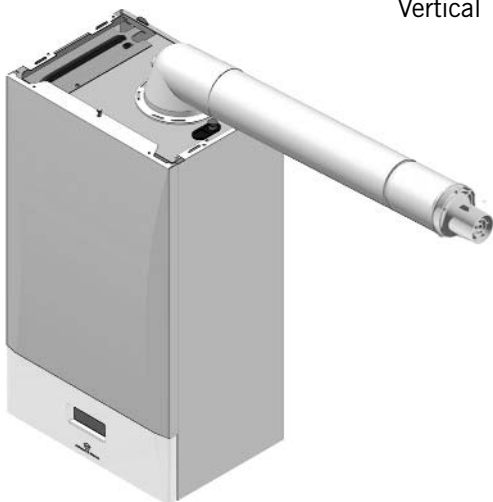


Fig.3-9
Horizontal Side Flue
(Can be left or right)
Standard Flue Kit
500 mm Extension

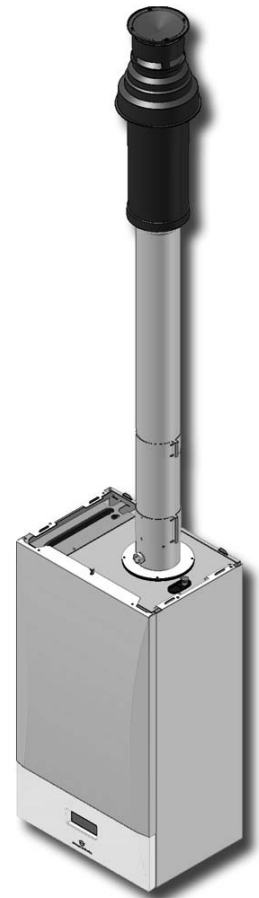


Fig.3-10
Vertical Flue
1m Extension
500 mm Extension
Vertical Appliance Adaptor
Vertical Terminal

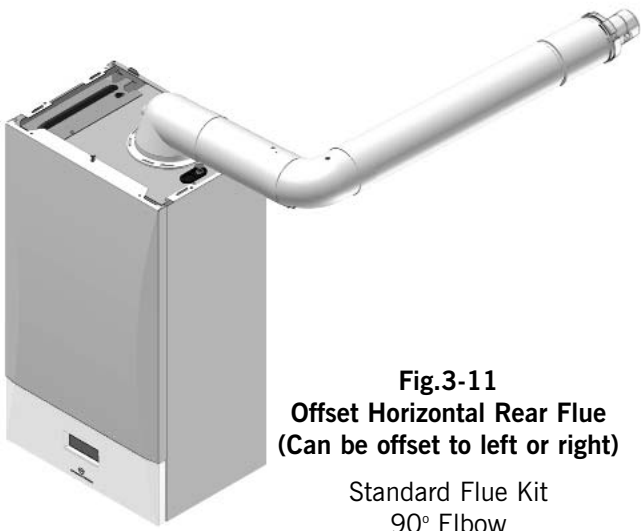


Fig.3-11
Offset Horizontal Rear Flue
 (Can be offset to left or right)

Standard Flue Kit
 90° Elbow
 1m Extension



Fig.3-12
Raised Horizontal Flue
 (Can also be LH or RH)

Horizontal Terminal
 90° Elbow
 1m Extension
 Vertical Appliance Adaptor

Typical Twin to Concentric Flue Configurations



Fig.3-13
Offset Twin to Vertical Concentric Terminal

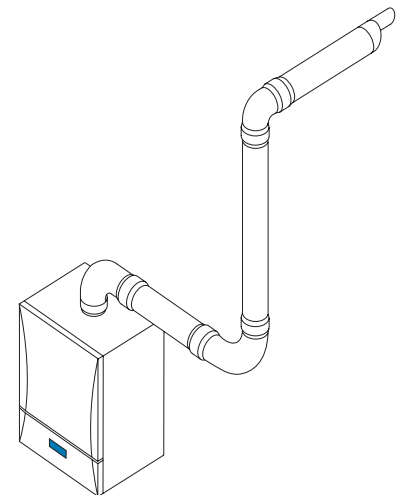
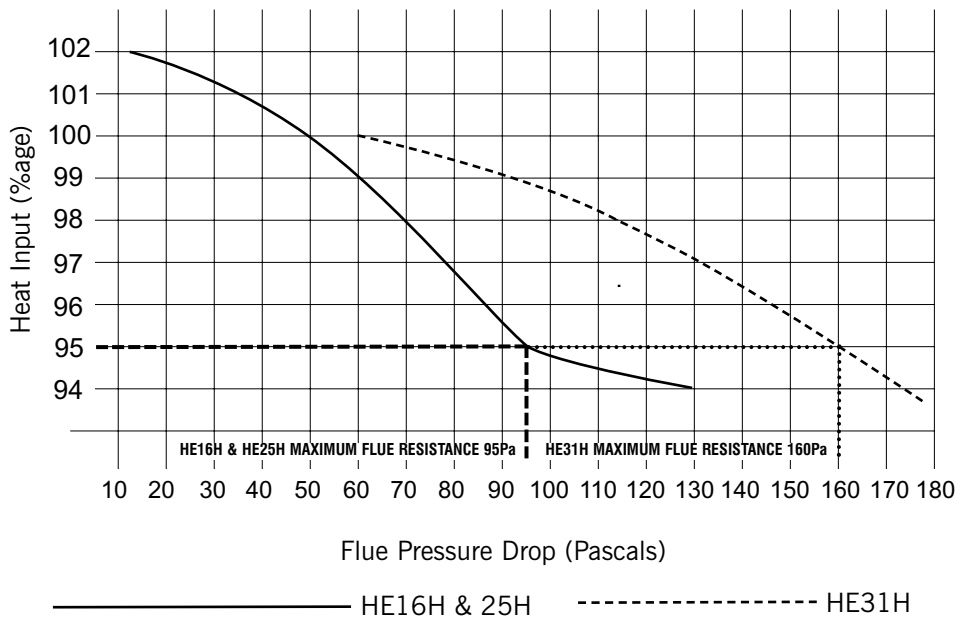
Twin pipe adaptor
 80mm x 500mm extensions (2 off)
 80mm x 45° elbows (4 off)
 80mm x 1000mm extension (2 off)
 Twin to concentric adaptor
 60/100mm vertical terminal



Fig.3-14
Offset Twin to Horizontal Concentric Terminal

Twin pipe adaptor
 80mm x 500mm extensions (4 off)
 80mm x 90° elbows (2 off)
 Twin to concentric adaptor
 60/100mm horizontal terminal

Table.3-2



PRESSURE DROP EXAMPLE

Turret + Horizontal Terminal	= 45 Pa
500mm Extension	= 2.5 Pa
90 Elbow	= 10 Pa
100m Extension	= 5 Pa
90 Elbow	= 10 Pa
TOTAL	= 72.5 Pa

Description	Parts included	Application	Pt No	Pascal
Std flue kit (horizontal terminal)	1 x Turret.	Horizontal	1000-0020070	45
	1 x Appliance seal.			
	1 x 60/80 adaptor.			
	2 x EPDM wall cover plate.			
	1 x 100 mm diameter clamp.			
	1 x 800 mm horizontal terminal.			
Turret	1 x Turret.	Horizontal	1000-0020020	40
Horizontal Terminal	1 x 800 mm horizontal terminal.	Horizontal	1000-0019830	5
1000 mm straight extension	1 x 1000 mm straight extension.	Horizontal Vertical	1000-0018940	5
	1 x 100 mm diameter clamp.			
	2 x screws.			
500 mm straight extension	1 x 500 mm straight extension.	Horizontal Vertical	1000-0018950	2.5
	1 x 100 mm diameter clamp.			
	2 x screws.			
250 mm straight extension	1 x 250 mm straight extension.	Horizontal Vertical	1000-0018960	1.25
	1 x 100 mm diameter clamp.			
	2 x screws.			
Vertical terminal 1140 mm	1 x vertical terminal assembly.	Vertical	1000-0018930	5
	1 x support bracket			
Vertical Appliance Adaptor	1 x Adaptor	Vertical	1000-0018990	0
90° elbow	1 x Elbow	Horizontal Vertical	1000-0018980	10
45° elbow	1 x Elbow	Horizontal Vertical	1000-0018970	5
Flat Roof Weather Collar	1 x Aluminium circular flat roof seal	Vertical	1000-0020060	N/A
Pitched Roof Collar (Black)	1 x Plastic & lead pitched roof seal	Vertical	1000-0020030	N/A
Pitched Roof Collar (Terracotta)	1 x Plastic & lead pitched roof seal	Vertical	1000-0020040	N/A
Fixing Bracket	Clamp for 100 mm tube	Horizontal Vertical	1000-0020050	N/A

**Table.3-4
(60/100 Flue Components)**

3.9 Electrical Connections:

External wiring must be correctly earthed, polarised and in accordance with BS 7671 (current edition).

All system components must be an approved type and all electrical components should have been tested and meet the requirements of BEAB or equivalent. All the electrical connections to the heating system must be through a common double pole isolation switched spur that has a 3 mm separation on each pole and has a 3A rated fuse. It should be used for the heating system only and no other household components. A fused three pin plug and shuttered outlet may also be used provided they both comply with BS 1363.

Important. This appliance must be earthed and it must be wired in accordance with these instructions. In addition, it must have a permanent electrical supply that is not interrupted by a timing device or thermostat.

Fit the electrical supply cable as shown using the connection plug provided. The cable must be at least 0.75 mm², PVC insulated to BS 6500 table 16.

If a frost 'stat is required to protect remote parts of the heating system, this should be fitted as shown.

All cables entering/leaving the appliance MUST be restrained by use of the cable clamps.

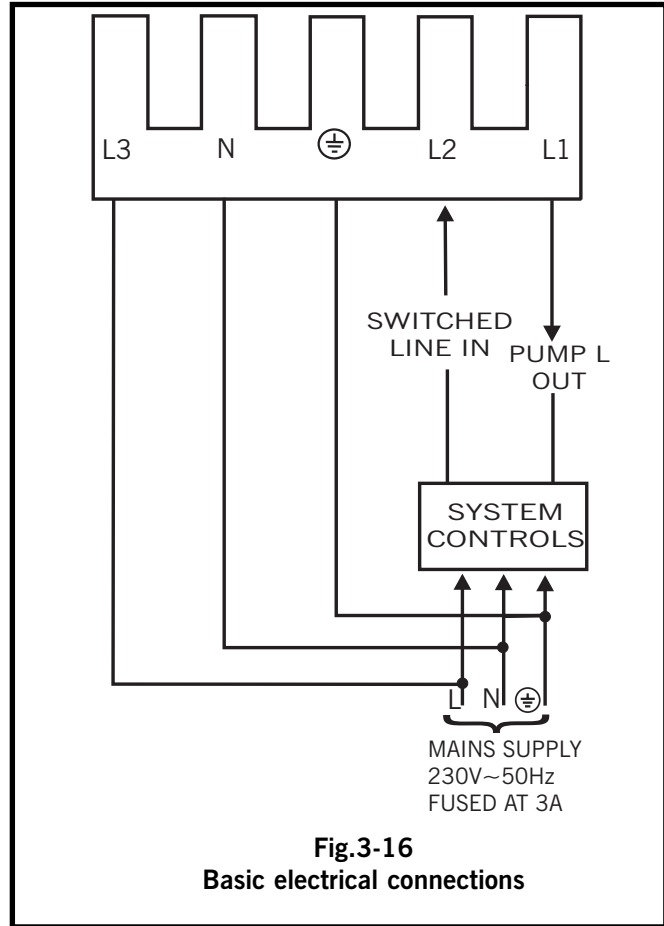
An external controller can be fitted, in which case reference should be made to the appropriate diagram.

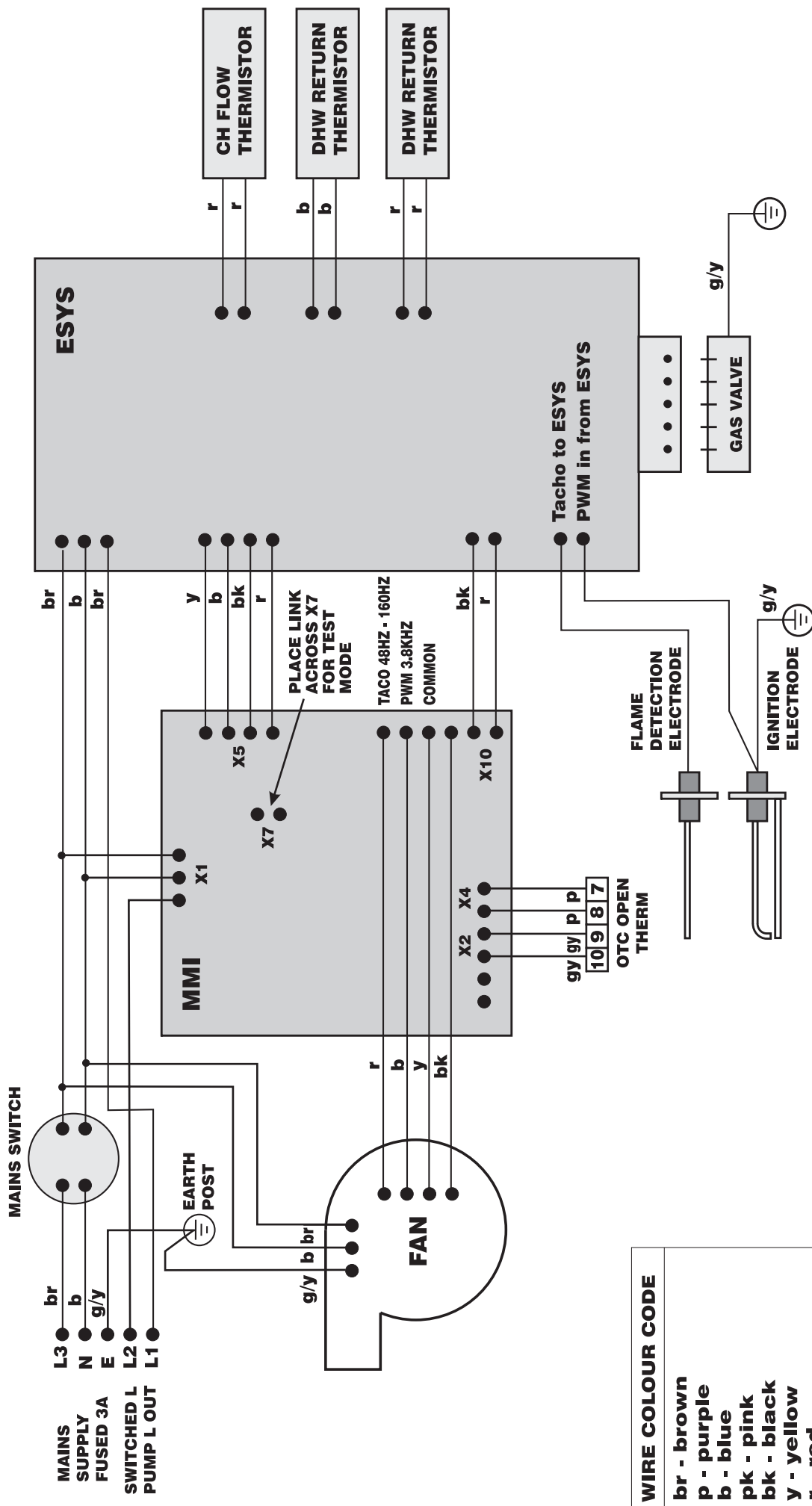
Optional System Controls: Opentherm protocol controls are available for outside temperature compensation and room temperature sensing and can be used to improve the heating system control. They must be connected to the correct terminals as described in their own instructions. A room thermostat **MUST NOT** be used with these controls

3.12 Electrical Testing:

Carry out electrical checks:

- Earth continuity and short circuit of cables
- Polarity of the mains supply
- Insulation resistance to earth





WIRE COLOUR CODE
br - brown
p - purple
b - blue
pk - pink
bk - black
y - yellow
r - red
or - orange
g/y - green/yellow
gy - grey

Fig.3-18
Functional Flow Diagram

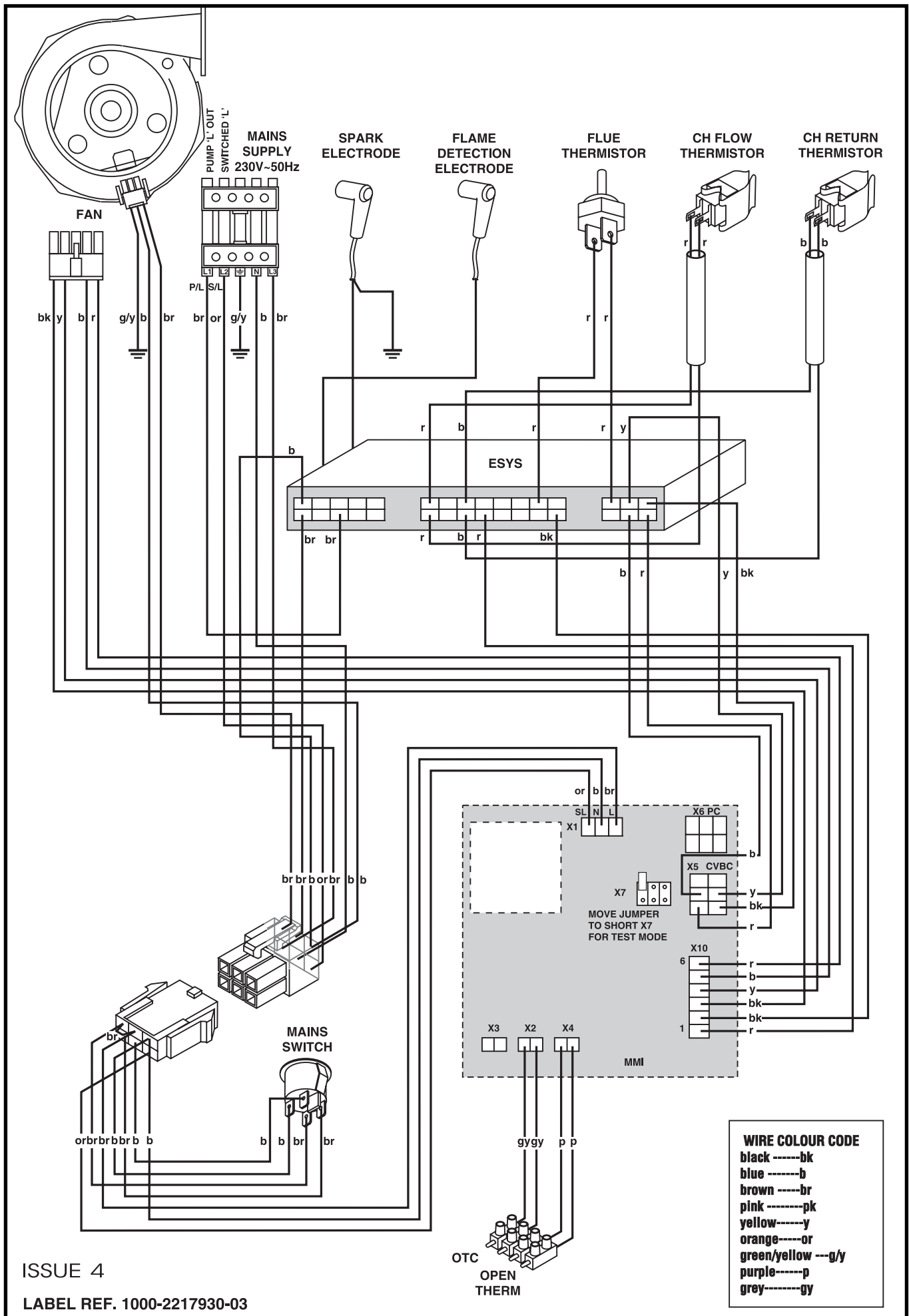


Fig.3-19
 Illustrated Wiring Diagram

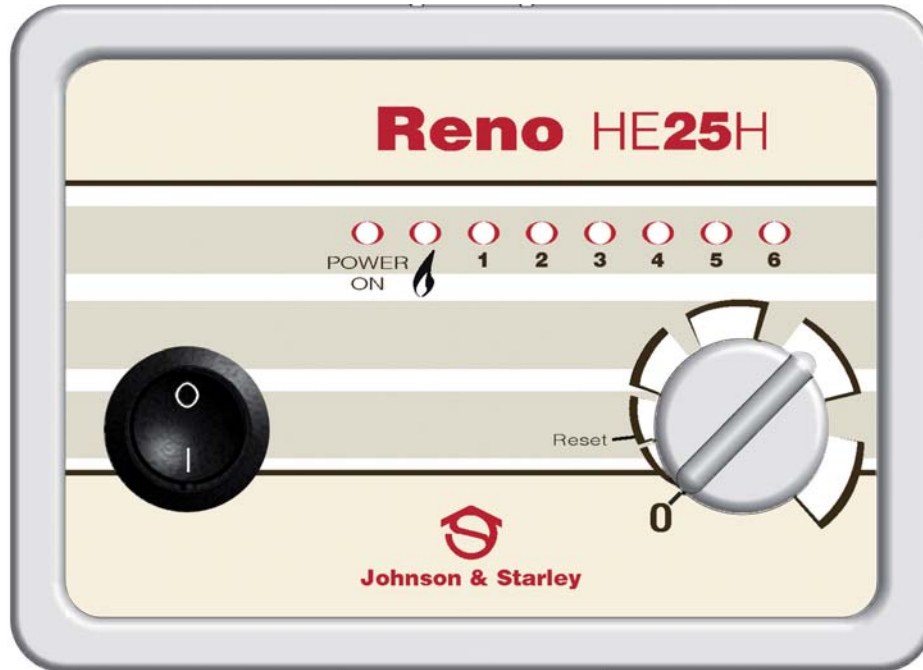
4.1 Commissioning the Appliance:

With all the pipe connections made, ensure that the system is filled, vented and having tested for gas tightness, purge air from the gas supply and turn on the gas service cock.

Switch on the electricity supply to the appliance, turn ON the ON/OFF switch on the boiler control panel and turn the temperature control to minimum.

NOTE

The gas valve is factory preset and must not be adjusted. A replacement valve must only be supplied by Johnson & Starley Ltd.



The LED display will become active, whilst the microprocessor control completes a number of checks and sets the appliance to a standby position.

Check that any external controls are calling for heat, and turn the temperature control fully clockwise. The fan will start and the ignition sequence will take place. The display will indicate the burner is on.

If ignition does not take place during the first ignition attempt, there will be a further 2 attempts. If the burner has still not lit, a fault code will be displayed and this may be due to air being present in the gas supply. Turn the temperature control to the "RESET" position and leave until the fault code clears and the boiler will initiate a fresh sequence of ignition attempts.

When the boiler lights, allow the appliance to operate at low temperature and vent all the air from the boiler and system.

Turn OFF the appliance by turning the temperature control to the minimum position.

When the above checks have been completed, a combustion performance test (as detailed in the SERVICING section) can be carried out if required.

After the combustion test, set the temperature control so that the boiler gives a flow temperature of between 60°C and 80°C.

When the boiler reaches its temp. set point, the anti-cycle feature introduces a 180 second delay between cycles

4.2 Handing over:

After completion of the commissioning procedure, the installer should hand the appliance over to the occupier of the house by the following procedure:

- Hand the User Instructions (ZZ1190) to the occupier and explain their responsibilities in respect of current legislation and regulations, both national and local.
- Explain and demonstrate how to light and shut down the appliance.
- In order to gain the best possible fuel economy in relation to the heating and hot water requirements of the household, carefully explain the operation of the appliance and the use/adjustment of all the system controls.
- Advise on the precautions required to prevent damage to the appliance; the system and the building in the event of the appliance being shut down in very cold weather.
- Explain how, in the event of a fault, the appliance will display a fault code, emphasising that if a fault is indicated they should note the fault code, turn off the appliance and contact a “competent person” which in normal circumstances would be a Gas Safe registered engineer.
- Explain and demonstrate the function/operation of time/temperature controls and thermostatic radiator valves, emphasising the economic use of the appliance.
- If a programmer has been fitted, hand the user instructions that were supplied with the programmer to the occupier.
- Emphasise the importance of a regular service and that servicing of the appliance MUST only be carried out by a “competent person” which in normal circumstances would be a Gas Safe registered engineer.
- As the installer you may wish to offer a service contract yourself, or alternatively you may wish to explain to the occupier that they can take advantage of an extended warranty scheme offered by Johnson & Starley Ltd.

Reminder: following the commissioning and handover of the appliance, complete the Benchmark Log Book and leave it with the occupier.

5. SERVICING SCHEDULE

To ensure that the appliance gives continued operation that is both safe and efficient, it is necessary to carry out regular service checks and whilst the period between servicing will depend on the installation condition and the demands placed upon the appliance, it is recommended that the appliance be serviced annually.

NOTE: it is a statutory requirement that ALL work be carried out by a “competent person” which in normal circumstances would be a Gas Safe registered engineer.

5.1 Servicing Sequence:

- Light the boiler and carry out a pre-service check, noting any operational faults.
 - Check the gas consumption.
 - Put the appliance in test mode and connect a suitable flue gas analyser to the sampling point on the top of the boiler or into the flue terminal if access is possible (optional test).
- For correct boiler operation, the CO/CO₂ content of the flue gas should not be greater than 0.008 ratio.
- Check that the gas input is at least 90% of the nominal. * See test mode inputs.
- Clean the main burner.
 - Clean the heat exchanger.
 - Check the condition of the combustion chamber insulation. Any cracked or damaged pieces should be replaced.
 - Wherever possible, remove and clean the condensate 'S' trap (refer to section 6.6) and check the drain for blockage.
 - Check that the flue terminal is unobstructed and that the flue system is sealed correctly.

Test Mode

To put the appliance in test mode, remove the fixing screw and drop down the electronics panel so that access can be gained to the PCB. The supplied jumper (parked) should be used to jump the two pins marked X7.

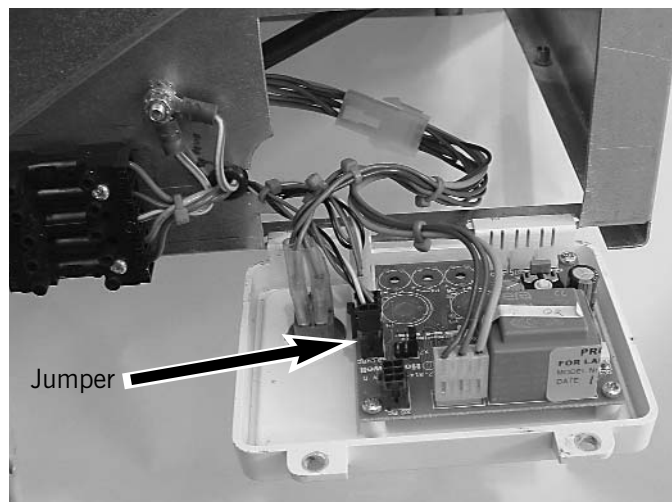
Test mode is indicated by the power light flashing. Max and min test mode can be selected by max and min on boiler stat.

Whilst in test mode, the appliance overrides all temperature setting and the temp control allows you to scroll between maximum and minimum rates, whilst still overriding all temperature settings*. To take the boiler out of test mode, remove the jumper and put it back into its parked position.

When in max test mode the unit will run at 100% fan speed. This will give an input of-

			16H	25H	31H
INPUT	NET	Kw	16.3	30.6	38.0
	GROSS	Kw	18.1	34.0	42.1

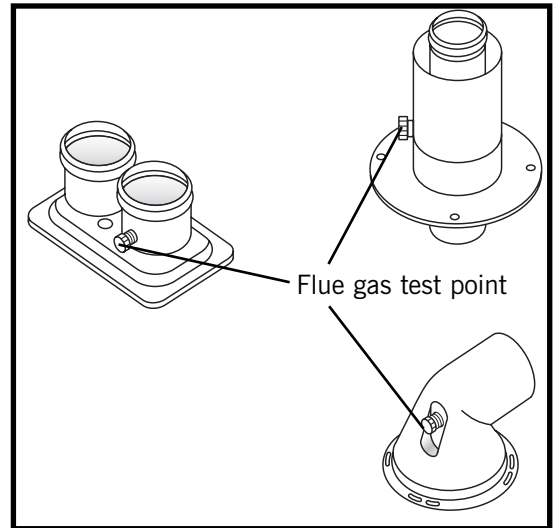
* On smaller heating systems, running at maximum output MIGHT cause the boiler to go into lockout. Allow the heating system to cool and turn the temp. control to RESET until the lockout clears.



Note. In order to carry out either servicing or replacement of components the boiler front panel and sealing panel must be removed. (Refer to section 6.2)

WARNING. Always turn OFF the gas supply at the gas service cock and switch OFF and disconnect the electricity supply to the appliance before servicing.

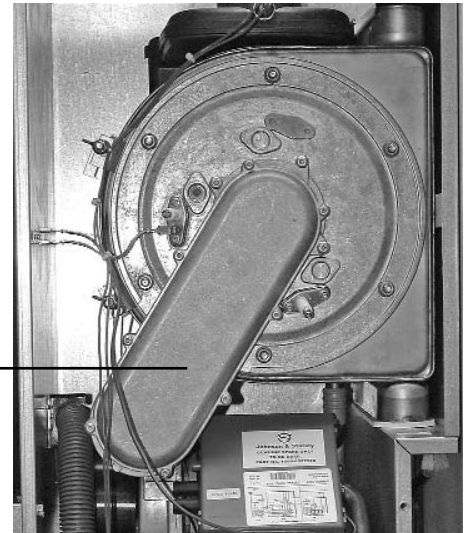
- After completing the servicing or exchange of components always test for gas tightness and carry out functional checks as described above.
- When work is complete, the sealing panel **MUST** be correctly refitted, ensuring that a good seal is made.
- If, for any reason, the condensate 'S' trap has been removed ensure the trap is refilled with water before reassembling.
- **After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist located on the inside back pages of this document.**



5.2 Gas/Air Duct and Internal Volume of the Burner

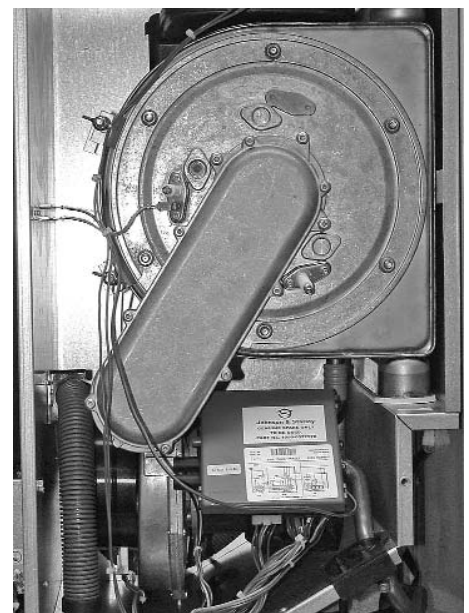
Remove the cover from the gas / air manifold (8 screws) and inspect the inside of the duct and burner for debris. Clean with a soft brush if necessary. Inspect the 'O' ring seal. Re-assemble the cover ensuring the seal is fitted correctly.

Gas/Air Duct



5.3 Combustion Assembly Complete

Referring to sections 6.7 and 6.11 remove both the condensate siphon and the ESYS). Disconnect the gas pipe at the top of the isolation valve, which will already have been turned off and unscrew the six retaining nuts from the studs that hold the assembly to the heat exchanger, supporting the assembly as the last one (bottom) is removed. Slowly withdraw the complete assembly, including the gas inlet pipe and the case seal. As the assembly is withdrawn, disconnect the two electrical connections from the fan. Inspect and clean the spark ignition and flame sensing electrode, removing any debris and oxidization and check the spark gap and position of the spark electrode and the position of the flame-sensing electrode. Refer to the illustration and adjust if necessary. Inspect the two seals and the ceramic pad on the inside of the mounting plate and clean or replace as necessary.



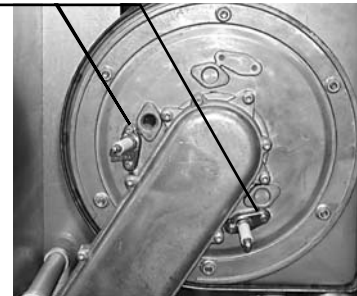
5.4 Combustion Chamber/Heat Exchanger

Inspect the inside of the combustion chamber for debris. If necessary, brush clean the inside of the tubes with a soft brush. Do not brush the insulation at the rear, if this part is damaged it will require replacement.



5.5 Ignition and Detection Electrodes

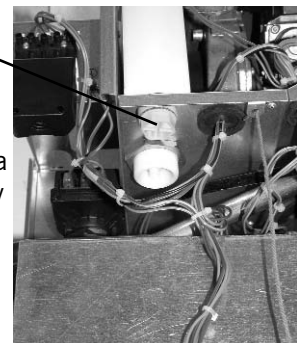
Remove the plug cap from the top and the earth wire from the base of the spark electrode. Unscrew the two screws that retain the electrode in the cover plate and remove the assembly. Inspect and clean the electrode, removing any debris and oxidation. If necessary use an abrasive paper or cloth. Inspect the gasket and replace if necessary during re-assembly. Repeat the sequence for the flame detection electrode with the exception of the earth lead.



5.6 Condensate Cap (Where a siphon is fitted)

On some boilers an integral condensate siphon may have been fitted. This has a removable cap that allows the removal of debris that may be caught within it. Place a bowl under the cap to catch the condensate that is expelled and remove the cap. Any debris inside will be expelled at this point. Replace the cap ensuring a good seal is made. Discard the condensate and debris

Note: The condensate is a weak acid with a ph value of between 4 and 6.



6. FAULT FINDING AND REPAIR

CAUTION:

Before commencing any mechanical servicing the appliance should be isolated from the electrical supply and the gas service cock on the appliance closed. All parts that are removed during a service operation should be replaced in reverse order, ensuring correct seals are made and wires are connected correctly. During the service remove any debris from within the appliance. When gas-carrying components are serviced the appliance must be tested for gas tightness after re-assembly. On completion of a service carry out a full functional test of all appliance components and ensure system controls are operating correctly.

Remove the upper front case that is retained by a screw in the top of the appliance.

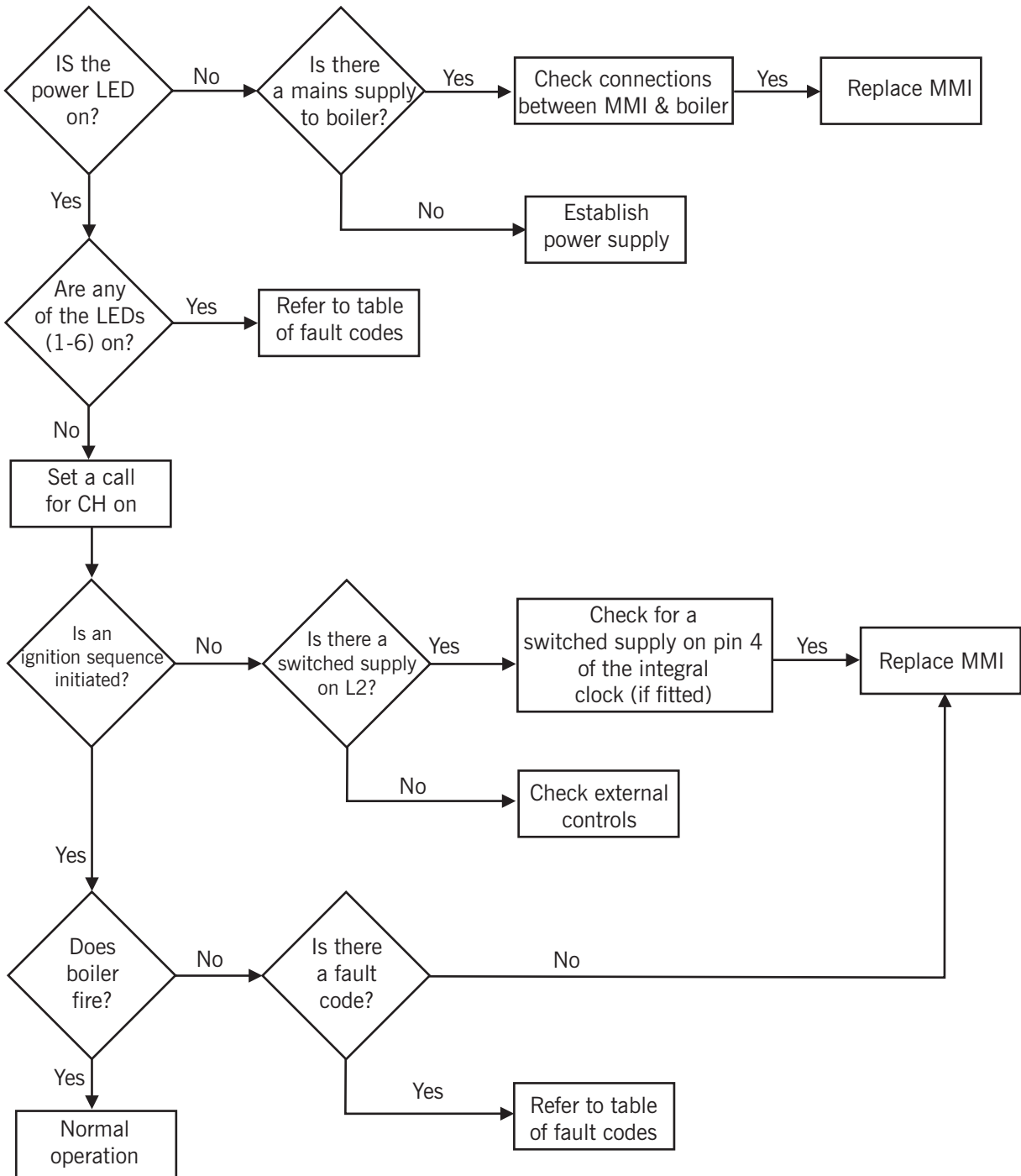
Remove the sealed door by removing the two screws and lifting the door clear.

Should a fault occur, the boiler will shut down and an error code will be displayed through a pattern of LED lights on the control panel. To clear the fault, turn the temp. control to the "RESET" position and leave until the fault code has cleared.

NOTE: if the lockout is because of overheat, it may take several minutes for the boiler to cool sufficiently to allow the MMI to reset.

FAULT FINDING ERROR CODES

Fault Code	Fault	Reason	Action
N/A	Boiler will not run	No call for heat to boiler control board	Check all external controls (if fitted) Check time clock settings Check boiler control settings
● ○ ○ ○ ○ ○ ○	Ignition lockout	Flame not detected	Check all external controls if fitted. Check settings of the time clock. Check settings of boiler controls
● ● ○ ○ ○ ○ ○	High limit error	Air in boiler. No water flow	Vent boiler Check pump
● ○ ● ○ ○ ○ ○	No tacho from fan	Fan not running or wiring fault	Check that fan runs. Check wiring between MMI X10 and fan.
● ● ● ○ ○ ○ ○	High flue gas temperature	Reduced water flow	Check pump operation.
○ ○ ○ ● ○ ○ ○	Flame circuit error	Flame sensing lead shorted to earth	Check flame detection lead between sensing probe and ignition control board.
● ○ ○ ● ○ ○ ○	Valve drive circuit error	Gas valve not detected	Replace ignition control board or gas valve.
● ● ○ ● ○ ○ ○	Duel sensor error		
○ ○ ● ● ○ ○ ○	Default lockout	Eprom memory fault	Change ESYS
● ○ ● ● ○ ○ ○	Remote reset lockout		Change ESYS
● ○ ● ○ ● ○ ○	ADC error		Change ESYS
○ ● ○ ● ● ○ ○	CRC error - SW switch		Change ESYS
○ ● ○ ● ● ○ ○	Flame signal lost 5 times in 4 minutes.	Flame sensing error. Falling gas pressure Fan fault Flue blockage	Check flame detection lead between sensor and ignition control board. Check gas supply: does pressure fall when boiler fires?
● ● ● ● ● ○ ○	Boiler flow temp sensor open circuit	Temperature sensor not connected/failed	Check wiring & connections. Check sensor continuity.
○ ○ ○ ○ ○ ● ○	DHW sensor short		
● ○ ○ ○ ○ ● ○	DHW sensor open		
○ ● ○ ○ ○ ● ○	Low mains voltage (Mains < approx 180V)	Electrical supply fault to property Faulty wiring to appliance.	Check incoming mains supply and wiring to appliance.
● ○ ● ○ ○ ● ○	Water pressure error		
○ ● ● ○ ○ ● ○	Reset key error (Shorted)		
● ● ● ○ ○ ● ○	OpenTherm sensor shorted to earth	Short circuit in wiring between sensor and MMI	Check wiring to sensor. Check the electrical resistance of the sensor.
○ ○ ○ ● ○ ● ○	Water pressure too high		
● ○ ○ ● ○ ● ○	No water pressure signal received from MMI		
○ ○ ● ● ○ ● ○	Boiler return temp. sensor open circuit	Temp sensor not connected/failed	Check wiring and connections. Check sensor continuity.
● ○ ● ● ○ ● ○	Flue gas temp sensor short	Short circuit between open sensor & MMI /failed	Check wiring to sensor. Check the electrical resistance of sensor.
○ ● ● ● ○ ● ○	Flue gas temp. sensor open circuit	Short circuit in wiring between sensor and MMI	Check wiring to sensor. Check the electrical resistance of sensor.
● ● ● ● ● ● ○	Communication MMI -CVBC lost	Connections between MMI & CVBC incorrectly made	Check wiring and connections



FAULT FINDING FLOWCHART

6.1 Fault Codes

Replacement of Parts

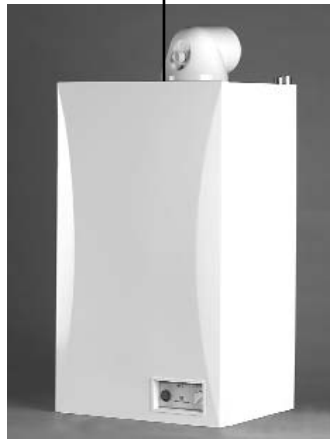
6.2 Initial Disassembly

Remove the upper front case that is retained by a screw in the top of the appliance.

Remove the sealed door by removing the two screws and easing it to the left to disengage it from the LH side of internal casing.

If access is required to the back of the control module, remove the fixing screw that holds the control module in place, rotate downward and unplug the wires so that it can be lifted out of the hinge slots in the metal work.

Front case retaining screw



Control module fixing screw

6.3 Control Panel (complete)

Because of the complexity and delicate nature of the control PCB, it is supplied as a complete kit with the plastic moulding and facia.

Remove the control panel as described at section 6.2. and fit the new assembly in reverse order.



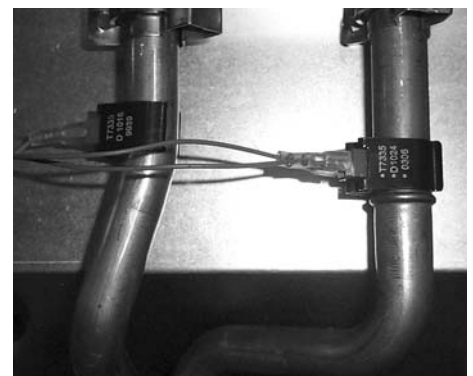
6.4 Electrical Switch

Follow the steps in section 6.2 in order to gain access to the rear of the control module, unplug the wires from the switch and remove the switch. Replace with a new component in reverse order.



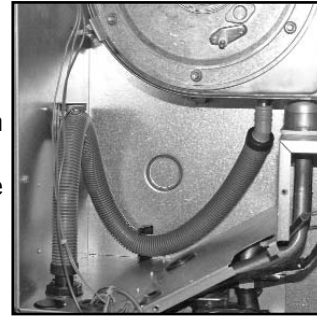
6.5 Primary Water Temperature Sensors (2 off)

Unplug the two wires from the temperature sensor to be replaced and unclip the sensor from the pipe. Replace with a new component in reverse order, ensuring it is fitted in the same position.



6.6 Condensate Drain

Referring to s.5.3, remove the complete combustion assembly including the burner arm. The flexible condensate pipe is a push fit and the grey plastic fitting connects to the heat exchanger. The flexible pipe MUST be routed through the two push fit retaining clips so that the pipe forms a "S" shaped trap. With the burner arm removed, pour water into the heat exchanger in order to fill the condensate drain pipe and check for leaks. Reassemble in reverse order



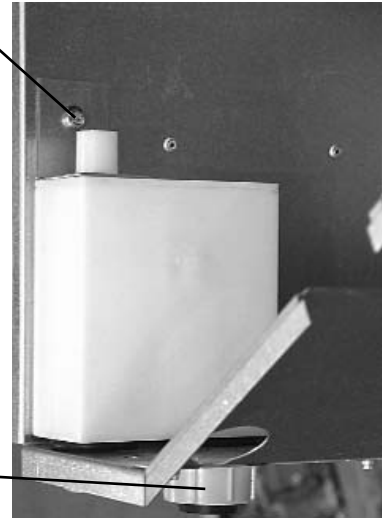
6.7 Condensate Siphon (Where Fitted)

Place a bowl under the cap on the condensate siphon and remove the cap in order to drain the siphon.

Pull the condense pipe from the top of the siphon and remove the fixing screw retaining the support bracket. Unscrew the knurled ring underneath the siphon and remove the drain pipe from the bottom of the siphon. Unscrew the 1" brass lock nut from the bottom of the siphon and remove the siphon from the sub assembly. Replace with a new component in reverse order.

Fixing screw

Knurled ring

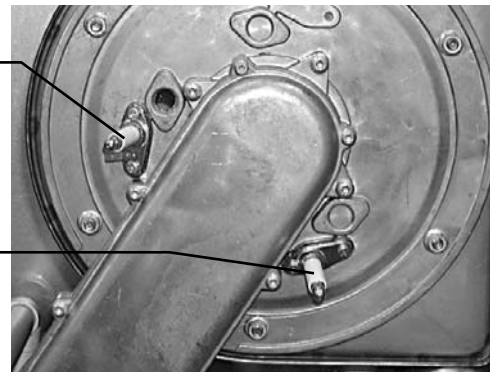


6.8 Ignition Electrode

Remove the plug cap and the earth wire from the electrode. Remove the two retaining screws and withdraw the electrode. Replace with a new unit, ensuring that the gasket is replaced with a new one, or that the existing gasket reused if it is in good condition.

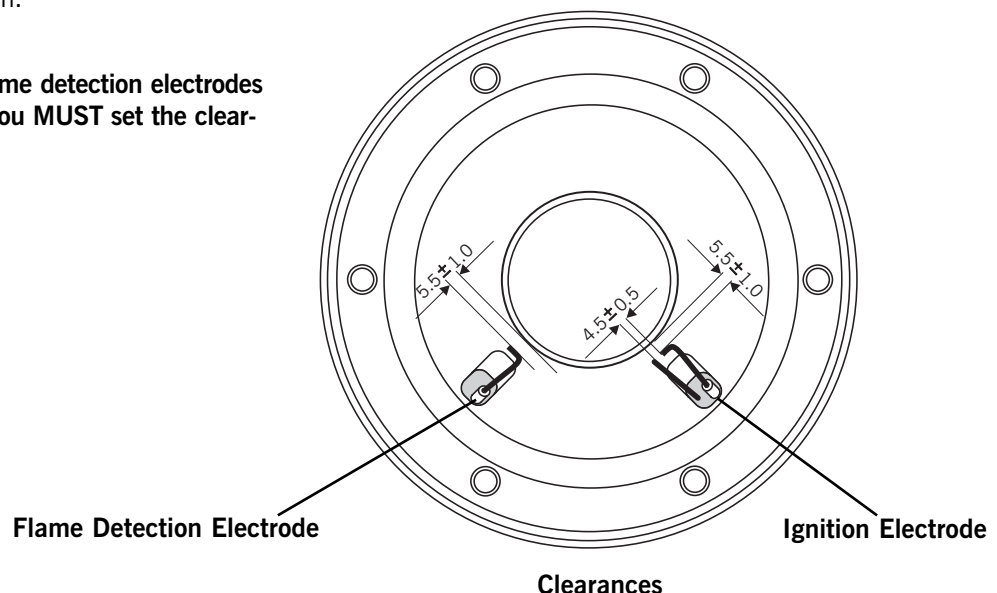
6.9 Flame Detection Electrode

Remove the plug cap from the electrode. Remove the two retaining screws and withdraw the electrode. Replace with a new unit, ensuring the gasket is replaced with a new one, or the existing gasket reused if it is in good condition.



IMPORTANT:

When either the ignition or flame detection electrodes have been serviced/replaced you MUST set the clearances as shown.



6.10 Burner

Unscrew the gas joint at the top of the gas cock. Unscrew the fan and gas/air manifold assembly (3 screws) from the heat exchanger. Unplug the multi pin plug connections from the top of the control and the fan. Remove the assembly.

Remove the assembly to allow the burner to be withdrawn from the heat exchanger assembly. Replace with a new component in reverse order. Ensure the rotational position of the burner is correct. Replace with a new component in reverse order ensuring that the grommet sealing the casing is correctly positioned.



6.11 Main Ignition/Control PCB (ESYS Grey/Red Housing on Gas Valve)

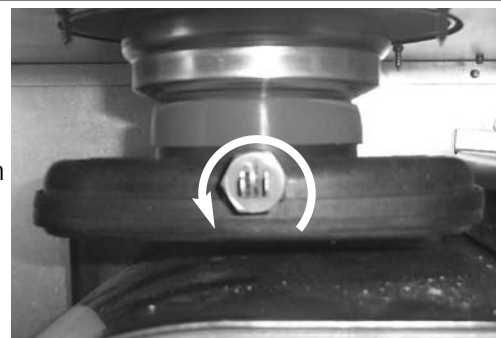
Unplug the multi pin plug connections from the top of the control and remove the spark detection wires. Unscrew the single retaining screw and slide the housing off the gas valve electrical connections. Replace with a new component in reverse order.

NOTE: The ESYS label is identified with the addition of an 'E' alongside the 3 stars.



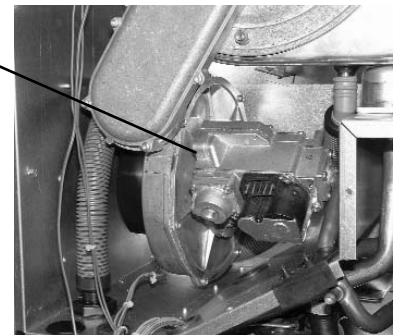
6.12 Flue Temperature Sensor

Carefully pull the two terminal connectors from the sensor and unscrew the sensor from the plastic flue hood. Replace with a new component in reverse order.



6.13 Fan

Unscrew the gas joint at the top of the gas cock and remove the ESYS (red box) from the gas valve. Unscrew the fan and gas/air manifold assembly (3 screws) from the heat exchanger. Unplug the multi pin plug connections from the top of the control and the fan. Remove the assembly. Replace with a new component in reverse order.

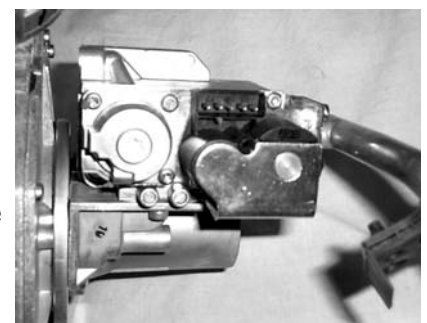


6.14 Gas Valve & Venturi Assembly

NOTE: the gas valve is factory preset and a must not be adjusted. A replacement valve must only be supplied by Johnson & Starley Ltd.

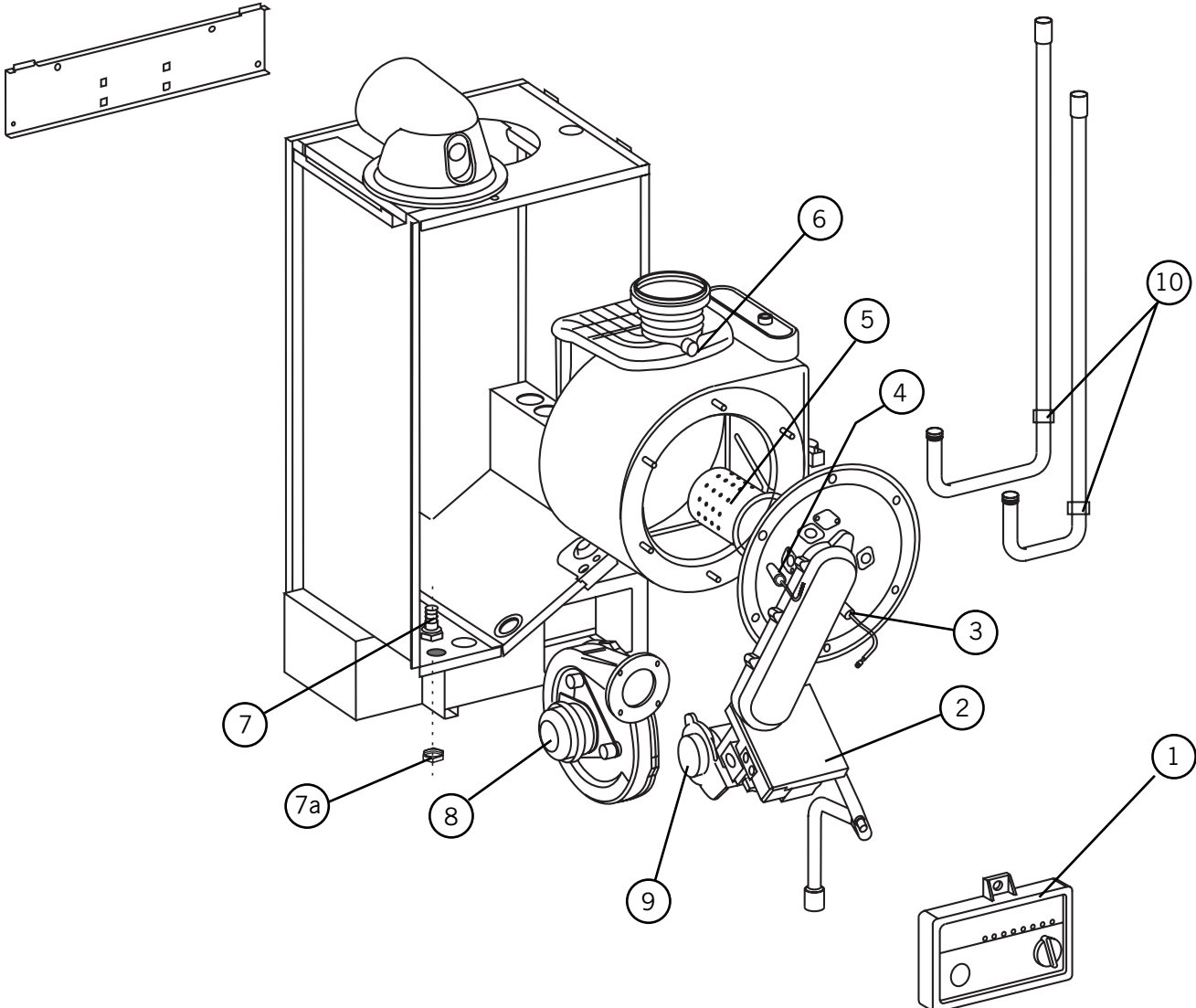
Remove the complete fan assembly as shown at paragraph 6.13 and remove the 4 fixing screws holding the gas feed flange on the gas valve. Remove the 2 fixing screws securing the venturi (and gas valve) to the fan and remove the assembly from the fan carefully removing the gasket.

Replace with a new component in reverse order, ensuring that all seals are in good condition and correctly positioned. Check the gas rate and combustion as described in section 5 Servicing Instructions.



7 SHORT SPARE PARTS LIST

Item	Part No	GC No	Description
HE25H			
1	R250-0500005	H23-625	Control Panel (complete)
2	1000-0522575	H23-621	Main Ignition/Control PCB (ESYS)
2	1000-0523395	H38658	Main Ignition/Control PCB (ESYS) from serial No: 70000283
3	1000-0709665	H23-619	Detection Electrode, Gasket & Screws (2)
4	1000-0709655	H23-618	Ignition Electrode, gasket & screws (2)
5	1000-0709675	H23-620	Burner and Small Seal
6	1000-0522645	H23-622	Flue Temp. Sensor
7	1000-0020895	H39975	Tank Connector
7a	1000-0020905	H39976	Tank Connector Nut
8	1000-0522635	H23-623	Fan, Gaskets (2) & Fixing Screws
9	1000-0709635	H23-624	Gas Valve & Venturi Assy (inc fan gasket, pipe gasket & screws (4)
10	1000-0522595	H23-613	Water Temperature Sensors
HE16H (as above except)			
1	R160-0500005	H40013	Control Panel (complete)
2	1000-0523415	H39981	Main Ignition/Control PCB (ESYS)
5	1000-0709805	H39978	Burner and Small Seal
9	1000-0709865	H39995	Gas Valve & Venturi Assy (inc fan gasket, pipe gasket & screws (4)
HE31H (as above except)			
1	R320-0500005	H49591	Control Panel (complete)
2	1000-0523405	H39970	Main Ignition/Control PCB (ESYS)
5	1000-0709825	H39967	Burner and Small Seal
9	1000-0709875	H39972	Gas Valve & Venturi Assy (inc fan gasket, pipe gasket & screws (4)



Service Record

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

Service Provider

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

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

Service 1 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 2 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 3 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 4 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 5 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 6 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 7 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 8 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 9 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Service 10 Date: _____
Engineer Name: _____
Company Name: _____
Telephone No. _____
Operative ID No. _____
Comments: _____
Signature: _____

Johnson & Starley are the leading UK & European manufacturers of a complete range of **Domestic Warm Air Heaters**. All the heaters suit both **Replacement** and **Upgrade** needs and are compliant with the new (2006) amendments to Part L of the Building Regulations.

HOME COMFORT SOLUTIONS

Company Details

Website Address	www.johnsonandstarley.co.uk
Email	sales@johnsonandstarley.co.uk marketing@johnsonandstarley.co.uk
Telephone Number	01604 762881 (Main switchboard)
Fax Number	01604 767408

Spares

Telephone	01604 707012
Fax	01604 762884

Sales

Telephone	01604 707012
Fax	01604 764879

Service

Telephone	01604 707011
Fax	01604 707017

Warm Air Upgrade Enquiry Service

Telephone	01604 707026
Fax	01604 707017



RENO BOILER RANGE



HI-SPEC BOILER RANGE



ECONOMAIRE BOILER RANGE



HOME 'N' DRY VENTILATION



DRYFLOW



HEAT RECOVERY

COMMERCIAL & INDUSTRIAL H&V SOLUTIONS

Company Details

Johnson & Starley Dravo Division Industrial H&V

Website Address	www.dravo.co.uk
Email	dravo@johnsonandstarley.co.uk
Telephone Number	01604 707022
Fax Number	01604 706467



RELIABILITY YOU CAN TRUST

Rhosili Road, Brackmills, Northampton NN4 7LZ

In the interests of continuous development Johnson & Starley reserve the right to change specification without prior notice.