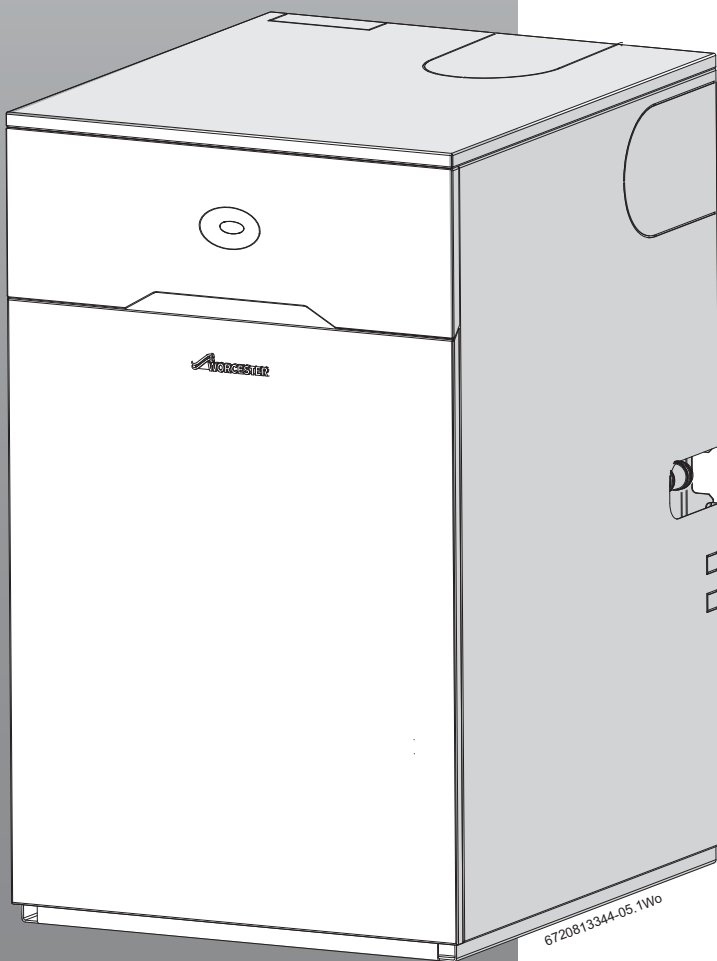


# Installation, Commissioning and Servicing instruction manual

**Floor Standing oil-fired Condensing Combination Boiler using Conventional and Room Sealed Flue**

## **Greenstar Heatslave II<sup>ErP+</sup> 12/18, 18/25 & 25/32**

For fully pumped sealed central heating systems and mains pressure domestic hot water.  
These appliances are for use with Kerosene (Class C2) only.



UK


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# 1 Key to symbols and safety instructions

## 1.1 Key to symbols

### Warnings




Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- **NOTICE** indicates a situation that could result in damage to property or equipment.
- **CAUTION** indicates a situation that could result in minor to medium injury.
- **WARNING** indicates a situation that could result in severe injury or death.
- **DANGER** indicates a situation that will result in severe injury or death.

### Important information



This symbol indicates important information where there is no risk to people or property.

### Additional symbols

Symbol	Meaning
1.	a numbered step in an action sequence
▶	a step in an action sequence
→	a reference to a related part in the document or to other related documents
①	a reference number to identify or refer to a part or item
.	a list entry
-	a list entry (second level)

Table 1 Symbols

### Examples of additional symbols used

#### A numbered step in an action sequence

A sequence of numbered steps or actions carried out in a specific order to complete a task.

1. First action
2. Second action
3. Third action
- etc.

#### A step in an action sequence

A sequence of defined actions or steps carried out in order to complete a task.

- ▶ Action
- ▶ Next action
- ▶ etc

#### A reference to a related part in the document or to other related documents.

To refer the reader to a specific figure/table/section within the manual.

→ e.g. figure 1.

#### A reference number to identify or refer to a part or item.

In a related figure, items or parts identified by a sequential number.

### List entries, first and second levels

- A single component/item
- A component/list, made up of multiple parts/items.
  - Sub component or sub list of main component/list.
  - etc.

### Abbreviations used in this manual

∅	Diameter
CH	Central Heating
DHW	Domestic Hot Water
DCW	Domestic Cold water
TRV	Thermostatic Radiator Valve
IP	Ingress Protection
CF	Conventional Flue
RS	Room Sealed
N/A	Not Applicable
SEDBUK	Seasonal Efficiency of Domestic Boilers in the UK
OFTEC	Oil Firing Technical Association for the Petroleum Industry
IET	Institution of Engineering and Technology
WRAS	Water Regulations Advisory Scheme
LABC	Local Authority Building Control Body
DWTA	Domestic Water Treatment Association

### Read these instructions before starting any installation

These instructions are applicable to the Worcester appliance model(s) stated on the front cover of this manual only and must not be used with any other make or model of appliance.

The instructions apply in the UK and Eire only and must be followed except for any statutory obligation.

This appliance must be installed by a competent person, failure to install correctly could lead to prosecution.

### 1.2 General safety instructions

These installation instructions are intended for heating engineers, plumbers, and electricians.

- ▶ Read any installation instructions (boiler, heating controls, etc.) carefully before starting the installation.
- ▶ Observe the safety instructions and warnings.
- ▶ Observe national and regional regulations, technical rules and guidelines.
- ▶ Record all work carried out.

#### Electrical work

Electrical work must only be carried out by a qualified electrician:

- ▶ Before starting electrical work;
  - Ensure that the electricity supply is safely Isolated and secured to prevent inadvertent re-connection. Information on safe isolation can be found in the Health and Safety Executive guidance HSG85.
  - Using test equipment approved to GS38 confirm that the electricity supply is disconnected.
- ▶ Refer to the manufacturer's information when installing other components with Worcester equipment within the system.

**Oil fumes or leaks from the appliance**

If you smell oil fumes, observe the following rules.

- ▶ Extinguish any naked flames
- ▶ Isolate the electrical supply
- ▶ Isolate the fuel supply to the boiler
- ▶ Open windows and doors
- ▶ Rectify the fault

**Health and safety**

The appliance contains no asbestos and no substances have been used in the construction process that contravene the COSHH Regulations (Control of Substances Hazardous to Health Regulations 1988). Where applicable, the CE mark indicates compliance with relative EU Directives.

**Combustible and corrosive materials**

Do not store or use any combustible materials (paper, thinners, paints etc.) inside or within the vicinity of the appliance.

The combustion air must be kept clear of chemically aggressive substances which can corrode the appliance and invalidate any warranty.

**Handling instructions and guidelines**

It is advised that more than one person is involved in the transfer of the packaged appliance from the van to the point of installation.

It is advised that no attempt should be made to move the packaged appliance without the use of a suitable truck.

At all times the correct method for handling heavy objects should be strictly observed.

- ▶ Lift only a manageable weight, or ask for help.
- ▶ When lifting, bend the knees, and keep the back straight and feet apart.
- ▶ Do not lift and twist at the same time.
- ▶ Lift and carry items close to the body.
- ▶ Wear protective clothing and gloves to protect from any sharp edges.

**Intended use**

This boiler must only be used as a heat appliance in a heating system for domestic purposes.

Any other use is considered inappropriate. Any damage that results from such use is excluded from liability.

**Appliance operation**

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge, if they have been given supervision or instruction concerning the use of the appliance, in a safe way, and understand the hazards involved.

Children shall not play with the appliance.

Cleaning and user maintenance shall not be made by children without supervision.

**Installation, commissioning and servicing**

Installation, commissioning and servicing must only be carried out by a competent registered engineer.

- ▶ Only use original spares.
- ▶ Advise the user to have the system regularly serviced by a competent, qualified engineer (such as OFTEC registered personnel) using approved spares, to help maintain the economy, safety and reliability of the appliance.

**Fitting and Modification**

Fitting the appliance and any controls to the appliance may only be carried out by a competent engineer in accordance with these instructions and the relevant Installation Regulations.

Flue systems must not be modified in any way other than as described in the fitting instructions.

Any misuse or unauthorised modifications to the appliance, flue or associated components and systems could invalidate the warranty. The manufacturer accepts no liability arising from any such actions, excluding statutory rights.

**Handover to the user**

When handing over, instruct the user how to operate the heating system and inform him about its operating conditions.

- ▶ Explain how to operate the heating system and draw the user's attention to any safety-relevant action.
- ▶ Explain that modifications and repairs must only be carried out by an authorised contractor.
- ▶ Advise the user to have the system serviced annually by a competent, qualified engineer, such as an OFTEC registered engineer.
- ▶ Leave the installation instructions with the completed commissioning form with the homeowner.

## 2 Installation regulations

### 2.1 Complying with the building regulations

This heating appliance forms part of the controlled services for the building. It is law that all controlled services for buildings must comply with building regulations. You must be able to satisfy your Local Authority Building Control Body (LABC) that the work carried out concerning the installation and commissioning of this heating appliance has been carried out to a satisfactory standard.

OFTEC operate a competent persons scheme and registered installers are able to certify that their work complies with building regulations. Under the scheme;

- OFTEC must be informed about every installation.
- OFTEC will issue a building regulations compliance certificate to the householder and will notify the LABC.

OFTEC provide controlled document forms CD10 and CD11 for use during installation and commissioning respectively.

Other organisations operate self-certification schemes e.g. NAPIT and BESCA Ltd. and it may be possible for installers who are members of these organisations to self certify their work.

Alternatively you must submit a building control notice to the LABC before installing any boiler. The LABC will then arrange regular inspection visits during the work to ensure that the installation complies with the regulations.

#### Installation

Failure to install appliances correctly could lead to prosecution.

The appliance should be installed by a competent person. The person installing the appliance should be aware of the Health and Safety at Work Act and take appropriate action to ensure that the regulations are adhered to. In order to give optimum efficiency and trouble free operation the appliance must be commissioned by a qualified OFTEC engineer.

The compliance with a British Standard does not, in itself, confer immunity from legal obligations. In particular the installation of this appliance must be in accordance with the relevant requirements of the following British Standards and regulations in respect of the safe installation of equipment:

BS 5410: part 1:	Code of practice for Oil Fired Boilers.
BS 799: part 5:	Specification for Oil Storage Tanks
BS 7593:	Code of Practice for treatment of water in domestic hot water central heating systems.
BS 5449: part 1:	Specification for forced circulation hot water central heating for domestic premises.
BS EN 12828: 2012 +A1: 2014	Heating systems in buildings. Design for water-based heating systems
BS 7291:	Thermoplastic pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings
BS 7074: part 1:	Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems.
BS 1254-2:	Copper and copper alloys plumbing fittings part 2: Fittings with compression ends for use with copper tubes.
BS 7671:	IET Wiring Regulations, current edition.
BS 1362:	Specification for general purpose fuse links for domestic and similar purposes.

The Building Regulations Part G, Part J and L1 England and Wales; Part F, Part G and Part J Section III Scotland; Part L and Part F Northern Ireland.

Local water company bye-laws.

The Control of Pollution (Oil) Regulations.

OFTEC Standards.

Where no specific instruction is given, reference should be made to the relevant codes of practice.

#### Installations in Eire (Republic of Ireland)

The Installation must be performed by a competent and suitably trained person in accordance with the following Eire regulations.

Current Building Regulations - Republic of Ireland

ETCI rules for electrical installation

#### For further guidance see:

OFTEC Technical book three - Regional requirements: Republic of Ireland

### 3 Appliance information

#### 3.1 General information

##### Standard package

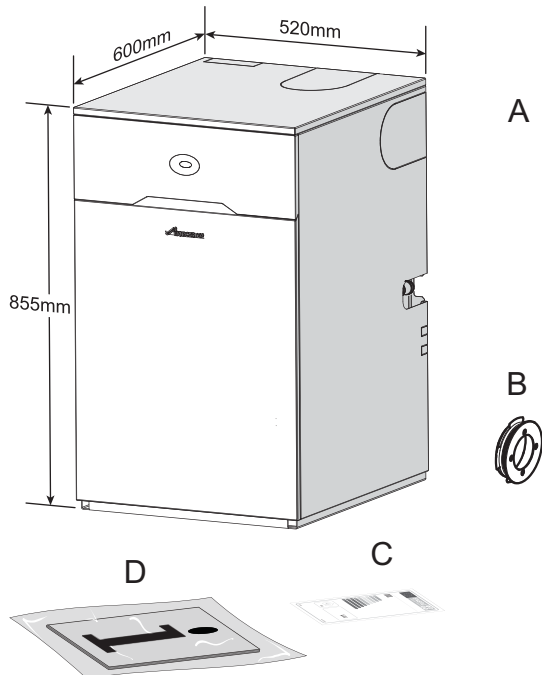


Fig. 1 Standard package

- [A] Floor standing oil fired condensing combination boiler for sealed domestic central system heating and mains fed domestic hot water.
- [B] Flue damper
- [C] ErP label
- [D] Literature pack

##### Check List (Literature pack)

Item	Qty
Greenstar Heatslave II Installation/Service Instructions	1
Users Instructions	1
Hardware Pack	1

#### 3.2 Technical data

Description	Units	12/18	18/25	25/32
<b>Central heating</b>				
Primary water capacity (total)	litres	62	63	64
Available pump head (20°C difference) at max. output	metres water	4.7	4.0	4.2
Max. permissible system operating pressure in accordance with WRAS guidelines	bar	2.5	2.5	2.5
Flow restrictor	colour	Lime	Beige	Grey
<b>Domestic Hot Water</b>				
Maximum flow rate (± 15%)	litres/min	15	18	22
Minimum inlet pressure (dynamic) for maximum flow rate	bar	1.5	1.2	1.6
Maximum hot water temperature rise for 90 litres draw off (@max flow rate)	°C	40	40	40
<b>Flue</b>				
Exit flue gas mass flow	kg/hr	29	40	51
<b>Pipework connections</b>				
Fuel line (compression)	mm	10	10	10
CH flow	mm	22	22	28
CH return	mm	22	22	28
Water main inlet	mm	15	15	15
DHW outlet	mm	22	22	22
CH drain	hose connection			
Condensate (polypropylene)	mm	21.5	21.5	21.5
<b>Electrical</b>				
Electrical power supply voltage	AC...V	230	230	230
Frequency	Hz	50	50	50
<b>Sensors &amp; Thermostats</b>				
CH control range	°C	50/82	50/82	50/82
Slave tank control range	°C	55/84	55/86	55/88
Boiler manual reset overheat set point	°C	105	105	105
Flue manual reset overheat thermostat set point	°C	110	110	110
Tank manual reset overheat thermostat set point	°C	95	95	95
<b>General data</b>				
Maximum hearth temperature	°C	<100	<100	<100
SEDBUK 2009	%	89.4	89.2	89.0
SEDBUK 2005	%	90.4	90.2	90.0
Appliance protection rating (with programmer blanking plate fitted)	IP	20	20	20
Appliance protection rating (with fascia programmer fitted)	IP	20	20	20
Dry weight (excluding packaging)	kg	124	126	128

### 3.3 Energy efficiency

The following product data satisfy the requirements of the EU Regulations No. 811/2013 and No. 812/2013 supplementing Directive 2010/30/EU.

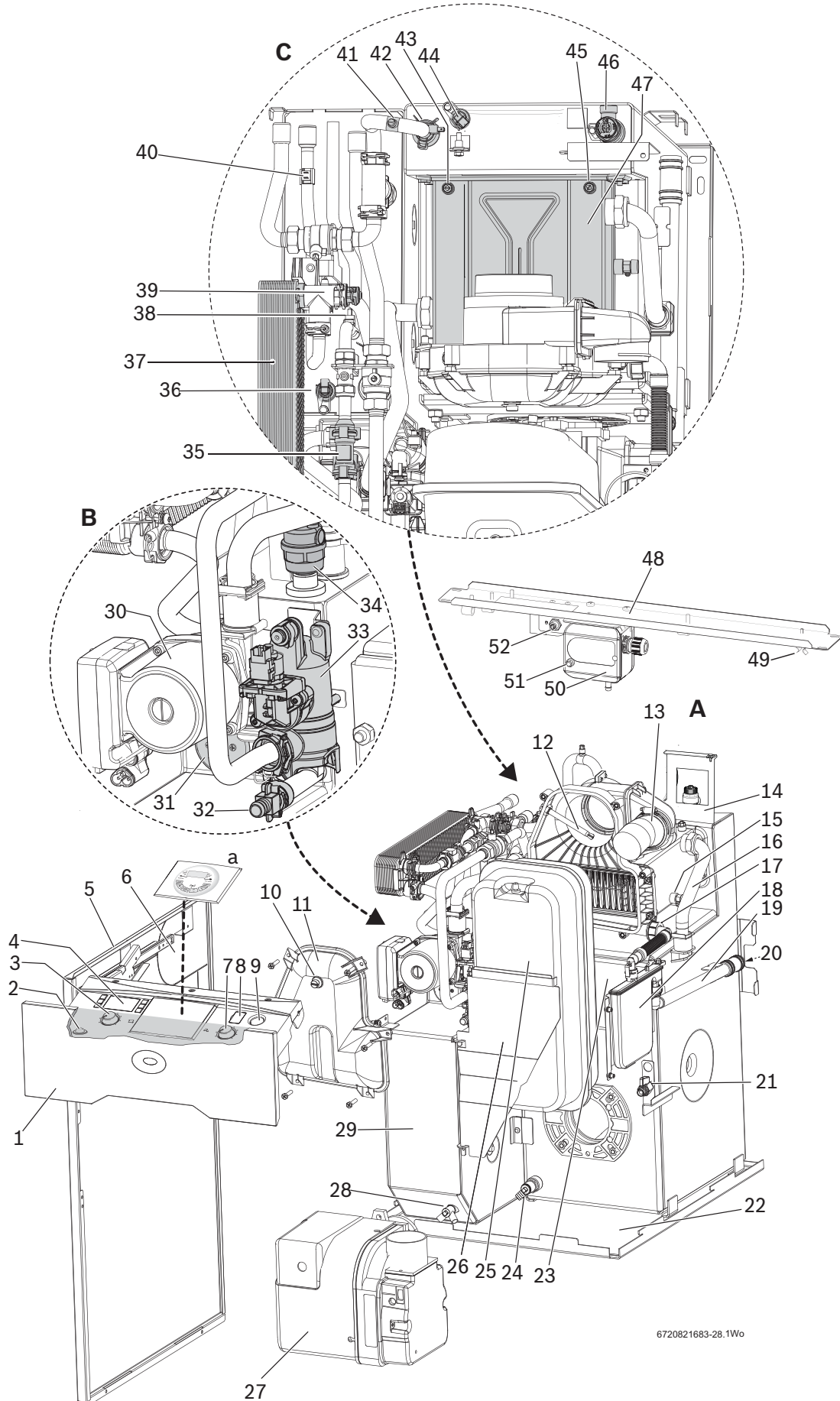
Product data	Symbol	Unit	7731600165	7731600166	7731600167
Product type	–	–	Greenstar Heatslave II <sup>ErP+</sup> 12/18	Greenstar Heatslave II <sup>ErP+</sup> 18/25	Greenstar Heatslave II <sup>ErP+</sup> 25/32
Condensing boiler	–	–	Yes	Yes	Yes
Low temperature boiler	–	–	No	No	No
B1 boiler	–	–	No	No	No
Cogeneration space heater (CHP)	–	–	No	No	No
Combination heater	–	–	Yes	Yes	Yes
Rated heat output	P <sub>rated</sub>	kW	18	25	32
Seasonal space heating energy efficiency	η <sub>s</sub>	%	90	90	XX
Energy efficiency class	–	–	A	A	A
<b>Useful heat output</b>					
At rated heat output and high temperature regime <sup>1)</sup>	P <sub>4</sub>	kW	18.2	25.6	32.3
At 30 % of rated heat output and low temperature regime <sup>2)</sup>	P <sub>1</sub>	kW	5.7	8	10.1
<b>Useful efficiency</b>					
At rated heat output and high temperature regime <sup>1)</sup>	η <sub>4</sub>	%	92.6	92.5	92.4
At 30 % of rated heat output and low temperature regime <sup>2)</sup>	η <sub>1</sub>	%	96.8	96.5	96.3
<b>Auxiliary electricity consumption</b>					
At full load	e <sub>lmax</sub>	kW	0.156	0.145	0.144
At part load	e <sub>lmin</sub>	kW	0.052	0.057	0.061
In standby mode	P <sub>SB</sub>	kW	0.002	0.002	0.002
<b>Other items</b>					
Standby heat loss	P <sub>stby</sub>	kW	0.174	0.121	0.172
Ignition burner power consumption	P <sub>ign</sub>	kW	0	0	0
Emissions of nitrogen oxides	NO <sub>x</sub>	mg/kWh	110	103	109
Annual energy consumption	Q <sub>HE</sub>	kWh	-	-	-
Sound power level, indoors	L <sub>WA</sub>	dB(A)	57	56	55
<b>Additional data for combination heaters</b>					
Declared load profile	–	–	XL	XL	XL
Daily electricity consumption	Q <sub>elec</sub>	kWh	0.210	0.176	0.199
Annual electricity consumption	AEC	kWh	46	39	44
Daily fuel consumption	Q <sub>fuel</sub>	kWh	31.23	32.84	32.43
Annual fuel consumption	AFC	GJ	25	26	26
Water heating energy efficiency	η <sub>wh</sub>	%	64	61	62
Water heating energy efficiency class	–	–	B	B	B

Table 2 Product data for energy consumption

- 1) High temperature regime means 60 °C return temperature at heater inlet and 80 °C feed temperature at heater outlet.
- 2) Low temperature means for condensing boilers 30 °C, for low-temperature boilers 37 °C and for other heaters 50 °C return temperature (at heater inlet).

### 3.4 Layout & components

The diagram below excludes the top, front and RH side casing panels.



6720821683-28.1Wo

Fig. 2



**Legend:****A**

- [1] CONTROL BOX ASSEMBLY
- [2] SERVICE MODE BUTTON
- [3] CH TEMPERATURE CONTROL KNOB
- [4] LCD DISPLAY
- [5] CASING SIDE PANEL
- [6] FLUE "KNOCK-OUT" SECTION
- [7] TANK TEMPERATURE CONTROL KNOB
- [8] DIAGNOSIS PORT - WORCESTER ENGINEER
- [9] SYSTEM PRESSURE GAUGE
- [10] FLUE GAS SAMPLING POINT
- [11] FLUE MANIFOLD COVER
- [12] FLUE OVERHEAT THERMOSTAT PHIAL
- [13] FLEXIBLE AIR DUCT  
(CONNECTING AIR INLET CASING TO AIR INTAKE ON BURNER)
- [14] CASING SUPPORT BRACKET
- [15] SECONDARY HEAT EXCHANGER DRAIN
- [16] HEAT EXCHANGER FLOW PIPE
- [17] CONDENSATE OUTLET
- [18] CONDENSATE TRAP
- [19] CONDENSATE DRAIN PIPE
- [20] FLEXIBLE CONDENSATE DRAIN PIPE CONNECTION
- [21] OIL ISOLATING VALVE
- [22] BASE PLATE AND OIL DRIP TRAY
- [23] COMBUSTION CHAMBER ACCESS DOOR AND ONE PIECE  
BAFFLE SET LOCATION
- [24] PRIMARY HEAT EXCHANGER DRAIN
- [25] EXPANSION VESSEL
- [26] EXPANSION VESSEL BRACKET
- [27] RIELLO RDB 2.2 BURNER
- [28] HEATSLAVE TANK DRAIN
- [29] HEATSLAVE TANK
- [a] OPTIONAL FASCIA MOUNTED PROGRAMMERS AVAILABLE  
(not supplied with the appliance)

**B**

- [30] CIRCULATING PUMP
- [31] MANUAL RESET TANK OVERHEAT THERMOSTAT
- [32] DRAIN POINT
- [33] DIVERTER VALVE ASSEMBLY
- [34] AUTOMATIC AIR VENT

**C**

- [35] DHW FLOW TURBINE
- [36] TANK TEMPERATURE SENSOR (NTC)
- [37] DHW HEAT EXCHANGER
- [38] MAINS INLET TEMPERATURE SENSOR (NTC)
- [39] DHW PRESSURE RELIEF VALVE
- [40] DHW TEMPERATURE SENSOR (NTC)
- [41] PRIMARY MANUAL AIR VENT
- [42] FLOW TEMPERATURE SENSOR (NTC)
- [43] SECONDARY HEAT EXCHANGER MANUAL AIR VENT
- [44] PRIMARY HEAT EXCHANGER SAFETY SENSOR (NTC)
- [45] SECONDARY HEAT EXCHANGER MANUAL AIR VENT
- [46] PRESSURE RELIEF VALVE
- [47] SECONDARY HEAT EXCHANGER
- [48] CROSS BRACE
- [49] FIRE VALVE SENSOR CLIP
- [50] AIR PRESSURE SWITCH
- [51] AIR PRESSURE SWITCH RESET
- [52] FLUE OVERHEAT THERMOSTAT RESET



**CAUTION:** Isolate the mains supplies before starting any work and observe all relevant safety precautions.



All the following Pre-Installation sections must be read and requirements met before starting boiler or flue installation.

## 4 Pre-Installation

### 4.1 Cleaning primary systems



**DANGER:** Danger to life through electric shock!

- ▶ Before carrying out any work on electrical components, isolate them from the power supply (230 V AC) (fuse, circuit breaker) and secure against unintentional reconnection.



**NOTICE:** Risk of damage to appliance or accessories!

- ▶ All the following pre-installation sections must be read and requirements met before starting the appliance or flue installations.



**NOTICE:** Risk of damage to system or appliance!

Debris from the system can damage the appliance and reduce efficiency. Failure to comply with the guidelines for the use of water treatment with the appliance will invalidate the appliance guarantee and contravene the Building Regulations.

- ▶ It is a requirement of the Building Services Compliance Guide which is a second tier document to the Building Regulations to flush and inhibit the primary water system in accordance with BS 7593.
- ▶ The Building Services Compliance Guide recommends that a primary water cleanser is fitted to the system.
- ▶ Worcester recommends fitting a filter that will help remove both magnetite and non-magnetic debris.

#### 4.1.1 Before cleaning the system:

- ▶ Ensure that the system and pipe work is in good working order.
- ▶ **Where possible keep the existing appliance/circulating pump in place when flushing the system.**

#### Follow the guidance of BS7593:

Treatment of water in domestic hot water central heating and also the flushing guidelines below.

#### 4.1.2 Flushing the system

- ▶ Fill the system with cold water and check for leaks.
- ▶ Open all drain cocks and drain the system.
  - See figure 76, page 40 for appliance drain points.
- ▶ Close drain cocks and add a suitable flushing agent at the correct strength for the system conditions in accordance with the manufacturer's instructions.
- ▶ Circulate the flushing agent before the boiler is fired up.
- ▶ Run the boiler/system at normal operating temperature as directed by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system to remove the flushing agent and debris.
- ▶ It may be necessary to use a power flushing machine to aid the cleansing procedure in some circumstances.
- ▶ Close the drain cocks and manual air vents.
- ▶ Add a suitable inhibitor to the system in accordance with the manufacturers instructions.
- ▶ Fill the system to between 1 and 1.5 bar via a WRAS approved filling loop.
- ▶ Vent any air from the boiler and system.
  - See figure 77 for appliance manual vent points.

#### 4.1.3 Inhibitor

Add a suitable inhibitor or combined inhibitor/anti-freeze, if the system is exposed to freezing conditions, to the heating system in accordance with the DWTA code of practice and inhibitor manufacturer's guidelines.



The inhibitor or combined inhibitor/anti-freeze must not cause damage to the materials within the boiler (mild steel, stainless steel, copper and brass) and any other materials/components within the system.

- ▶ The concentration level of inhibitor in the system should be checked every 12 months or sooner if system content is lost.



**WARNING:** Sealing agents

- ▶ In cases where all attempts to find a system micro leak have failed, Worcester, Bosch Group supports the use of Fernox F4 leak sealer.

#### Water treatment products

Suitable water treatment products can be obtain from the following manufacturers:

ADEY	01242 546717 - <a href="http://www.adey.com">www.adey.com</a>
FERNOX	0870 601 5000 - <a href="http://www.fernox.com">www.fernox.com</a>
SENTINEL	0800 389 4670 - <a href="http://www.sentinel-solutions.net">www.sentinel-solutions.net</a>

#### 4.1.4 Artificially softened water

It is possible to have an ion exchange water softener fitted to the cold water system of the property. However, the boiler requires an untreated cold water connection taken from the mains supply, before the water softener, to the primary water filling point of the heating system.

Alternatively there are water softening/treatment devices that do not adjust or alter the pH levels of the water. With these devices it may not be necessary to provide an untreated water by-pass to the primary water filling point of the heat system.



**NOTICE:**

- ▶ Salt based, softened water must not be used to fill the central heating system.

## 4.2 Mains supply

### 4.2.1 Electrical supply

- Supply: 230 V - 50 Hz
- Cable: PVC insulated 0.75mm<sup>2</sup> (24 x 0.2mm) temperature rated to 90°C. to BS EN50525.
- External 5A fuse to BS1362.
- The appliance must be earthed.
- This appliance must not be connected to a three phase supply.
- IPX4D.
- The wiring between the appliance and the electrical supply must comply with the latest IET wiring regulations that apply to wiring a fixed appliance.
- Any additional components that are connected to the boiler with mains electrical supply must not have a separate supply.

### 4.2.2 Water supply

The following are general requirements and if necessary the advice of the local water company should be sought before fitting the appliance.

- The appliance cold water supply should be the first connection off the water main where possible.
- The appliance will accept pre-heated hot water to a maximum of 60°C

**Mains water pressure**

**NOTICE:** Boiler damage

- ▶ Non-return, back flow prevention devices (including those associated with water meters) fitted to the mains water supply can cause a pressure build up which could damage the boiler and other household appliances.

**Minimum dynamic mains water pressure for maximum performance**

12/18	18/25	25/32
1.5bar	1.2bar	1.6bar

- Maximum mains fed water pressure 10 bar. If necessary, fit a pressure reducing valve.
- Where the water main supply has a non-return, back flow prevention valve fitted, a mini expansion vessel (A) must be connected to the mains water inlet pipe (B) between the non-return valve (C) and the boiler (D) as shown below.

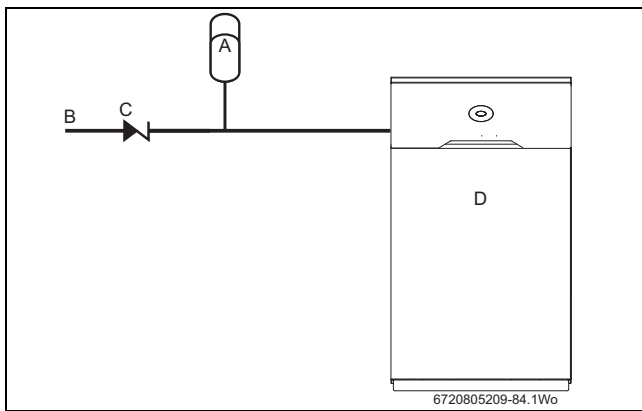


Fig. 3 Mains expansion vessel

- [A] Mini expansion vessel
- [B] Mains water inlet
- [C] Non return valve
- [D] Boiler

**Use in hard water areas**

Normally there is no need for water treatment to prevent scale formation as the maximum temperature of the heat exchanger is limited by the electronic control circuit.

In areas where the temporary water hardness exceeds 200ppm, consideration may need to be given to the fitting of a scale prevention device. In such circumstances, the advice of the local water authority should be sought.

**4.3 Oil supply**

**NOTICE:** Contaminated oil supplies can damage the appliance.

Failure to ensure that the oil supply is clear of contaminants may invalidate the appliance warranty.

- ▶ Ensure the oil supply is free of contaminants and measures are taken to prevent contamination of the appliance.

- **This appliance is suitable for Kerosene (Class C2) only, no other fuel must be used.**
- Plastic or steel tanks should be installed to BS 5410. A steel tank should conform to BS 799: part 5 and have a slope of 1:24 away from the outlet with a sludge cock at the lower end.
- **Do not use galvanised steel tanks or pipework for the oil system.**
- **Do not use soldered joints on the oil supply pipework.**

**Key to Oil supply illustrations, figures 4, 5 & 6**

1	Oil storage tank
2	Full base (plastic tank)
3	Isolating valve
4	Oil strainer and water separator
5	Fire valve to BS 5410
6	External wall
7	Oil filter (70µm max filtration size)
8	Fire valve sensor
9	Oil pump
10	Oil burner
11	Non-return valve
12	De-aerator
13	Appliance isolation valves

Table 3 Key to oil supply feed system

**4.3.1 Single pipe gravity feed system:**

The oil storage tank [1] must be positioned so that the oil level does not exceed 4 metres above the level of the burner oil pump [9] and in addition the oil level must be at least 300mm above the oil pump [9]. Where the maximum oil level in the oil storage tank exceeds 4 metres, a head breaking device must be installed between the tank [1] and the burner oil pump [9].

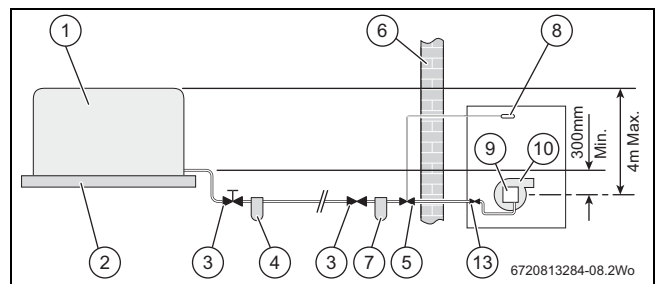


Fig. 4 Single pipe feed

**i** All dimensions are in metres unless otherwise stated. The maximum pipe run figures are based on using copper pipe with an inside diameter of 2mm less than the outside diameter.

**Maximum pipe run for single pipe gravity fed system**

Head (m)	10mmØ	12mmØ	Head (m)	10mmØ	12mmØ
0.5	12	30	2.5	62	100
1.0	25	69	3.0	74	100
1.5	37	91	3.5	87	100
2.0	49	100	4.0	99	100

**4.3.2 Double pipe sub-gravity feed system:**

Maximum suction height 3.5 metres. Non-return valves must be fitted to the inlet and return oil line between the oil pump [9] and oil storage tank [1].

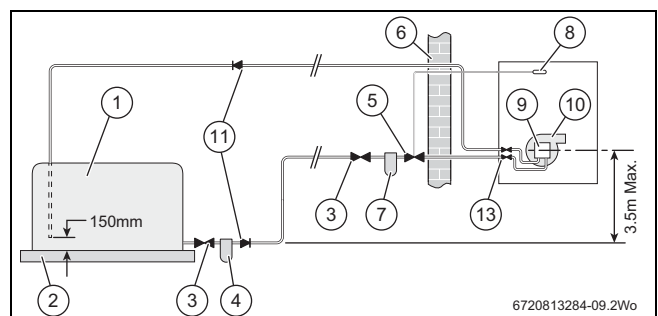


Fig. 5 Double pipe feed

### Maximum pipe run for double pipe sub-gravity fed system

Head (m)	10mmØ	12mmØ	Head (m)	10mmØ	12mmØ
0	50	100	2.0	26	66
0.5	44	100	2.5	20	50
1.0	38	95	3.0	14	37
1.5	32	80	3.5	8	22

#### 4.3.3 Single pipe suction lift with de-aerator:

Maximum suction height 3.5 metres. The oil tank [1] must be positioned below the oil pump [9]. Create an inlet and return loop between the de-aerator [12] and oil pump [9].

A non-return valve must be incorporated within the de-aerator or fitted to the oil line between the oil storage tank [1] and the de-aerator [12].

A top feed oil tank fitted with a de-aerator using an internal non-return valve should have any non-return valves fitted in the base of the tank to the suction line removed to assist purging air from the oil line.

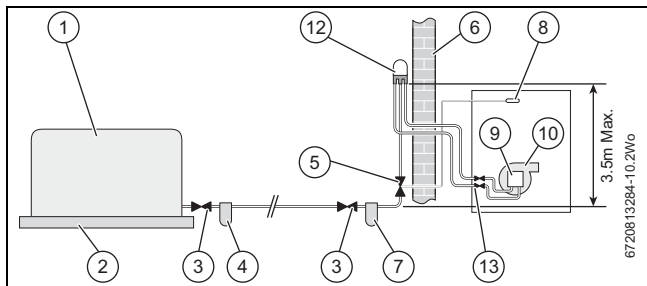


Fig. 6 De-aerator feed

### Maximum pipe run for single pipe suction lift with de-aerator

Head (m)	FUEL FLOW RATE			
	2.5kg/h 8mmØ	5kg/h 8mmØ	10kg/h 8mmØ	10kg/h 10mmØ
0	100	55	26	100
0.5	95	45	23	100
1.0	80	40	20	90
1.5	70	35	17	75
2.0	60	30	14	65
2.5	45	25	11	50
3.0	35	15	8	35
3.5	25	10	5	20



The table and illustration above is a guide only and does not in any way override the de-aerator manufacturer's instructions

#### 4.3.4 Pipework

▶ Refer to the oil supply sections Single pipe gravity feed system: 4.3.1, Double pipe sub-gravity feed system: 4.3.2 & Single pipe suction lift with de-aerator: 4.3.3 for oil supply pipework configurations.

Oil supply pipework considerations:

- Lay the oil supply pipe as straight and level as possible to avoid air pockets and unnecessary friction losses.
  - Route away from the boiler access door or other hot surfaces.
- Install a manual isolating valve to the oil supply pipe, as close to the oil storage tank as possible.
- Fit an oil strainer and water separator to the oil supply pipe, near the oil storage tank.
  - Fit an additional oil filter (70 µm max filtration size) close to the boiler, but not inside the boiler casing.
- Fit a fire valve in accordance with BS 5410.

- The fire valve should be fitted externally to the building with the fire valve sensor located within the appliance case.
- A fire valve with a shut off temperature of 85°C or higher must be fitted to avoid the possibility of nuisance shut offs.
- A capillary type valve provides a neat and simple installation. Alternatively, a fusible link or electrical system may be used.
- Under no circumstances should a combination isolating/fire valve be used as the sole fire protection device.

#### 4.3.5 Boiler isolation valve

- ▶ Use copper pipe of the correct diameter according to the information shown in oil supply sections 4.3.1, 4.3.2 & 4.3.3.
  - If using soft copper pipe (R220) with a compression fitting, an insert must be used to prevent the pipe from collapsing or distorting when the fitting is tightened.
- ▶ Slide nut [1] and olive [5] onto the oil supply pipe [4].
- ▶ Slide insert [3] into the pipe.
- ▶ Offer the pipe to the fitting [2] and tighten the nut [1].

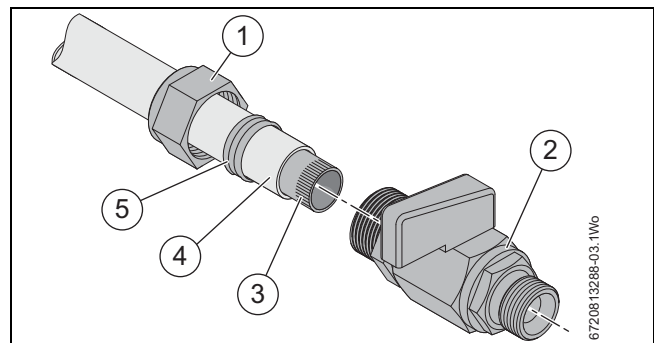


Fig. 7 Isolation valve bracket removed for clarity

- ▶ Use flexible hoses to connect from the boiler isolation valve/s to the oil pump.

## 4.4 Water systems and pipework



The boiler should not be allowed to operate with a return temperature of less than 30°C when the system is up to operating temperature.

#### Primary system plastic pipework

- Any plastic pipework used for the CH system must have a polymeric barrier, complying with BS 7291 and installed to BS 5955 with 1000mm (minimum) length of copper or steel pipe connected to the boiler.
- Plastic pipework used for underfloor heating must be correctly controlled with a thermostatic blending valve limiting the temperature of the circuits to approximately 50°C with 1000mm (minimum) length of copper or steel pipe connected to the boiler, and a 20 K differential must be maintained at the appliance.

#### Primary system/connections/valves

- Do not use galvanised pipes or radiators.
- All system connections, taps and mixing valves must be capable of sustaining a pressure of 3 bar.
- Radiator valves should conform to BS 2767:10.
- All other valves should conform to BS 1010.
- An automatic bypass valve must be connected between the heating flow and return where TRVs are used on all radiators, fitted to give at least a 3 metre circuit when activated.
- Drain cocks are required at all the lowest points on the system.
- Air vents are required at all high points on the system.

#### Sealed primary system

- Where the system volume is more than 180 litres at 0.5 bar or exceeds 2.65 bar at maximum heating temperature an extra

expansion vessel (B) must be fitted as close as possible to the appliance in the central heating return.

- Pressurise the extra expansion vessel (B) to the same figure as the expansion vessel (A) built into the appliance.

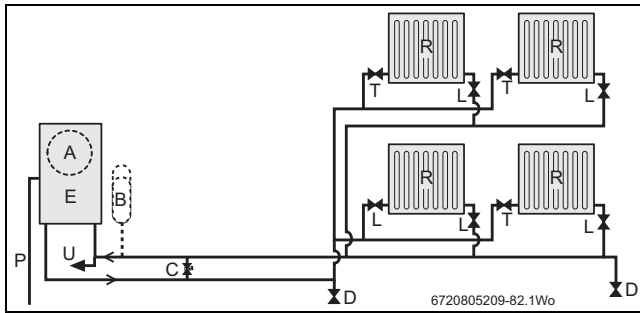


Fig. 8 Combi boiler sealed system layout

- [A] Expansion vessel
- [B] Extra expansion vessel
- [C] Automatic bypass valve
- [D] Drain cock
- [E] Appliance
- [L] Lockshield valve
- [R] Radiators
- [T] Thermostatic radiator valve TRV
- [U] To filling system

**Filling primary sealed systems**



**Filling the system**

- ▶ The system must not be filled with salt based, softened water.

- Filling the system must comply with the method shown in the figure below.
- The filling point must be at low level and must never be a permanent connection to the mains water supply.
- Filling loops must be WRAS approved.

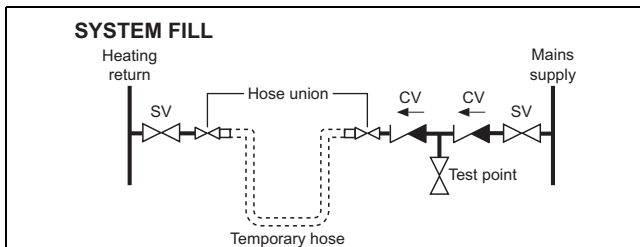


Fig. 9

- [CV] Check valve
- [SV] Stop valve

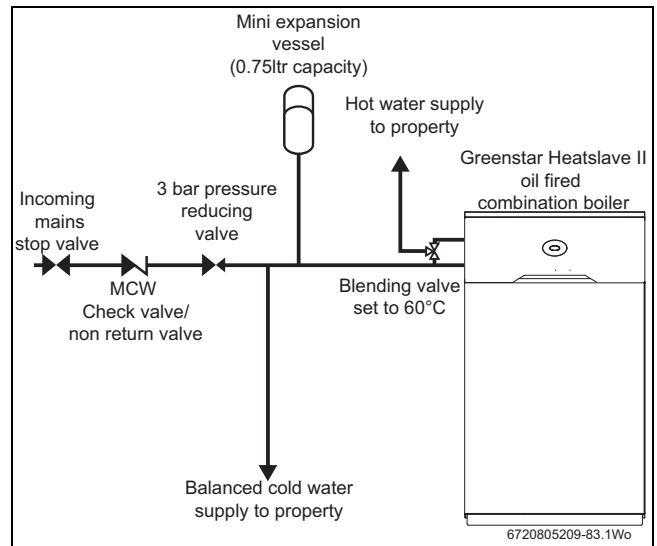


Fig. 10

**Showers/Bidets:**

- If a shower head can be immersed in water or comes closer than 25mm from the top edge of a bath or shower tray spill over level then an anti-siphon device must be fitted to the shower hose. Only thermostatically controlled showers are suitable for use with this appliance.
- Bidets with direct hot & cold mains water can be used (with the approval of the local water authority) and must be the over rim flushing type with shrouded outlets to prevent the fitting of hand held sprays.

**Domestic hot water:**

**Plastic pipework**

- Any plastic pipework used for the DHW system must have a polymeric barrier, complying with BS 7291 and installed to BS 5955 with 1000mm (minimum) length of copper or stainless steel pipe connected to the boiler.
- Before installing plastic pipework, the pipe manufacturer's literature should be consulted.
- To prevent the temperature & pressure exceeding the limits advised by the pipe manufacturer, a pressure reducing valve must be used to prevent the incoming water pressure exceeding 3 bar (maximum). Also a mini expansion vessel must be fitted to absorb the expanding water and a blending valve set to 60°C must be fitted before the DHW plastic pipework.
- When selecting plastic pipework for use with domestic water supply, it should be ensured that it is compliant with all current local & national legislation & regulations, including building regulations part G, BS 7291 - 1,2 & 3: 2006, BS 8000 - 15-15: 1990 and information.

**General:**

- Taps and mixing valves must be capable of sustaining a pressure up to 10 bar in accordance with the Water Regulations as they will be operating at mains water pressure.
- Hot water temperature and flow rate are affected by the size and insulation of pipework making up the distribution system and are controlled by the hot water tap and the water main inlet pressure. A mixing valve can be fitted if a more permanent setting is required.
- If using more than one outlet at once causes water flow starvation, fit flow balancing valves or Ball-O-Fix valves to the appropriate outlets.

### 4.5 Condensate discharge

For correct installation and trouble free operation of the appliance the following advice should be followed:

1. All condensate pipework must 'fall' from the appliance by a minimum of 3 degrees (52mm per metre) to ensure adequate condensate flow.
2. The pipework route must allow air to be supplied back to the appliance for correct operation of the condensate trap.
3. Connection to a rainwater down pipe must include an air break.

Also:

- Keep external pipework as short as possible and not exceed 3 metres length.
- External pipework should be increased to a minimum diameter of 32mm and ideally be insulated.
- Minimise the number of bends and connectors.
- Remove burrs after cutting pipe.
- Remove surplus solvent from the interior of the pipe.

#### 4.5.1 Condensate pipe work



Follow **HHIC** guidance and recommendations for condensate disposal



**NOTICE:**

- ▶ Where a new or replacement boiler is being installed, access to an internal "gravity discharge" point should be one of the factors considered in determining boiler location.
- ▶ The condensate pipe must be nominally 21.5mm Ø plastic pipe.
- ▶ The condensate pipe work must fall at least 52mm per metre towards the outlet and should take the shortest practicable route.
- ▶ Ensure there are no blockages in the pipe run.



**NOTICE:** Unheated internal areas.

- The condensate discharge may freeze in areas during prolonged cold temperatures.
- ▶ Internal pipe runs in unheated areas such as lofts, basements and garages should be treated as external runs.

Key to condensate illustrations, figures 12, 13, 14 & 15

1	Condensate discharge from boiler
2	Soil and vent stack
3	Minimum 450mm and up to three storeys
4	Visible air break at plug hole
5	Sink or basin with integrated overflow
6	75mm sink waste trap
7	Condensate pump

Table 4 Key to Internal condensate disposal methods

#### 4.5.2 Internal connections

In order to minimise risk of freezing during prolonged cold spells, the following methods of installing condensate drainage pipe should be adopted, in order of priority.

Wherever possible, the condensate drainage pipe should be routed and terminated so that the condensate drains away from the boiler under gravity to a suitable internal foul water discharge point such as an internal soil and vent stack. A suitable permanent connection to the foul waste pipe should be used.

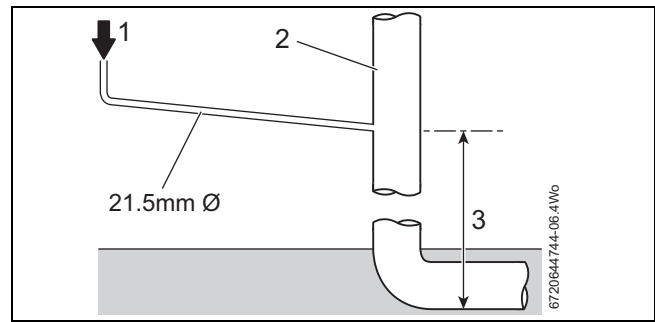


Fig. 11 Disposal to soil vent stack

Alternatively if the first option is not possible an internal kitchen, bathroom or washing machine waste pipe etc. can be used. Ensure that the condensate drain pipe is connected "down stream" of the waste trap.

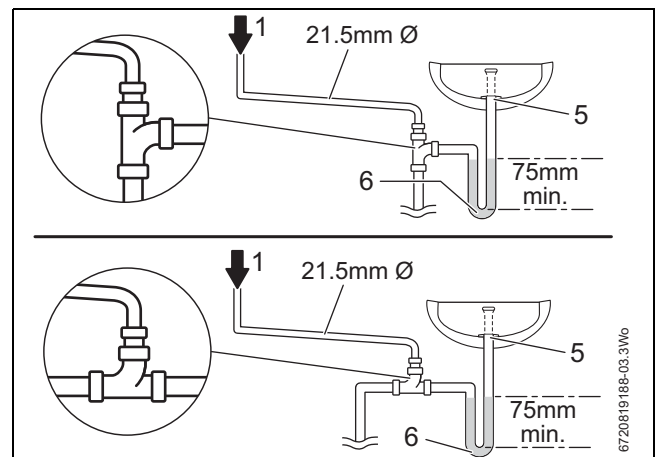


Fig. 12 Disposal to a waste pipe

#### CONDENSATE PUMP

Where "gravity discharge" to an internal termination is not physically possible, or where very long internal runs would be required to reach a suitable discharge point, condensate should be removed using a proprietary condensate pump, of a specification recommended by the boiler or condensate pump manufacturer.

The pump outlet pipe should discharge to a suitable internal foul water discharge point such as an internal soil and vent stack or if not possible to internal kitchen, bathroom or washing machine waste pipe etc. A suitable permanent connection to the foul waste pipe should be used.

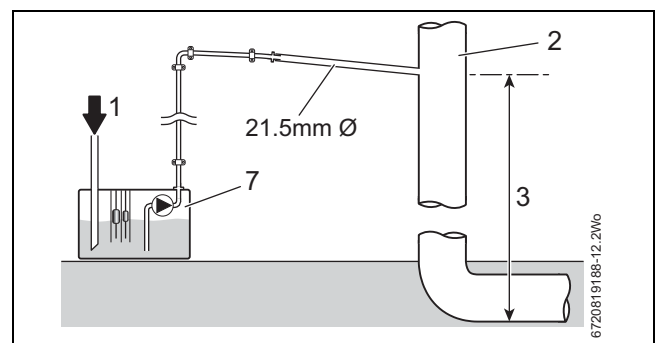


Fig. 13 Condensate pump disposal

**4.5.3 External connections**

**NOTICE:** Rainwater or external drain disposal  
Untreated condensate must not be allowed to flow into streams or rivers

- ▶ A rainwater down pipe or an external drain shall only be used for condensate disposal if the down pipe or external drain is connected to a combined foul and rainwater system
- ▶ Refer to BS 6798 for more information

**NOTICE:** Grey water systems  
Contamination of recovered water

- ▶ Condensate disposal shall not be allowed into a grey water recovery system that is intended for re-use

**NOTICE:** Freezing conditions

- ▶ Pipe work length should be kept to a minimum and the route as vertical as possible.
- ▶ When required, use only weather proof insulation.

**NOTICE:** Condensate waste

- ▶ Care should be taken when siting a soak-away to avoid obstructing existing services.

**Continued - Key to condensate illustrations, figures 13,14, 15 & 16**

8	Pipe work transition
9	Insulate and increase pipe size
10	External rain water pipe into foul water
11	External air break
12	Air gap
13	PVCu strap-on fitting
14	43mm 90 male/female bend
15	100mm Ø minimum plastic pipe
16	Drainage holes
17	Limestone chippings
18	Bottom of sealed tube
19	Increase size of soak-away with lime chippings if in clay soil

Table 5 Key to external condensate disposal methods

**i** Condensate drainage pipe can be run above or below ground. If the pipe work is run under ground, care must be taken to ensure that the pipe work "fall" towards the disposal point is maintained

If no other discharge method is possible then the use of an externally run condensate drainage pipe terminating at a suitable foul water discharge point, or purpose-built soak away, may be considered. If this method is chosen then the following measures should be adopted:

- ▶ The external run be kept as short as possible and not exceed 3 metres.
- ▶ The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to 32mm before it passes through the wall to the exterior. The pipe should be insulated using suitable waterproof and weather resistant insulation, if not using a CondenseSure siphon.
- ▶ The external pipe should take the shortest and least exposed route to the discharge point, and should "fall" as steeply as possible away from the boiler, with no horizontal runs in which condensate might stand.
- ▶ The use of fittings, elbows etc. should be kept to a minimum and any internal "burrs" on cut pipe work should be removed so that the internal pipe section is as smooth as possible.

**FITTING AN EXTERNAL AIR BREAK**

- Refer to figure 14 when a rain water down pipe is used to dispose of condensate.
- An air break must be installed in the 43mm pipe work, between the boiler condensate outlet and the drainpipe, outside the property, to avoid flooding during adverse weather conditions.

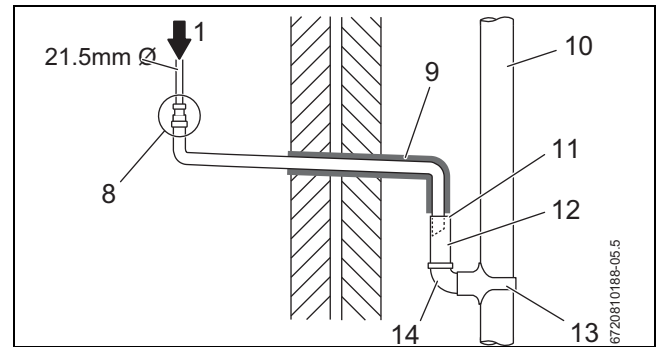


Fig. 14 Disposal into a rainwater down pipe

Where the pipe terminates over an open drain or gully, the pipe should terminate below the grating level, but above water level, in order to minimise "wind chill" at the open end.

The use of a drain cover (such as those used to prevent blockage by leaves) may offer further protection from wind chill.

Pipe drainage will be improved if the end is cut at 45° as opposed to a straight cut.

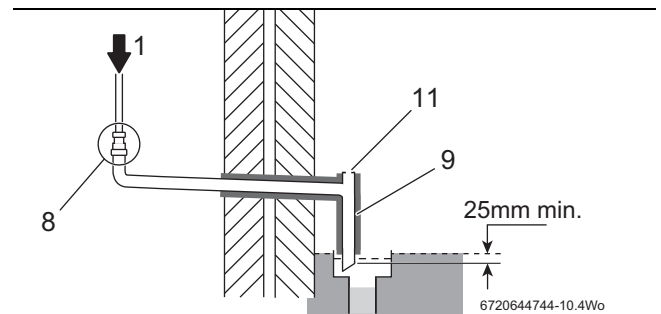


Fig. 15 External disposal

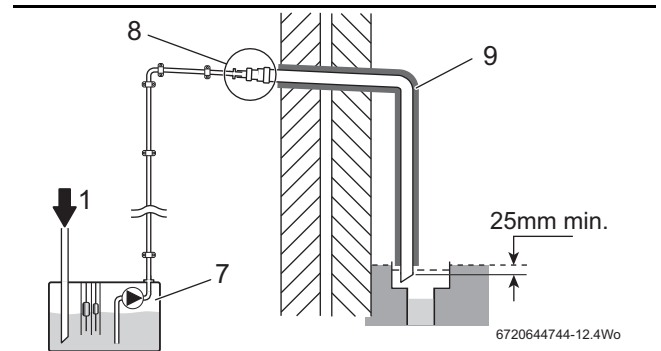


Fig. 16 Condensate pump to external disposal

**CONDENSATE SOAK AWAY**

- The condensate drainage pipe may be run above or below the ground to the soak away. The examples shown on this page run above ground.
- The soak away must use a 100mm Ø plastic tube with two rows of three 12mm holes on 25mm centres and 50mm from the bottom of the tube. The holes must face away from the house.
- The tube must be surrounded by at least 100mm of limestone chippings to a depth of 400mm.

**i** Minimum hole size for the condensate soak away must be 400mm deep by 300mmØ.

In situations where there are likely to be extremes of temperature or exposure, the use of a proprietary trace-heating system for external pipe work, incorporating an external frost thermostat, should be considered. If such a system is used, the requirement to use 32mm pipe does not apply. However, all other guidance above and the instructions for the trace heating system, should be closely followed.

**NOTICE:** Unheated internal areas.  
 ▶ Internal pipe runs in unheated areas such as lofts, basements and garages should be treated as external runs and consideration should be given to using a CondenseSure siphon.

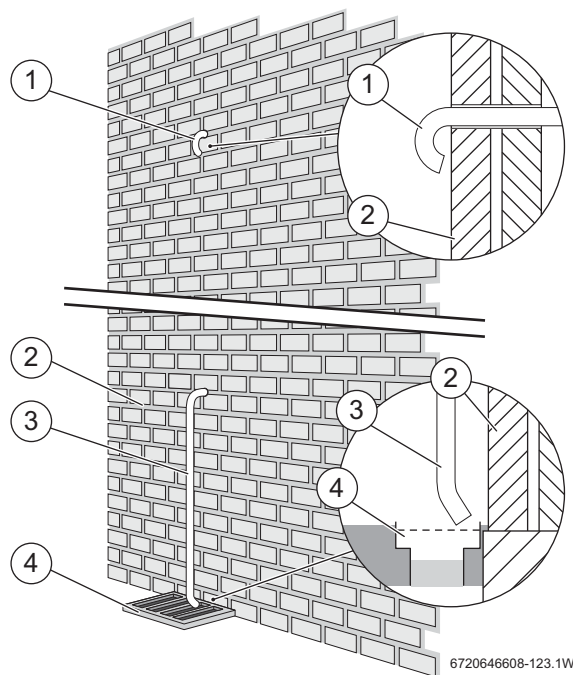


Fig. 18 Pressure relief pipe work

- [1, 3] PRV discharge pipe
- [2] Outside wall
- [4] External drain

**4.7 Boiler locations and clearances**

This boiler is only suitable for installing internally within a property at a suitable location onto a fixed rigid surface of the same size as the boiler and capable of supporting the boiler weight. The boiler must be installed on a flat level surface to ensure condensate does not enter the primary heat exchanger. The boiler is not suitable for external installation unless a suitable enclosure is provided. Roof space installations must fully conform to BS 5410 part 1: roof space installations.

**Open flue model (CF)**

In order to ensure clean and efficient combustion an adequate supply of air must be delivered to the combustion chamber. To provide sufficient air a suitable inlet must be provided into the room or space in which the boiler is situated.

Output	12/18	18/25	25/32
Size cm <sup>2</sup>	99	138	165

An air brick or other form of continuous air supply may have to be built into the installation in order to ensure an adequate supply of air. If the appliance is to be installed in a confined space or compartment two air vents are required, one at high level and one at low level. The minimum free area of each vent is shown in table 6 and depends whether the air is taken from another room or from outside the building. Where the air is taken from another room that room must contain an air inlet as described above.

**Room sealed flue (RS)**

The appliance does not require a separate vent for combustion air. Installation in cupboards or compartments require permanent vents for cooling purposes, one at high level and one at low level, either direct to outside air or to a room.

Both vents must pass to the same room or be on the same wall to the outside air.

The minimum air vent free area is given in table 7.

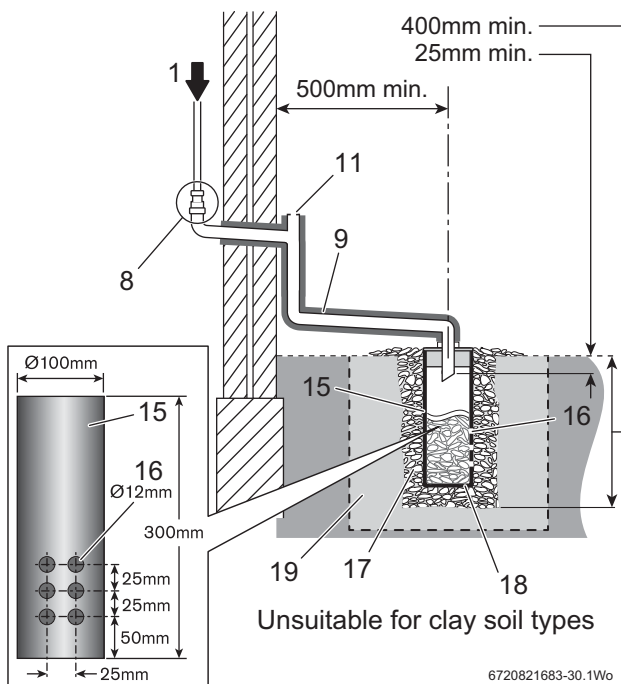


Fig. 17 To a soakaway

**4.6 Pressure relief pipework**

- The pressure relief discharge pipe [1] should be at least 15 mm diameter copper pipe and run downwards away from the boiler and discharge away from any electrical or other hazard, preferably to an external drain or soak away.
- Pipe [3] should be finished with a partial bend, near the pipe outlet to face the external wall (as shown) to help prevent freezing.



**Installation clearances**

Figure 19 shows the minimum space recommended to install the boiler only.

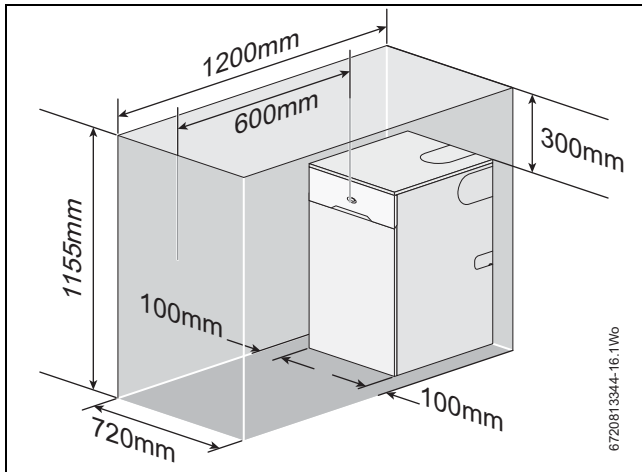


Fig. 19 Installation clearances

**Service clearances**

Figure 20 shows the minimum space required to carry out an annual service.

\* Remove the flue "knock-out" panel sections if this clearance is less than 75mm.

The appliance is suitable for an under worktop installation providing that the worktop above the boiler (min 10mm clearance) is removable for maintenance and repair and the front of the boiler is not enclosed.

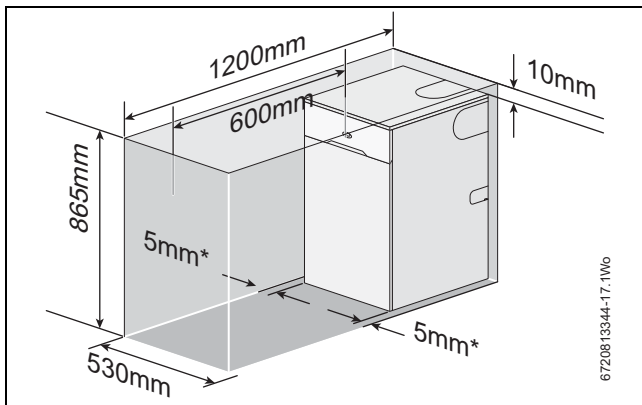


Fig. 20 Service clearances

**Maintenance clearances**

Figure 21 shows the clearances required for maintenance.

\* Remove the flue "knock-out" panel sections if this clearance is less than 75mm.

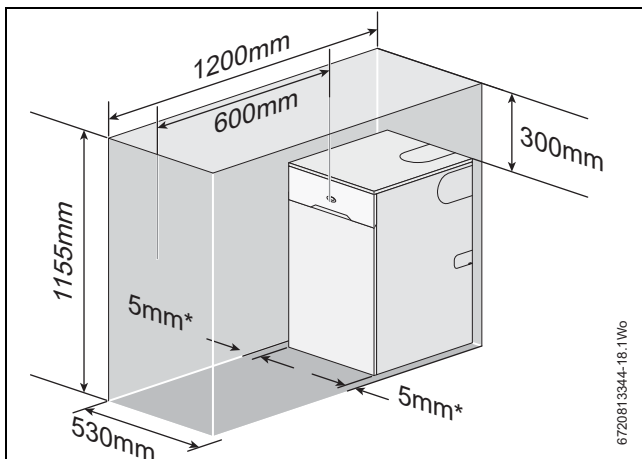


Fig. 21 Maintenance and repair clearances

**Minimum air vent area (cm<sup>3</sup>) for appliances installed in compartments**

Model	Internal ventilation		External ventilation	
	High level	Low level	High level	Low level
12/18	198	297	99	198
18/25	275	413	138	275
25/32	330	495	165	330

Table 6 Conventional flue

Model	Internal ventilation		External ventilation	
	High level	Low level	High level	Low level
12/18	198	198	99	99
18/25	275	275	138	138
25/32	330	330	165	165

Table 7 Room sealed flue

**Compartments**

Follow the requirements of BS 5410 and note:

- Minimum clearances must be maintained.
- An access door is required to install, service and maintain the boiler and any ancillary equipment.
- If fitting the boiler into an airing cupboard use a non-combustible material (if perforated, maximum hole sizes of 13mm) to separate the boiler from the airing space.

**Venting compartments**

There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. The clearances required for installation and servicing will normally be adequate for ventilation.

- Ventilation must be provided for boilers fitted into compartments as described in BS 5410.
- Combustion air must not be taken from a room or internal space containing a bath or shower and must not communicate with a protected area such as a hall, stairway, landing, corridor, lobby, shaft etc.
- Air vents must allow access for clean free air and must be sited to comply with the flue terminal position requirements.
- Air duct runs must not exceed 3 m.
- Low level air vents must be less than 450mm from the floor.
- A warning label must be added to the vents with a statement to the effect: "Do not block this vent. Do not use for storage".

**Rooms containing a bath or shower**

**WARNING:** Conventional flues  
▶ Conventional flue boilers must not be installed in a bathroom

**WARNING:** Electric shock  
▶ Any switch or appliance using mains electricity must not be within reach of a person using the bath or shower.

**i** In all cases the installation must be in accordance with the latest amendments in the latest edition of the IET wiring regulations (BS7671)

Refer to figure 22, the boiler must not be installed in zones 1 or 2. The boiler can be installed outside the shaded areas.

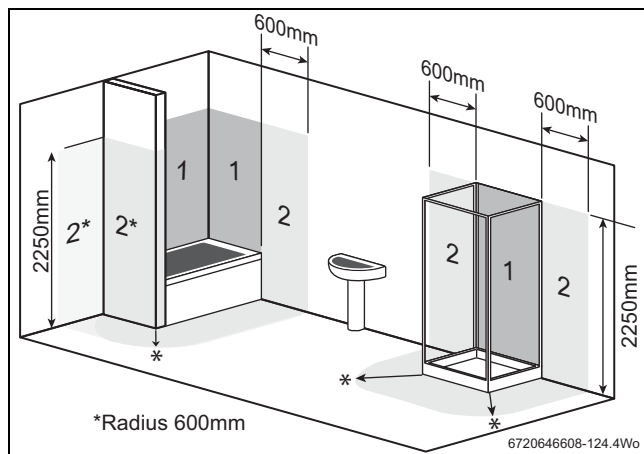


Fig. 22 Bathroom zones

[2\*] Without end wall, zone 2 must extend 600mm from the bath

[\*] 600mm radius from the bath or shower

#### 4.8 Flue terminal positions



##### NOTICE:

- ▶ All measurements are the minimum clearances required.
- ▶ Terminals must be positioned so to avoid combustion products entering the building.
- ▶ Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings:  
- flue bracket 125mm x 1 - part number: 7 716 191 179-
- ▶ In spite of the dimensions given here, the terminal must not be closer than 300mm to combustible material, in the case of a thatched roof double this dimension.
- ▶ Terminals must be positioned so to avoid products of combustion accumulating in stagnant pockets around the building or entering the building.
- ▶ Terminals must be at least 1.8m from an oil storage tank unless a wall with of at least 30 minutes fire resistance and extending 300mm wider and higher than the tank is between the tank and the terminal.

##### Key to illustration

1. 1500mm vertically between terminals and the same wall.
2. 1000mm below eaves, gutters, pipes and drains. External flue joints must be sealed with suitable silicon sealant.
3. 1,500mm measured horizontally between a vertical flue terminal and a window, dormer window or opening.
4. 1,200mm between terminals facing each other.
5. Vertical flue clearance, 300mm adjacent to a boundary line unless it will cause a nuisance. BS 5410: Part 1 2014 recommends that care is taken when siting terminal in relation to boundary lines.
6. 2500mm to a boundary line, unless it will cause a nuisance. It is recommended that care is taken when siting terminal in relation to boundary lines.
7. 300mm minimum clearance from a non opening skylight to a vertical flue.
8. Vertical flue clearance, 750mm to non-combustible building material, and 1,500mm clearance to combustible building material.
9. 1000mm above, below and either side of an opening door, air vent or opening window. These clearances are required by BS 5410-Part 1:2014 to reduce a possible pluming nuisance, this could be reduced to 600mm if there was no pluming nuisance, seek guidance from the local authority building control.
10. 600mm diagonally to an opening door, air vent or opening window.
11. 300mm to an internal or external corner.
12. 1000mm below a Velux window for a vertical flue (1000mm for horizontal flue terminal exhaust) 300mm above or to either side of the Velux window. The terminal must be at least 1000mm from the Velux when measured horizontally.
13. The flue must extend at least 600 mm above the roof and 400mm horizontally from a pitched roof or 500mm in regions with heavy snow fall.
14. 1500mm clearance to any vertical structure on a roof or open flue, or 1,000 to a room sealed flue.
15. 1000mm below eaves and gutters and sanitary pipe and 300mm from vertical sanitary pipes and drains.
16. Flue clearance must be at least 300mm from the ground. Terminal guards must be fitted if the flue is less than 2 metres from the ground or if a person could come into contact with the flue terminal.
17. 2500mm to a surface facing a terminal, unless it will cause a nuisance. This could be reduced if there was no pluming nuisance, seek guidance from the local authority building control
18. Terminals must be at least 1800mm from an oil storage tank unless a wall with of at least 30 minutes fire resistance and extending 300mm wider and higher than the tank is between the tank and the terminal.
19. For the purpose of determining suitable flue terminal positions for the appliances, the boundary can be considered to extend to the centre line of any adjacent routes or waterways e.g. paths, streets, rights of way, canals, rivers or railways.



##### NOTICE:

- ▶ Installations in car ports are not recommended.
- ▶ Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.
- ▶ A flue terminal guard should be fitted over a terminal, if persons could come into contact with the terminal, or it could be subject to damage and where the terminal is less than 2m from the finished floor level.

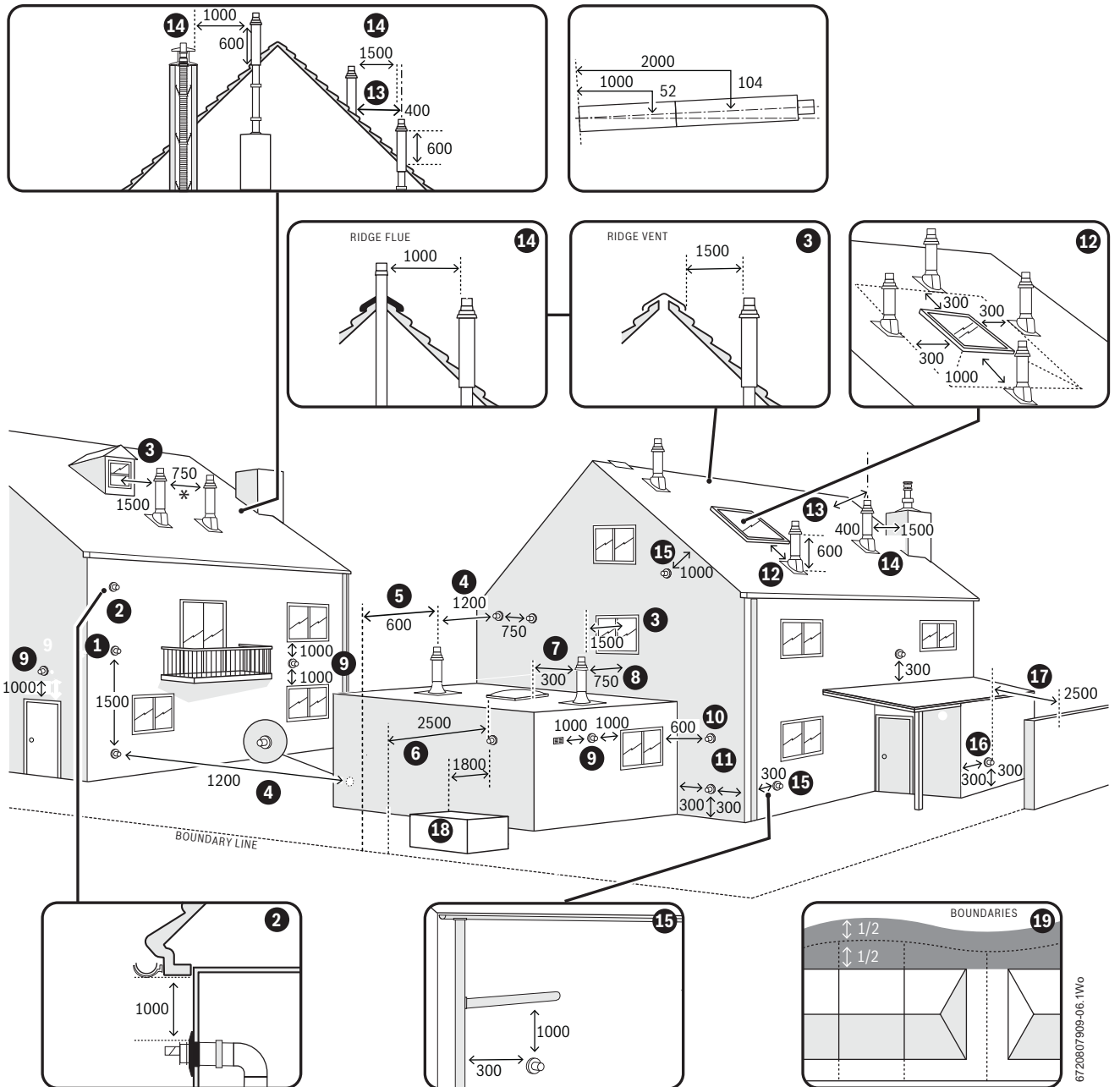


Fig. 23 Flue terminal positions

## 4.9 Flue options

### 4.9.1 Conventional flue (CF)



If an open-flued appliance is to be installed, a carbon monoxide detector alarm conforming to BS EN 50291 must be fitted in accordance with manufacturer's instructions.

- Open (conventional) flued appliances must not be installed in a bedroom, bathroom or bed-sitting room.
- The flue system must be in accordance with BS 5410: Part 1 and the current Building Regulations.
- The flue must be constructed of materials suitable for use with condensing combustion products.
- External flue systems must be of the insulated type.
- Brick and masonry chimneys must be lined with a suitable non-combustible material and properly jointed to withstand the effects of the working temperature (minimum rating of material 120°C) of the appliance and any condensate which may form.
- All flue joints must be sealed to prevent the leakage of condensate and combustion products.
- Ensure that joints are made so that the condensate runs away and is not collected within the joint.



The flue can be increased in size from the boiler take off point providing the joint is correctly sealed. Never reduce the flue diameter from the boiler take off point.

#### CF Sizing

Boiler size	Third party flue size	Worcester Flexible Flue
12/18	100/103mm Ø	100mmØ
18/25	100/103mm Ø	100mmØ
25/32	130mm Ø	100mmØ

- Because the flue operates at a lower temperature on a condensing boiler compared to that of a conventional appliance, the flue draught will be lower. Typically the draught will be between 0.5mmwg and 4.4mmwg, measured with the flue warm but the burner not firing. The actual figure will vary depending on weather conditions, flue height and position.
- The flue should be vertical and contain as few bends as possible, a maximum of two 135° bends should be used.
- The flue outlet must be extended beyond the eaves of the building and where possible, above the apex.
- Fit a suitable anti down-draught terminal where down draughts are experienced.

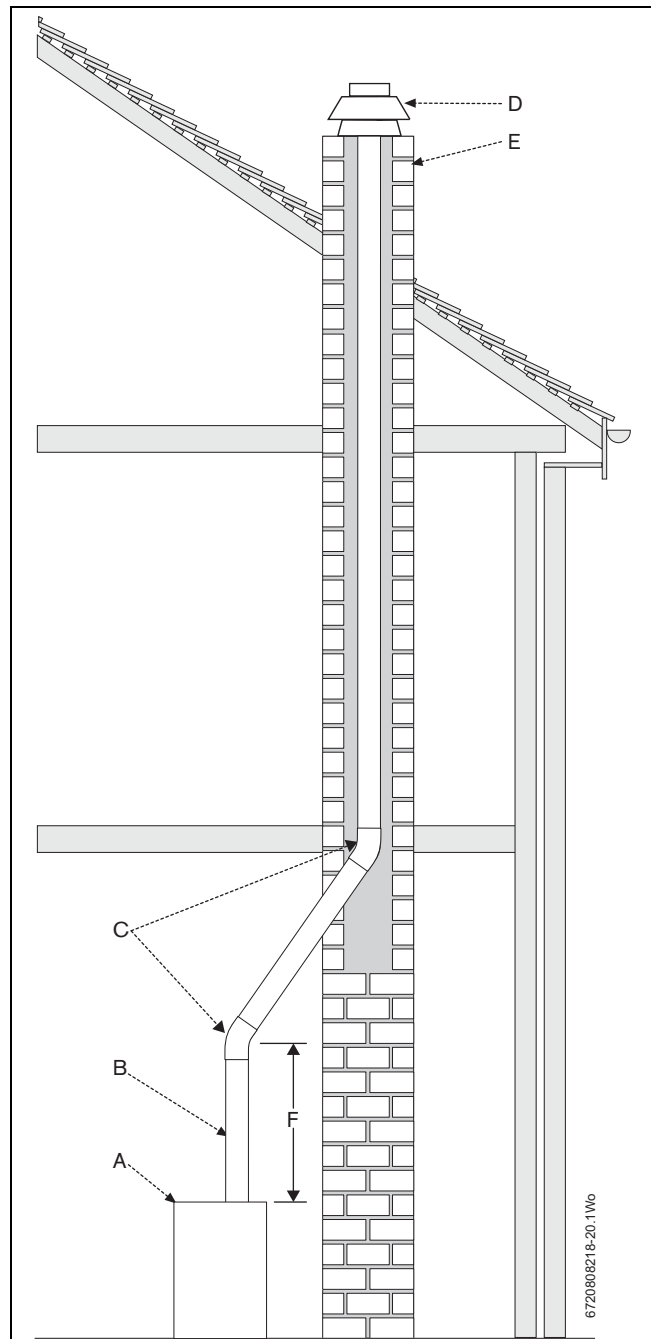


Fig. 24 Conventional flue

- [A] Boiler
- [B] Stainless steel flue
- [C] Max. two bends at 135°
- [D] Anti down-draught terminal
- [E] Chimney
- [F] Height to first bend from top of boiler (min. 600mm)

**4.9.2 Room sealed flue options**

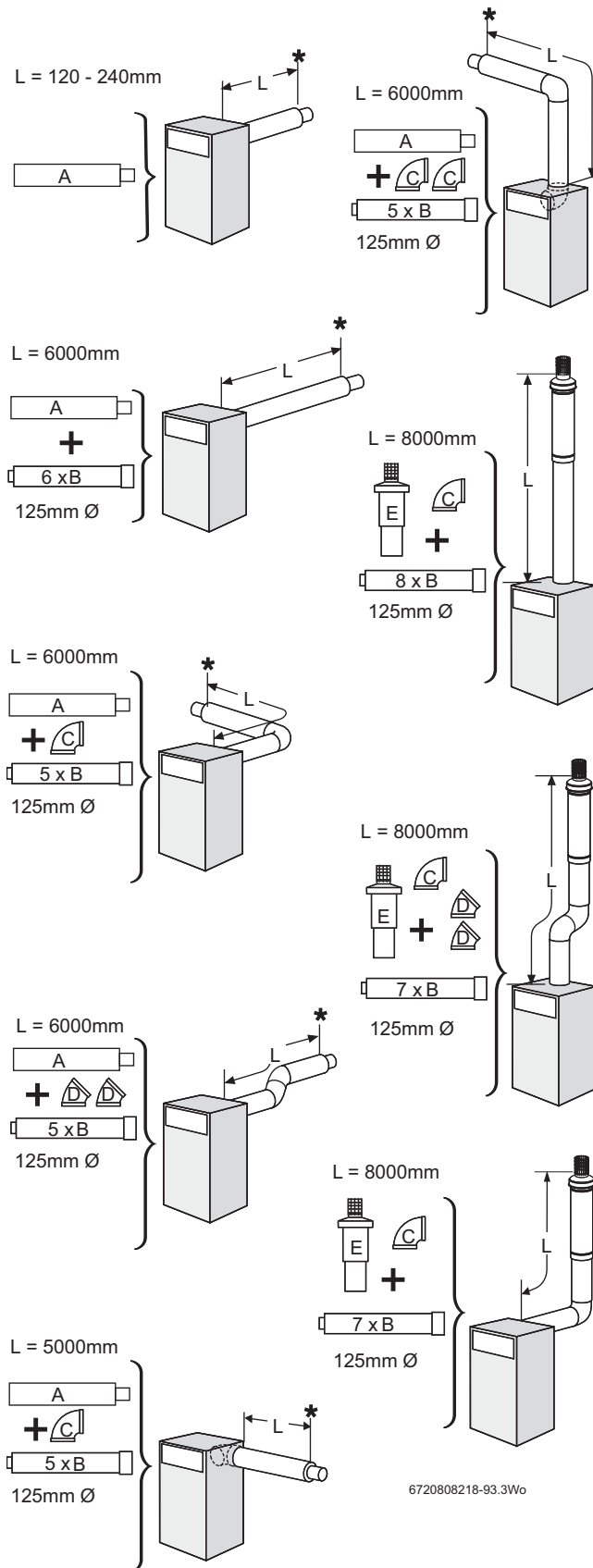


Fig. 25 Room sealed flue options

- [A] Flue terminal
- [B] Flue extension
- [C] 90° bend
- [D] 45° bend
- [E] Vertical flue terminal

Figure 25 shows the components used and the maximum flue length [L] for each flue configuration.

In all cases L is measured from the outside of the boiler casing.

- To achieve the maximum flue length [L], a flue section will have to be reduced in length.
- Only the flue terminal or straight flue extensions can be reduced in length by cutting.
- The flue terminal end can be fitted from the inside or outside of the building.



All horizontal sections must rise away from the boiler by 52mm per metre (3°) to allow the condensate to drain back to the boiler.

**Calculating the flue length**

Measure the total flue length required, noting that the maximum straight flue length including the terminal is:

Horizontal 80/125mm Ø: 6000mm (excluding 120mm of terminal extending outside the building)

Vertical 80/125mm Ø: 8000mm (measured from the boiler top panel).

Then reduce the total straight flue length for each extra flue bend (excluding the vertical flue kit 90° elbow) by:

- 1000mm for 90°
- 500mm for 45°

**Flue extension lengths**

Horizontal & Vertical 80/125mm Ø: 1000mm overall length.

Effective length when engaged into sockets within the flue run is 950mm.

**Flue terminal lengths**

Horizontal 80/125mm Ø: 720mm

Vertical 80/125mm Ø: 1080mm + cage

\* to outside wall.

6720808218-93.3Wo

## 5 Installation

### 5.1 Unpacking the boiler



Lifting and carrying precautions:

- ▶ Lift only a manageable weight, or ask for help.
- ▶ When lifting or putting things down, bend the knees, and keep the back straight and feet apart.
- ▶ Do not lift and twist at the same time.
- ▶ Lift and carry objects close to the body.
- ▶ Wear protective clothing and gloves to protect from any sharp edges.

#### Unpacking

It is advised that two or more persons are involved in the transfer of the packaged boiler from the van to the point of delivery.

1. Once the packaged boiler has been delivered, the outer carton is removed first. Care should be taken when releasing the straps. If a sharp implement is used make sure the outer carton is not pierced and that the implement is used in such a way so that it may not cause personal injury. All sharp objects must be covered or the blade retracted after use and put away in a safe place.
2. Lift carton up and away from the boiler.
  - ▶ Remove the plastic bag and upper front protection cover from the boiler and place safely aside.
3. Pull control box drawer forward and remove the 2 screws [A] from the front panel.
4. Lift front panel [B] upwards slightly to disengage and remove. Store safely away from the working area.
5. Remove the bolts securing the boiler to the transport pallet.
  - ▶ Two or more persons are required to remove the boiler from the pallet taking care not to damage the boiler, panels or the floor.



At all times the correct method for handling heavy objects should be strictly observed.

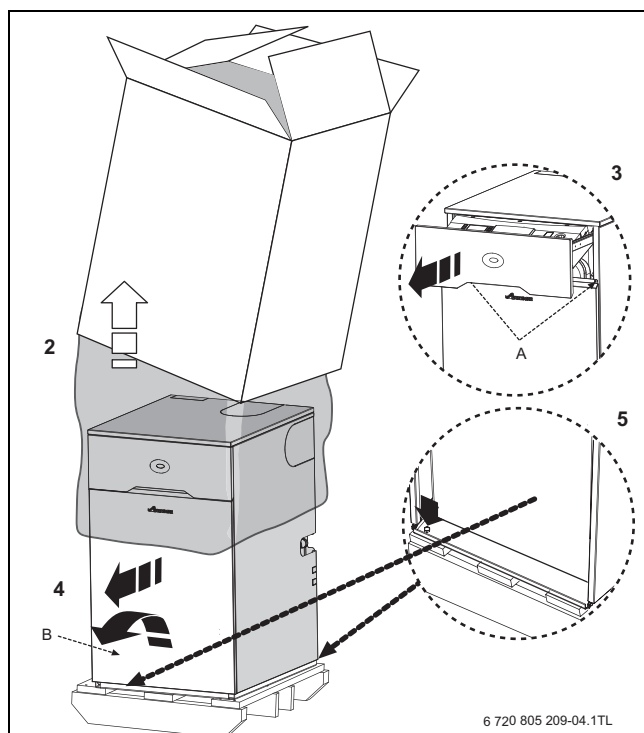


Fig. 26

### 5.2 Pipework positions and flue opening



**CAUTION:** Ensure there are no pipes, electric cables, damp proof courses or other hazards before drilling.

#### Safety

All relevant safety precautions must be undertaken. Protective clothing, footwear, gloves and safety goggles must be worn as appropriate.

#### Pipework positions

A to G (below) show the flue and pipe positions:

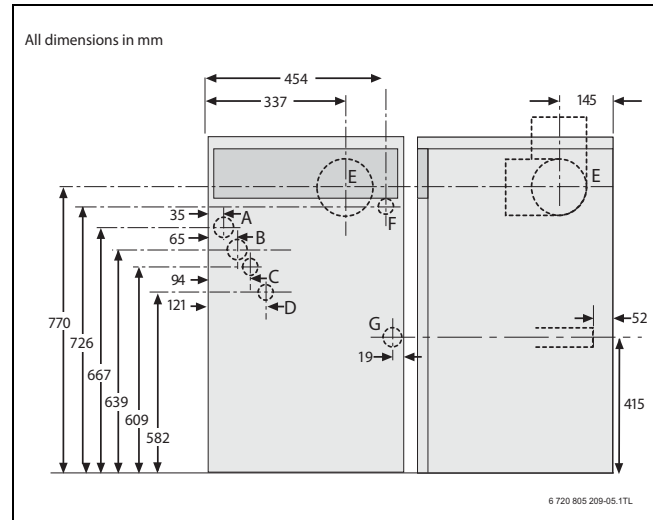


Fig. 27

#### Pipework positions:

- [A] CH flow 22mm Ø copper (28mm Ø on 25/32kW model)
- [B] DHW flow 22mm Ø copper
- [C] DCW mains water inlet 15mm Ø
- [D] CH return 22mm Ø copper (28mm Ø on 25/32kW model)
- [E] Flue outlet
- [F] Pressure relief pipe 15mm Ø
- [G] Condensate outlet 21.5mm Ø



For servicing purposes, keep the condensate and pressure relief discharge pipes away from components and pipework connections.

#### Flue opening

- ▶ Follow figure 29 to mark the centre of the flue (1, & 2) for rear opening, (2 & 3) for side opening or (1 & 4) for top opening.



All horizontal flue sections must rise away from the boiler by 52mm per metre to ensure that condensate flows back into the boiler for safe discharge via the condensate waste pipe.

- ▶ Make an opening (X, Y or Z) through the wall using a core drill or similar at a size relative to the wall thickness as shown below:

125mm Ø flue	
Wall thickness mm	Flue hole size Ø mm
150 - 240	155
240 - 330	160
330 - 420	165
420 - 500	170

Table 8

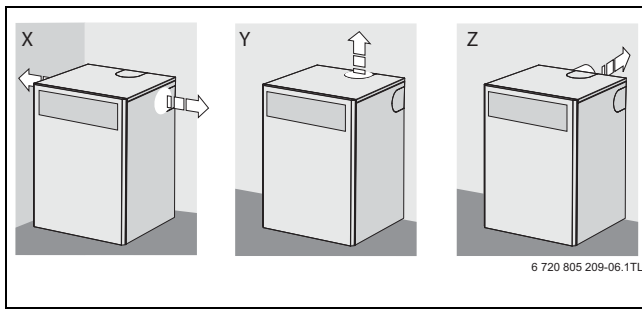


Fig. 28

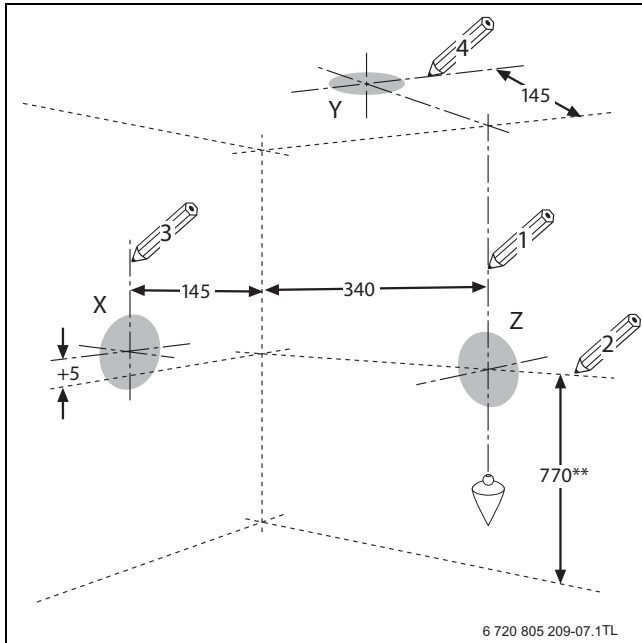


Fig. 29

[\*\*] IMPORTANT: for horizontal flues, increase this height by 5.2mm for every 100mm of horizontal length that the flue opening is away from the boiler.

### 5.3 Boiler installation

- ▶ Lift the top panel [A] upwards to disengage the ball stud connections [B] and remove.
- ▶ Remove the installation and literature packs.
- ▶ Pull control box drawer [C] forward.
- ▶ Depress the two levers [D], one on either side, to release the control box and pull fully forward.
- ▶ Swivel the complete control box assembly upwards.
- ▶ Remove front panel securing screws [F] from each side.
- ▶ Lift panel [G] slightly to free it from the lip [H] on the baseplate and remove.
- ▶ Unplug burner lead [J] from control box [C].
- ▶ Swivel the expansion vessel [K] on its support bracket out of the boiler taking care not to snag any electrical cables or kink the flexible hose.
- ▶ Loosen air duct pipe clip [N] and disconnect the air duct pipe.
- ▶ Unscrew burner retaining nut [O] and remove the burner [P] and store safely away from the boiler.

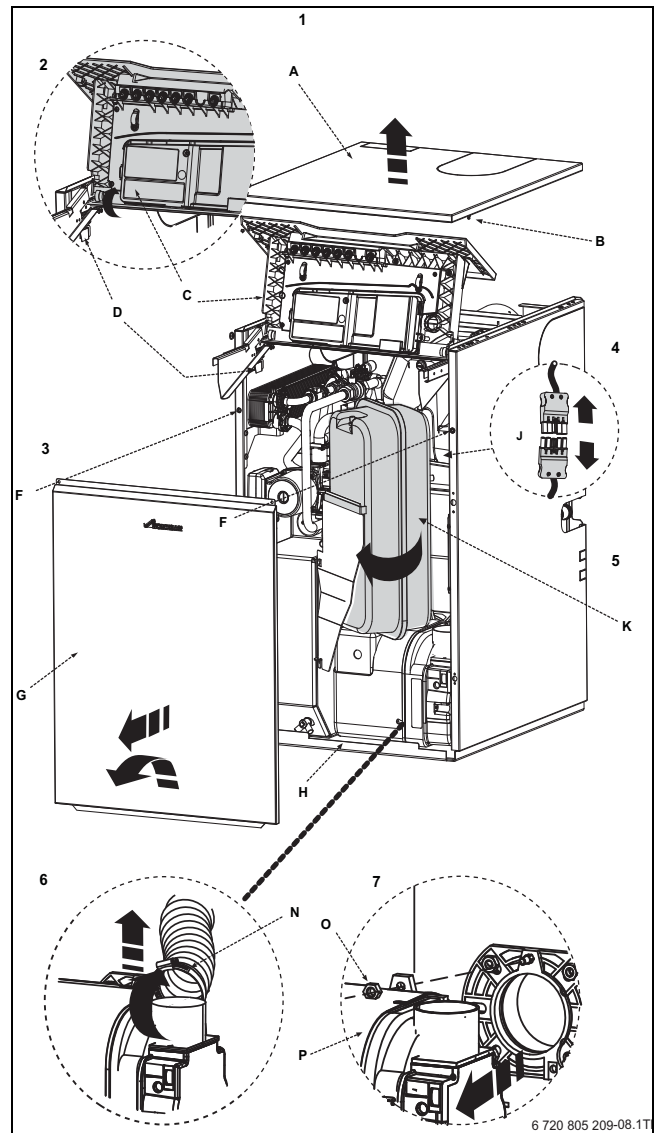


Fig. 30

### 5.4 Flue installation

The flue can exit the boiler from outlets A, B, C or D for vertical (RS) and horizontal (RS low or high level) flues to be fitted. (CF position 'A' only). Refer to the separate flue installation instructions supplied with the flue kits available for this boiler:

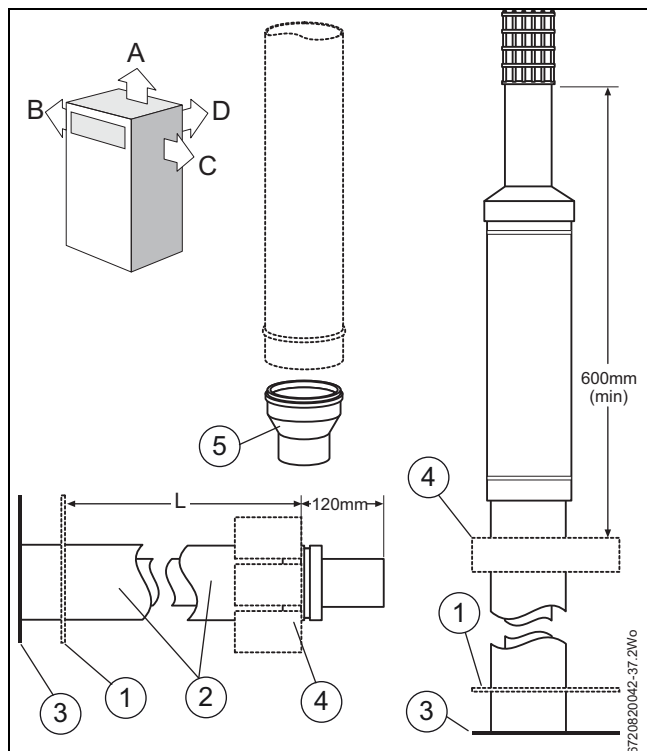


Fig. 31

- [1] Boiler outer casing
- [2] Outer flue tube
- [3] Outlet/elbow connection
- [4] Outside wall/roof
- [5] CF adaptor
- [L] Effective length of the flue

#### 5.4.1 Flue damper installation

**NOTICE:** Fitting the flue damper  
Failure to fit the flue damper, when required, will effect the performance of the boiler and may cause "Lockouts"

**i** The flue damper is only fitted to models stated in the table below

Model range	Output (kW)	Flue damper fitted
12/18	13	Yes
	15	Yes
	18	Yes
18/25	18	Yes
	21,5	Yes
	25	Yes
25/32	25	No
	28	No
	32	Yes ≤ 4m flue length
	32	No > 4m flue length

Table 9

Insert the flue damper into the inner tube of the straight extension or 90° elbow and fit the flue as shown in figure 32. Ensure that the rubber seal is fitted into the inner tube.

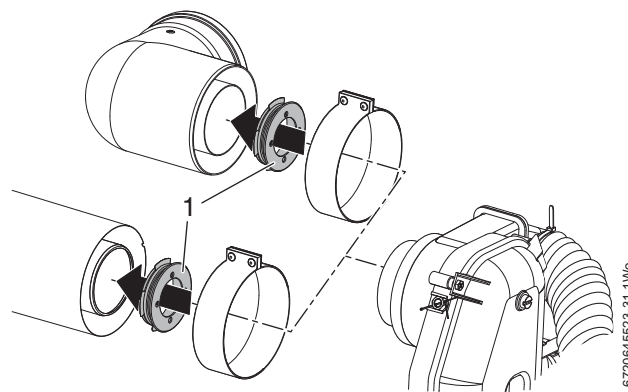


Fig. 32 Flue damper fitting

#### 5.4.2 Installation notes

- ▶ If using an extension or horizontal terminal onto the boiler outlet, remove the flue elbow retaining bracket [6].

**WARNING:** Escaping flue gases  
The flue elbow and clamp may become loose.  
▶ The flue elbow retaining bracket [6] must be fitted if a flue elbow is used on the boiler outlet.

- ▶ When connecting a flue elbow [8] directly to the boiler flue outlet, loosen the flue elbow retaining bracket screws [7] before fitting the flue elbow. Insert the flue elbow with the flue retaining clamp [9] loosely fitted, then tighten the bracket screws [7]. Clamp the elbow when adjusted to its required orientation.
- ▶ Orient the flue elbow into the required position and secure with the clamp.
- ▶ Ensure all flue seals are in good condition and seated properly.
- ▶ To ease assembly of flue components, grease seals lightly with the solvent-free grease supplied.
- ▶ A clamp should be installed for every 1m and at every change of direction.

**i** The boiler is not designed to take the weight of the flue system, this must be supported externally to the boiler.

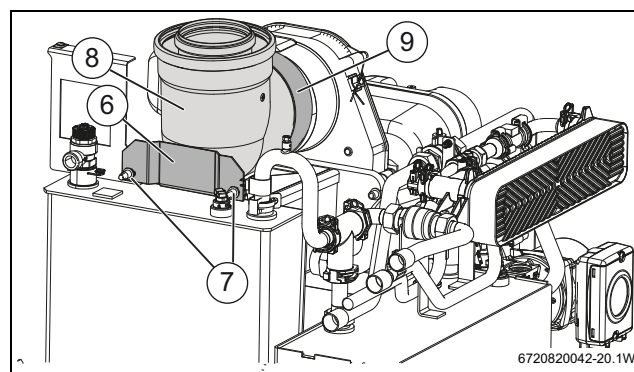


Fig. 33

- ▶ All horizontal flue sections must rise by at least 52mm for each metre (3°) away from the boiler to ensure that condensate flows back into the boiler for safe discharge via the condensate waste pipe.
- ▶ The horizontal terminal must be installed at 3° to ensure that the condensate drains back to the boiler whilst also preventing rain ingress down the air duct.



### 5.5 Combustion chamber

- ▶ Unscrew screws [G] and remove flue manifold access cover [H].
- ▶ Check that all the baffles [J] and baffle retainer [K] are correctly fitted to the secondary heat exchanger.
- ▶ Check that the flue damper is correctly fitted, if required, refer to section 5.4.1
- ▶ Remove the retaining nuts and washers [B].
- ▶ Remove combustion chamber/baffle access door [A].

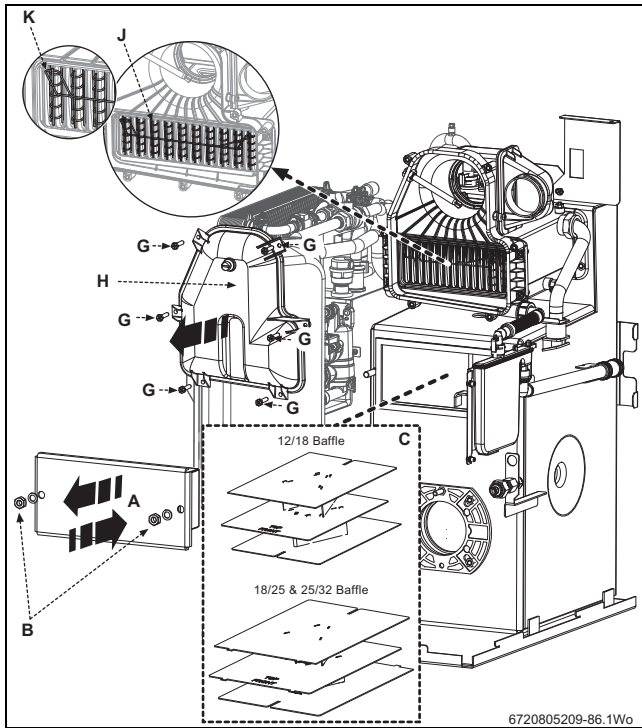


Fig. 34

- ▶ Ensure one piece baffle set [C] is in the right location [D], correctly resting on the baffle rests [F] on either side of the combustion chamber and pushed securely into place. Baffle sets for the 18/25 and 25/32 boilers are identified with tabs on the front and rear edge
- ▶ Refit combustion chamber door [A].

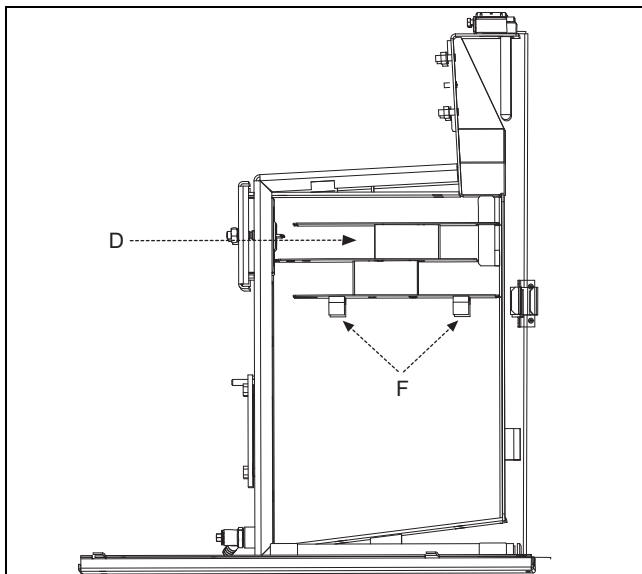


Fig. 35

**i** Secure with nuts and washers [B] and tighten until the chamber door is firmly secured, do not over tighten.

### 5.6 Pipework connections

**CAUTION:** Isolate the oil & water mains supply before starting any work and observe all relevant safety precautions.

#### Water connections

- ▶ Ensure all pipework is clean.

**i** Water may be present, due to factory testing.

- ▶ Align water pipework and connect
- ▶ Check that all unused sockets have been capped.

#### Oil supply connections

- ▶ Route the oil supply pipe [W] along either side of the boiler as required and connect to the isolating valve [G] and ensure the valve is closed.
- ▶ Connect the flexible oil hose [H] to the isolating valve [G].

#### Condensate connection

- ▶ Connect 21.5mm polypropylene pipe [L] (not supplied) to the condensate waste pipe flexible push fit connector [K] and terminate to waste.
- ▶ Do not use any solvents, adhesives or lubricants when pushing the pipe into the rubber connector [K].
- ▶ Ensure that the condensate pipe runs away from the boiler at a constant fall of 52mm (min.) for every metre.
- ▶ Seal all condensate pipe joints.
- ▶ Carefully pour 500ml of water into the condensate collection [U] to fill condensate trap.
- ▶ Check the water is running away and the condensate pipework joints are water tight.
- ▶ Check the flue manifold seal (within the rim recess of the flue manifold access cover) is undamaged and seated correctly.
- ▶ Refit flue manifold access cover [T] and secure with screws [S].

**i** The condensate trap must be correctly filled to prevent the possibility of potentially harmful flue products escaping via the condensate pipework.

#### Pressure relief connection

- ▶ Connect the pressure relief pipe [N] to a copper discharge pipe (15mm Ø min.).

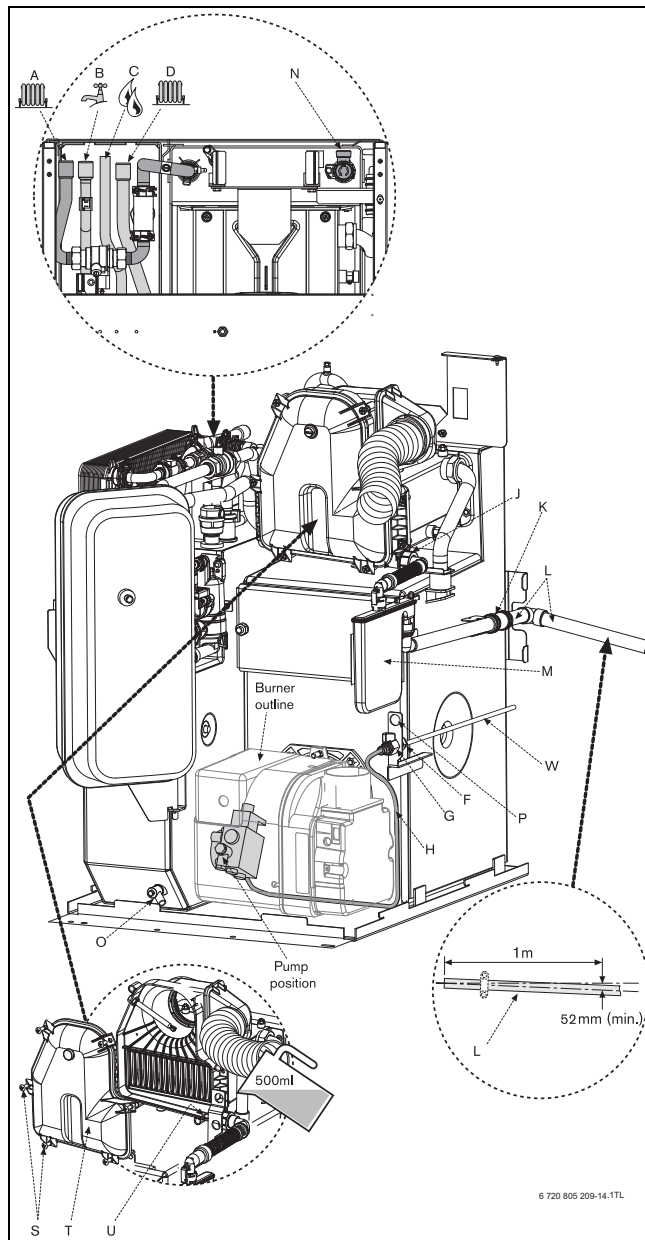


Fig. 36 Pipe connections

- [A] CH flow 22mm Ø copper (28mm Ø on 25/32 models)
- [B] DHW flow 22mm Ø
- [C] DHW water main inlet 15mm Ø
- [D] CH return 22mm Ø copper (28mm Ø on 25/32 models)
- [F] 10mm Ø oil supply connection
- [G] Oil isolating valve (10mm Ø)
- [H] Flexible oil hose (Replace hose at annual service to prevent leaks)
- [J] Flue manifold condensate outlet
- [K] Condensate outlet and flexible push fit connect (21.5 mm Ø) - supplied
- [L] Condensate pipe - not supplied
- [M] Condensate trap - supplied
- [N] Pressure relief (15mm Ø)
- [O] Drain
- [P] Fixing point for optional return oil pipe
- [S] Manifold access cover screws
- [T] Flue manifold access cover
- [U] Condensate collection sump
- [W] Oil supply pipe (not supplied)

### Fire valve

Where required, check that the oil supply pipe has a fire valve fitted externally to the building with the fire valve sensor located in the case. A fire valve sensor clip [1] is provided for this purpose on the support bar between the side panels.

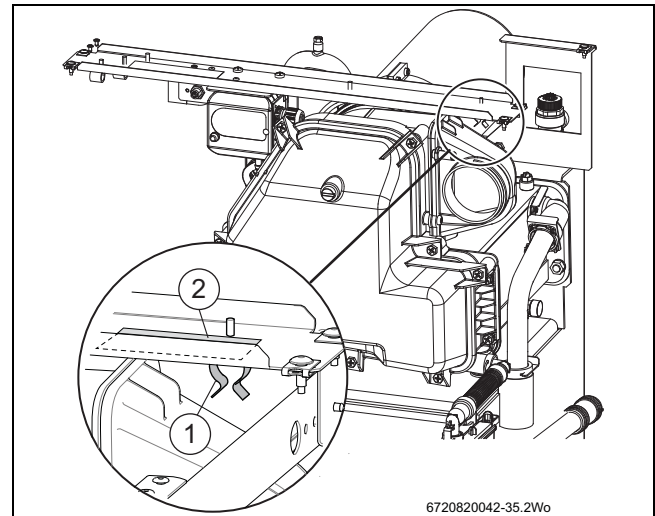


Fig. 37 Fire valve clip

- [1] Fire valve clip
- [2] Fire valve label

The fire valve label [2] states that the fire valve should be rated at 85°C or above to avoid nuisance cut outs.

### 5.7 Oil burner and pump

**CAUTION: MAINS SUPPLIES**

- ▶ Isolate the oil & water mains supply before starting any work and observe all relevant safety precautions.

**NOTICE: Nozzle orifice contamination**

- ▶ to avoid contamination do not dismantle, clean or touch the nozzle tip

#### Oil burner nozzle

Before removing or fitting a new nozzle refer to figure 38:

- ▶ Remove the screws [1] from the blast tube [2] and remove the blast tube

**i** There is a recirculation tube fitted to the 12/18 models, this does not need to be removed from the blast tube

- ▶ Unplug the HT leads [4]
- ▶ Loosen the screw [3] securing the break plate[5] and slide the unit off
- ▶ Use a suitable spanner to stop the nozzle body turning
- ▶ Remove the nozzle [8]and secure the new nozzle, hand tight
- ▶ Tighten the nozzle utilising the two spanners used during removal, do not overtighten
- ▶ Refit the break plate ensuring that the photocell and the break plate hole [5] are aligned and secure with the screw [3] into the seating provided [7]
- ▶ Reconnect the HT leads [4]
- ▶ Refit the blast tube [2] and secure with the screws [1]

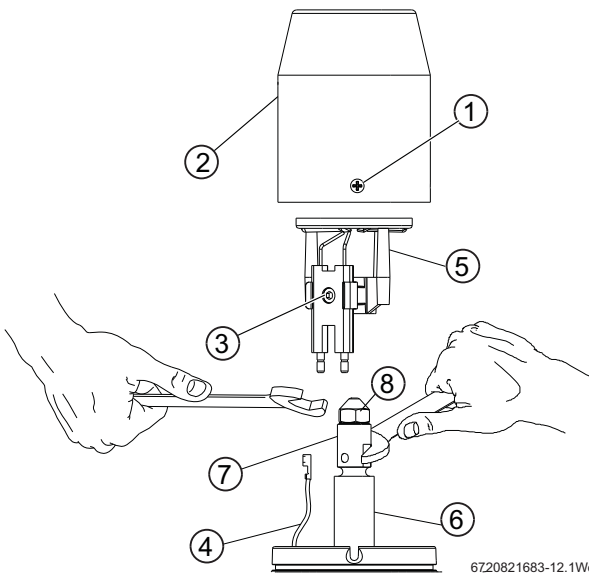


Fig. 38 Nozzle access

Refer to figure 39:

- ▶ Check that the nozzle [1] and the electrode [2] alignment settings are correct.
- ▶ Ensure that the nozzle [1] is aligned centrally within the combustion head [3].
- ▶ Inspect for any visible defects.

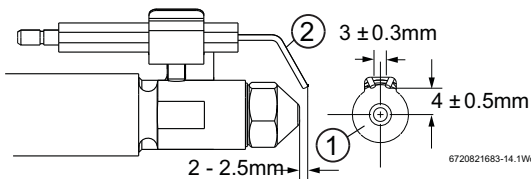


Fig. 39 Nozzle and electrode alignment

**Burner head adjustment**

The burner head adjustments are made to achieve the required output from the burner. The adjustments are made via a thumb-wheel on the burner. Refer to section 6.3.3 for setting information.

**Oil pump - Single pipe connection**

Connecting the oil pump for a single pipe system:

- ▶ The pump is factory set for single pipe operation with the flexible oil pipe fitted.
- ▶ Check connections before use.

**Oil pump - two pipe connection**

Converting the oil pump for a double pipe system:

1. Check the inlet pipe connection.
  - ▶ Unscrew the return plug [1].
  - ▶ Screw in by-pass screw [2] that is supplied in a plastic bag attached to the oil pump.
2. Connect the flexible oil pipe return hose [3] (not supplied) to the oil pump and return pipe fixing and tighten to secure (for routing see figure 36).

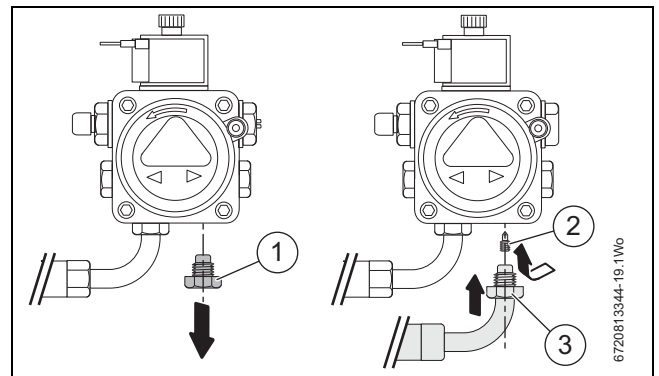


Fig. 40 Converting to double pipe system

- [1] Return plug
- [2] By-pass screw
- [3] Return pipe connection

**5.8 Refitting components**

**WARNING: Flue gas leakage.**

The seal between the burner and the mounting flange must form a gas tight seal to prevent leakage of potentially dangerous gases from the combustion chamber.

- ▶ Unless the burner is level when pushing the burner into the flange the O ring may not seat properly allowing flue gas to escape!
- ▶ Always check that the O-ring seal (Fig. 41 item A) is in good condition before fitting the burner. Replace the O-ring seal if defective.

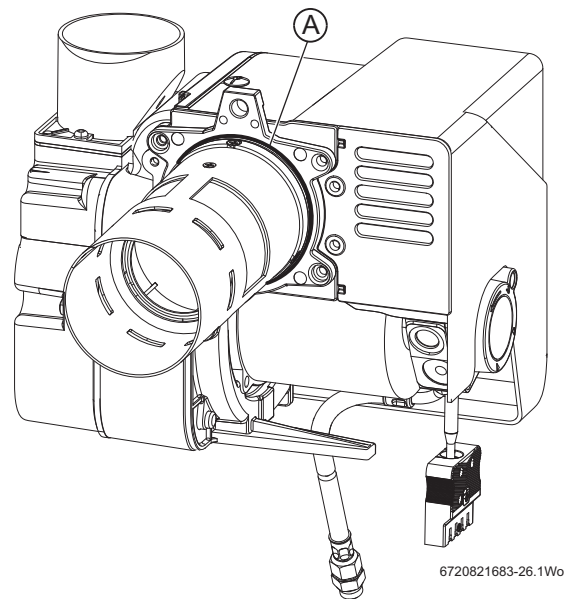


Fig. 41 12/18 Burner O-ring seal shown

Refer to figure 42

1. Align burner combustion head into the boiler collar.
  - ▶ Locate the burner retainer [A] over the threaded lug on the collar [B], ensure that the burner is level and push the burner firmly onto the flange ensuring the O-ring seal is fully engaged. Support the burner in position and secure with the retaining nut [C]. Tighten sufficiently to hold the burner but do not over tighten.
  - ▶ Check that the burner is seated correctly on its mounting flange and that the oil hose/s are routed correctly as shown in Fig. 36 and not trapped in front of or underneath the burner.
2. Refit the flexible air duct and secure with clip [D].

**Installation**

3. Plug burner lead [F] into connector [G].
4. Swivel the expansion vessel [H] back into position taking care not to kink the flexible hose or snag electric cables.
5. Refit control box.
  - ▶ Rotate the box towards you [J].
  - ▶ Slide control box drawer back into position.
6. Refit panels.
  - ▶ Locate bottom edge of panel [K] onto the bottom supporting ledge [L] on the boiler.
  - ▶ Secure panel [K] with screws [M].
7. Locate top panel [N] onto brackets at rear of the side panels [O].  
Locate ball stud connections [P] and press down to secure.

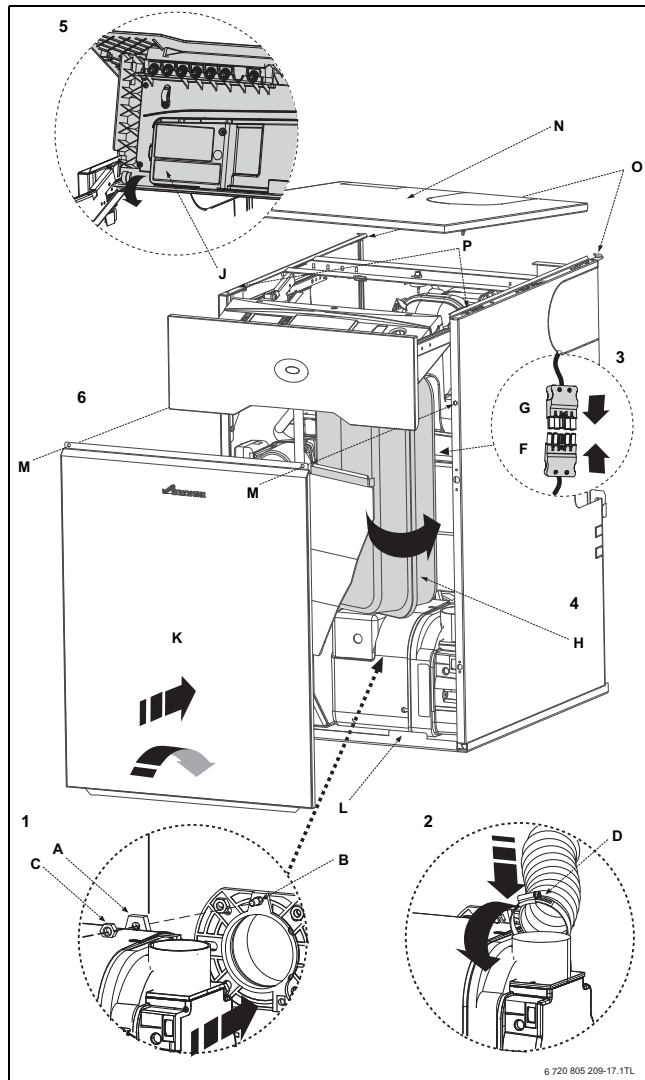


Fig. 42 Refitting components

## 5.9 Electrical

**DANGER: ISOLATE THE 230V ELECTRICITY SUPPLY**

- ▶ Ensure that the electricity supply is safely isolated and secured to prevent inadvertent re-connection. Information on safe isolation can be found in the Health and Safety Executive guidance HSG85. Using test equipment approved to GS38 confirm that the electricity supply is disconnected.

**i**

- ▶ The mains electrical supply to the boiler and system wiring centre must be common and through either a common fused double pole isolator or a fused three pin plug and unswitched socket.
- ▶ The isolator shall be sited next to the boiler for new systems and where practicable, replacement boilers.
- ▶ The isolator must have a contact separation of 3mm minimum between the poles.
- ▶ Any additional components that are connected to the boiler with mains electrical supply must not have a separate supply.
- ▶ External fuse 5 Amps.
- ▶ When stripping wires ensure copper strands do not fall into the control box.

**NOTICE:**

When wiring mains and control cables, ensure that the cable has sufficient length for the control box to be slid forward and tilted over.

### Access to electrical connections

Access to all wiring connections are via the Installer access cover at the bottom front of the control board.

1. Release the 3 captive screws [A] and remove the Installer access cover [B].

### Electrical connections

2. C. Low voltage connections.  
D. Mains voltage connections.  
E. Fuse carrier.

**i** The 230V links (L OUT to CH LR & L OUT to DHW LR) are required for fascia mounted programmers to operate.

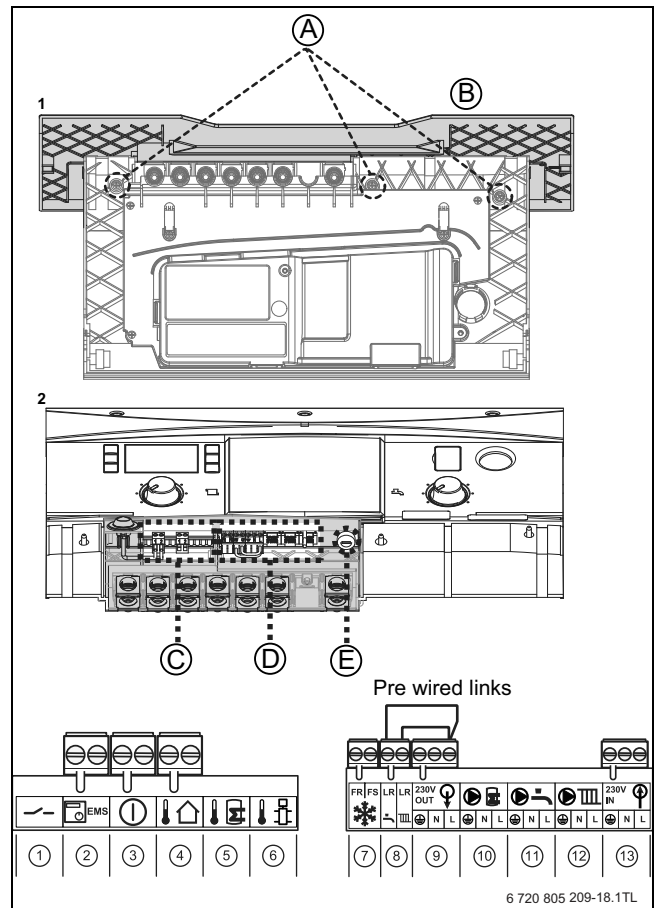


Fig. 43

### Low voltage terminal strip

1	Not used
2	EMS bus connections
3	Service mode switch
4	Outdoor compensation sensor
5	Not used
6	Not used

### Mains voltage terminal strip

7	External 230 V A.C. frost thermostat [FS]
8	230 VA.C. switched live inputs (heating and DHW) [LS] [LR]
9	230 VA.C. mains output to wiring centre
10	Not used
11	Not used
12	Not used
13	Boiler 230 VA.C. mains supply

**DANGER: 230 Volts**

Isolate the mains electricity supply before starting any work and observe all relevant safety precautions.

### Mounting optional Plug-In controls

#### Removing the blanking plate

The control panel must be pulled fully forward to gain access to the top cover panel (refer to page 23 for access to the control panel).

1. Release the 3 screws [A] and remove the access cover [B].
  - ▶ Use the tab [C] to lift and also press down on the bottom edge of the blanking plate and at the same time push the blanking plate upwards to release it from the clips on the control panel.
  - ▶ Pull the blanking plate forwards to remove.

**Fitting the programmer/timer**

2. If your programmer has a ribbon cable, connect the ribbon cable to the socket [D] in the control panel, ensuring the cable will fit into the recess [E] in the control panel.

If your programmer does not have a ribbon cable then the EMS connections will be utilised to make connection to the boiler.

- ▶ Align the clips on the back of the programmer/timer with the slots [G] in the control panel and push in to engage the clips into the 4 slots.
- ▶ Pull the programmer/timer downwards to secure into place.
- ▶ Replace the top access cover [B] securing in position with the 3 screws [A].



The 230V links (L OUT to CH LR & L OUT to DHW LR) are required for facia mounted programmers to operate.

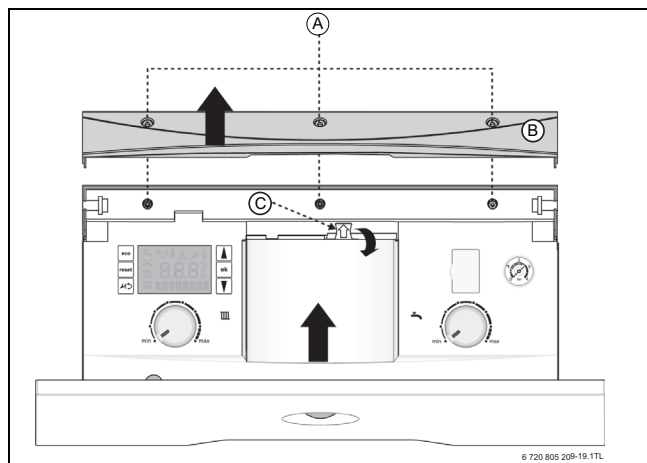


Fig. 44

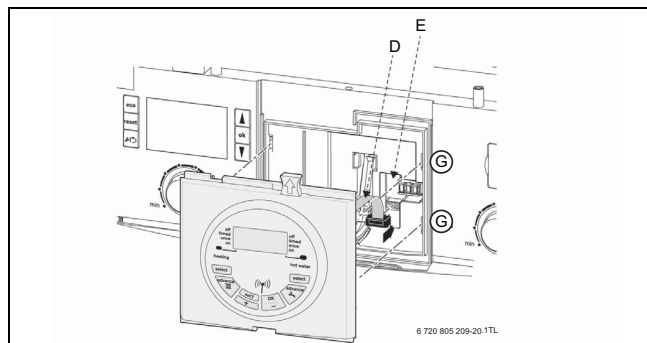


Fig. 45

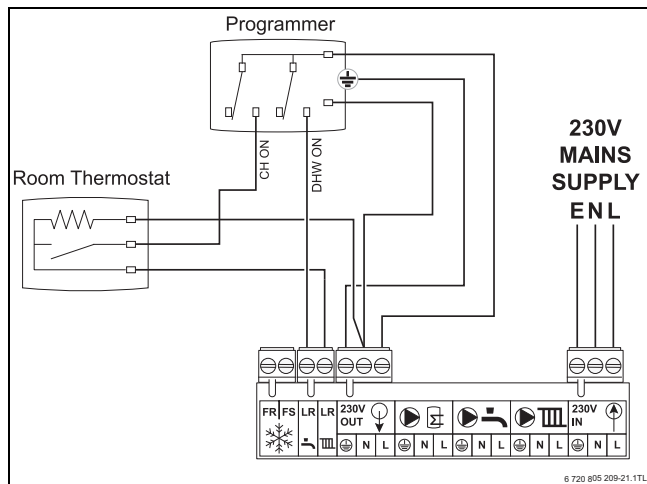


Fig. 46 External 230 V Twin Channel Programmer and Room Thermostat

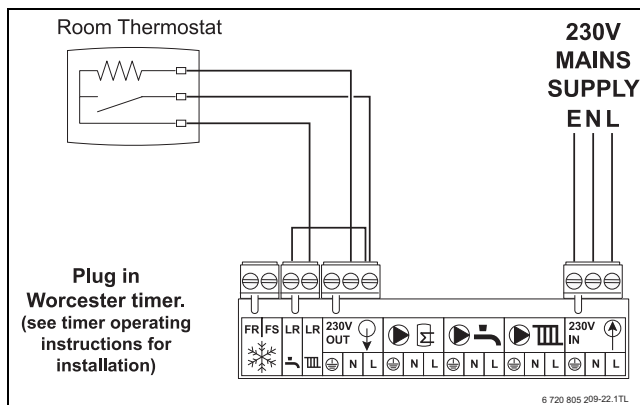


Fig. 47 Room Thermostat and Plug In Twin Channel Programmer

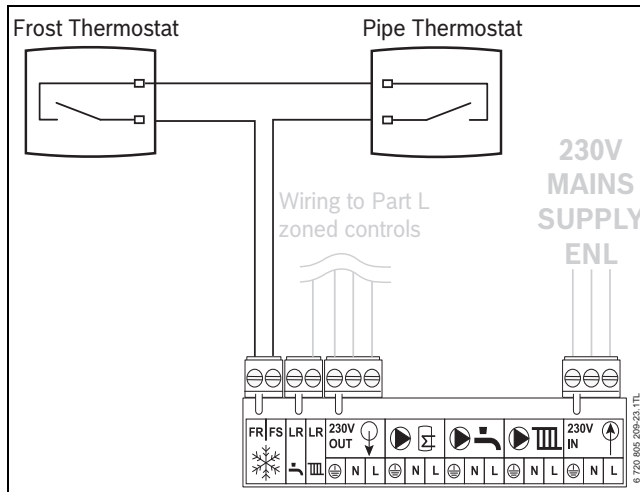


Fig. 48 Optional External 230 VAC Frost Stat Connection for protection of system pipework in unheated air space

- ▶ Connect frost thermostat cables to terminals FS & FR.
  - These connections are not polarity sensitive.
  - The Boiler internal frost protection will bring on the burner if required.

5.10 Electrical schematic

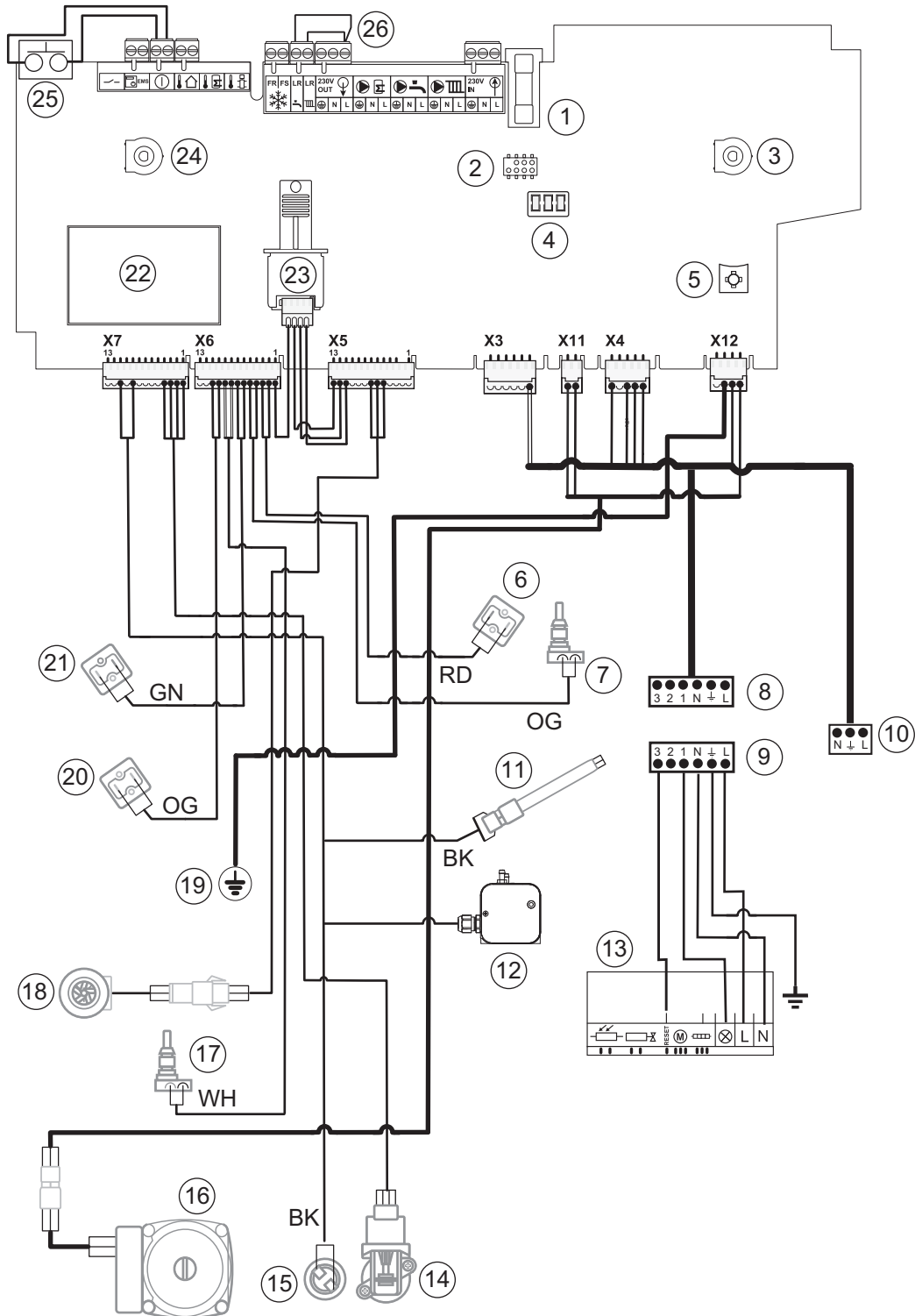


Fig. 49

- |                                      |   |
|--------------------------------------|---|
| [1] Fuse (slow blow) 5A              | [14] Diverter valve                                   |
| [2] Worcester 24V controls point     | [15] Tank overheated thermostat                       |
| [3] Storage tank temperature control | [16] Circulation pump                                 |
| [4] EMS bus connections              | [17] Tank sensor                                      |
| [5] Diagnostic port                  | [18] Flow turbine                                     |
| [6] Flow sensor                      | [19] Boiler earth                                     |
| [7] Max safety sensor                | [20] DHW outlet sensor                                |
| [8] Burner plug                      | [21] DCW inlet sensor                                 |
| [9] Burner socket                    | [22] LCD display                                      |
| [10] Shut off valve connector        | [23] HCM) Heat control module)                        |
| [11] Flue overheated thermostat      | [24] Central heating temperature control              |
| [12] Air pressure switch             | [25] Burner service mode switch                       |
| [13] Burner control                  | [26] Pre-wired links                                  |
|                                      | [BK] Black [RD] Red [OG] Orange [WH] White [GN] green |

### 5.11 Weather compensation

The appliance will modulate the CH flow temperature based on the outside temperature when an outdoor sensor is connected to the outdoor sensor connection on the control board and the weather compensation is active.

This is designed for use with a system that has thermostatic radiator valves and a room thermostat.

The appliance will operate at lower temperatures when there is a lower heat load because the building is losing less heat due to higher external temperatures. This means that the appliance is running more efficiently as it is operating for longer at condensing temperatures.

The weather compensation curve can be adjusted to tune the flow temperature to suit the particular installation.

The appliance is supplied with the weather compensation deactivated.

Weather compensation activation:

The weather compensation is activated via menu 1 of the text display.

- ▶ Select Menu 1 via ▲ ▼ scroll buttons.
- ▶ Press OK button.
- ▶ Select W1 via ▲ ▼ scroll buttons.
- ▶ Press OK button.
- ▶ Set W1 to 1 via ▲ scroll button.
- ▶ Press OK button.

The weather compensation is now active and the appliance will check for the presence of an outdoor sensor and deactivate the CH flow temperature modulation if a sensor is not detected. When weather compensation is activated but an outdoor sensor is not fitted/detected, the warning triangle and H03 will be displayed on the LCD display.

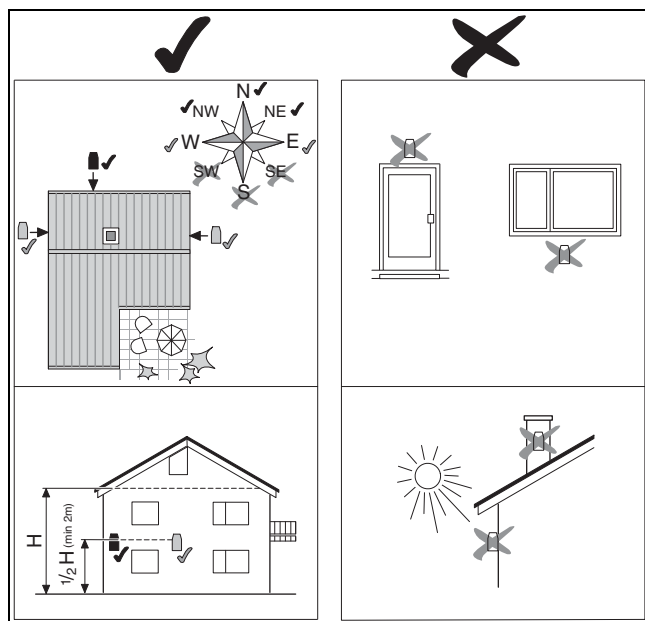


Fig. 50

Weather compensation sensor optimum siting indicated by black tick.

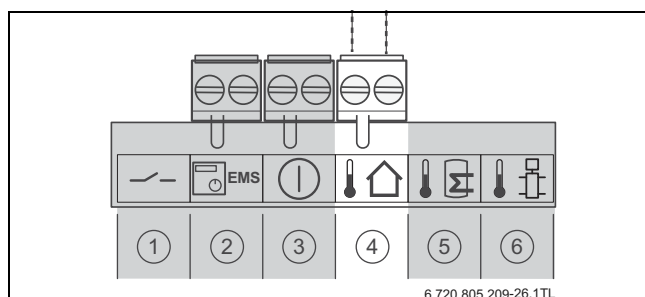


Fig. 51

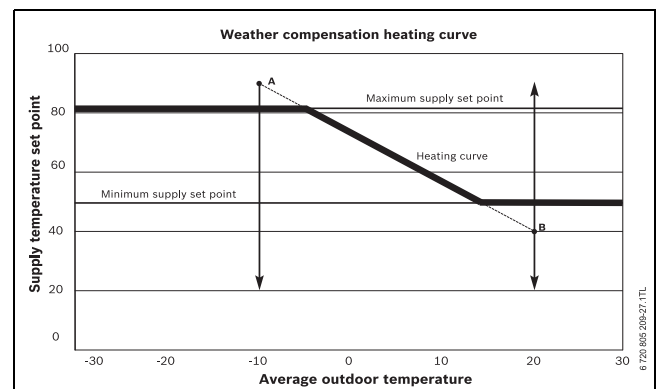
The sensor is wired directly into the control box via terminal 4 in the low voltage terminal strip (→ page 29).

### The heating curve

The CH flow temperature has an upper limit of 82°C (this can be capped via the CH control knob setting) and a lower limit of 50°C, (it is recommended that the CH knob is set to 82°C for the weather compensation to operate most effectively).

The default settings for the curve are point A = 90°C and point B = 40°C, this gives a 80°C flow at -4°C outdoor temperature and a 50°C flow at 14°C outdoor temperature which should be suitable for typical systems.

Point A is the projected value for the flow temperature at -10°C outdoor temperature and point B is the projected value for the flow temperature at +20°C outdoor temperature, (these values dictate the angle of the slope only they are not CH flow temperature limits).



### Adjusting the heating curve

- ▶ The weather compensation curve can be adjusted via the text display by adjusting the projected flow temperature at -10°C (point A), Menu 1 W2 (pA), and 20°C (point B), W3 (pB), enabling the slope as well as the position of the curve to be adjusted to suit the installation.
- ▶ Point A and B can be set between 90 and 20°C but point A must always be greater than point B.

### Outdoor sensor error

- ▶ If during weather compensation the outdoor sensor is open circuit or closed circuit the CH flow temperature modulation is deactivated and the CH flow temperature set to the CH control knob setting, a warning triangle and H03 are displayed on the LCD.
- ▶ The appliance will monitor the outdoor sensor input and if the sensor returns to normal then the flow temperature modulation will be reactivated and the LCD warning triangle and H03 are turned Off, (there may be a 10 second delay).

### Average outdoor temperature

- ▶ To stop rapid fluctuations the outdoor temperature used for CH flow temperature modulation is an average value taken over a ten minute period.
- ▶ When an outdoor sensor is first detected the sensor value is taken to be the outdoor temperature, subsequent to this the outdoor temperature will be adjusted every 10 minutes using an average outdoor temperature value from the previous 10 minute period.

### Frost protection

The normal condition for the appliance is that the weather compensation frost protection is turned Off.

If required the frost protection is activated via Menu 1 W5 of the text display, 0 = OFF, 1 = ON.

On Activation of the weather compensation frost protection if the outdoor temperature is less than 5°C the system frost protection is activated the same as if an external frost thermostat was activated.



## 6 Commissioning

### 6.1 Pre-commissioning checks-appliance



**CAUTION:** Isolate the mains supplies before starting any work and observe relevant safety precautions.

1. Check that the service and water pipes are connected correctly.
  2. Check that the oil supply is Kerosene and that the pipework is connected correctly to the oil pump via the supplied flexible oil hose (→ correct routing for flexible hose on page 26).
- ▶ Turn on the main oil supply valve at the tank, check the oil supply pipework and connections. Rectify any leaks.



Replace flexible hose at annual service to prevent possible oil leakage.

3. Check the flue is correctly fitted and the connections are secure.
  4. Check the condensate pipework is correctly fitted and connected.
- ▶ Check the condensate trap is filled with water.
5. Check the CH circulating pump is set to 3.

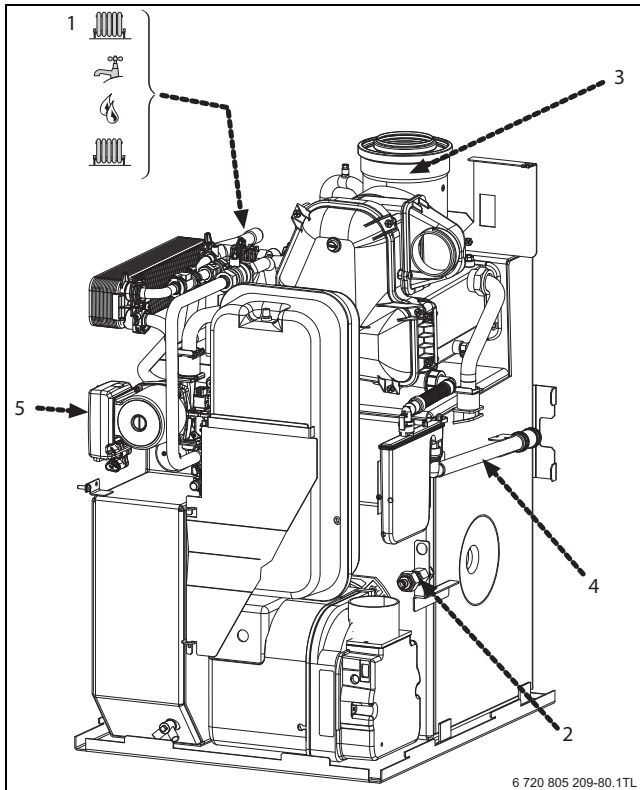


Fig. 52



**NOTICE:**

If the boiler is not to be commissioned immediately then: After successfully completing all of the checks and any rectification work, close the water valves, shut off the oil supply and electrically isolate the boiler. Complete the installation part of the Guarantee Registration Card, and complete a CD10 or equivalent to inform the LABC of the installation.

### 6.2 Filling the system

1. The diverter valve will sit in mid-position when the boiler has no demand and is powered up.

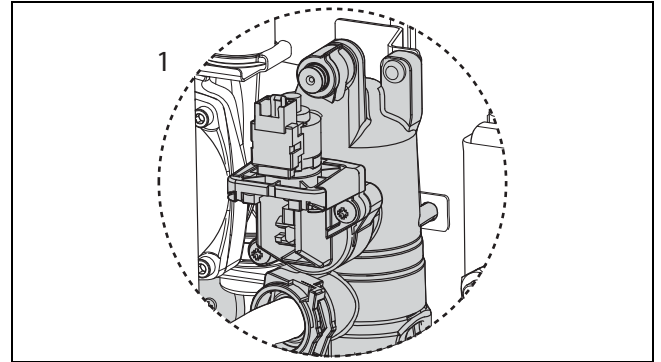


Fig. 53

2. Loosen the flow pipe manual air vent screw.

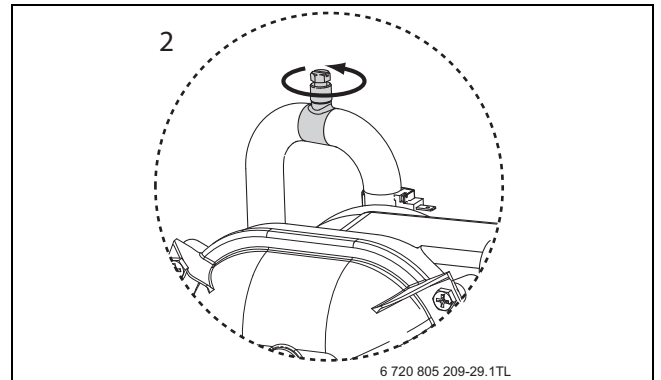


Fig. 54

3. Check and if required, adjust the expansion vessel pressure using the Schraeder type valve [A].

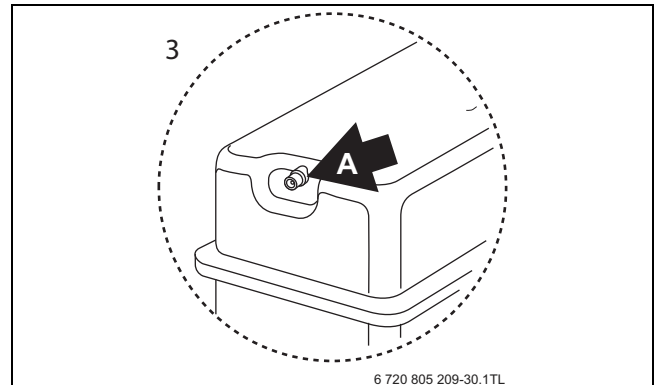


Fig. 55

The charge pressure of the built-in 12 litre expansion vessel is 0.7 bar as dispatched, which is equivalent to a static head of five metres. At 1 bar pressure the vessel will provide 107 litres expansion capacity, the boiler has a primary water capacity of between 62 and 64 litres and therefore additional system expansion capacity may be required.

Total system volume (litres)	Initial system pressure (bar)	Initial charge pressure (bar)
180	0.5	0.5
107	1.0	0.5
138	1.0	1.0

If an extra expansion vessel is fitted to the central heating return, adjust this to the same pressure as the appliance internal expansion vessel, refer to separate instructions supplied with the extra expansion vessel.

4. Open all system and radiator valves.
  - ▶ Turn on the water main stop cock.
  - ▶ Close the flow pipe manual air vent when water is vented.
  - ▶ Fill the system to between 1 and 2 bar pressure via a WRAS approved filling link. Monitor the pressure gauge during venting and repressurise if required.
  - ▶ Check air is being discharged from the automatic air vents.
  - ▶ Vent all radiators, retighten when completed, check the system and correct any leaks.
  - ▶ Bleed air from both of the secondary heat exchanger air vents [B] and flow pipe air vent.
  - ▶ Bleed air from the pump using the pump bleed screw.

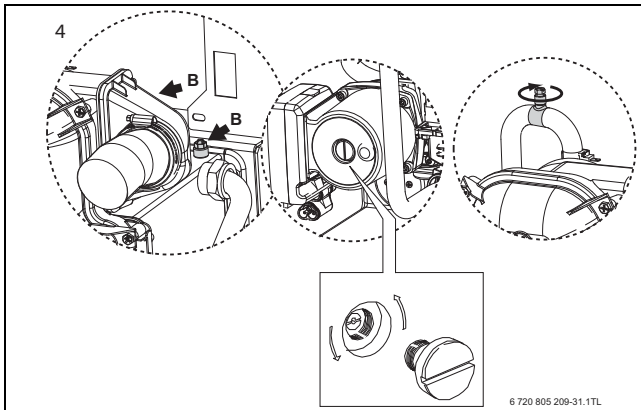


Fig. 56

5. Connect a suitable hose to the Heatslave tank drain. Open the drain valve to reduce the system to the correct pressure, then close the drain valve. Ensure safe disposal of the discharge.

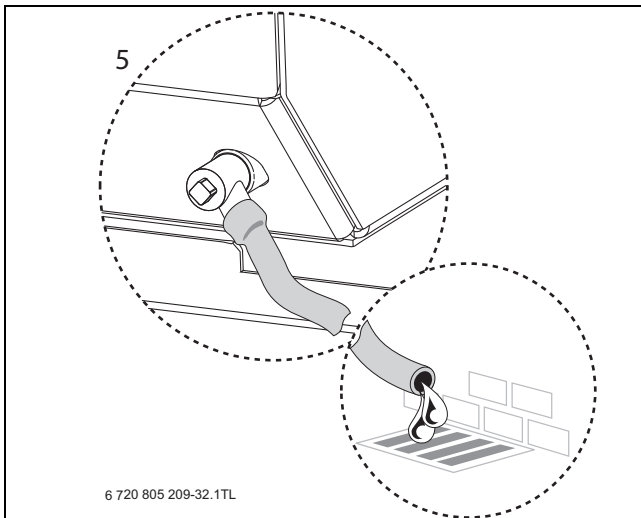


Fig. 57

6. Check system and rectify any leaks.

### 6.3 Starting the appliance

**NOTICE:**  
Never run the appliance when the appliance/system is unpressurised or empty.

1. Check the oil supply is correctly fitted, pressure tested and in good working order before turning on the oil supply valves to the boiler.
  - ▶ Turn on the main oil supply valve at the tank and draw off at least 2.5 litres of oil until a steady flow of clear uncontaminated oil can be seen as follows:
    - The oil supply to the boiler should be primed before the burner is operated to avoid unnecessary pump wear.

- The use of an oil suction pump will prime and flush through any oil supply set up simply and easily, alternatively the following procedures can be used.

#### 6.3.1 Single pipe gravity feed systems:

- ▶ Disconnect the flexible oil hose and open the isolating valve to discharge the oil into a suitable container.
- ▶ If a top entry tank has been used the pipework will need to be primed before the oil will discharge under gravity.
- ▶ When completed, close the isolating valve, reconnect the flexible oil hose.

#### When the oil reaches the pump, bleed the air from the pump:

- ▶ Open the isolating valve and the oil pump bleed port [1] to discharge into a suitable container once the boiler is started up.
- ▶ Switch on the electricity supply to the boiler.
- ▶ Set the programmer to ON for CH and DHW.
- ▶ Turn on the boiler CH control thermostat.
- ▶ Allow the burner to run through to lockout indicated by the control panel LCD display [J] showing code 9F 855.

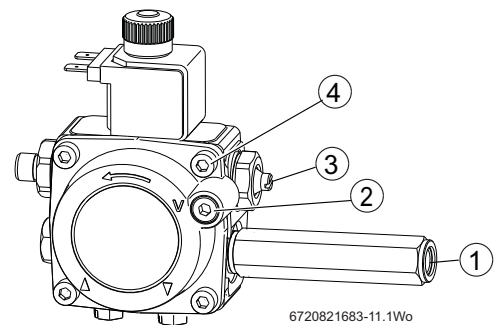


Fig. 58

- [1] Bleed and pressure gauge port
- [2] Vacuum gauge connection
- [3] Pressure adjuster
- [4] Cover retaining screws x4

#### If no oil comes out of the port valve [1], then re-prime the oil line as detailed above

- ▶ Wait 2 minutes then press the lockout reset button [K].
- ▶ Repeat the procedure until a steady stream of oil without air, runs from the bleed port, then lock bleed port [1].
- ▶ Switch off the boiler.

#### 6.3.2 Double pipe sub-gravity feed systems and single pipe suction lift with de-aerator:

- ▶ Prime the oil supply pipework to prevent oil pump damage.
- ▶ To prime a de-aerator [2], disconnect the flexible oil inlet hose [7] from the isolation valve and place in a container of heating oil [6]. Connect a spare flexible oil hose [5], to discharge into container [6]. Open the isolating valve, turn on the power to the boiler and set the programmer to ON. Prime the de-aerator until there is a steady flow of oil into container [6]. Turn off the boiler then reconnect the flexible oil inlet hose [7].
- ▶ Turn on the boiler, the oil level in the de-aerator will drop whilst the oil is being drawn from the tank. If the de-aerator empties and the burner locks out before the oil is drawn from the tank, you will have to prime the de-aerator again.

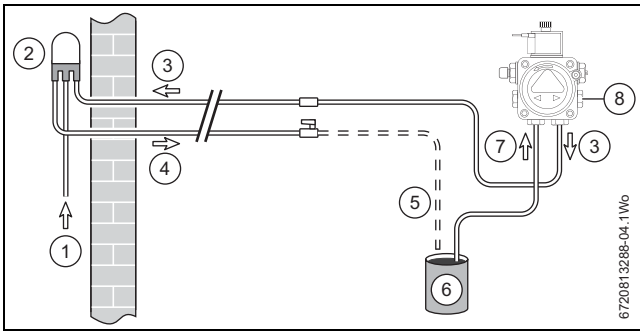


Fig. 59 Priming the pump

- [1] Oil supply
- [2] De-aerator
- [3] Return
- [4] Flow
- [5] Spare flexible oil hose
- [6] Container of oil
- [7] Oil pump flexible inlet hose
- [8] Bleed and pressure gauge port

2. Fit a pressure gauge to port [1] on the oil pump (refer to figure 58).



**NOTICE:**

If changing the burner output, ensure the position of the air damper disc is correct for the output → table 11.

► **12/18 - RIELLO RDB 2.2**

Adjust position of the air damper disc to suit the burner output (→ table 11 on page 39), located as shown in figure 60. Access is by removing the screws securing the air inlet manifold [1].

► **18/25 & 25/32 - RIELLO RDB 2.2**

No damper disk is fitted to the 18/25 or 25/32 burner.

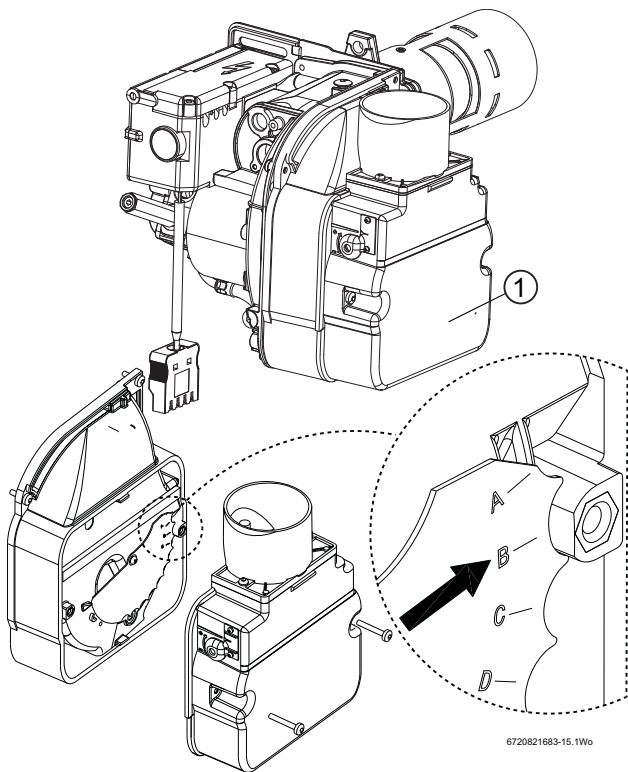


Fig. 60

**6.3.3 Burner head setting**

Adjustments to the burner head are made on the basis of the required output, refer to table 11 for the required setting for your boiler.

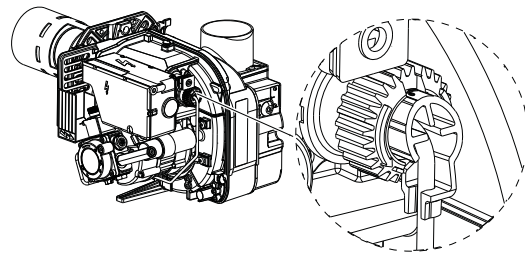


Fig. 61 Burner head adjustment thumbwheel

One complete rotation clockwise (cw) from the minimum position equals approximately one millimetre. Adjust the thumb-wheel to achieve the setting indicated in the table 11, according to your appliance model and output.

Using an engineer's rule or vernier gauge measure from the lip of the blast tube to the inside of the break plate as show in the figure below. Ensure that the break plate is level, check at four equal points to get an average of the required setting. The setting tolerance should be no more than  $\pm 0.25\text{mm}$

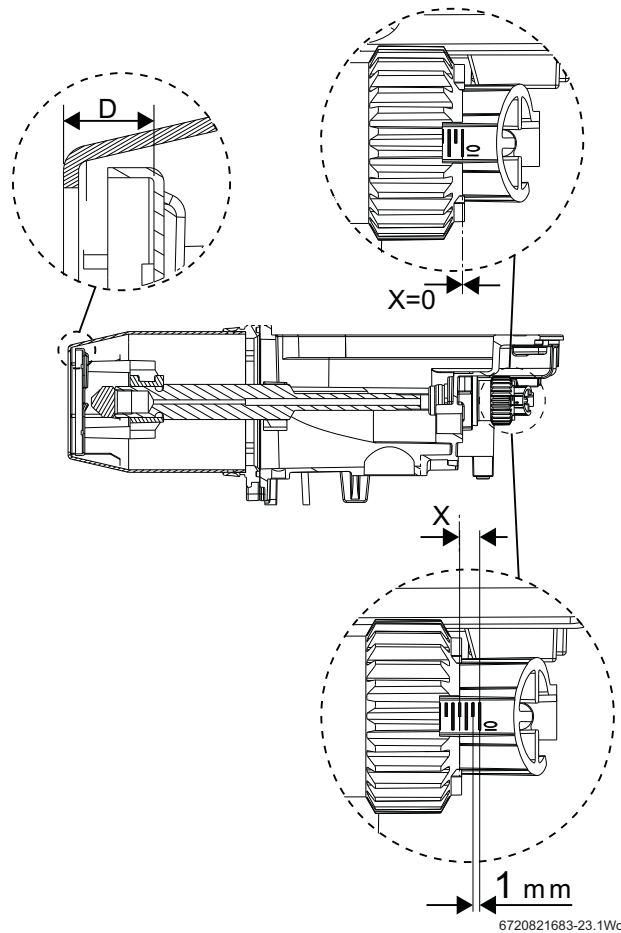


Fig. 62 Burner head adjustment

### 6.3.4 Boiler lockout

If the burner fails to establish a normal firing pattern or flame failure occurs the flame monitoring photocell mounted in the burner body will alert the burner control box to shut the burner down and provide a safe lockout state indicated on the control panel LCD display [J] by code 9F 855.

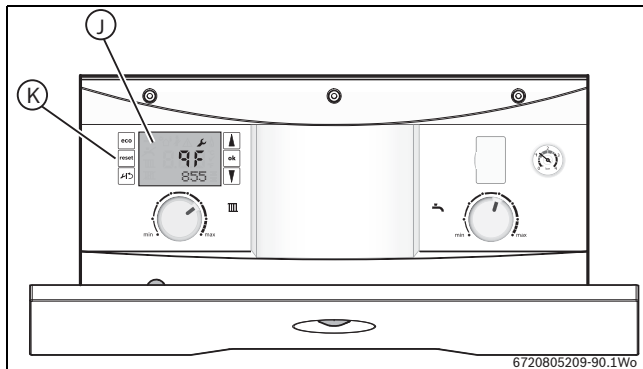


Fig. 63

- ▶ Wait two minutes then press the lockout reset button [K] to initiate another start sequence.
- ▶ Repeat procedure until a flame is established.
- 1. Start and run for three minutes then switch off.
- ▶ Release the burner retainer nut [H].
- ▶ Remove the burner.
- ▶ Check for after-spurting from the nozzle, indicated by oil saturation on the combustion head [G]. *If after-spurting occurs:*
- ▶ Remove the combustion head [G], and electrodes, hold the burner vertically, unscrew the nozzle and fill the nozzle holder with oil.
- ▶ Refit nozzle, electrodes, combustion head [G] and the burner.
- ▶ Restart and run for three minute intervals until after-spurting stops.

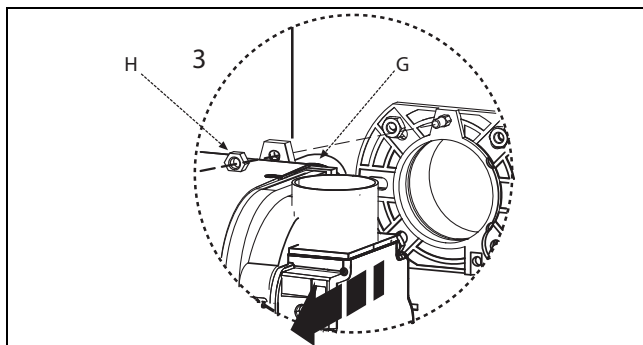


Fig. 64

- 2. Start and run for 20 minutes.
- ▶ Check that the oil pressure is set according to table 11 on page 39
- ▶ Remove sampling point plug [J] to check the smoke reading is between 0-1. If the smoke level is above 1, check the combustion settings are correct and the oil nozzle is in good condition.

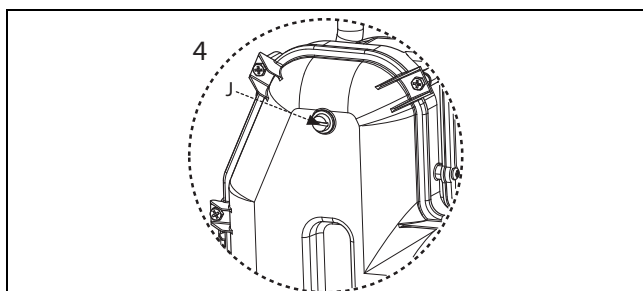


Fig. 65

**i** Smoke readings may be inaccurate until the smoke from burning organic binder in the access door insulation has ceased.

### 6.3.5 Switching the appliance on/off

- ▶ Turn on the mains power supply, initially the “Boiler start up screens” will be displayed (see figure 67:)
- ▶ Turn on any external controls.
- ▶ Set the thermostatic radiator controls to maximum.
- ▶ Set the clock/programmer to continuously ON and the room thermostat to maximum temperature

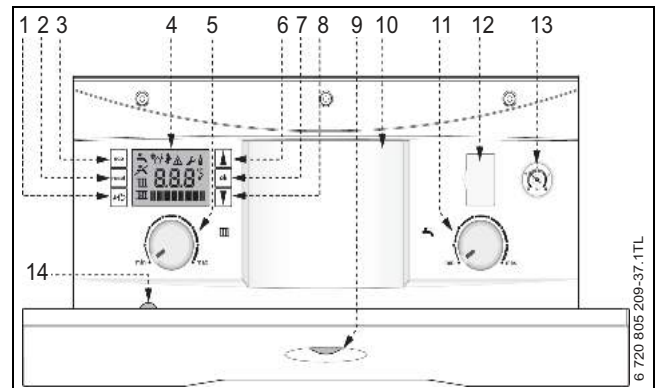


Fig. 66

#### Control board:

- [1] Spanner/return button
- [2] Reset button
- [3] ECO button
- [4] Boiler LCD display
- [5] Central heating temperature control
- [6] Scroll up button
- [7] OK - Select/confirmation button
- [8] Scroll down button
- [9] Operation and fault indicator (blue)
- [10] Position for optional programmer
- [11] Hot water temperature control
- [12] Diagnostic port
- [13] System pressure gauge
- [14] Burner service mode button

**The blue operation/fault indicator light will be illuminated when there is a demand for heat or hot water.**

- ▶ Turn the boiler CH temperature control [5] to maximum.

**If the boiler fails to light, a flashing fault code will be displayed.**

**i** Do not press the blue operation/fault indicator [9] to attempt to reset the boiler.

- ▶ To reset the boiler, press the reset button [2], the “tick” symbol will be displayed briefly for a successful reset.

#### Boiler start up screens

On initial start up, the following screens are displayed:

1. All the symbols are displayed for approximately 2 seconds.
2. The control will run an internal test.
3. When the internal test has been successfully performed, this screen is displayed:
  - ▶ The boiler is in stand-by.
  - ▶ The flow temperature sensor indicates the primary temperature from the heat exchanger (not the target set point).
4. If no adjustments are made for 30 seconds, the back light goes off.
  - ▶ As soon as an adjustment is made, the screen will light up and the relevant information will be displayed.

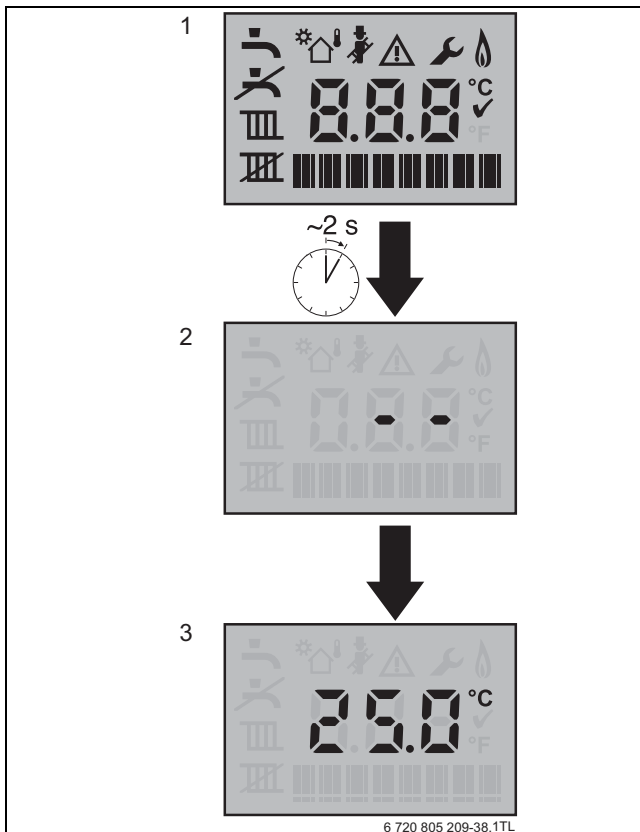


Fig. 67 Start up screens

**Screen display**

All possible screen symbols are displayed briefly during start up. Extended diagnostic features have rendered the greyed out symbols not required for the operation of this appliance.

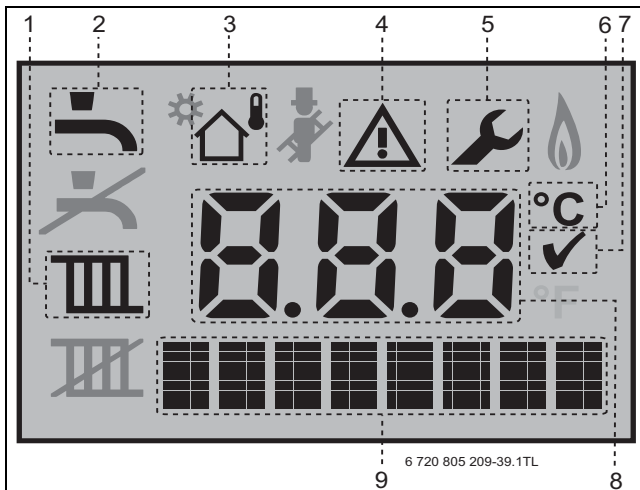


Fig. 68

- [1] **Central heating symbol**  
Displays this symbol during CH demand.
- [2] **Hot water symbol**  
Displays this symbol during DHW demand (DHW flow rate > 2 litres per minute) and tank reheat.
- [3] **Weather Compensation active symbol**  
Displays this symbol only if a Weather Compensation sensor has been fitted to the appliance and is active.
- [4] **Alert symbol**  
Displays with the boiler status code and diagnostic code during a fault condition.
- [5] **Service mode symbol**  
Displays when in the service menu.

- [6] **Centigrade symbol**  
Displays next to the temperature reading.
- [7] **Confirmation symbol**  
This symbol confirms a manual change.
- [8] **Alpha/Numerical display**  
Displays a temperature or boiler status code.
- [9] **Text display**  
Displays ECO or diagnostic code.

**Status code**

During normal operation various status codes can be displayed by pressing the service button.

The first screen of the information menu displays the current status code, this will change as the boiler runs through the various modes and sequences.

These are not faults, but provide information concerning the current status.

Status Code		
200	CH active	The Central Heating system is being heated.
201	DHW active	The Domestic Hot Water is being heated/tank is being heated.
202	CH Anti rapid-cycle mode	Time delay to prevent rapid-cycling of the boiler on the room thermostat.
203	System stand-by	The boiler has no CH or DHW demands.
270	Power up mode	The boiler is ON, warming up and running self check routines. This lasts approximately 35 seconds.
358	Three way valve anti-seize	Anti-seize operation. If the diverter valve has not moved in 24 hours, the valve is operated to prevent seizing, duration approximately 10 seconds.

Table 10

**6.3.6 Selecting Service Menus**

1. Press and hold and buttons together for 1 second, the display will show Menu 1.

Double up or down arrows indicate that the menu can only be scrolled up or down.

An up and down arrow indicates position in the menu where options can be scrolled either up or down.

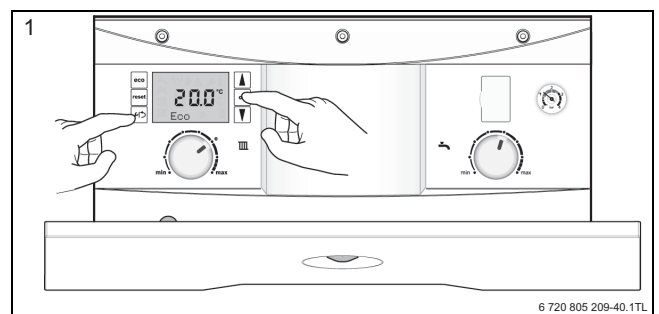


Fig. 69

- 1. Scroll up and down through the menus with the arrow buttons

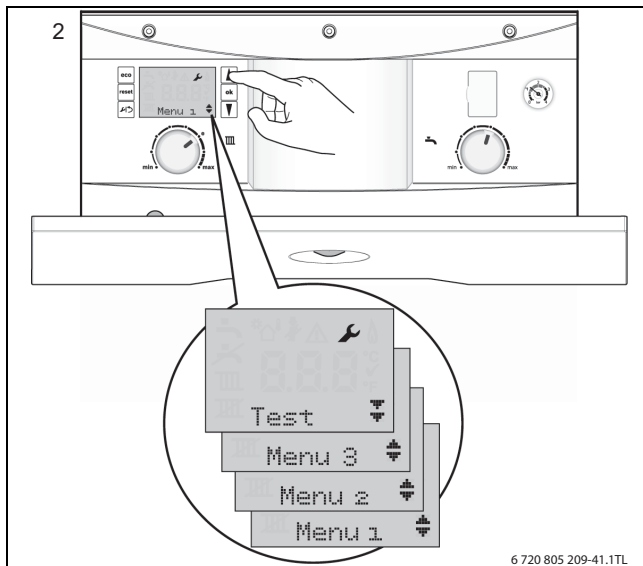


Fig. 70

**Menu 2 - Boiler parameters**

- 3. Select Menu 2 via the and arrow buttons.
- ▶ Press and hold OK button, for 1 second to enter Menu 2. The menu lists the boiler parameters, that can be adjusted in this menu.

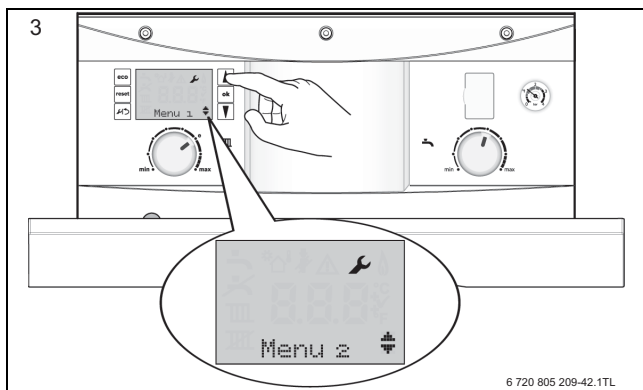


Fig. 71

**To modify setting**

- 4. Select the desired menu option using the arrow buttons (refer to figure 72) and press the OK button, the option will flash.
- ▶ Adjust the parameter using the up and down arrow buttons and press the OK button to confirm.

A tick will appear on the display for 3 seconds to confirm the update of the new value.

The same process is used for adjusting Menus 1 & 2.

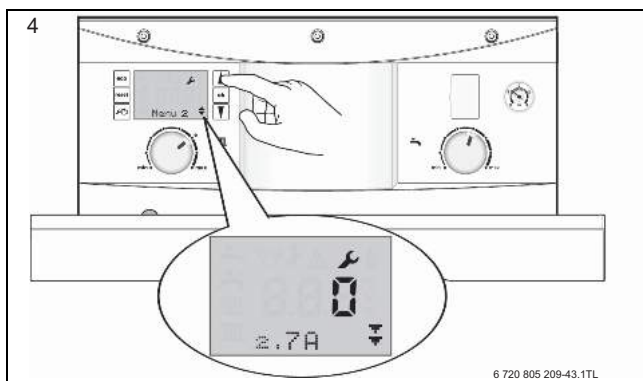


Fig. 72

**Menu 2 parameter**

<b>2.7A</b> Demand /fault indicator (blue light) activation	0 = The blue light will only operate as a flashing fault alert. 1 = The blue light will operate as a boiler demand light and fault alert. This is set to 1 by default.
---	---

**Reset to factory settings**

To reset any or all changes made in Menu 2 back to the factory default setting:

Any changes made to Menu 1 are not reset by these actions.

- 1. Press and hold the , , and buttons for at least five seconds. The screen will then display code BE and spanner symbol.

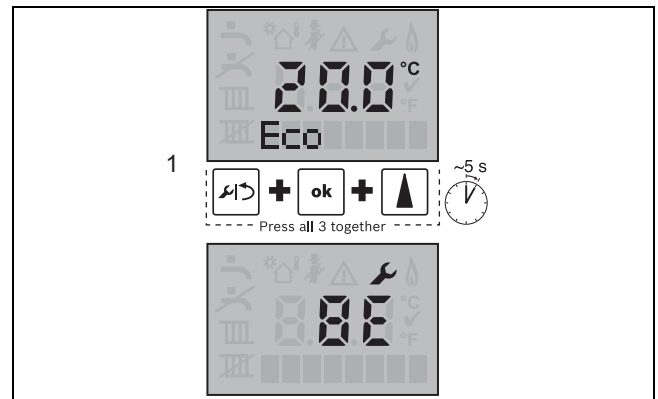


Fig. 73

- 2. Press the button and "reset" will be displayed with the tick symbol for three seconds. After three seconds the display will revert to the normal operation screen.

**APPLIANCE MUST BE SET TO CO<sub>2</sub> LEVELS.**  
Air settings are approximate, as flue length and nozzle variations will affect them.

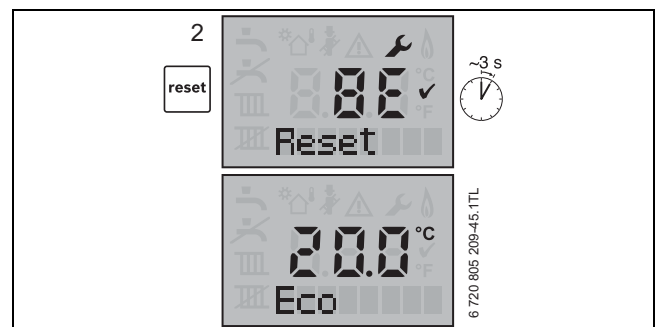


Fig. 74

### 6.3.7 Finish commissioning boiler checks

Check the CO<sub>2</sub> levels, refer to table 11 and adjust the air shutter [4].

► Check the flue gas temperature is close to the values in table 11.  
If the flue gas temperature is too high and the baffles are correctly fitted, then reduce the oil pump pressure [2] 5-10 p.s.i. to compensate for nozzle variations.

- Turn off the electrical supply.
  - Isolate the oil supply to the burner.
  - Remove the oil pressure gauge.
  - Refit the blanking plug [1].
  - Check and rectify any oil leaks.
3. Switch on the oil supply.
- Switch on the electrical supply.
  - Restart the boiler and run for 5 minutes.
  - Recheck the CO<sub>2</sub> levels and if required, adjust the air shutter setting [4] to obtain the correct CO<sub>2</sub> level.
  - Refit the sample point cap (hand tighten only, do not over tighten) and refit the burner cover.

- Complete the oil boiler commissioning checklist at the back of this manual.

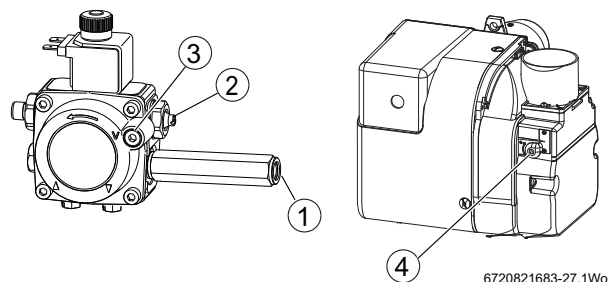


Fig. 75

- [1] Bleed and pressure gauge port blanking plug
- [2] Pressure adjustment
- [3] Vacuum gauge port
- [4] Air shutter setting

### Nominal boiler rating at normal operating temperature using Kerosene (Class C2)

Nozzle	Oil pump pressure bar	psi	Fuel flow rate Kg/h	l/h	Approx flue gas temp. °C	%CO <sub>2</sub>	Combustion head settings mm	Approx. air setting	Input (appliance) kW	Output (appliance) kW	Air damper disc setting	Flue damper required	Burner head
<b>Greenstar Heatslave II 12/18 model</b>													
0.40 x 80° EH	8.5	123	1.12	1.38	67	12.0	10.5	2.3	13.2	13.0	A	Yes	BX & recirculation tube
0.40 x 80° EH	10.0	145	1.30	1.60	70	11.5	11	1.75	15.3	15	B	Yes	BX & recirculation tube
0.50 x 80° EH	10.0	145	1.54	1.90	80	12.0	11.5	2.5	18.3	18.0	C	Yes	BX & recirculation tube
<b>Greenstar Heatslave II 18/25 model</b>													
0.50 x 80° EH	10.0	145	1.54	1.90	76	12.5	12.5	1.5	18.3	18.0	N/A	Yes	BX
0.60 x 60° EH	8.8	128	1.84	2.28	81	12.5	14	3.25	21.9	21.5	N/A	Yes	BX
0.65 x 80° EH	9.5	138	2.15	2.66	90	12.5	15	3.25	25.5	25.0	N/A	Yes	BX
<b>Greenstar Heatslave II 25/32 model</b>													
0.65 x 80° EH	9.8	142	2.15	2.66	79	11.5	19	3.5	25.5	25.0	N/A	No	BX
0.75 x 80° EH	10.3	150	2.46	3.04	84	12.0	19	4.25	29.1	28.5	N/A	No	BX
0.85 x 80° EH	10.0	145	2.78	3.44	85	12.5	19	4.75	32.7	32.0	N/A	Yes <sup>1)</sup>	BX

Table 11 Combustion settings

1) Internal boilers with flues less than 4 metres

## 6.4 Water treatment



### NOTICE:

- ▶ Artificially softened water must not be used to fill the central heating system.

Ensure that the system has been cleaned. Refer to section 4.1.2 of these instructions.

### Flushing (Central Heating)

- ▶ Ensure the appliance is switched off.
- ▶ Open all drain cocks and drain the system while the appliance is hot.
- ▶ Close drain cocks and add a suitable flushing agent at the correct strength for the system condition in accordance with the manufacturer's instructions.
- ▶ Run the appliance/system at normal operating temperature for the time stated by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system to remove the flushing agent and debris.

### Inhibitor (Central Heating)

- ▶ Check drain cocks are closed and all radiator valves are open before adding a suitable inhibitor that is compatible with aluminium, or combined inhibitor/anti-freeze if the system is exposed to freezing conditions, to the heating system water in accordance with the manufacturer's instructions.



The pH value of the system water must be between 6.5 and 8 or the appliance warranty will be invalidated.

- ▶ Fill system via a WRAS approved filling loop to between 1 and 1.5 bar.
- ▶ Vent all radiators; tighten vents when complete.
- ▶ Re-pressurise, if necessary, to between 1 and 1.5 bar.
- ▶ Set all controls to maximum.
- ▶ Record the date when the inhibitor was added to the system in the Boiler commissioning checklist and in the guarantee registration.



### NOTICE:

- ▶ The concentration of inhibitor in the system should be checked every 12 months or sooner if system content is lost.
- ▶ In cases where all attempts to find a micro leak have failed, Worcester, Bosch Group supports the use of Fernox F4 leak sealer.

### Water treatment products

Suitable water treatment products can be obtained from the following manufacturers:

ADEY	01242 546717 or <a href="http://www.adey.com">www.adey.com</a>
FERNOX	0870 601 5000 or <a href="http://www.fernox.com">www.fernox.com</a>
SENTINEL	0800 389 4670 or <a href="http://www.sentinel-solutions.net">www.sentinel-solutions.net</a>

### Appliance Drain Points

- ▶ The appliance can be drained via the primary heat exchanger point [4]:
  - There is an additional drain point on the secondary heat exchanger [1] with drain tube [2].
  - The heat bank also has a drain point [3]

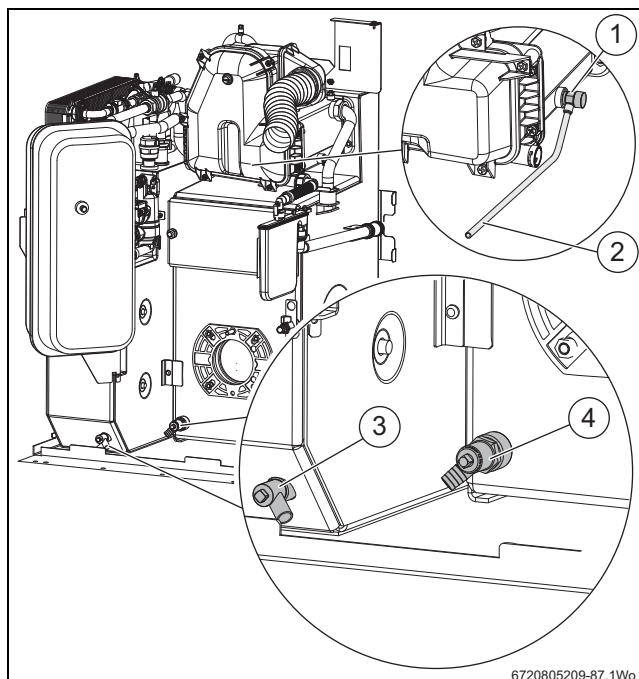


Fig. 76 Appliance drains points

### Appliance manual vent points

- ▶ The appliance can be manually vented via:
  - The two vent points at the top of the secondary heat exchanger. Only one may be in use, the other may be obscured by side fluing.
  - A vent point on the primary flow from the primary heat exchanger.
- ▶ Use a radiator key or suitable screwdriver to open the vent point.

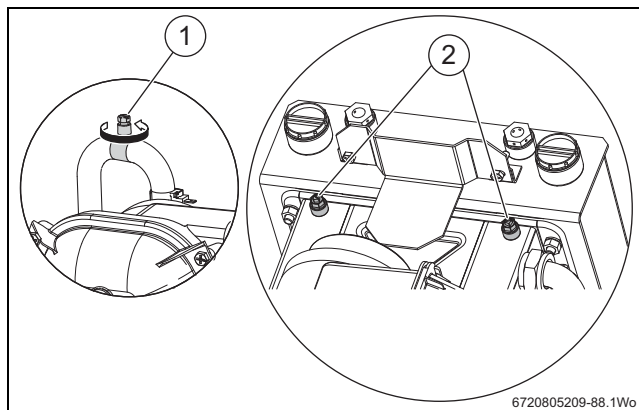


Fig. 77 Appliance manual vent points



## 6.5 Finishing commissioning - Appliance

Refer to figure 78

1. Rotate the control box [A] towards you [B].  
Slide back into position [C].
2. Locate the bottom edge of the front panel [D] onto the supporting ledge off the baseplate [E] and secure in place with screws [F].
3. Locate the top panel [G] onto the brackets at the rear of the boiler [H] and locate the ball stud connections [J] and press down to secure.

**Always apply pressure at the edges of the boiler panels when securing to avoid accidental damage.**

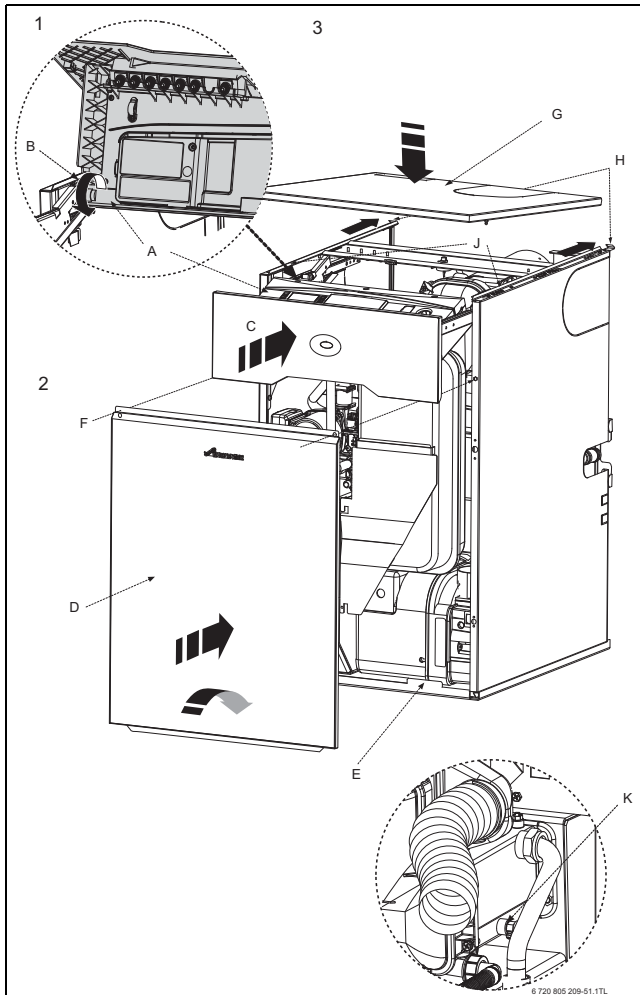


Fig. 78

### Handover

- ▶ Complete the Guarantee Registration Card, Combustion Record (at the rear of this manual) and CD11 or an equivalent commissioning form.
- ▶ Set up the controls and show the user how to operate all the controls shown in the User Guide and all system controls.
- ▶ Where applicable, instruct the customer how to re-pressurise the system.
- ▶ If the appliance is unused and exposed to freezing conditions, shut off all the mains supplies and drain the system and boiler.



Release drain point [K] to drain the secondary heat exchanger.

### 6.5.1 Appliance guarantee

This appliance has a guarantee against faulty materials or workmanship for a period from the date of installation subject to the following terms and conditions:

- During the period of this guarantee any appliance components that are proven to be faulty or defective in manufacture will be exchanged or repaired free of charge by Bosch Thermotechnology Ltd.
- The householder may be asked to prove the date of installation, that the appliance was correctly commissioned and, where appropriate, the first year's service has been carried out to the satisfaction of Bosch Thermotechnology Ltd., when requested. These should be documented as a part of the Boiler commissioning Checklist.
- The appliance has been used only for the normal domestic purposes for which it was designed.

This guarantee does not affect your statutory rights.

#### Guarantee registration

Your Greenstar appliance carries a guarantee against faulty material or manufacture subject to Terms and Conditions.

Guarantee Registration can be completed:

- On-line
  - You can register on our website:  
[www.worcester-bosch.co.uk/guarantee](http://www.worcester-bosch.co.uk/guarantee)
- By phone
  - You can register by ringing 0330 123 2552
- By post
  - Please send your completed form to:  
Worcester, Bosch Group, Cotswold Way, Warndon, Worcester, WR4 9SW.

To read the full Terms & Conditions please visit us on-line at [www.worcester-bosch.co.uk/guarantee](http://www.worcester-bosch.co.uk/guarantee).

Your statutory rights are not affected by the manufacturer's guarantee.

## 7 Service and Spares

### 7.1 Inspection and service



**CAUTION:** Isolate the water, electricity and oil mains supplies before starting any work and observe all relevant safety precautions.

#### Routine servicing

To maintain efficient boiler operation, the following should be carried out at least once a year.

- ▶ Carry out a pre-service check and note any operational faults:

#### Pre-service checks

1. Lift the top panel [1] upwards to disengage the ball stud connections [2] and pull forward to remove.
  2. Pull the control box [3] all the way forwards.
    - ▶ Depress the two levers [4], one on either side, to release the control box and pull fully forward and swivel control box upwards.
  3. Remove securing screws [5] from front panel [6].
    - ▶ Lift panel [6] upwards off the supporting ledge [7] and store safely away from the working area.
- Operate the appliance and system and note any faults which may need to be corrected during the service.
- ▶ Switch off and electrically isolate the boiler.
4. Unplug burner lead [8] from control box Lead [9].
  5. Swivel the expansion vessel [10] on its support bracket out of the boiler taking care not to snag any electrical cables or kink the flexible hose.
  6. Loosen air duct pipe clip [11] and disconnect the air duct pipe.
  7. Unscrew burner retaining nut [12] and remove the burner [13] and store safely away from the boiler.

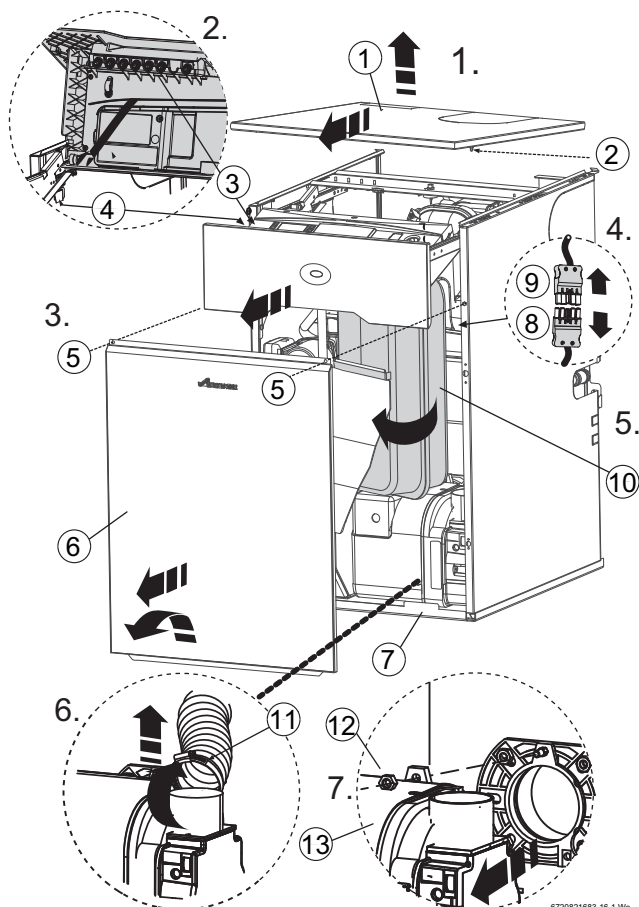


Fig. 79

See the following instructions for detail of some of the service requirements listed below:

- ▶ Check and clean the burner.
- ▶ Replace burner nozzle and flexible oil hose/s.
- ▶ Check and clean the baffle retainers.
- ▶ Check and clean the baffles.
- ▶ Check that the flue damper is correctly fitted, if required.
- ▶ Check and clean the heat exchangers surfaces.
- ▶ Check the combustion chamber access door insulation board.
- ▶ Check that the flue system is unobstructed and clean as necessary.
- ▶ Clean or replace all oil filters.
- ▶ Check that the condensate system is not obstructed, clean and refill the condensate trap.

#### Clean the burner

- ▶ Remove the two hex head screws [1] and remove the air intake cover [2] and clear any debris from the air intake and air damper.
- ▶ Remove the four screws [3] and remove the suction inlet [4] to gain access to the fan.
- ▶ Clean both sides of the fan and suction inlet cover with a brush and compressed air.
- ▶ Check the condition of the gaskets between these parts and replace if necessary.
- ▶ Note the position of the air damper adjustment and check the air damper moves freely.
- ▶ Check that the fan rotates freely.
- ▶ Reassemble the components.

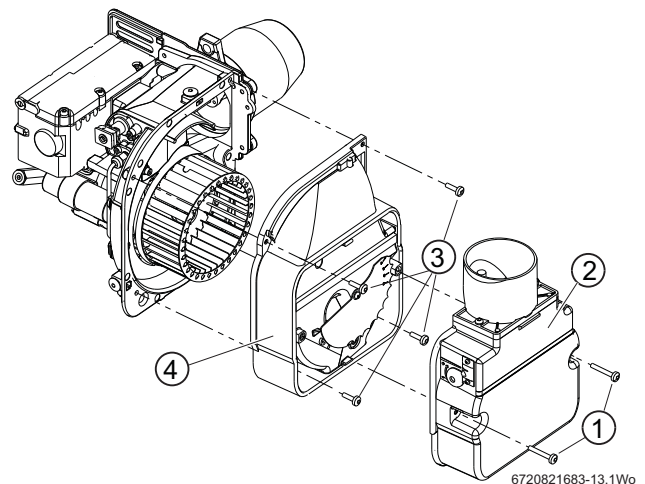


Fig. 80 Fan access

#### Oil burner nozzle

Before removing or fitting a new nozzle refer to figure 81:

- ▶ Remove the screws [1] from the blast tube [2] and remove the blast tube



There is a recirculation tube fitted to the 12/18 models, this does not need to be removed from the blast tube

- ▶ Unplug the HT leads [4]
- ▶ Loosen the screw [3] securing the break plate [5] and slide the unit off
- ▶ Use a suitable spanner to stop the nozzle body turning
- ▶ Remove the nozzle [8] and secure the new nozzle, hand tight
- ▶ Tighten the nozzle utilising the two spanners used during removal, do not overtighten
- ▶ Refit the break plate ensuring that the photocell and the break plate [5] are aligned and secure with the screw [3] into the seating provided [7]
- ▶ Reconnect the HT leads [4]

- ▶ Refit the blast tube [2] and secure with the screws [1]

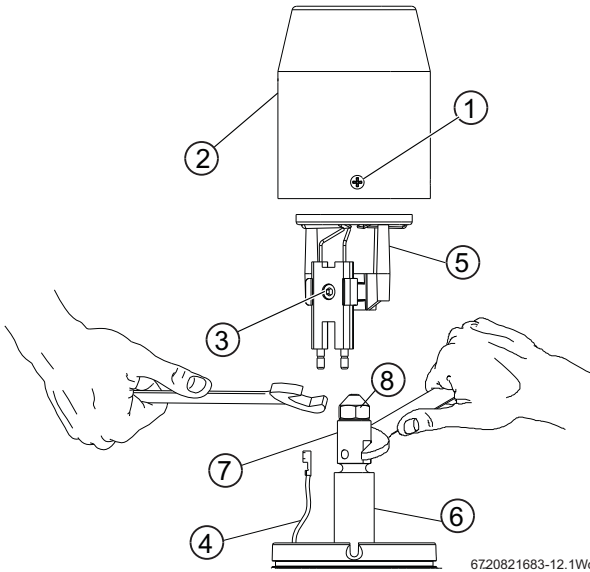


Fig. 81 Nozzle access

Refer to figure 39:

- ▶ Check that the nozzle [1] and the electrode [2] alignment settings are correct.
- ▶ Ensure that the nozzle [1] is aligned centrally within the combustion head [3].
- ▶ Inspect for any visible defects.

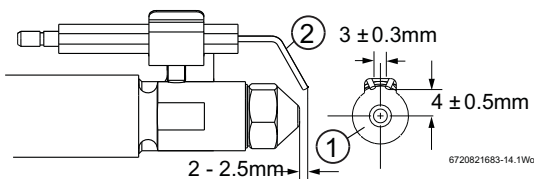


Fig. 82 Nozzle and electrode alignment

### Pump filter

- ▶ Refer to figure 83 and remove the oil pump internal filter, clean in Kerosene and reassemble.

The internal filter is accessed by removing screws [1] and the oil pump cover [2].

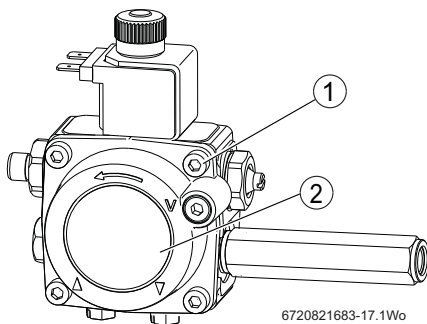


Fig. 83 Pump filter access

- ▶ Replace the standard flexible oil line/s at every annual service to prevent the possibility of leakage due to ageing.
- ▶ Reassemble the burner components.
- ▶ Check the O-ring seal located around the combustion head and replace if necessary. This seal must be in good condition, seal failure will cause flue gases to escape into the room.

### External oil filter

- ▶ Remove the paper element from the external oil filter and replace it. If the filter contains a washable element, thoroughly clean in Kerosene and reassemble into the filter.

### Clean the boiler - Manifold access

Refer to figures 84.

- ▶ Release screws [1] to remove the flue manifold access cover [2] and clear any debris.
- ▶ Check the flue system and clean if necessary.
- ▶ Remove the baffle retainer [3] and baffles [4] from the secondary heat exchanger.
- ▶ Check and clean the secondary heat exchanger surfaces.



Do not use wire brushes or cleaning agents to clean the stainless steel secondary heat exchanger components.

- ▶ Check the condensate route [5] is clear.
- ▶ The condensate trap [7] should be removed and cleaned.
- ▶ Release the pipe locking tab [8] and disconnect the flexible pipe [9] from the top of the trap and move the flexible pipe up away from the trap.
- ▶ Release the trap locking tab [10] and move the trap up and back to remove from its mountings.
- ▶ Clean the trap by flushing with water.
- ▶ Check the O ring seals and replace if necessary, grease the seals with a solvent free grease.
- ▶ Refit the trap making sure that the locking tabs are locked in place.
- ▶ Pour 500 ml of water into drain [5] to refill the condensate trap and check that the condensate discharge pipe is discharging.
- ▶ Clean the secondary heat exchanger baffles [4] if necessary and refit correctly.
- ▶ Refit the baffle retainer [3].
- ▶ Check and clean the flue damper, ensure that it is correctly fitted
- ▶ Check the seal on the manifold access cover [6] and replace if necessary.
- ▶ Refit the flue manifold access cover [2] and secure with screws [1].

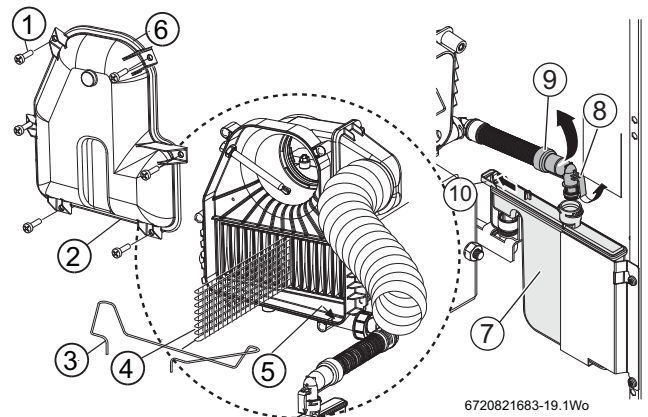


Fig. 84 Secondary heat exchanger and condensate trap detail

### Combustion chamber

Refer to figure 85

- ▶ Remove the retaining nuts and washers [A].
- ▶ Remove combustion chamber/baffle access door [B].
- ▶ Check the fibreglass rope seal on the combustion chamber/baffle access door [B] and replace if necessary.
- ▶ Remove the one piece baffle set [C], clean and check the condition of the baffles. Replace baffle set if considered to be badly corroded/degraded.
- ▶ Thoroughly clean all of the heat exchanger surfaces using a suitable brush and clear all loose debris from the combustion chamber.
- ▶ Check the condition of the combustion chamber/baffle access door insulation. If the insulation is damaged the door assembly must be replaced.

- ▶ Refit the one piece baffle set [C] making sure it is in the right location [D], correctly resting on the baffle rests [F] on either side of the combustion chamber and pushed securely into place.
- ▶ Refit combustion chamber door [B].

**NOTICE:**  
Secure with nuts and washers [A] and tighten until the chamber door is firmly secured, do not over tighten the nuts.

**Fire valve**

- ▶ Check that the oil supply pipe has a fire valve fitted externally to the building with the fire valve sensor located within the appliance case. A fire valve sensor clip [E] is provided for this purpose.

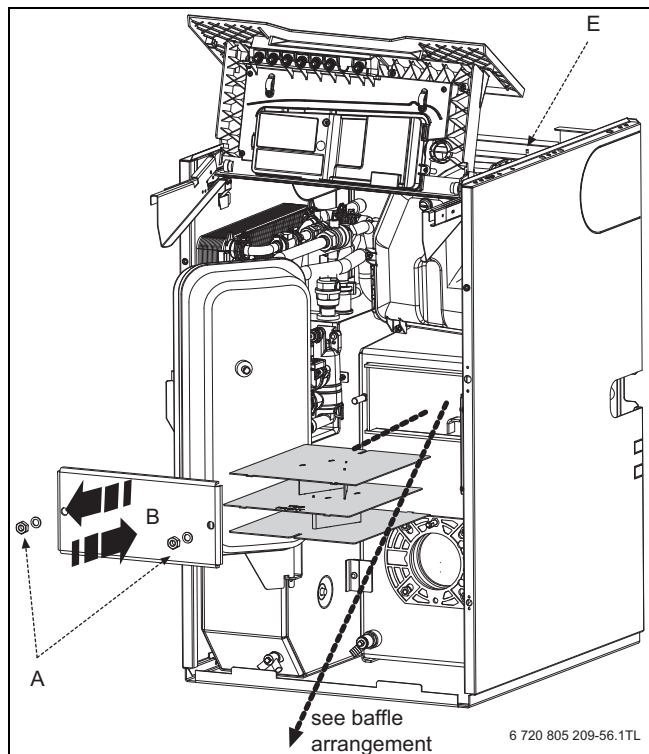


Fig. 85

**i** 18/25 and 25/32 baffle are identified with tabs on the front and rear edges

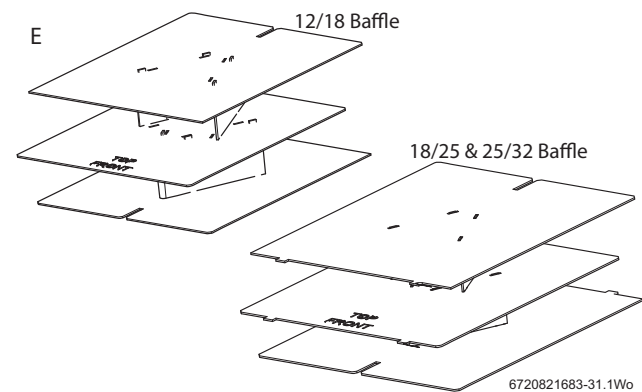


Fig. 86 Baffle arrangement

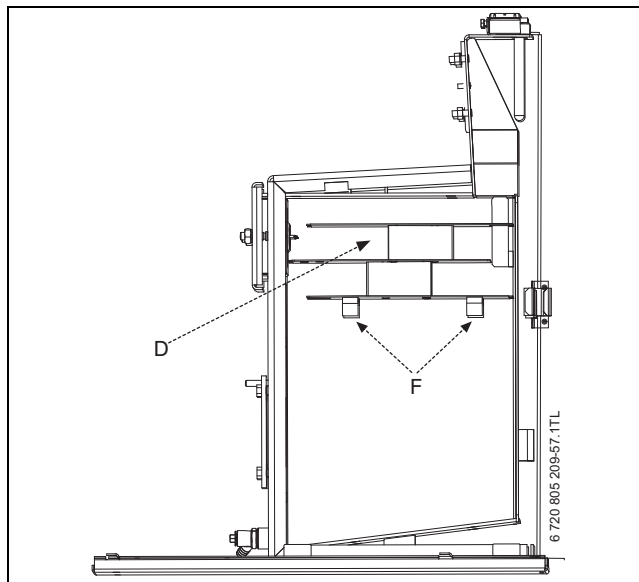


Fig. 87 Baffle location

**Re-commission the burner**

**WARNING:** Flue gas leakage.  
The seal between the burner and the mounting flange must form a gas tight seal to prevent leakage of potentially dangerous gases from the combustion chamber.

- ▶ Unless the burner is level when pushing the burner into the flange the O ring may not seat properly allowing flue gas to escape!
- ▶ Always check that the O-ring seal (Fig. 88 item A) is in good condition before fitting the burner. Replace the O-ring seal if defective.

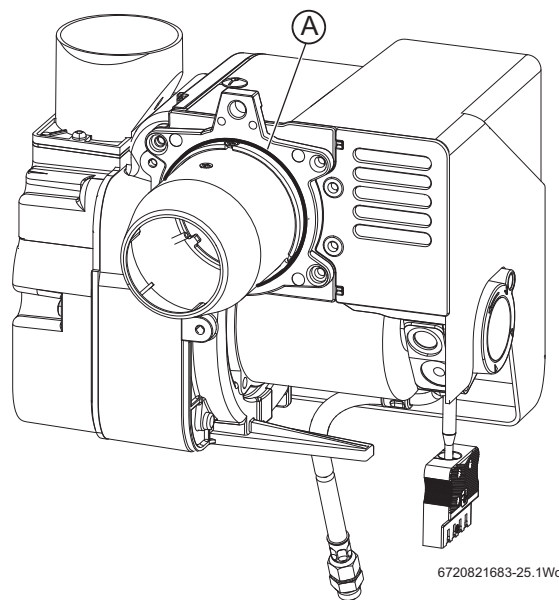


Fig. 88 18/25 and 25/32 Burner O-ring seal shown

Refer to figure 89:

1. Align burner combustion head into the boiler collar.
  - ▶ Locate the burner retainer [A] over the threaded lug on the collar [B], ensure that the burner is level and push the burner firmly onto the flange ensuring the O-ring seal is fully engaged. Support the burner in position and secure with the retaining nut [C]. Tighten sufficiently to hold the burner but do not over tighten.

- ▶ Check that the burner is seated correctly on its mounting flange and that the oil hose/s are routed correctly as shown in Fig. 36 on page 26 and not trapped in front of or underneath the burner.
- 1. Refit the flexible air duct and secure with clip [D].
- 2. Swivel the expansion vessel [F] back into position taking care not to kink the flexible hose or snag electric cables.
- 3. Plug the burner lead [G] into the connector [H].
- ▶ Connect an oil pressure gauge to the oil pump, run the burner and check the oil pressure is correct for the required boiler output. Check that the smoke reading is between 0 and 1, if the smoke reading is above one check the air setting. If the air setting is correct check that the burner has been reassembled correctly. Allow the boiler to warm up then check the combustion settings are correct as indicated in table 11, adjust the CO<sub>2</sub> if necessary using the air shutter. When the combustion is correct turn off the boiler, remove the pressure gauge and refit the blanking plug and plastic cover.

**Refit control box**

- 5. Rotate the box towards you [J].
- ▶ Slide control box drawer back into position.

**Refit panels**

- 6. Locate bottom edge of panel [K] onto the bottom supporting ledge [L] on the boiler.
- ▶ Secure panel [K] with screws [M].
- 7. Locate top panel [N] onto brackets at rear if the side panels [O]. Locate ball stud connections [P] and press down to secure.

**After service handover**

- ▶ Make a note of the date of any water treatment.
- ▶ Set the controls back to the users requirements.
- ▶ Complete the service interval record at the back of this manual and a CD11 or an equivalent form.
- ▶ If the appliance is unused and exposed to freezing conditions; shut off all the mains supplies, isolate the boiler and drain the system and boiler, including the secondary heat exchanger.

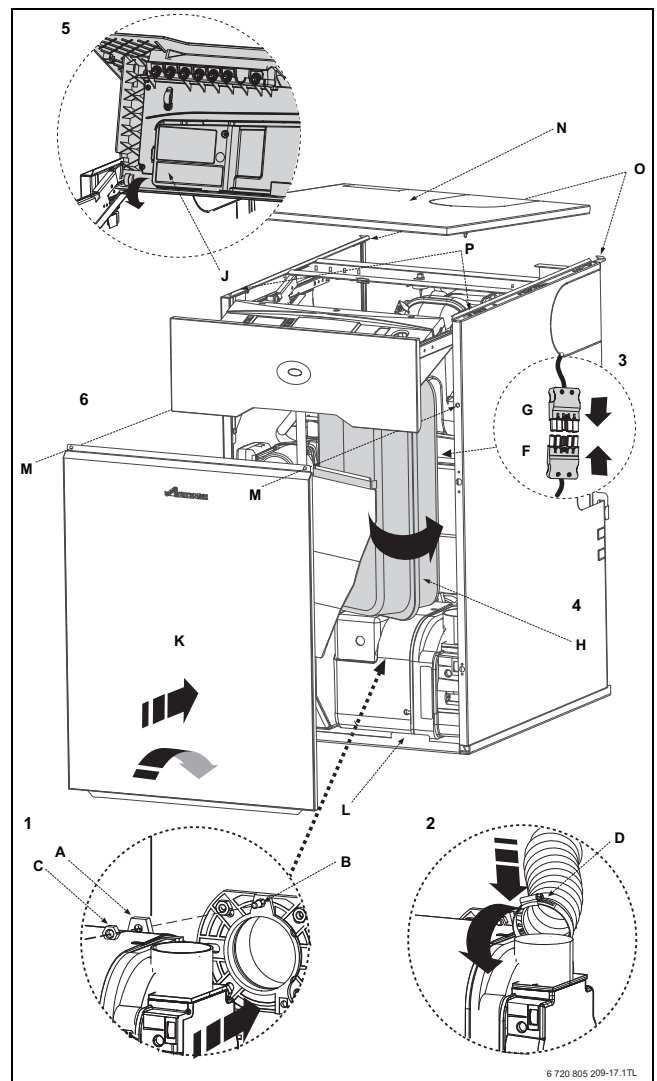


Fig. 89 Refitting components


**Spares**

For Worcester Bosch spares refer to the the website at [www.worcester-bosch.co.uk/spares](http://www.worcester-bosch.co.uk/spares)

## 8 Fault finding and diagnosis

### 8.1 Status cause codes

These cause codes are displayed during the normal operation of the boiler. They are not faults, they just give information on the current status of the boiler in real time.

 During normal operation various status codes can be displayed by pressing the service button.

The first screen of the information menu displays the current status code, this will change as the boiler runs through the various modes and sequences.

Cause code		
200	CH active	The Central Heating system is being heated.
201	DHW active	The Domestic Hot Water is being heated/tank is being heated.
202	CH Anti rapid-cycle mode	Time delay to prevent rapid-cycling of the boiler on the room thermostat.
203	System stand-by	The boiler has no CH or DHW demands.
270	Power up mode	The boiler is ON, warming up and running self check routines. This lasts approximately 35 seconds.
358	Three way valve anti-seize	Anti-seize operation. If the diverter valve has not moved in 24 hours, the valve is operated to prevent seizing, duration approximately 10 seconds.

Table 12

### 8.2 Information menu





#### Selecting the Information Menu

The Information Menu is a “read only” menu. Information about the boiler is displayed here, some of the values are updated in real time to give the current status of the boiler.

All menus time-out after 2 minutes and the display returns to the normal operation display, the display backlight turns off after another 30 seconds and goes into stand-by mode.

Double up or down arrows indicate that the menu can only be scrolled up or down, an up arrow combination indicates position in the menu where options can be scrolled either up or down.

#### To enter the Information Menu

- Press the  button to enter the Information Menu.
  - A 3 figure boiler status code will be displayed alongside the Information Menu number. Refer to page 36 for a description of the boiler status codes.
- Use the  and  arrow buttons to scroll through the menu items.
- Press the  button again to exit the Information Menu.

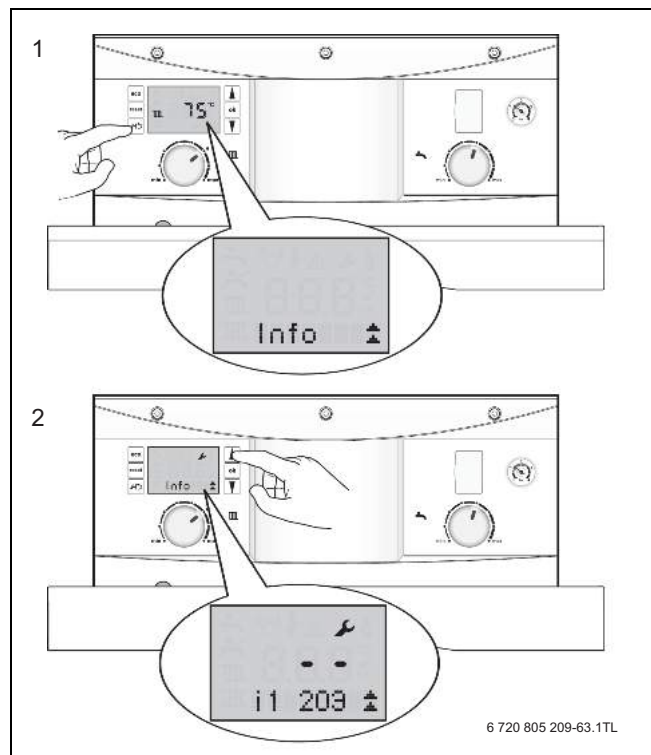


Fig. 90

#### Information Menu listing

i1	Current status	Every operation and mode of the boiler has a related boiler status code. The boiler status code is displayed on the screen as a three figure number.
i2	Last error	This can be viewed during normal operation. Displays the last diagnostic code with boiler status code.
i3	Maximum CH output	The maximum possible CH output is displayed in kW.
i4	Maximum DHW output	The maximum possible DHW output is displayed in kW.
i6	DHW flow rate	The screen displays the current DHW flow rate in 0.1 l/m units.
i7	CH flow temperature set point	This is the temperature set point for the primary flow from the main heat exchanger. This will be zero during CH demand. Shows the heating control knob set point unless weather compensation is activated when it is the calculated set point.
i9	Flow temperature	This is the flow temperature from the primary heat exchanger displayed in real time (rounded to 0.5°C units).
i10	Maximal temperature	This is the current temperature from the maximum safety sensor displayed in real time (rounded to 0.5°C units).
i11	DHW flow temperature	Current DHW flow temperature displayed in real time (rounded to 0.5°C units).
i12	DHW temperature set point	This is the thermal store set point temperature, selected via the Hot Water control knob on the fascia.
i13	Thermal store current temperature	This is the thermal store current temperature, displayed in real time (rounded to 0.5°C units).
i14	DCW inlet temperature	Current DCW inlet temperature, displayed in real time (rounded to 0.5°C units).

Table 13

i15	Out door temperature	This is the out door temperature displayed in real time (rounded to 0.5°C units). Only available if a Weather Compensation sensor has been fitted and Weather Compensation is active.
i19	Time inputs	This indicates the status of the optional fascia mounted controls: 24 = CH off, DHW off 25 = CH off, DHW on 26 = CH on, DHW off 27 = CH on, DHW on
i20	Software version	Firmware version of the main control board..
i21	Software version	Firmware version of the fascia control display board
i22	Heat Control Module (HCM) number	HCM last 3 digits displayed: 391 = 12/18kW 390 = 18/25kW 301 = 25/32kW
i23	Heat Control Module (HCM) version number	For example "4"

Table 13

### 8.3 Service menu

#### Selecting Service Menus

- Press and hold the and buttons together for 1 second, the display will show Menu 1.
  - Double up or down arrows indicate that the menu can only be scrolled up or down, an up and down arrow combination indicates positions in the menu where options can be scrolled either up or down.

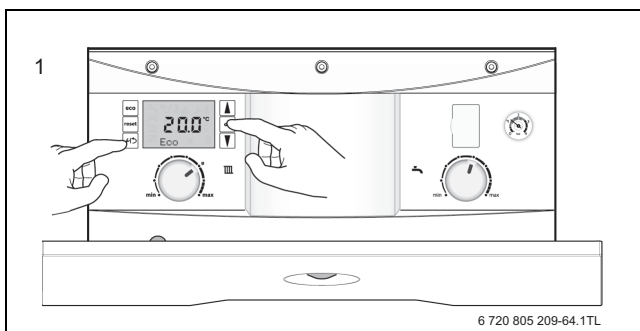


Fig. 91

- Scroll up and down through the menus with the and arrow buttons on the right hand side of the display.

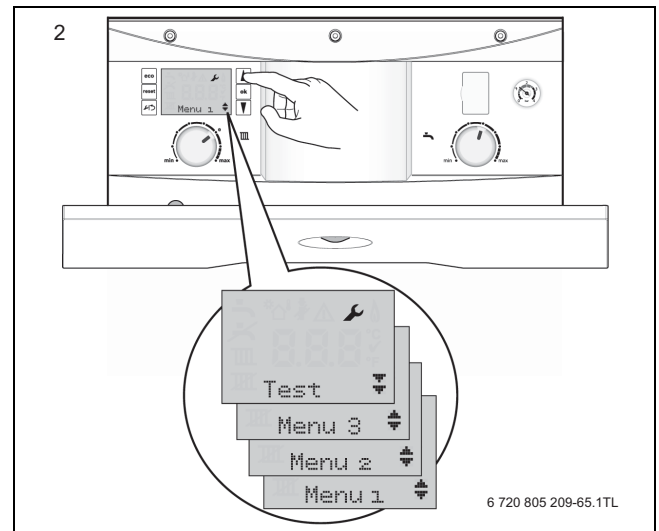


Fig. 92

#### Menu 1 system parameters

Initially Menu 1 will be displayed.

<b>1.W1</b>	Weather Compensation Functionality	Enable.
<b>1.W2</b>	Weather Compensation Functionality	Point A (@-10°C)
<b>1.W3</b>	Weather Compensation Functionality	Point B(@+20°C)
<b>1.W4</b>	Weather Compensation Functionality	System frost protection enable.

#### Menu 2 boiler parameters

- Select Menu 2 via the arrow buttons.

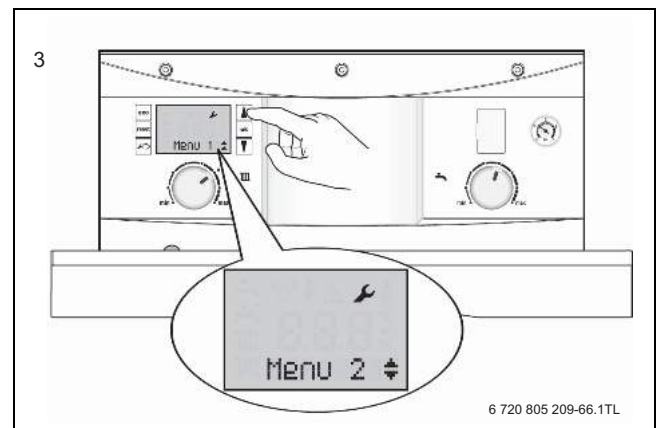


Fig. 93

- Press and hold the button for 1 second to enter Menu 2.
  - The menu lists the boiler parameters, that can be adjusted in this menu.
  - To modify the setting, select the desired menu option and press the button, the option will flash.
  - Adjust the parameter using the arrow buttons and press the button to confirm.
    - A will display for 3 seconds to confirm the update of the new value.

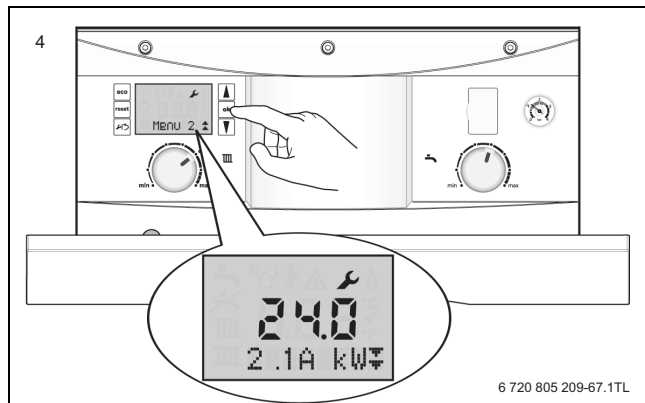


Fig. 94

<b>2.7A</b>	Demand/fault LED (blue light) activation	0 = The blue light will only operate as a flashing fault alert.
		1 = The blue light will operate as a boiler operation and fault alert. This is set to 1 by default.

**i** Menus 3 and Test are empty and are not used on this appliance.

## 8.4 Factory reset and fault codes

### 8.4.1 Factory reset

To reset changes made in Menu 2 back to the factory default setting:

**i** Any changes made to Menu 1 are not reset by these actions.

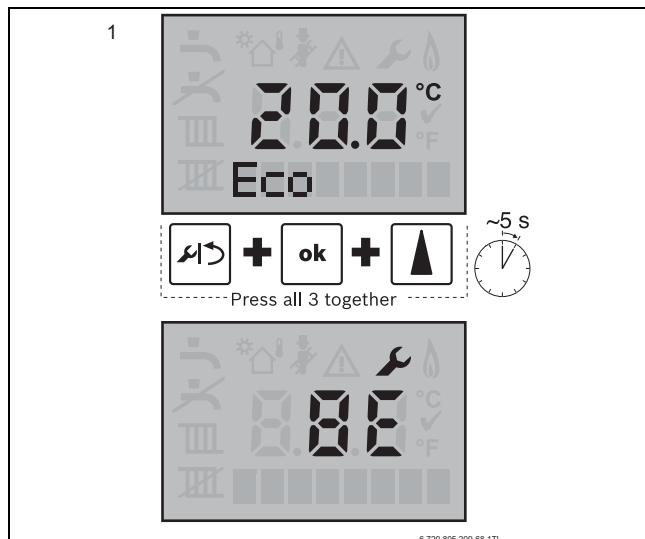


Fig. 95

1. Press and hold the and buttons for at least 5 seconds. The screen will then display code BE with the spanner symbol.

2. Press the button and “reset” will be displayed with the tick symbol for 3 seconds. After 3 seconds the display will revert to the normal operation screen.

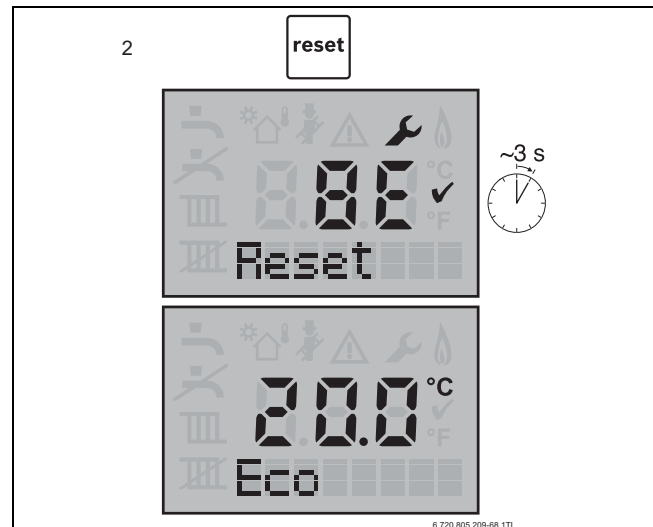


Fig. 96

### 8.4.2 Locking or Blocking fault conditions

Should a fault develop with this boiler (or the system), the boiler will enter into a Locking or Blocking condition.

#### Locking condition

- The boiler display will flash a warning triangle.
- A 3 digit **cause code** will flash on the display during a Locking error.
- An alpha numeric **fault code** will be displayed indicating the fault group.
- The operation and fault indicator will flash on the front of the appliance.

Manual intervention is required following clearance of the fault.

- ▶ Press the reset button on the boiler fascia.

#### Blocking condition

- The boiler will stop operating and no fault code will be displayed.
- An alpha numeric **fault code** is accessed in the info menu by pressing the spanner/return button.

**i** Unlike a Locking error, during a Blocking error (or normal operating status), a fault code is not automatically displayed.

- A 3 digit cause code is also accessed in the info menu by pressing the spanner/return button.
- The condition will clear automatically when the associated fault clears e.g. waiting for an area of the boiler to cool down.
- In some cases a Blocking error has a defined time duration prior to changing to a Locking condition.



### 8.4.3 Cause and fault codes

Cause code	Fault code	Description	Reset type	Blocking	Locking	Possible cause/solution
210	E9	Maximum temperature thermostat or air pressure switch activated	Reset		X	Flue gas or tank thermostat overheat. Reset the overheat thermostat or air pressure switch before resetting appliance.
212	No code	Safety or flow temperature too high		X		Air lock or reduced water content.
218	E5	Flow temperature too high	Reset		X	Primary sensor overheated, wait 30 minutes and try a reset.
219	E9	Safety temperature too high	Reset		X	The main heat exchanger has overheated. Maximum temperature 105°C, wait 30 minutes and try a reset.
220	E9	Safety sensor short circuit	Reset		X	Maximum temperature sensor on the main heat exchanger has failed.
221	E9	Safety sensor open circuit	Reset		X	Maximum temperature sensor on the main heat exchanger has not been recognised.
222	E2	Flow sensor short circuit	Reset		X	Flow sensor shorted or damaged, reconnect or replace as required.
223	E2	Flow sensor open circuit	Reset		X	Flow sensor disconnected or damaged, reconnect or replace as required.
233	E2	HCM (Heat Control Module)	Reset		X	HCM Code plug missing or defective. Refer to table 13, i22 and i23 to determine HCM number fitted
237	F0	Software relay error	Reset		X	Resistors between plug X4 pins 3 & 5 disconnected/>150k Ω or water in the burner control box
238	F0	Software relay error	Reset		X	Resistors between plug X4 pins 3 & 5 disconnected/>150k Ω or water in the burner control box
239	F0	Watchdog relay error	Reset		X	If the error persists, change the control board
259	F0	A/D reference relay error	Reset		X	If the error persists, change the control board
263	F0	Appliance powered off with locking fault present	Reset		X	Locking fault still present when powered off/on, press the reset button to clear.
271	D4	Temperature difference between flow and safety sensors exceeds limit		X		The temperature of the primary flow and the safety sensor on the main heat exchanger should be within 15°C of each other. Check the flow sensor is seated properly on the flow pipe.
276	E9	Flow temperature exceeds 95°C		X		Primary overheat - boiler waits for temperature to reduce, wait approximately 30 minutes and try a reset.
277	E9	Safety temperature exceeds 95°C		X		Main heat exchanger safety sensor overheat - boiler waits for temperature to reduce, approximately 30 minutes.
278	F0	Sensor test error	Reset		X	On power up, all safety sensors are checked. Check has failed.
279	F0	A/D converter error	Reset		X	If the error persists, change the control board
290	F0	A/D converter reference error	Reset		X	If the error persists, change the control board
332	E5	Primary flow has exceeded 105°C	Reset		X	Primary sensor overheated.
359	No Code	DHW outlet or storage tank exceeds 90°C		X		Pump & burner are blocked until temperature drops to <89°C. wait approximately 30 minutes for temperature to drop.
360	9A	Incorrect HCM for boiler variant		X		Replace with the correct HCM. Refer to table 13, i22 and i23 to determine HCM number fitted and select correct HCM number from list
380	No code	Inlet DCW temperature higher than DHW outlet temperature		X		The output is blocked until the inlet temperature drops below the output temperature, wait for approximately 30 minutes.
808	A7	DHW sensor defective	Reset		X	Check and replace defect sensor as necessary
809	A0	Thermal store sensor defective	Reset		X	Check and replace defect sensor as necessary
855	9F	Burner lock out	Reset		X	Check the burner and fuel supply. Ensure the oil supply is free of contaminants.
856	9F	5 burner lockouts repeated resets	Turn boiler off/on		X	After Five 855 burner lock outs in one demand period, cause code 856 is displayed. After boiler off/on cause code 263 will be displayed, press the reset button to clear this fault. another 5 burner lock resets can be attempted.

Table 14 Cause and fault codes

H code	Displayed symbols	Cause
H29	Warning triangle and House symbol displayed on controller	Weather compensation activated but no weather sensor detected, refer to section 5.11 on page 32 for more information.
H27	Warning triangle symbol displayed on controller	DCW in sensor defect, (appliance operation not affected)

Table 15 H fault codes

8.5 DHW function chart

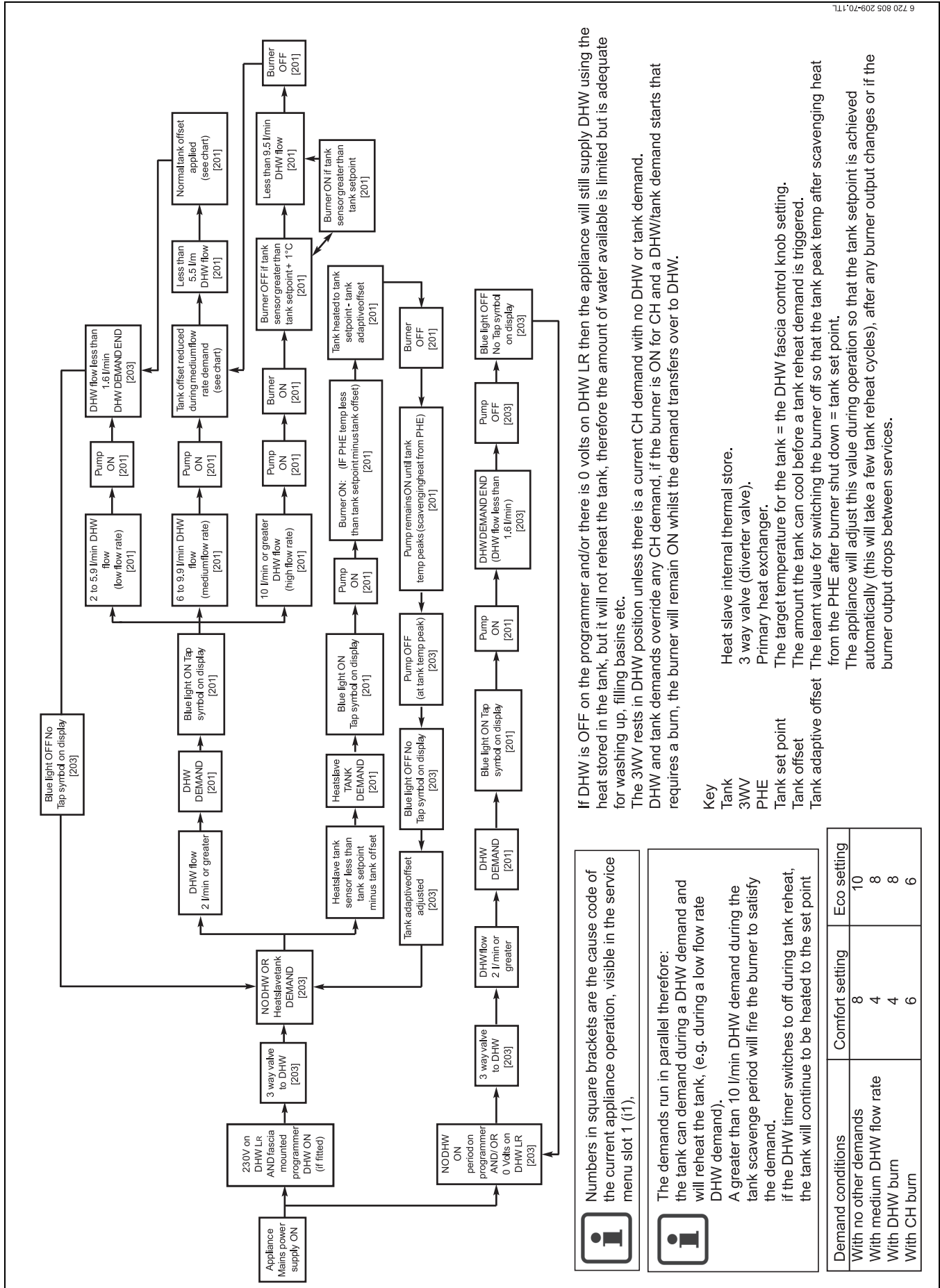


Fig. 97

**i** Numbers in square brackets are the cause code of the current appliance operation, visible in the service menu slot 1 (1),

**i** The demands run in parallel therefore: the tank can demand during a DHW demand and will reheat the tank, (e.g. during a low flow rate DHW demand). A greater than 10 l/min DHW demand during the tank scavange period will fire the burner to satisfy the demand. if the DHW timer switches to off during tank reheat, the tank will continue to be heated to the set point

If DHW is OFF on the programmer and/or there is 0 volts on DHW LR then the appliance will still supply DHW using the heat stored in the tank, but it will not reheat the tank, therefore the amount of water available is limited but is adequate for washing up, filling basins etc.

The 3WV rests in DHW position unless there is a current CH demand with no DHW or tank demand. DHW and tank demands override any CH demand, if the burner is ON for CH and a DHW/tank demand starts that requires a burn, the burner will remain ON whilst the demand transfers over to DHW.

9 720 805 209-70,111

**8.6 CH function chart**

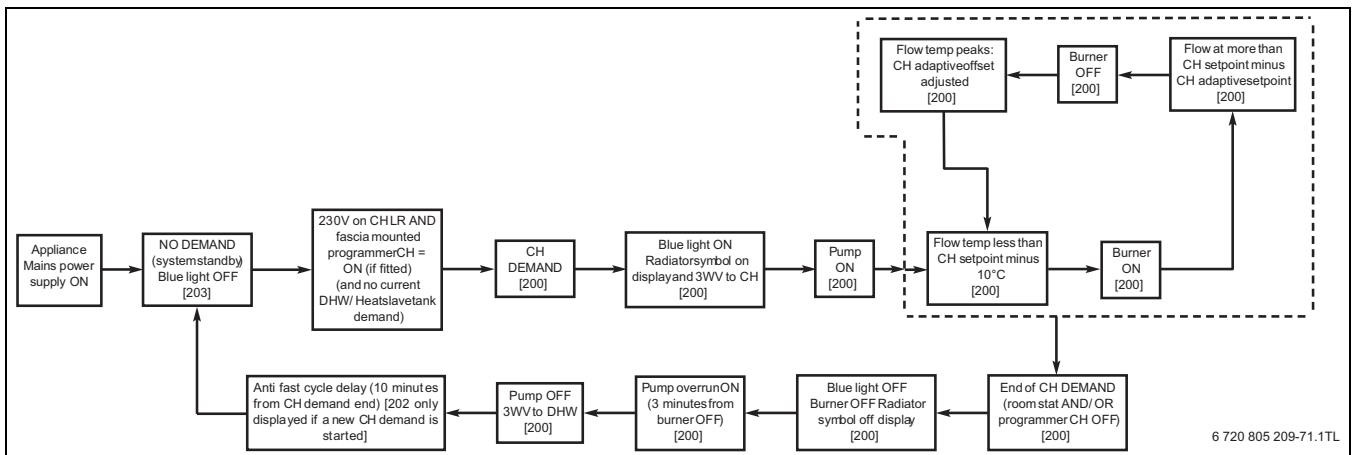


Fig. 98

**i** Numbers in square brackets are the cause code of the current appliance operation, visible in the service menu slot 1 (i1).

Key	
<b>3WV</b>	3 way valve (diverter valve).
<b>CH set point</b>	The target flow temperature set on the CH fascia control knob.
<b>CH adaptive offset</b>	The learnt offset temperature applied to the CH flow so that the peak flow temperature after burner OFF = CH set point.
<b>Anti fast cycle delay</b>	To stop the appliance short cycling if a room stat is intermittently calling or is poorly positioned, there is a 10 minute delay for CH demands timed from the last CH demand end.

### 8.7 Protection functions

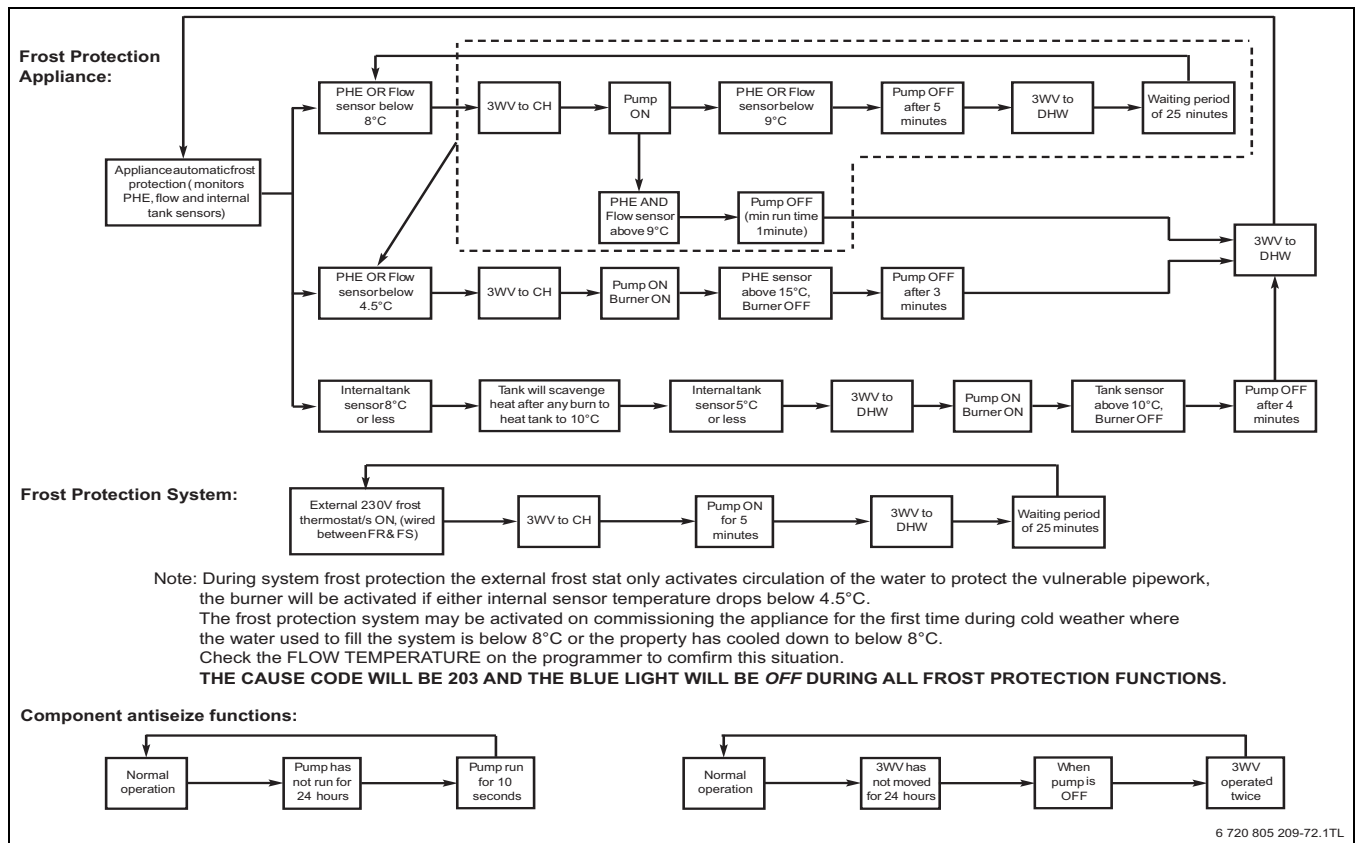


Fig. 99

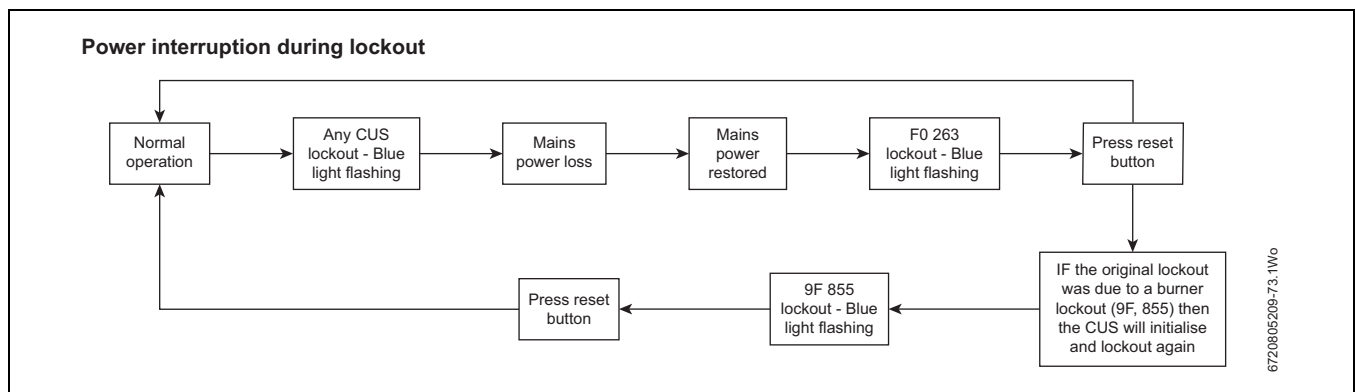
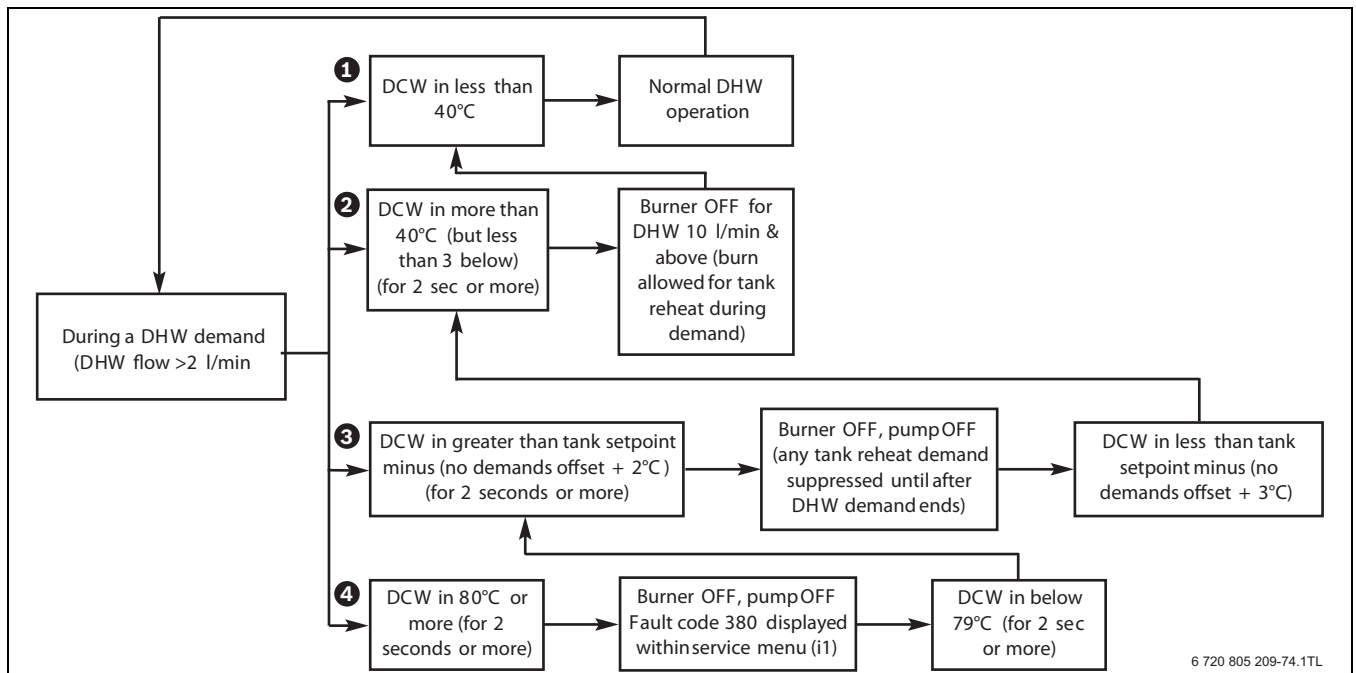


Fig. 100

Key	
PHE	Primary heat exchanger.
3WV	3 way valve (diverter valve).
FS	Appliance connection frost stat supply (230 V)
FR	Appliance connection frost stat return (230 V)

### 8.8 Solar compatibility



- [1] Normal operation: the tank will cool more slowly for the same DHW performance if the DCW is above normal DCW temperature, thus saving fuel.
- [2] Solar tank hot: the burner will not be required at high DHW flow rate and the tank will boost the solar heated water if the temperature drops.
- [3] Solar tank will satisfy the DHW requirements: therefore the appliance allows the water to pass straight through without taking any action apart from monitoring the temperatures. To utilise the solar panels to their maximum potential, the solar tank thermostat will need to be set high and the Heatslave II DHW setting low.
- [4] Solar tank overheat: DCW above solar tank limit, appliance will not operate pump or burner and fault code will be displayed in the service menu.

### 8.9 Burner diagnostics mode

Service/installation engineers only.

To access the Burner control box diagnostics or to use the burner reset button to reset the burner, the burner diagnostic mode must be activated as follows:

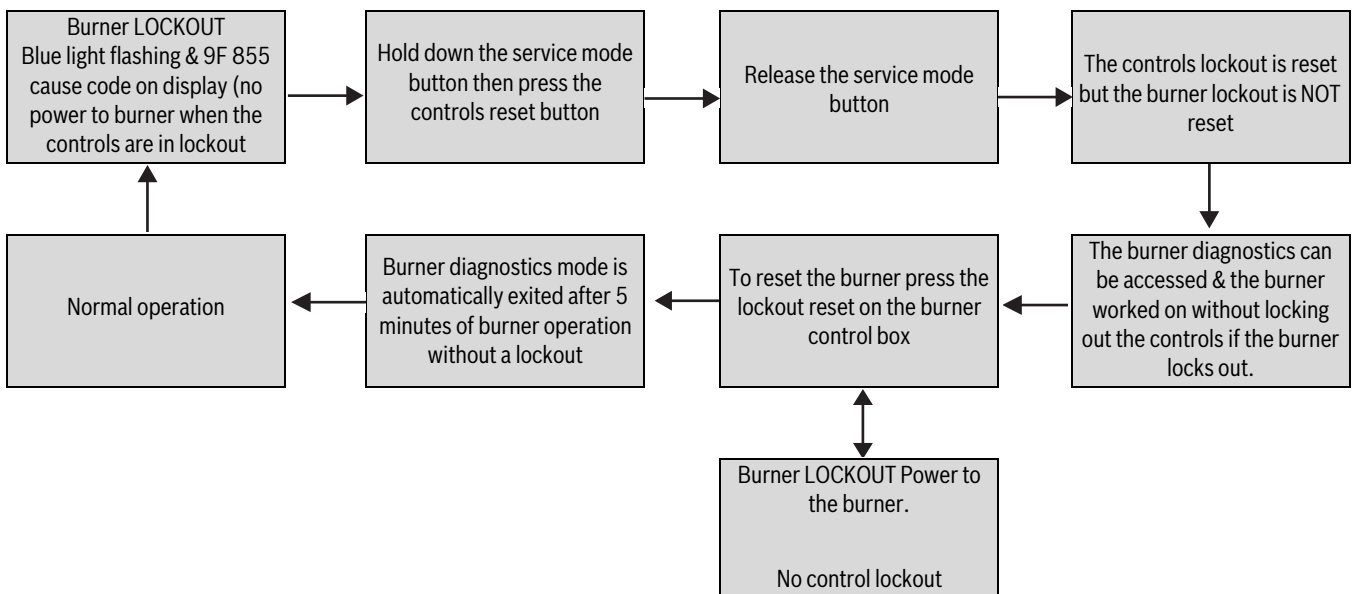


Table 16



The burner diagnostics mode can be manually exited at any time when the burner is locked out by holding down the service mode button whilst pressing the controls reset button.

**Fault code 9F 856:** If burner lockout is reset 5 times in one demand period using the fascia reset button the controls will lockout with a new code: 9F 856. This is to protect the burner components against over use of the reset and requires a power down of the appliance to reset. The burner control box also has this facility, if the reset button is operated 5 times the burner control box will not reset until the power has been interrupted to the burner.

## 8.10 Riello digital control boxes

### 8.10.1 Control box LED codes

Lockout types (burner in lockout)	
<b>RED steady ON</b> Lockout for no flame after safety time	[3]
<b>RED 0.5 seconds ON / RED 0.5 seconds OFF</b> Lock out for false flame signal	[5a]
<b>RED 0.2 seconds ON / RED 0.2 seconds OFF</b> Lock out for maximum number of flame loss re-lights	[9]
<b>RED 2.5 seconds ON / ORANGE 0.5 seconds ON</b> Lock out for fan motor failure	[3d]
<b>RED 2.5 seconds ON / GREEN 0.5 seconds ON</b> Lock out for oil valve circuit driver failure	[8c]
<b>ORANGE 0.5 seconds ON / GREEN 0.5 seconds ON</b> Lock out for EEPROM failure	Replace control box
<b>Red 0.5s ON / Red 2.5s OFF</b> Max pre-heat time exceeded (10 minutes)	[2]

Table 17

Anomaly types (Burner in stand-by)	
<b>Green 0.5 s ON / Green 2.5 s OFF</b> Pre-heating time	Fit pre-heat link
<b>Green 0.5s ON / RED 0.5s ON</b> Extraneous light	Lock out after 25s
<b>Orange steady ON</b> Abnormal frequency supply	When an anomaly appears during: ▶ pre-purge. the burner remains in pre-purge. ▶ after ignition, burner remains in operation. When anomalies disappear the burner re-starts
<b>Orange 0.2s ON / Green 0.2s ON</b> Control box internal error	
<b>Green 0.2s ON / Red 0.2s ON</b> Reset pushbutton or remote reset failure	Remote reset / pushbutton is activated for more than 60 seconds. When anomaly appears the burner does not stop

Table 18

#### Last lockout memory feature

The control box allows the last lockout that happened to be displayed.

Access to this function is possible in both STANDBY and OPERATING status.

- ▶ Keep the button pressed for 25 seconds = t < 30 seconds
- ▶ Release the button.  
LED displaying the type of lockout memorised for 10 seconds

The time displaying the type of lockout can be extended by pressing the reset button again during the display of the lockout (the lock out display continues for another 10 seconds)

### 8.10.2 Fault finding

Line	Check	Yes	Action	
1	Control box is supplied with heat demand?	Yes	Go to line 2	
		No	Check boiler and system controls	
2	Is the pre-heater fitted or if no pre-heater is fitted, is the link fitted?	Yes	Go to line 3	
		No	Fit the Pre-Heater or link	
3	Motor starts after initialization check time 3.5 seconds?	Yes	Go to line 4	
		No	Go to line 3a	
	3a	Green 0.5 seconds ON/Red 0.5 seconds ON before lockout?	Yes	Go to line 5a
			No	Go to line 3b
	3b	Fan motor or oil pump seized?	Yes	Replace seized component
			No	Go to line 3c
	3c	230 Volts to motor across blue and black motor wires?	Yes	Go to line 3d
			No	Replace control box
	3d	Approximately 35 Ω across blue and black motor wires?	Yes	Replace motor capacitor
			No	Replace fan motor and check control box

Table 19

Line	Check	Action		
4	Motor runs for less than 12 seconds?	Yes	Go to line 4a	
		No	Go to line 5	
	4a	Motor gives 50 Volts a.c. across black and white wires?	Yes	Replace control box
			No	Replace fan motor
5	Burner does not fire, burner locks out after 25 seconds from motor start?	Yes	Go to line 5a	
		No	Go to line 6	
	5a	Burner fires when the photo cell is covered?	Yes	Remove extraneous light
			No	Go to line 5b
	5b	Photo cell voltage $\geq 3.8V$ in the dark and approximately 0V in the light?	Yes	Replace the control board
			No	Replace the photo cell
6	Pump washing pressure 1 to 2 bar?	Yes	Go to line 7	
		No	Go to line 6a	
	6a	Pump pressure more than 6 bar?	Yes	Replace oil pump
			No	Go to line 6b
	6b	Check oil supply to the pump, if oil supply is OK	Go to line 6c	
	6c	Drive coupling broken?	Yes	Replace drive coupling
No			Replace oil pump	
7	Ignition spark present?	Yes	Go to line 8	
		No	Go to line 7a	
	7a	Are ignition leads and electrodes OK and set correctly?	Yes	Replace control box
			No	Replace/reset electrodes/ignition leads
8	Solenoid coil releases working pressure?	Yes	Go to line 9	
		No	Go to line 8a	
	8a	Does burner light or green 0.5 seconds ON/red 0.5 seconds ON before lockout?	Yes	Go to line 5a
			No	Go to line 8b
	8b	Contaminated fuel filters?	Yes	Clean/Replace filters
			No	Go to line 8c
	8c	Coil lead OK	Yes	Go to line 8d
			No	Replace solenoid coil lead
	8d	Solenoid coil resistance 90 to 110 $\Omega$	Yes	Go to line 8e
			No	Replace solenoid coil
8e	After 15 seconds from motor start, 25 to 30 Volts d.c. to solenoid coil? (coil connected)	Yes	Replace oil pump	
		No	Replace control box	
9	Air set correctly?	Yes	Go to line 10	
		No	Adjust combustion air settings	
10	Does the burner light? Flue damper fitted? (if required)	Yes	Go to line 11	
		No	Go to line 10a	
	10a	Is the nozzle atomising the fuel?	Yes	Go to line 11
			No	Go to line 10b
	10b	Nozzle new?	Yes	Go to line 10c
			No	Replace nozzle
10c	Check oil pipe from pump to nozzle holder	Clean/ replace pump and fuel line filters		
11	Combustion head set correctly?	Yes	Go to line 11a	
		No	Reset combustion head	
	11a	Flame goes out then re-lights	Yes	Go to line 11c
			No	Go to line 11b
	11b	Boiler or flue blocked	Yes	Clear blockage
			No	Go to line 11c
	11c	If balanced flue, remove the snorkel and test - now OK?	Yes	Go to line 11d
			No	Go to line 11e
	11d	Balanced flues can recirculate gases causing recycling	Check the flue position and seals	
	11e	Photo cell voltage $\geq 3.8V$ in the dark and approximately 0V in the light?	Yes	Replace the control box
No			Replace photocell	

Table 19

### 8.11 Flame sensing photocell

#### Digital photocell

To check the correct functioning of the photocell, perform the following actions:

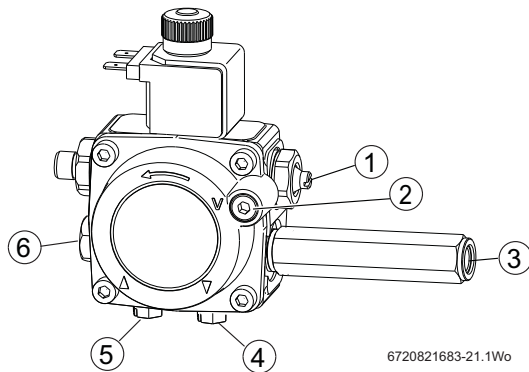
- ▶ Electrically isolate the burner
- ▶ Remove the photocell
- ▶ Connect a voltmeter across the blue and brown wires to the photocell
- ▶ Reconnect the power to the burner and wait until the burner locks out due to the false flame fault (red and green LEDs blinking)
- ▶ Cover the photocell to exclude any light and the voltmeter should read 3.8 Volts or higher
- ▶ Expose the photocell to light and the voltmeter should read approximately 0 Volts
- ▶ If these two conditions are not met, change the photocell
- ▶ Disconnect the voltmeter
- ▶ Disconnect the burner and replace the photocell

### 8.12 Oil supply vacuum testing

A vacuum gauge can be attached to the oil pump vacuum test port [1] and the boiler operated to check the vacuum readings. Oil pumps can operate if readings are between plus 0.4 bar and minus 0.35 bar. This means oil tanks can be 4 metres higher (to top of oil) or 3.5 metres lower (if fitted with a de-aerator or two-pipe oil delivery system) than the oil pump.

If vacuum is greater than minus 0.35 bar then you must also check that the oil supply is not obstructed and that the oil supply pipe is correctly sized.

Accessory 8-716-116-333-0 is available to assist in connecting a vacuum gauge to the vacuum test port.



6720821683-21.1Wo

Fig. 101 Oil pump ports/connections

- [1] Pressure adjuster
- [2] Vacuum gauge port
- [3] Bleed and pressure gauge port
- [4] Return connection
- [5] Inlet connection
- [6] Auxiliary pressure gauge port

### 8.13 Air pressure switch, flue overhear reset and tank overhear reset

This is a blocking error that must be reset by pressing thermostat reset button or air pressure switch reset button.

If the flue-gas temperature exceeds the cut-off point or the flue is restricted, the appliance will lockout indicated by code E9 210 [1]

- ▶ Press the flue-gas thermostat reset button [3], located on the underside of the support bracket [2].

-or-

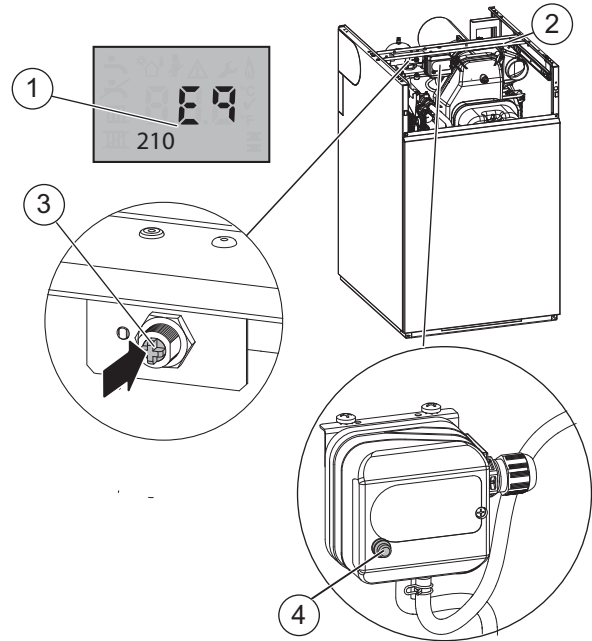
If the pressure differential between the flue inlet and exhaust exceeds a certain value the appliance will lockout indicated by code E9 210 [1]

- ▶ Press the air pressure reset button [4], located on the underside of the support bracket [2].

-or-

If the tank exceeds a set temperature value the thermostat will trip.

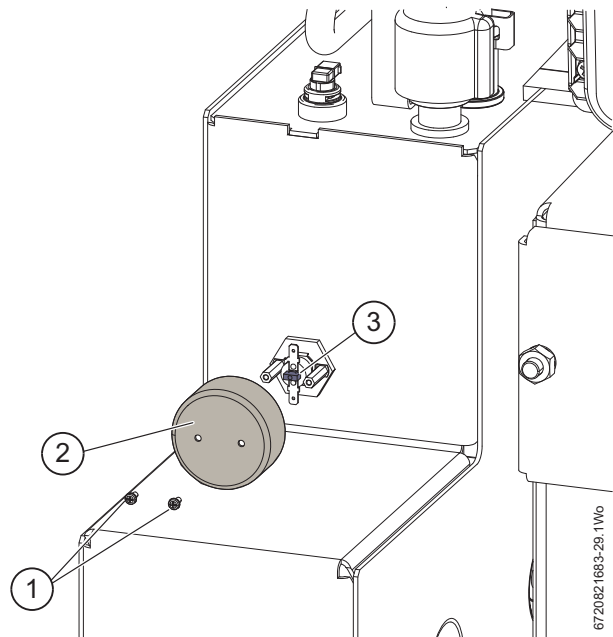
- ▶ Remove the screws securing the cover [1]
- ▶ Remove the cover [2]
- ▶ Press the black reset button
- ▶ Replace the cover and secure with the screws



6720822437-01.1Wo

Fig. 102

- [1] Error display
- [2] Boiler cross brace
- [3] Flue overhear reset
- [4] Air pressure reset



6720821683-29.1Wo

Fig. 103 Tank overhear reset

- [1] Screws
- [2] Overheat thermostat cover
- [3] Black reset button



### 8.14 Air pressure switch connections



**NOTICE:** APS pressure sensing tubes

- ▶ Ensure that the pressure sensing tubes are not kinked or trapped when working on the boiler.
- ▶ Kinked or trapped tubes will prevent the APS from functioning correctly



**Air pressure switch sensing tube connections:**

- ▶ Ensure that the sensing tubes are connected correctly, refer to figure 104

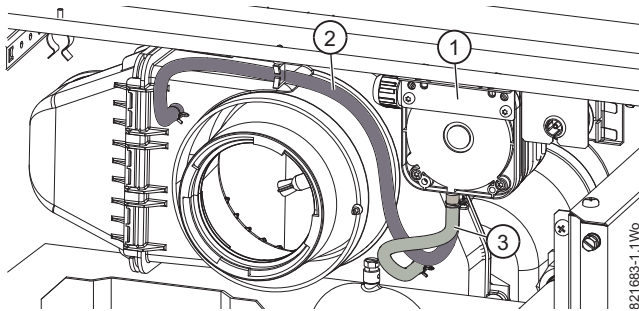


Fig. 104 Sensing tube connections

- [1] Air pressure switch
- [2] Air intake connection (front connection)
- [3] Flue exhaust connection (rear connection marked with a +)

### 8.15 Oil appliance commissioning checklist

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



**IMPORTANT**

▶ Leave this manual with the Homeowner.

**Appliance details**

Appliance make and model: \_\_\_\_\_  
 Appliance serial number: \_\_\_\_\_

**Commissioning Engineer**

Company name: \_\_\_\_\_  
 Company address: \_\_\_\_\_  
 Telephone number: \_\_\_\_\_  
 Commissioned by (signature) \_\_\_\_\_  
 (print name) \_\_\_\_\_  
 Commissioning date: \_\_\_\_\_

**Commissioning checks**

Oil type used is Kerosene	Yes <input type="checkbox"/>
Pump pressure	PSI
CO <sub>2</sub>	%
CO	ppm
CO/CO <sub>2</sub> ratio	
Smoke reading	
Flue gas temperature	°C
Flue pressure	
Burner model:	

**Controls: Tick the appropriate boxes**

Time and temperature control to heating	Room thermostat and programmer/timer	<input type="checkbox"/>	Programmable room thermostat	<input type="checkbox"/>
	Load/Weather compensation	<input type="checkbox"/>	Optimum start control	<input type="checkbox"/>
Time and temperature control hot water	Cylinder thermostat and programmer/timer	<input type="checkbox"/>	Combination boiler	<input type="checkbox"/>
Heating zone valves	Fitted	<input type="checkbox"/>	Not required	<input type="checkbox"/>
Hot water zone valves	Fitted	<input type="checkbox"/>	Not required	<input type="checkbox"/>
Thermostatic radiator valves	Fitted	<input type="checkbox"/>	Not required	<input type="checkbox"/>
Automatic by-pass valve fitted to system	Fitted	<input type="checkbox"/>	Not required	<input type="checkbox"/>
Boiler interlock			Provided	<input type="checkbox"/>

**All Systems**

The system has been flushed and cleaned in accordance with BS7593 and appliance manufacturer's instructions? Yes

What system cleaner was used? \_\_\_\_\_

What inhibitor was used? \_\_\_\_\_ Quantity  litres

Has a system filter been fitted? Yes  No

The condensate drain has been installed in accordance with the manufacturer's instructions and/or BS5546/BS6789? Yes

If the condensate pipe terminates externally has the pipe diameter been increased and weatherproof insulation fitted? Yes

**Central Heating mode: Measure and record**

Central Heating flow temperature  °C      Central Heating return temperature  °C

**Domestic Hot Water mode: Measure and record**  
**Combination boilers only**

Is the installation in a hard water area (above 200ppm)? Yes  No

If yes, has a water scale reducer been fitted? Yes  No

What type of scale reducer has been fitted? \_\_\_\_\_

Cold Water Inlet temperature  °C      Hot Water Outlet temperature  °C

Water flow rate  l/min

**All installations**

Fire valve fitted rated to 85 °C. Yes

Is the flue damper correctly fitted? Yes  No

Are the hoses from the Air pressure switch correctly routed and free from kinking? Yes  No

Is a solid non-combustible surface large enough to accommodate the appliance provided? Yes  No

Is the oil tank and supply clean and free from contamination? Yes  No

Does the installation comply with current OFTEC Regulation? Yes  No

The heating and hot water system complies with the appropriate Building Regulations? Yes  No

The appliance and associated products have been installed and commissioned in accordance with the manufacturer's instructions? Yes  No

The operation of the appliance and system controls have been demonstrated to and understood by the customer? Yes  No

### 8.16 Service interval record

It is recommended that your appliance is serviced annually and that the Service Interval Record is completed and signed.  
Before completing the service Interval record below, ensure that you have carried out the service functions described in this manual.  
Always use the manufacturer's recommended spare parts

<b>Service 1</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 3</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 5</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 7</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 9</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 2</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 4</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 6</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 8</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

<b>Service 10</b>		Date:	
Engineer's name:			
Company name:			
Telephone number:			
Registration number:			
Fire valve inspected (rated to 85 °C)		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Nozzle changed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pump pressure:	psi
CO <sub>2</sub>	CO	ppm	CO/CO <sub>2</sub> ratio
F.G.T.	°C	Flue pressure:	
Comments:			
Signature:			

**If the boiler does not give complete satisfaction, before calling for a service engineer, the installer should check the following:**

#### **General checks**

1. Is there 230 V across the boiler live and neutral terminals?
2. Is the polarity correct? (230 V across live and earth, 0 V across neutral and earth)
3. Is the air bled from the primary system?
4. Is the air bled from the oil supply?
5. Is the flue sized and routed correctly?

#### **Boiler runs straight to lockout**

1. Has the oil line been purged of air.
2. Where an air eliminator is used in conjunction with a top feed oil tank the non-return valve, (if fitted), should be removed from the oil dip pipe.


#### **Boiler locks out at the start of a demand (Heating off over night for example)**

1. If an air eliminator is being used, check that there are no leaks that allow air to be pulled into the oil supply.
2. If a two pipe oil supply is being used, has a non-return valve been fitted to the inlet pipe? Refer to the instructions for guidelines.

#### **No domestic hot water**

1. Is the mains water in connected to the 15 mm isolation valve?
2. Is there a domestic hot water demand from the programmer and has the tank reached temperature?

#### **No domestic hot water (external programmer)**

3. Is there 230 V on  ?



4. Refit link between  and  .




If the DHW now operates correctly there is a problem with the external programmer and/or its wiring.



#### **No central heating**

1. Are both programmer and room thermostat on demand for central heating?
2. Is the room thermostat wired correctly

#### **No central heating (external programmer)**

1. Is there 230 V on  ?



2. Refit link between  and  .



If the CH now operates correctly there is a problem with the external programmer and/or its wiring.



Under no circumstances must an appliance be left to operate with any control linked out or over ridden.

#### **WORCESTER, BOSCH GROUP:**

TECHNICAL SUPPORT: 0330 123 3366

APPOINTMENTS: 0330 123 9339

SPARES: 0330 123 9779

LITERATURE: 0330 123 9119

TRAINING: 0330 123 0166

SALES: 0330 123 9669

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