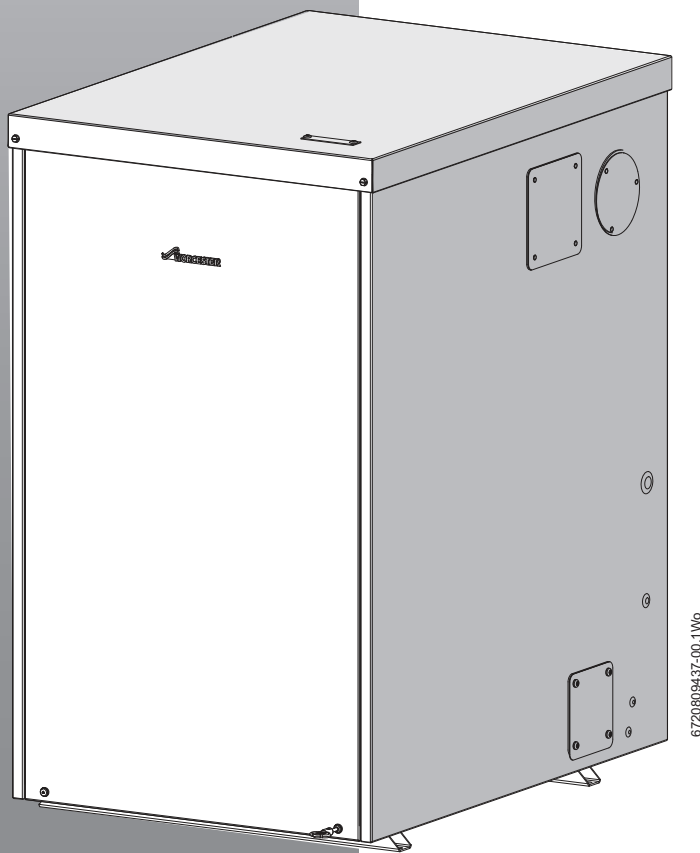


Installation, Commissioning and Servicing instruction manual

Floor Standing oil-fired Condensing Boiler using Room Sealed Flue

Greenstar Danesmoor External Regular ^{ErP} & External System ^{ErP} 12/18, 18/25 & 25/32

For fully pumped open vent or sealed central heating systems and domestic hot water cylinders.
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

	<p>Warnings in this document are identified by a warning triangle printed against a grey background.</p> <p>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.</p>
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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

	<p>This symbol indicates important information where there is no risk to people or property.</p>
---	--

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 sublist 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
BF	Balanced Flue
N/A	Not Allowed
SEDBUK	Seasonal Efficiency of Domestic Boilers in the UK
OFTEC	Oil Firing Technical Association for the Petroleum Industry
IET	Institute of Engineering and Technology
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.

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
- ▶ 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.

This boiler must only be operated by a responsible adult who has been instructed in, understands and is aware of the boiler's operating conditions and effects.

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.

Electrical work

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

- ▶ Before starting electrical work:
 - Isolate the mains electrical supply and secure against unintentional re-connection.
 - Check for zero potential.
- ▶ Also observe connection diagrams of other system components.

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, OFTEC registered engineer.
- ▶ Leave the installation instructions with the completed commissioning form and the operating instructions with the user or at the gas meter.

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 5955: part 8: Specification for the installation of thermoplastic pipes and associated fittings for use in domestic hot and cold water services and 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:

- A - Floor standing oil fired condensing boiler
- B - Literature pack:
 - Greenstar Danesmoor external Installation, Commissioning and Servicing instruction manual
 - User Instructions
 - Guarantee registration card
- C - Condensate trap
- D - BSP plug, one inch (Regular only)
- E - ErP label
- F - Cabinet key
- G - 100mm Ø Services duct
- H - Balanced flue kit

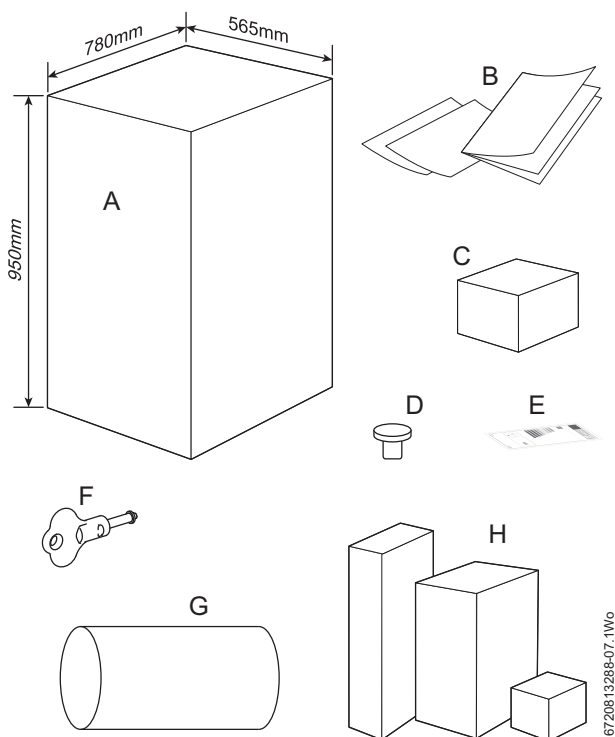


Fig. 1 Standard package

3.2 Technical data

Description	Units	12/18	18/25	25/32
Central heating				
Central heat output (max)	kW	18	25	32
Primary water capacity (total)	litres	20	21	22
Max. static head (Regular only)	metres	30	30	30
Min. static head (Regular only)	metres	1	1	1
Water side resistance (20°C difference)	mbar	20	30	56
Maximum available pump head (20°C difference) System only	mH ₂ O	5.2	4.3	4.1
Maximum permissible sealed system operating pressure in accordance with WRAS guidelines	bar	2.5	2.5	2.5
Flue				
Exit flue gas mass flow	kg/hr	29	40	51
Pipework connections				
Fuel line (compression)	mm	10	10	10
Flow Kitchen	BSP	1"	1"	1"
Flow Kitchen System	mm	22	22	28
Kitchen flow and optional vent/air vent	BSP	1"	1"	1"
Return	mm	22	22	28
Condensate (Polypropylene)	mm	21.5	21.5	21.5
PRV outlet - System only	mm	15	15	15
Electrical				
Electrical power supply voltage	ac ..V	230	230	230
Frequency	Hz	50	50	50
Thermostats				
Boiler flow temperature range (cut in/cut out)	°C	55/81	55/81	55/81
Control thermostat differential	°C	5	5	5
Boiler high limit thermostat set point	°C	95	95	95
Boiler manual reset overheat thermostat set point	°C	105	105	105
Flue manual reset overheat thermostat set point	°C	110	110	110
General data				
Maximum hearth temperature	°C	<100	<100	<100
SEDBUK 2009	%	91.1	90.9	90.7
SEDBUK 2005	%	93.2	93.0	92.8
Appliance protection rating	IP	45	45	45
Weight (excluding packaging)	kg	110	114	124
External Regular				
Weight (excluding packaging)	kg	119	121	131
External System				

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	7731600059	7731600060	7731600061	7731600068	7731600069	7731600070
Product type	–	–	Danesmoor External Regular ^{ErP} 12/18	Danesmoor External Regular ^{ErP} 18/25	Danesmoor External Regular ^{ErP} 25/32	Danesmoor External System ^{ErP} 12/18	Danesmoor External System ^{ErP} 18/25	Danesmoor External System ^{ErP} 25/32
Condensing boiler	–	–	Yes	Yes	Yes	Yes	Yes	Yes
Low temperature boiler	–	–	No	No	No	No	No	No
B1 boiler	–	–	No	No	No	No	No	No
Cogeneration space heater (CHP)	–	–	No	No	No	No	No	No
Combination heater	–	–	No	No	No	No	No	No
Rated heat output	P _{rated}	kW	18	25	32	18	25	32
Seasonal space heating energy efficiency	η_s	%	91	90	91	91	90	91
Energy efficiency class	–	–	A	A	A	A	A	A
Useful heat output								
At rated heat output and high temperature regime ¹⁾	P ₄	kW	17.9	24.9	32.2	17.9	24.9	32.2
At 30 % of rated heat output and low temperature regime ²⁾	P ₁	kW	5.7	7.9	10.2	5.7	7.9	10.2
Useful efficiency								
At rated heat output and high temperature regime ¹⁾	η_4	%	91.1	90.9	91.4	91.1	90.9	91.4
At 30 % of rated heat output and low temperature regime ²⁾	η_1	%	96.8	95.8	96	96.8	95.8	96
Auxiliary electricity consumption								
At full load	e _{l,max}	kW	0.143	0.16	0.16	0.143	0.16	0.16
At part load	e _{l,min}	kW	0.043	0.048	0.048	0.043	0.048	0.048
In standby mode	P _{SB}	kW	0	0	0	0	0	0
Other items								
Standby heat loss	P _{stby}	kW	0.123	0.16	0.16	0.123	0.123	0.16
Ignition burner power consumption	P _{ign}	kW	-	-	-	-	-	-
Emissions of nitrogen oxides	NOx	mg/kWh	243	193	136	243	193	136
Annual energy consumption	Q _{HE}	kWh	-	-	-	-	-	-
Sound power level, indoors	L _{WA}	dB(A)	N/A	N/A	N/A	N/A	N/A	N/A

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 and components - 18/25 Regular appliance shown

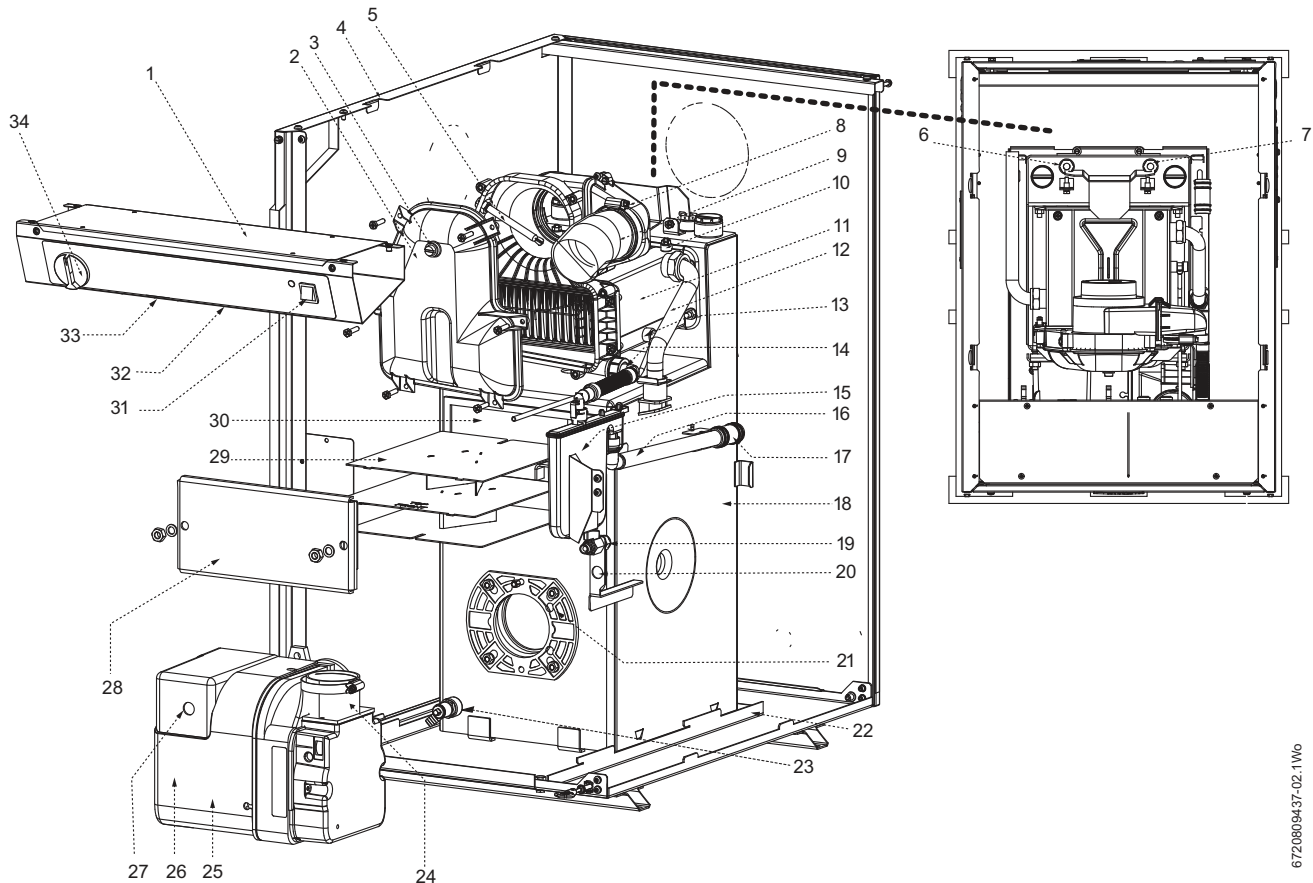


Fig. 2 18/25 Appliance shown

Figure 2 does not include the top, front, and right hand side panel.			
1	Control box assembly	18	Primary heat exchanger
2	Flue manifold access cover	19	Oil isolating valve
3	Flue gas sampling point	20	Optional oil return position
4	Casing side panel	21	Burner mounting plate
5	Flue overheat thermostat phial	22	Base plate and oil drip tray
6	Control & manual reset overheat thermostat phial	23	Primary heat exchanger drain
7	Auto-reset high-limit thermostat phial	24	Burner air intake - connected by flexible duct (9) to air inlet casing (8)
8	Air inlet casing	25	Burner motor - behind plastic cover
9	Flexible air duct (connecting to air intake on burner)	26	Oil pump - behind plastic cover
10	Secondary heat exchanger bleed point (one on either side)	27	Lockout reset button (on front of burner control box)
11	Secondary heat exchanger	28	Combustion chamber access door (primary baffle inside)
12	Heat exchanger flow pipe	29	One piece baffle arrangement
13	Secondary heat exchanger drain	30	Combustion chamber
14	Condensate outlet	31	Mode switch
15	Condensate trap	32	Boiler overheat reset button
16	Condensate drain pipe	33	Flue overheat reset button
17	Flexible condensate drain pipe connection	34	Temperature control knob

Table 3 Appliance component details (Regular model)

3.5 Layout and components - 12/18 System appliance shown

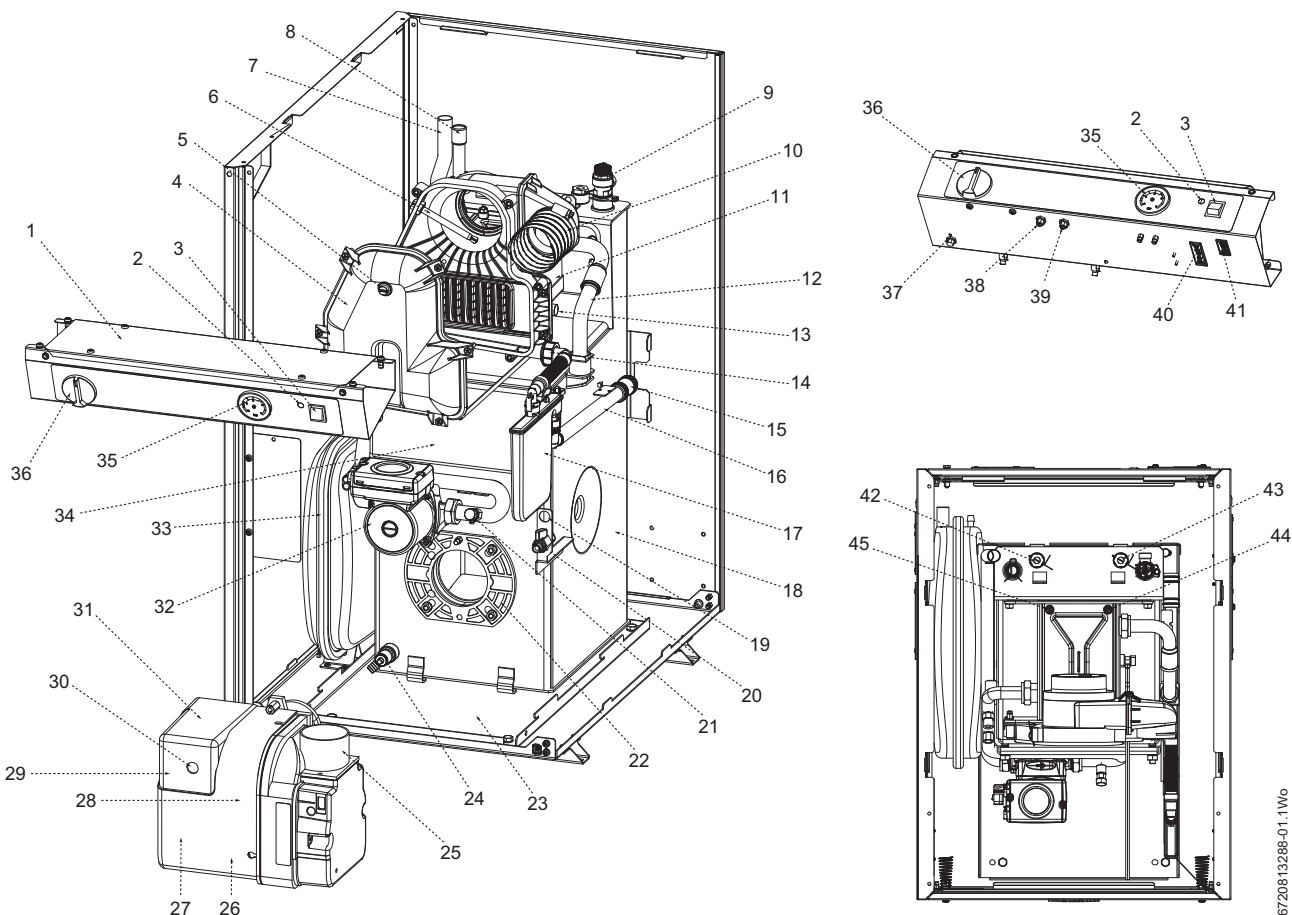


Fig. 3 Exploded system appliance view

1	Control box assembly	24	Primary heat exchanger drain
2	Demand indicator	25	Burner air intake - connected to air inlet casing by flexible duct
3	Mode switch	26	Oil pump (behind plastic cover)
4	Flue manifold access cover	27	Riello RDB burner
5	Flue gas sampling point	28	Burner motor (behind plastic cover)
6	Flue overheat thermostat phial	29	Plastic cover
7	Return connection	30	Lock out reset button (on the front of the burner control box)
8	Flow connection	31	Burner control box (behind plastic cover)
9	Pressure relief valve	32	Circulating three speed pump
10	Flexible air duct (connecting to air intake on burner)	33	Expansion vessel
11	Secondary heat exchanger	34	Combustion chamber access door (primary baffle inside)
12	Heat exchanger flow pipe	35	System pressure gauge
13	Secondary heat exchanger drain	36	Temperature control knob
14	Condensate outlet	37	Auto reset thermostat
15	Base plate and oil drip tray	38	Flue overheat reset button
16	Condensate drain pipe	39	Boiler overheat reset button
17	Condensate trap	40	Burner lead connector socket
18	Primary heat exchanger	41	Service socket
19	Optional oil return position	42	Control & manual reset overheat thermostat phial
20	Oil isolating valve	43	Auto-reset high-limit thermostat phial
21	Pump drain point	44	Secondary heat exchanger bleed point (one on either side)
22	Burner mounting plate	45	Secondary heat exchanger bleed point (one on either side)
23	Base plate and oil drip tray		

Table 4 Appliance component details (System model)

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.
- ▶ It is recommended that you fit a primary water cleanser 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 vented systems only:
 - Turn off the water to the system header tank.
- ▶ Open all drain cocks and drain the system.
- ▶ 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 manufacturer's instructions.
- ▶ Open vented systems only:
 - Turn on the water to the system header tank and allow the system to fill.

- ▶ Sealed systems only:
 - Fill the system to between 1 and 1.5 bar via a WRAS approved filling loop.
- ▶ Vent any air from the boiler and system.

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 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 obtained from the following manufacturers:

FERNOX	0870 601 5000
	www.fernox.com
SENTINEL	0800 389 4670
	www.sentinel-solutions.net

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:


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

4.2 Mains supply

4.2.1 Electrical supply

- Supply: 230V - 50 Hz
- Cable: PVC insulated 0.75 mm² (24 x 0.2mm) temperature rated to 90°C.
- Circuit breaker incorporating earth leakage protection.
- External 5A fuse to BS1362.
- The appliance must be earthed.
- This appliance must not be connected to a three phase supply.
- Wiring must comply with the latest IET wiring regulations.
- It must be possible to isolate the appliance from the electrical supply with at least a 3mm contact separation in both poles supplying the appliance.
- Wiring between the appliance and the electrical supply must comply with IET wiring regulations and any local regulations that may apply for fixed wiring to a stationary appliance.
- Any system connected to the boiler must not have a separate electrical supply.

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 boiler casing
7	Oil filter (70µm max filtration size)
8	Fire valve sensor
9	Oil pump
10	Oil burner
11	Non-return valve
12	De-aerator

Table 5 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].

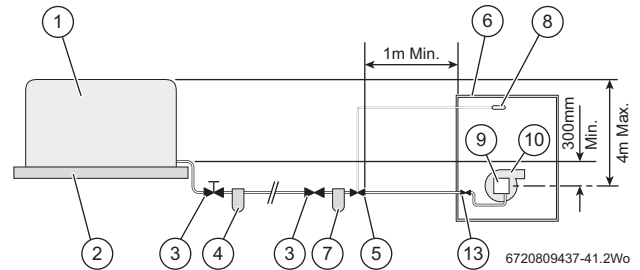


Fig. 4 Single pipe feed



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].

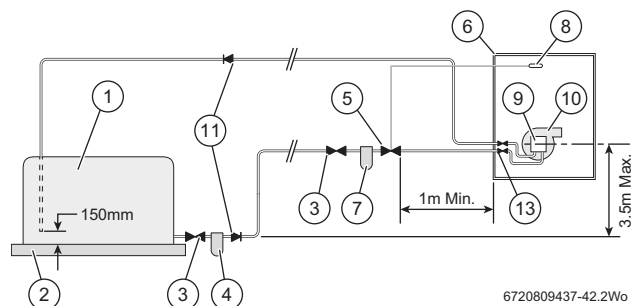


Fig. 5 Double pipe feed

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.

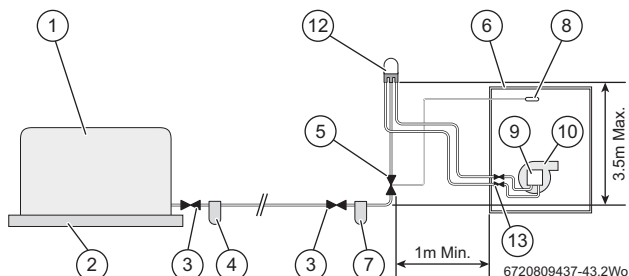


Fig. 6 De-aerator feed

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].

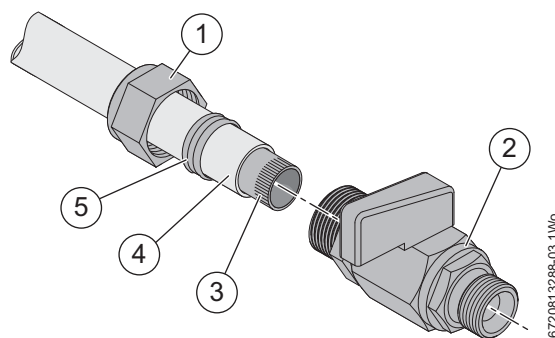


Fig. 7 Isolation valve bracket removed for clarity

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

4.4 Water systems and pipework

NOTICE:

- ▶ 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 7921 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 20K 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.

Open vent primary system (regular only)

- The open vent pipe [F] and feed and expansion pipe [H] must rise continuously from the appliance.
- The feed and expansion cistern [E] must be positioned to provide a static head [S] of at least 1 metre above the highest point in the heating system to the water level in the feed and expansion cistern [E].
- Ensure adequate space is left in the expansion cistern for expansion of the system water.
- No valve shall be fitted in the open vent pipe (H) or the feed and expansion pipe [F].
- The open vent pipe [H] must be at least 22mmØ.

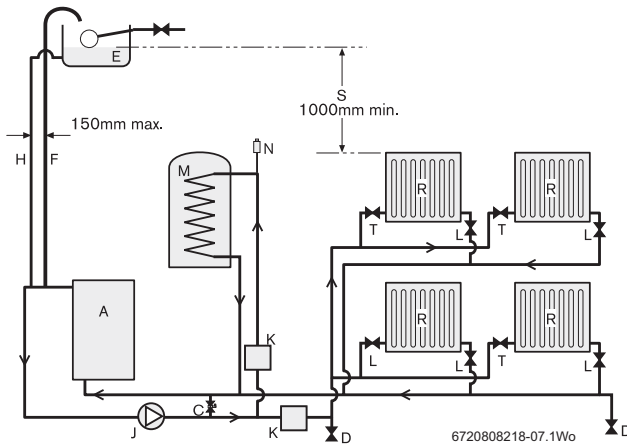


Fig. 8 Regular appliance system layout

- [A] Regular appliance
- [A1] System appliance
- [B] Expansion vessel*
- [C] Automatic bypass valve
- [D] Drain cock
- [E] Feed and expansion cistern
- [F] Open vent 22mmØ min.
- [G] Pressure gauge*
- [H] Feed and expansion 15mmØ min.
- [J] Circulating pump*
- [K] Zone valves
- [K1] Three port valve
- [L] Lockshield valve
- [M] Hot water cylinder
- [N] Automatic air vent
- [P] Pressure relief valve*
- [P1] Pressure relief discharge
- [R] Radiators
- [T] Thermostatic radiator valve TRV
- [U] To filling system
- [NOTE] * Components included internally on the system boiler

Fully pumped sealed primary system:

- A pressure relief valve [P], spring loaded safety valve set to operate at 3bar, must be fitted to the heating flow pipe as close as possible to the boiler or onto one of the boiler top 1" BSP outlets.
- An expansion vessel [B] must be fitted to the heating return pipe as close as possible to the boiler and pressurised for the system volume according to the instructions supplied with the vessel.
- A pressure gauge [G], 3 bar minimum, must be fitted to the heating flow pipe or one of the boiler 1" BSP outlets.
- An automatic air vent [N] must be fitted.

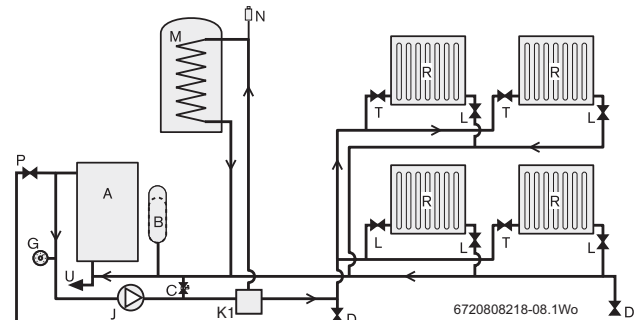


Fig. 9 Regular appliance system layout

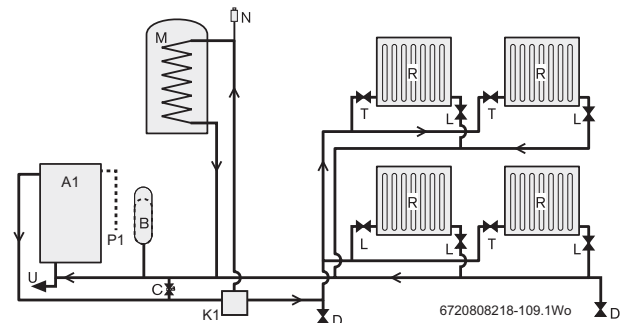


Fig. 10 System appliance system layout

Sealed system considerations

i The charge pressure of the built-in 12 litre expansion vessel is 0.5 bar as dispatched, which is equivalent to a static head of five metres.

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

i 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.

Filling primary sealed systems

NOTICE: FILLING THE SYSTEM

- The system must not be filled with artificially softened water.

- 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] figure 10 must be fitted as close as possible to the appliance in the central heating return.
- Pressurise the extra expansion vessel [B] figure 10 to the same figure as the expansion vessel built into the appliance (system boilers).
- Filling the system must comply with one of the methods shown in the figure 11.
- 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.

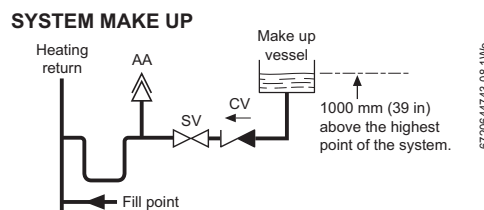
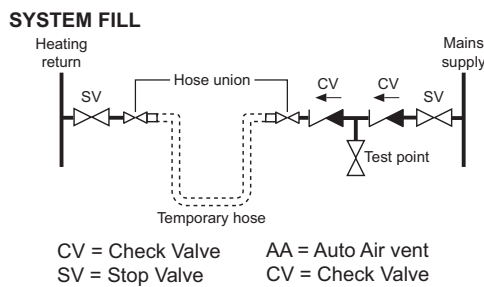


Fig. 11 System fill and make up

4.5 Condensate pipework

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 Polypropylene 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.

Externally run condensate drainage pipe should terminate at a suitable foul water discharge point, or purpose-designed soak away. If this method is chosen then the following measures should be adopted:

- The external run be kept as short as possible and not exceed three metres.
- The pipe diameter should be increased to 32mm and should be insulated using suitable waterproof and weather resistant insulation.
- 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.

4.5.1 Condensate disposal connections

i Condensate drainage pipe can be run above or below ground.

Key to condensate illustrations

1	Condensate discharge from boiler
2	Universal connector
3	Soil and vent stack
4	Minimum 450mm and up to three storeys
5	Pipe work transition
6	Insulate and increase pipe size
7	External rain water pipe into foul water
8	External air brake
9	43mm pipe (min 100mm upstand)
10	PVCu strap on fitting
11	43mm 90° male/female bend
*	Condensate trap of 75mm already incorporated into the boiler

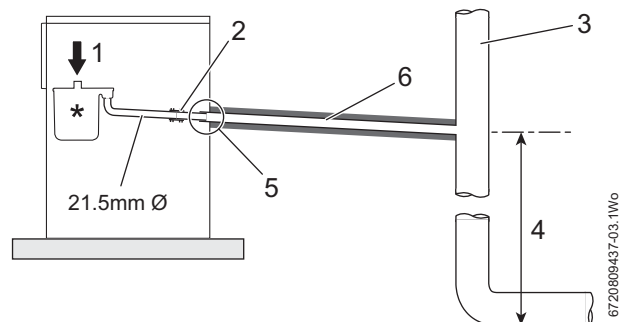


Fig. 12 Disposal to a soil vent stack

Fitting an external air break

- Refer to figure 13 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.

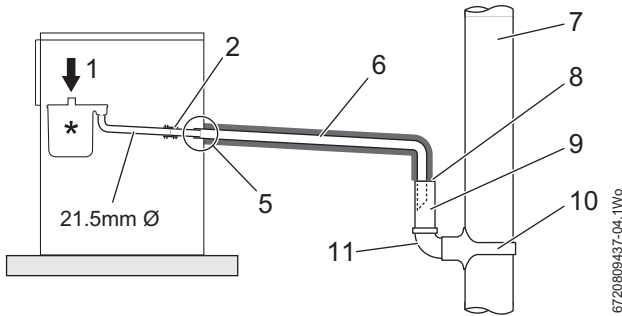


Fig. 13 Disposal into a rainwater down pipe

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.

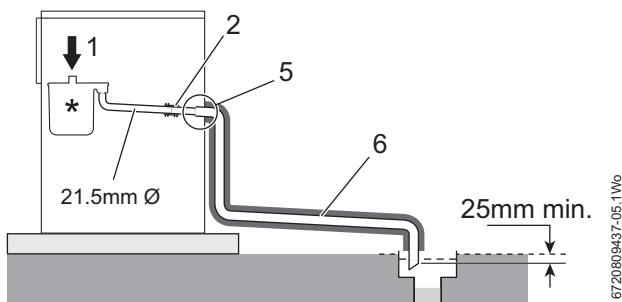


Fig. 14 External drain

4.5.2 Soak away



NOTICE: Condensate waste

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

- 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 filled with and surrounded by at least 100mm of limestone chippings to a depth of 400mm.



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.

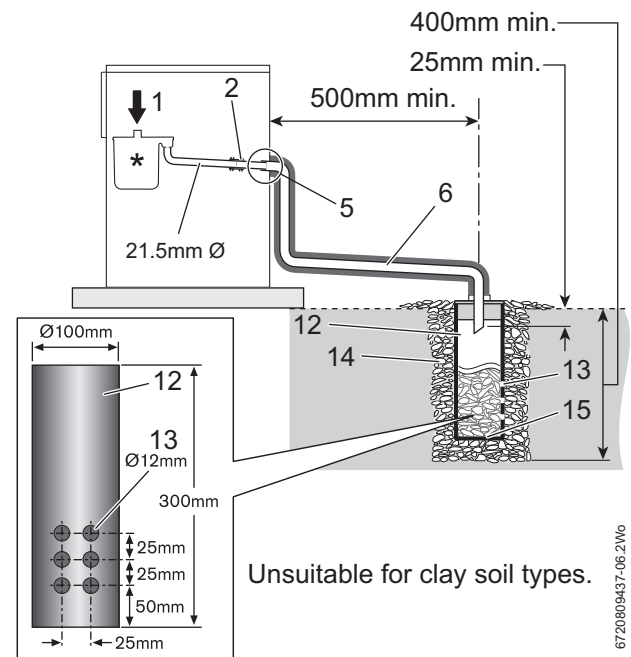


Fig. 15 Disposal to a soakaway

Key to condensate soakaway	
1	Condensate discharge from boiler
2	Universal connector
3	Soil and vent stack
4	Minimum 450mm and up to three storeys
5	Pipe work transition
6	Insulate and increase pipe size
12	100mm Ø minimum plastic pipe
13	Drainage holes
14	Limestone chippings (25kg min.)
15	Bottom of sealed tube
*	Condensate trap of 75mm already incorporated into the boiler

4.6 Pressure relief pipework

- The pressure relief discharge pipe [2] 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 soakaway.
- Pipe [2] should be finished with a partial bend, near the outlet to prevent discharge onto entrances or other public access where it could cause a hazard.

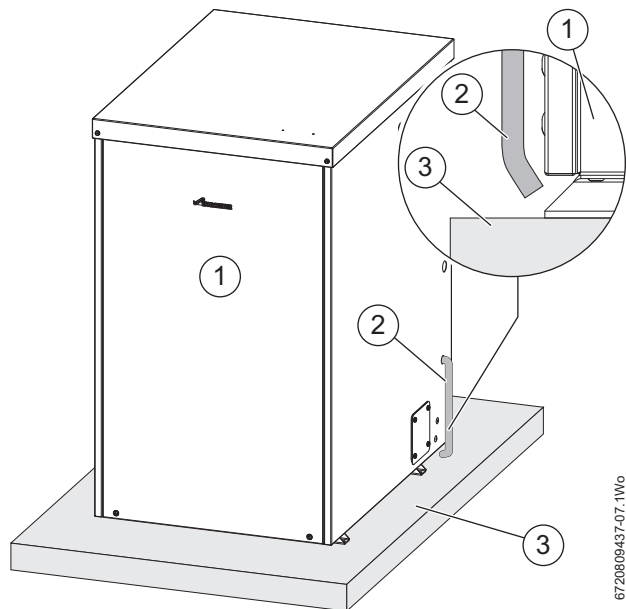


Fig. 16 Pressure relief pipe work

- [1] External casing
- [2] PRV discharge pipe
- [3] Hardstanding

4.7 Boiler locations and clearances



WARNING: This appliance should not be installed where there is a potential for excessive ground water coverage. This boiler is only suitable for installing externally at a suitable location onto a fixed permanent rigid surface capable of supporting the boiler weight. There must be a sufficient hard standing around the appliance to allow for servicing. The boiler must be installed on a flat level surface to ensure that condensate does not enter the primary heat exchanger. Tarmac and wood hardstandings are not recommended.

Clearances:

- ▶ Minimum service and flue clearances.
 - Above - 600mm
 - Front - 600mm
 - RH/LH clearance flue outlet on opposite side - 10mm
 - RH clearance flue outlet on rear - 45mm
 - LH clearance flue outlet on rear - 85mm
 - Rear clearance flue outlet on side - 50mm
 - Rear clearance flue outlet on rear 2500mm
- It is strongly recommended that the flue terminal faces away from walls to reduce the possibility of wetting occurring.

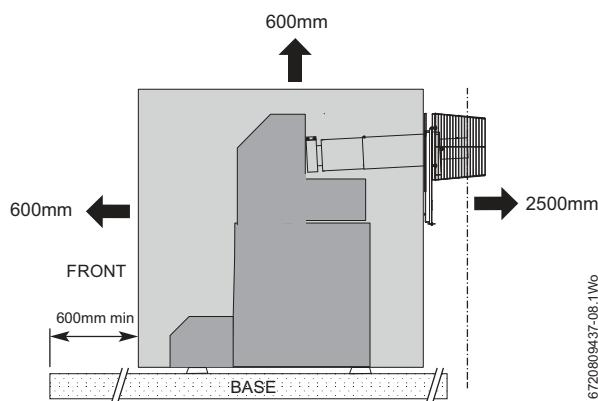


Fig. 17 Above clearance

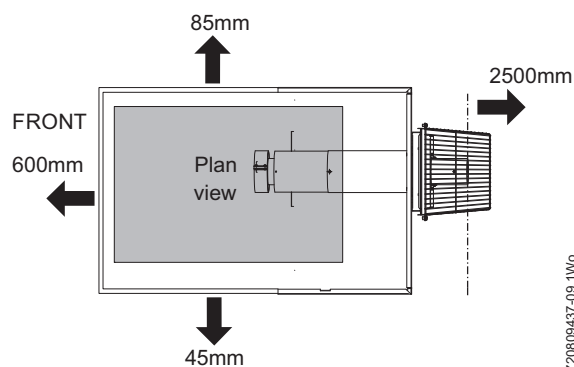


Fig. 18 Rear exit flue clearances

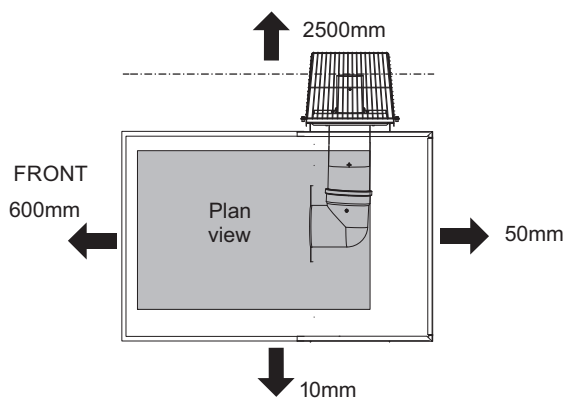


Fig. 19 Left exit flue clearances

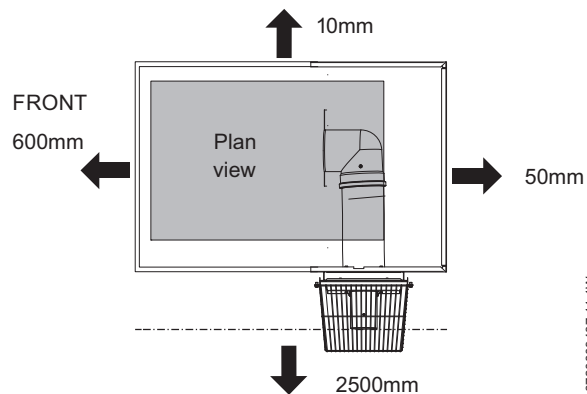
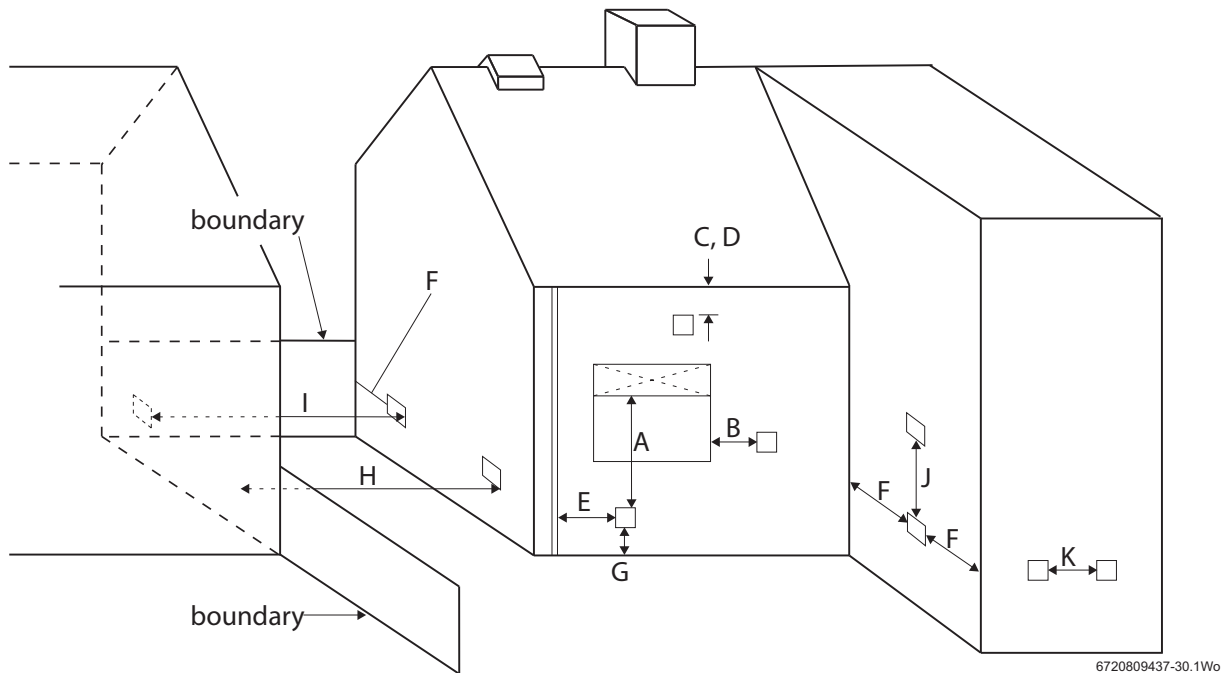


Fig. 20 Right exit flue clearances

4.8 Flue terminal positions



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Fig. 21 External boiler flue terminal positions

	Terminal position	Balanced horizontal flue
A ¹	Directly below an opening, air brick, opening window etc.	600mm
B ¹	Horizontally to an opening, air brick, opening window, etc.	600mm
C	Below a plastic/painted gutter, drainage pipe or eaves if combustible material is protected	75mm
D ²	Below a plastic/painted gutter, drainage pipe or eaves without protection to combustible material	600mm
E	From vertical sanitary pipework	300mm
F	From an external or internal corner or from a surface or boundary alongside a terminal	300mm
G	Above ground or balcony level	300mm*
H	From a surface or boundary facing a terminal	600mm**
J	From a terminal facing a terminal	1200mm**
K	Vertically from terminal on the same wall	1500mm

- An opening means an openable element, such as an openable window, or a permanent opening such as a permanently open air vent.
Notwithstanding the dimensions above, a terminal should be at least 300mm from combustible material, e.g. a window frame. Terminals should be positioned so as to avoid products of combustion accumulating in stagnant pockets around the building or entering into buildings.
 - A way of providing protection of combustible material would be to fit a heat shield at least 750mm wide.
 - Terminating positions should be at least 1.8m from an oil storage tank unless a wall with at least 30 minutes fire resistance and extending 300mm higher and wider than the tank is provided between the tank and the terminating position.
- The following additional guidelines (from part L Exceptions Guidance Document) are recommended when determining the flue outlet position:
 - Avoid discharging flue gases into car ports or narrow passageways.
 - *Minimum distance of the flue terminal from above ground is 2100mm where directed to a public footpath, private access route or a frequently used area and 2500mm from a car parking area.
 - **Recommended minimum distance of the flue terminal to a facing wall, fence, building or property boundary is 2500mm.
 - Terminals should be positioned so as to avoid products of combustion accumulating in stagnant pockets around the building or entering into buildings.
 - The flue must be fitted and terminated in accordance with the recommendations of BS5410.
 - The flue must not cause an obstruction.
 - Discharge from the flue outlet must not be a nuisance.
 - Flue gases have a tendency to plume and in certain weather conditions a white plume of condensation will be discharged from the flue outlet which could be regarded as a nuisance, for example, near security lighting.
 - There should be no restriction preventing the clearance of combustion products from the terminal.
 - The air inlet/outlet duct and the terminal of the boiler must not be closer than 25mm to any combustible material. Detailed recommendations on protection of combustible materials are given in BS 5410:1
 - A protective stainless steel terminal guard, must be fitted if the terminal is 2m or less above a surface where people have access.
 - The guard must be spaced equally (minimum 50mm) around the flue and fixed with plated screws.
 - See 'Contact Information' on the back cover for flue guard information.

4.9 Flue options

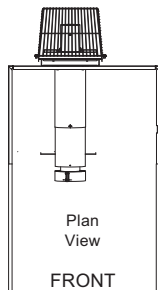
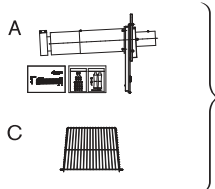
4.9.1 Cabinet mounted balanced horizontal flue options



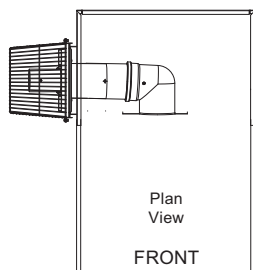
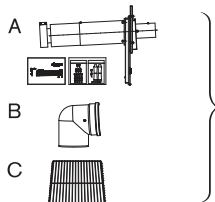
It is strongly recommended that the flue terminal faces away from walls to minimise the occurrence of wetting.

- The horizontal flue is fitted to the rear or either side of the cabinet.

REAR FLUE OUTLET



LEFT HAND FLUE OUTLET



RIGHT HAND FLUE OUTLET

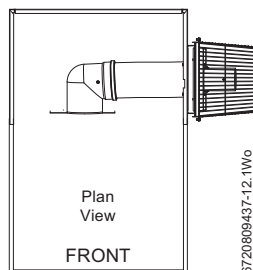
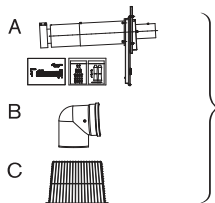


Fig. 22 Flue options

4.9.2 Plume management



NOTICE: Flue length:

- The flue length of all the external boilers using this plume management application will be in the range of 160 to 2000mm.

Effective lengths of elbows

Bend	Flue	Plume
90°	1000mm	1000mm
45°	500mm	500mm

Table 6 Effective lengths of bends

Fitting the terminal plume management kit

- Remove and retain the screws that secure the terminal end into the flue.
- Discard the terminal end.
- Fit the terminal elbow into the flue but do not secure with the screws until the plume management system has been assembled.

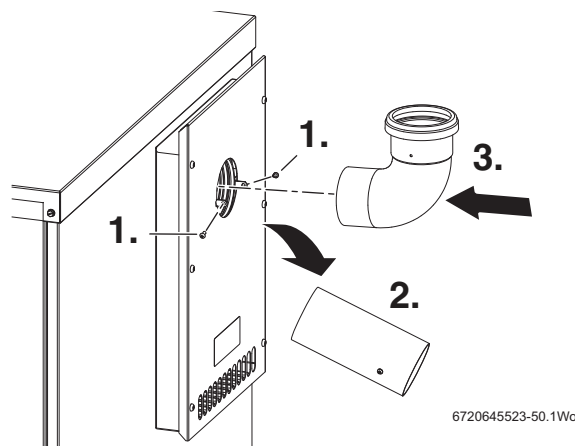


Fig. 23 Fitting the terminal bend

- Connect the sections of the plume management for desired length.
 - Screw the clamp into the wall.
 - Push the extension/s tube fully into the 90° bend, then withdraw the tube by approximately 10mm to allow for expansion.
- Once the plume management system is in place and secured to the wall, secure the terminal bend with the screws remove earlier.
 - The terminal end can be positioned up to 45° either side of the central position, for plume re-direction.
 - Adjust the plume management terminal end into the desired position and secure with the screws provided.

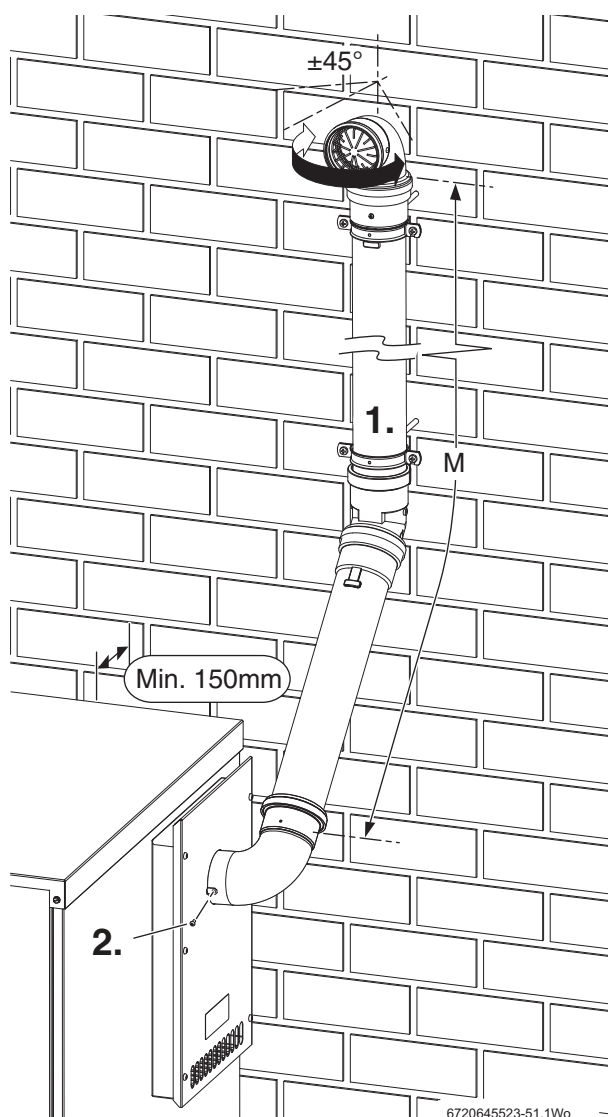


Fig. 24 Plume management detail

5 Installation

5.1 Unpacking the boiler



CAUTION: Lifting and carrying

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



NOTICE: Before installation

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

Unpacking

It is advised that at least 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.
 - ▶ Two or more persons are required to move the boiler taking care not to damage the boiler, panels or the floor.



NOTICE: Heavy objects

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

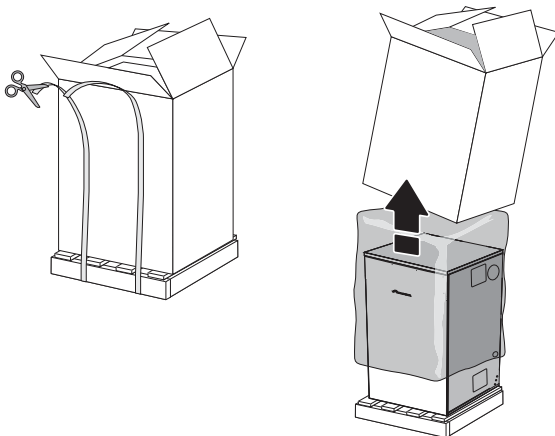


Fig. 25 Unpacking

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5.2 Pipework positions and flue opening

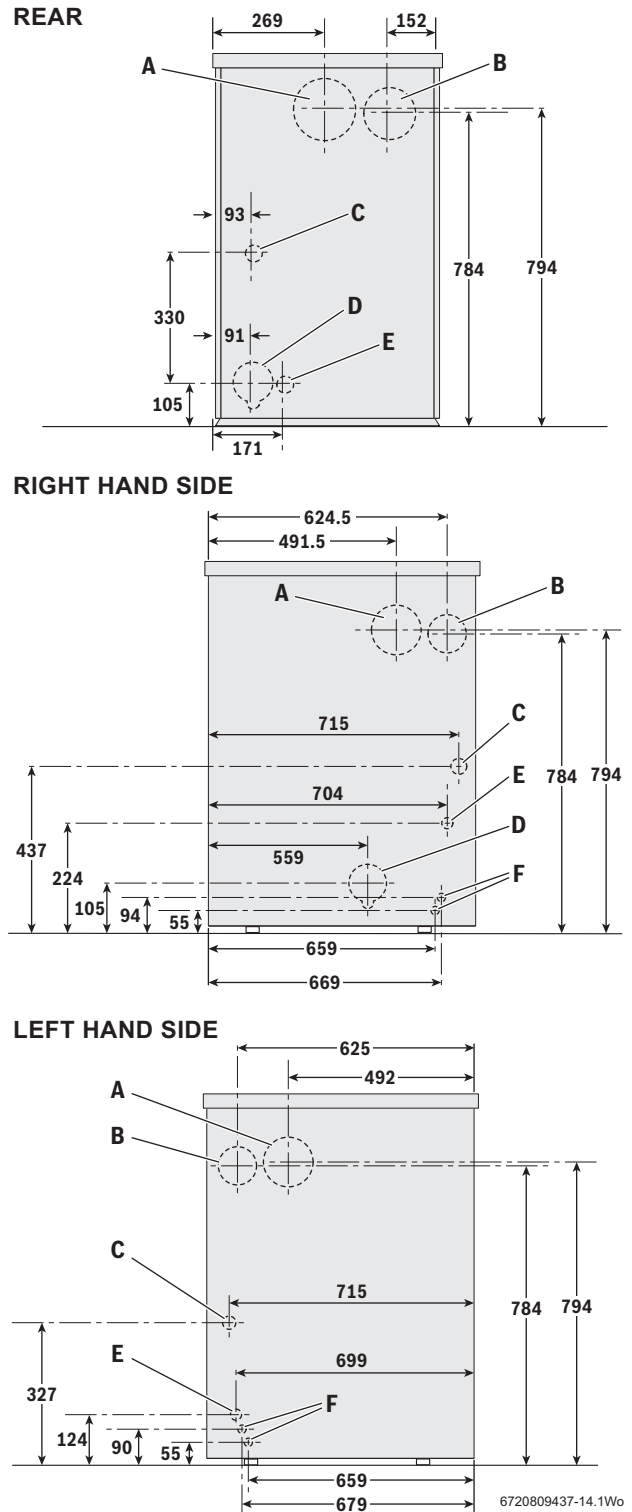


Fig. 26 Pipework and flue positions (all measurements in mm)

- [A] Flue
- [B] Services
- [C] Condensate
- [D] Fire valve & drain access
- [E] PRV (Pressure Relief Valve)
- [F] Oil



CAUTION: Drilling

- ▶ Ensure there are no pipes, electrical 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.



For servicing purposes, keep condensate discharge pipe away from components and pipework connections.

Pipework connections - Regular

- Flow connections (optional combined feed and vent) 1" BSP
- Return connections 22mmØ copper on 12/18, 18/25 models and 28mmØ copper on 25/32 models
- Condensate outlet 21.5mm Ø

Pipework connections - System

- Flow connections 12/18 & 18/25 - 22mm Ø , 25/32 - 28mm Ø .
- Return connections 22mmØ copper on 12/18, 18/25 models and 28mmØ copper on 25/32 models
- Condensate outlet 21.5mm Ø
- PRV - 15mm

5.3 Boiler installation

- ▶ Mark position of the 100mm services duct on the exterior wall and make a hole through.
- ▶ Remove the screws [1] securing the base panel to the transit pallet and lift the boiler off the pallet and into its installation position taking care not to scrape the base panel across the hard standing.
 - Do not attempt to lift and position the boiler on your own.
 - Do not use the copper pipes to move the boiler.
- ▶ Fasten the base to the hard standing using the holes provided. Care should be taken to ensure that the base is level.
- ▶ Remove the key for the door fasteners from the literature pack.
 - Undo the screws at the bottom of the front panel (using the key provided) and remove the screws from the rear panel pulling both panels down and out to remove. Store safely away from the installation point.
- ▶ Remove the screws from the top panel and lift up to remove, store safely away from the installation point. Remove the screw tool from the installation pack.

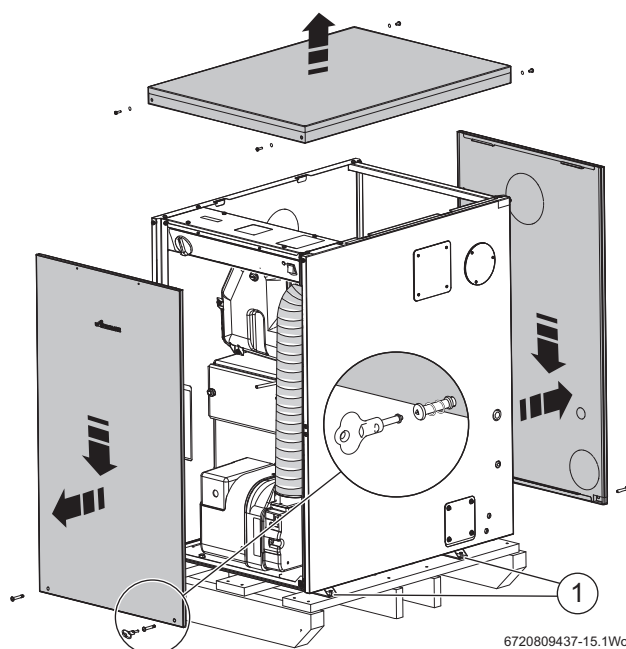


Fig. 27 Access to boiler

- ▶ Unplug burner lead [1] from control box.
- ▶ Unscrew to loosen the retaining ring [4] that secures the flexible air supply tube [3] to the burner and remove from the burner.
- ▶ Undo and remove the retaining nut [2] on the top of the burner. The burner can now be removed from the heat exchanger. Store the burner and retainer nut safely away from the boiler.
- ▶ Measure the 100mm Ø services duct to give at least 10mm inside the casing and to finish flush with the interior wall surface, cut to size and fit the duct. Fit the 100mm sealing ring where the duct enters the casing and seal the joint to the exterior wall and inside the cabinet with a suitable sealant.

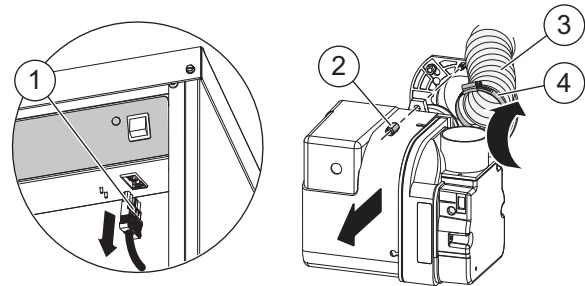


Fig. 28 Disconnecting burner

- ▶ Measure the 100mm Ø services duct to give at least 10mm inside the casing and to finish flush with the interior wall surface, cut to size and fit the duct. Fit the 100mm sealing ring where the duct enters the casing and seal the joint to the exterior wall and inside the cabinet with a suitable sealant.

5.4 Flue installation

Installation notes

- ▶ Ensure all the seals are in good condition and seated properly.
- ▶ To ease assembly of flue components, grease seals lightly with the solvent free grease supplied.
- ▶ A terminal guard must be fitted if the terminal is 2m or less above a surface where people have access.
- ▶ Lightly grease the flue cowl seal with the solvent free grease supplied.
- ▶ Carefully remove the blanking plate from the appropriate flue aperture (if necessary) and refit the blanking plate in the unused aperture.
- ▶ Carefully remove the insulation from the flue aperture in the cabinet that the flue is to pass through, and fit to the unused aperture (if necessary).
- ▶ Refer to the flue manual supplied with the flue kit for flue installation.

5.5 Combustion chamber (18/25 Regular shown)

- ▶ Unscrew screws and remove flue manifold access cover [5].
- ▶ Check that all the baffles [2] and baffle retainer [3] are correctly fitted to the secondary heat exchanger. Hook the retainer [1] over the end two baffles.
- ▶ Release retaining nuts and washers and remove baffle/combustion chamber access door [5].
- ▶ Ensure one piece baffle set [6] is in the right location, correctly resting on the baffle rests [7] on either side of the combustion chamber and pushed securely into place.

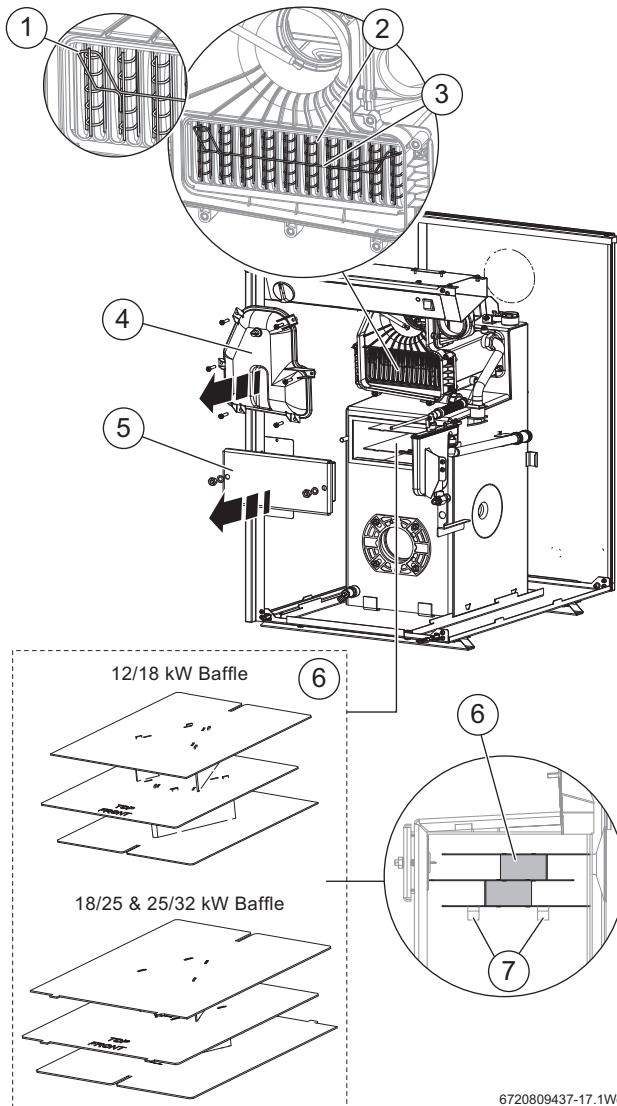


Fig. 29

- ▶ Secure baffle/combustion chamber access door [5] with nuts and washers. Tighten until door is firmly secured. Do not overtighten the nuts.

5.6 Pipework connections



CAUTION: MAINS SUPPLIES

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

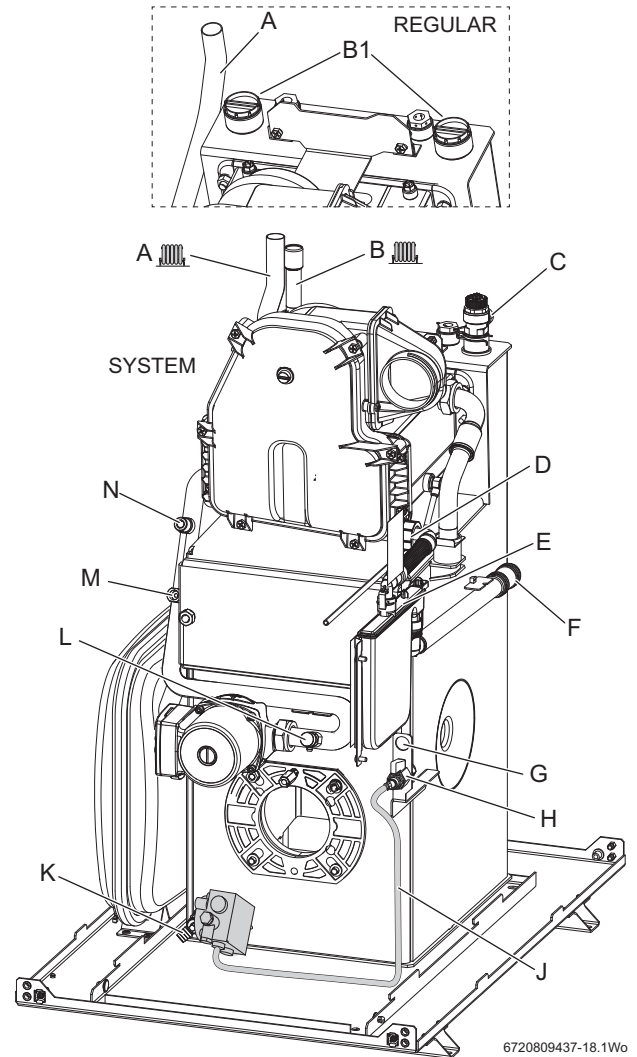


Fig. 30 Pipework connections

- [A] Return connection 22mm Ø copper (28mm Ø on 25/32 models)
- [B] Flow connection 22mm Ø copper (28mm Ø on 25/32 models)
- [B1] Flow & optional combined feed and vent 1" BSP
- [C] Pressure relief valve
- [D] Flue manifold condensate outlet
- [E] Condensate trap - supplied
- [F] Condensate outlet & flexible push fit connection (21.5mmØ)
- [G] Fixing point for optional oil return pipe
- [H] Oil isolating valve (10mmØ)
- [J] Flexible oil hose and routing
- [K] Primary Drain (hose connection)
- [L] Pump circuit drain point
- [M] Pressure gauge connection
- [N] Expansion vessel connection

Water connections



Surplus water may be present due to factory testing.

- ▶ Remove the transit bungs from the pipework connections on e boiler.
- ▶ Ensure all of the pipework is clean.
- ▶ Align the water pipework and connect.
- ▶ Check that all the unused sockets have been capped.

Return pipe connection

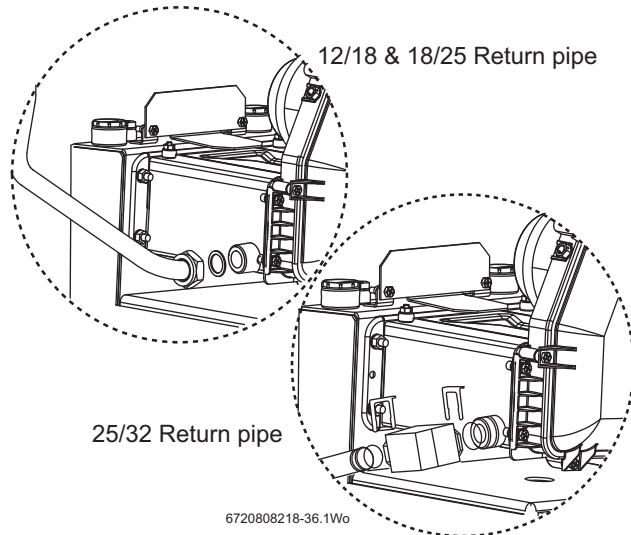


Fig. 31 Return pipes

Oil supply connections

- ▶ Refer to figure 30 and ensure that the isolating valve (H) is closed and route the oil supply pipe along the right side of the boiler and connect to the isolating valve (H).

Condensate connection

- ▶ Connect the 21.5mm polypropylene pipe (not supplied) to the condensate waste pipe flexible push fit connector [F] figure 21 and terminate to waste. Do not use any solvents, adhesives or lubricants when pushing the pipe into the flexible push fit connector [F] figure 21.
- ▶ Ensure that the condensate pipe runs away from the boiler at a constant fall of 52mm (minimum) for every metre.
- ▶ Carefully pour 500ml of water into the condensate collection [P] to fill condensate trap.
- ▶ Check the water is running away and the condensate pipework joints are water tight.
- ▶ Check the flue manifold seal is undamaged and seated correctly.
- ▶ Refit flue manifold access cover [R] and secure with screws [S].

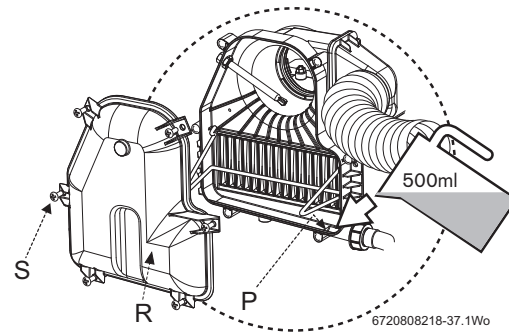


Fig. 32 Condensate

- [P] Condensate collection sump
- [R] Manifold access cover
- [S] Screws x 6

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.

Oil burner

NOTICE: IMPORTANT INFORMATION

- ▶ Before removing or fitting a nozzle [3], loosen screw [2] (figure 33) and move the electrodes [1] forward. After refitting check that the electrode gaps are correct, as shown in figure 34.
- ▶ Whenever replacing the combustion head, ensure that the photocell is lined up with the sight hole.
- ▶ The 12/18 model has a brass deflection washer [4] figure 34 and locating circlip [5] figure 34 behind the nozzle. These must be in place for the correct operation of the burner.

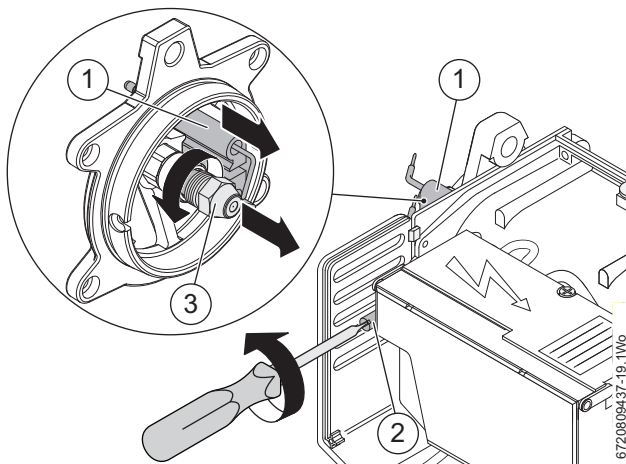


Fig. 33 Nozzle access

- ▶ Check that the nozzle [1] and the electrode [2] alignment settings are correct as shown in figure 34.
- ▶ Ensure that the nozzle [1] is aligned centrally within the combustion head [3].
- ▶ Inspect for any visible defects.

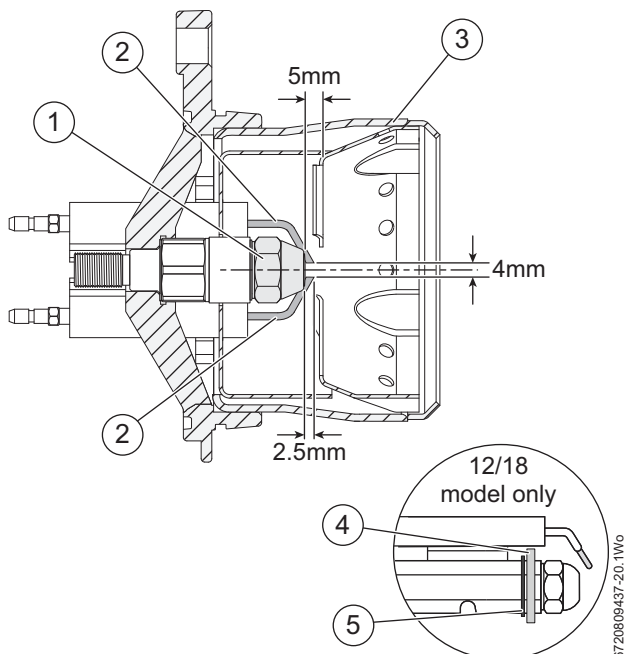


Fig. 34 Nozzle and electrode alignment

Oil pump

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.

Converting the oil pump for a double pipe system:

- ▶ Check the inlet pipe connection.
- ▶ Unscrew return plug [1].
- ▶ Screw in by-pass screw [2] which will be found attached to the oil pump.
- ▶ 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 69, page 37.

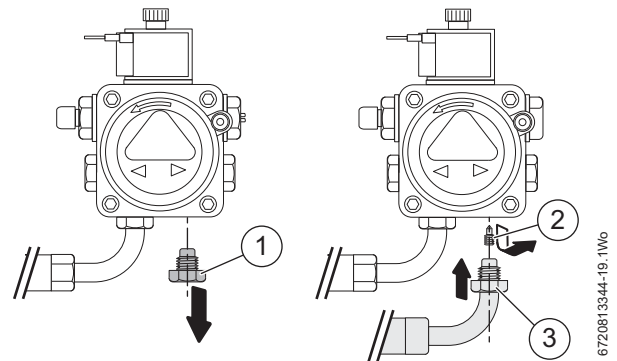


Fig. 35 Converting to double pipe system

5.8 Refitting components

- ▶ Plug burner lead [1] into control box.
- ▶ Slide the burner into position in the heat exchanger and secure with the retaining nut [2] on top of the burner.
- ▶ Reposition the flexible air supply tube [3] over the burner air supply connection [5].
- ▶ Secures the flexible air supply tube [3] in place with the locking band [4].

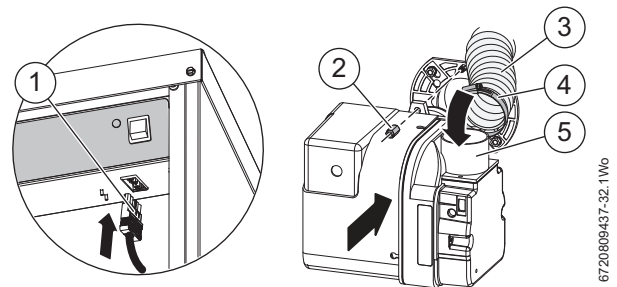


Fig. 36 Refitting the burner

5.9 Electrical

DANGER: 230 Volts

- ▶ Isolate the mains electricity supply before starting any work and follow all relevant safety precautions.
- ▶ External equipment operated at 230 volts should not be serviced or repaired under adverse weather conditions.
- ▶ Any external device connected to the boiler must take its power supply from the boiler supply only and must NOT have a separate supply.



This appliance provides a permanent external electrical supply for servicing and must therefore be fed via a circuit breaker incorporating earth leakage protection

Access to 230V connections

- ▶ Remove the four cover panel retaining screws [2] from the control box [1].
- ▶ Release screws [4] from cable clamp [7].
- ▶ Pull inner clamp part [6] outwards.
- ▶ Feed sufficient power cable [5] through the cable clamp [7] and secure grip with screws [4].
- ▶ Separate wires from cable end and strip to 6mm.

230V connections

- ▶ Connect LIVE wire (Brown) to terminal L.
- ▶ Connect NEUTRAL wire (Blue) to terminal N.
- ▶ Connect EARTH wire (Green/Yellow) to the earth terminal



Electrical power cable

- ▶ Route the power cable down the side panel using the clip provided on the support panel to the external connection point avoiding any potentially hot surfaces allowing sufficient cable to pivot the control box into the service position.

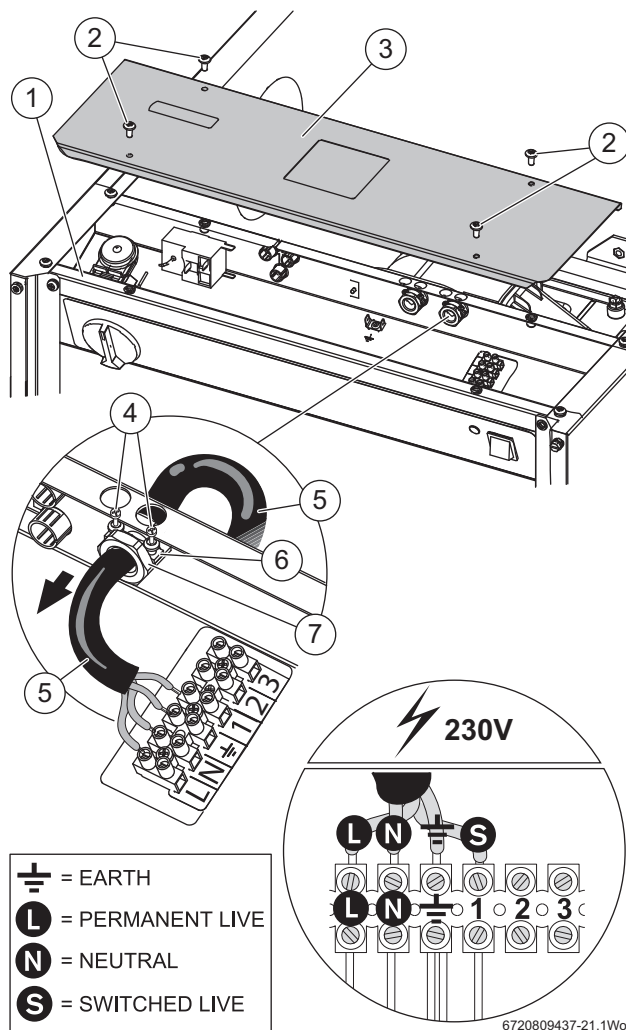


Fig. 37 Electrical connections



A frost thermostat is fitted as standard to the external appliance to provide frost protection.

Regular appliance electrical connections.

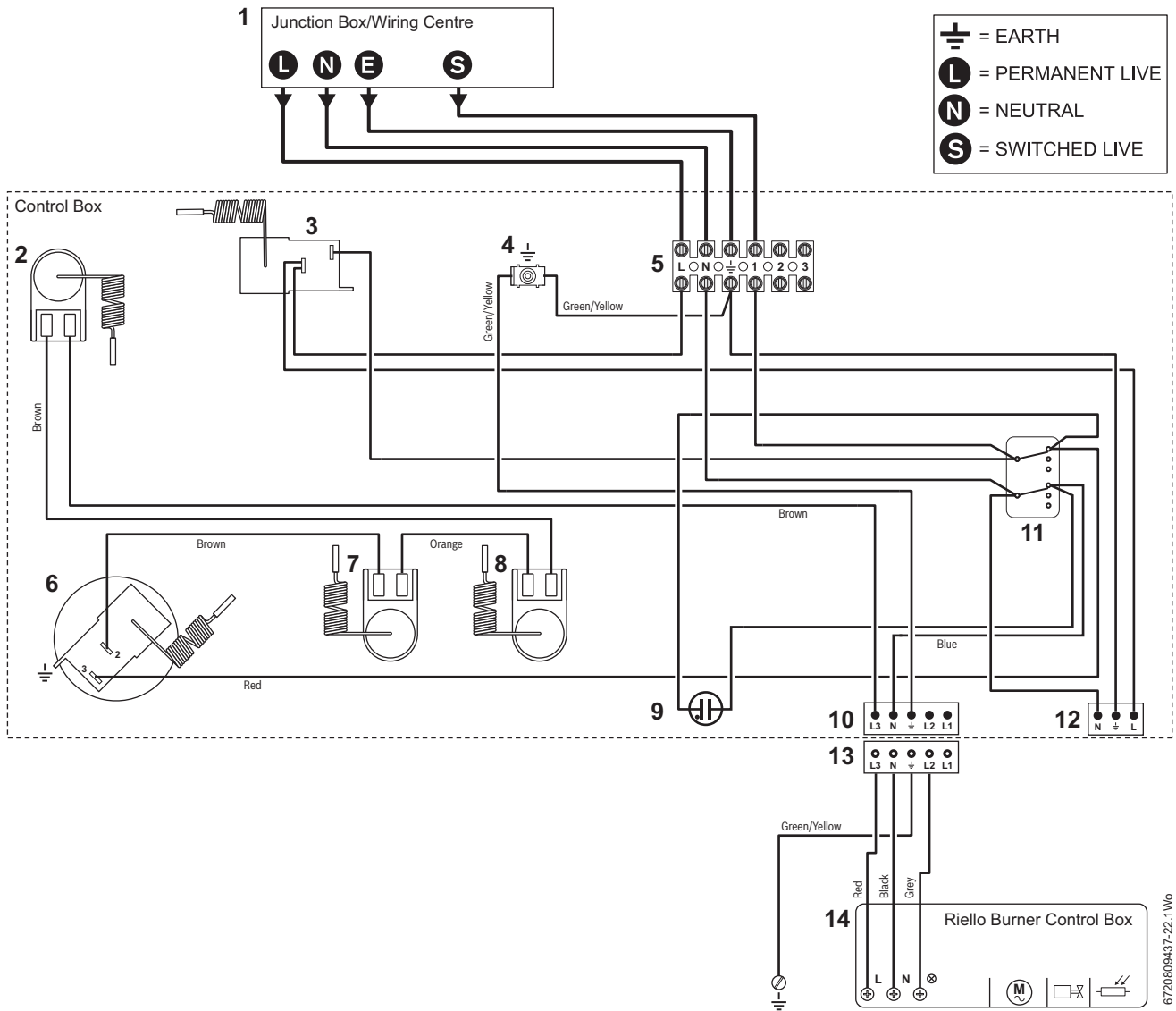


Fig. 38 Regular wiring diagram

Key to components:

- [1] Remote junction box (10 way).
- [2] High limit thermostat
- [3] Frost thermostat
- [4] Earth stud
- [5] Terminal connector block
- [6] Control thermostat
- [7] Flue manual reset thermostat
- [8] Boiler manual reset thermostat
- [9] Demand neon
- [10] Burner socket
- [11] Mode switch
- [12] Service socket connection
- [13] Burner plug
- [14] Burner control box

System appliance electrical connections.

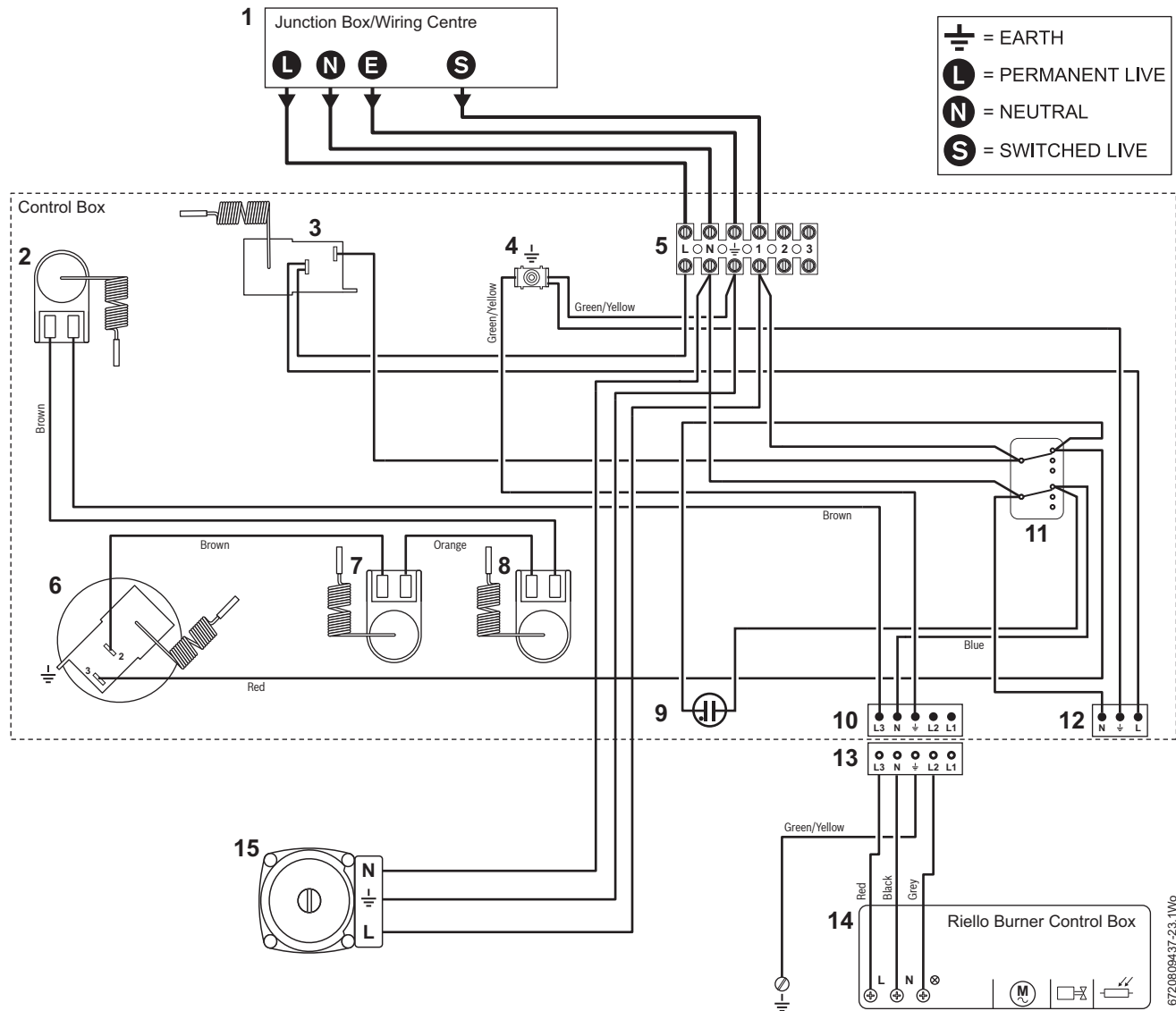


Fig. 39 System wiring diagram

Key to components:

- [1] Remote junction box (10 way).
- [2] High limit thermostat
- [3] Frost thermostat
- [4] Earth stud
- [5] Terminal connector block
- [6] Control thermostat
- [7] Flue manual reset overhear thermostat
- [8] Boiler manual reset overhear thermostat
- [9] Demand neon
- [10] Burner socket
- [11] Mode switch
- [12] Service socket connection
- [13] Burner plug
- [14] Burner control box
- [15] Pump

6 Commissioning

6.1 Pre-Commissioning checks - 18/25 Regular shown

CAUTION: 230 Volts

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

- ▶ Check that the service and water pipes are connected correctly.
- ▶ Check that all unused sockets are capped.
- ▶ Check that the oil supply is 28 second kerosene and that the pipework is connected correctly to the oil pump via the supplied flexible oil hose [2].
- ▶ Check that the burner is seated correctly on its mounting flange and that the oil hose/s are routed correctly.
See page 37, figure 69 for correct routing of the oil hose.
- ▶ Turn on the main oil supply valve at the tank, check the oil supply pipework and connections. Rectify any leaks.
- ▶ Check the flue is correctly fitted and the connections are secure.
- ▶ Check the condensate pipework [1] is correctly fitted and connected.
- ▶ Check the condensate trap is filled with water and discharging correctly.

NOTICE: If the boiler is not to be commissioned 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.
- ▶ Refit the top panel.

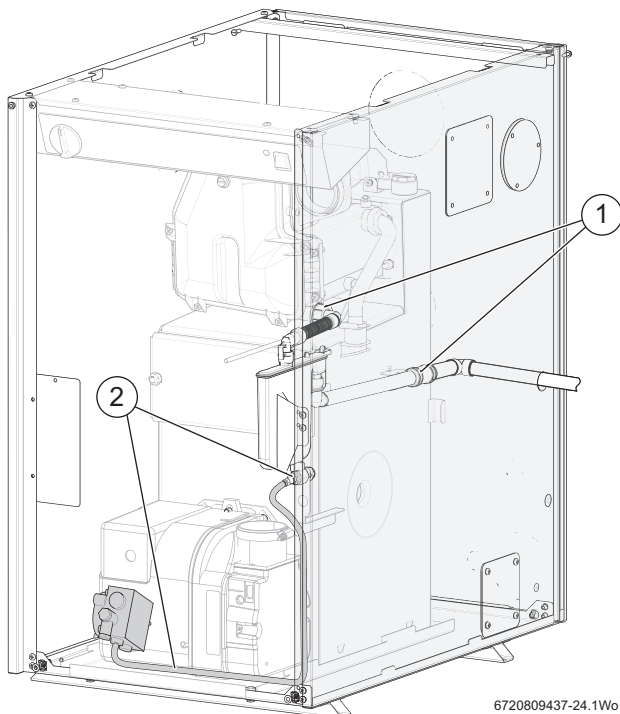


Fig. 40 Pre-Commissioning checks

6.2 Filling the system

- ▶ Open all system and radiator valves.
- ▶ Turn on the water main stop cock.
- ▶ Open vented systems only:
 - Turn on the water to the system feed and expansion cistern and allow the system to fill.
- ▶ Sealed systems only:
 - Check and if required, adjust the expansion vessel pressure using the Schraeder type valve.
- ▶ 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.
- ▶ Vent all radiators, retighten when completed.
- ▶ Check the system and correct any leaks.
- ▶ Bleed air from at least one of the secondary heat exchanger air vents (a radiator key is ideal for this). There are two venting bosses [1] on the top of the secondary heat exchanger. Only one can be used if fluing to the side.

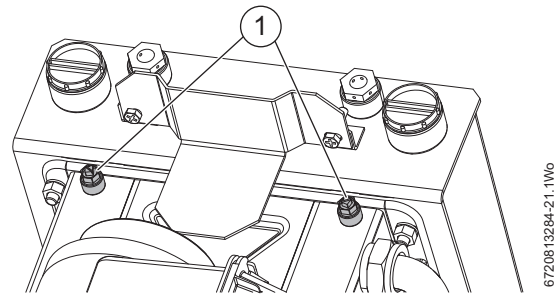


Fig. 41 Manual vent points

[1] Manual vent points (each side of the secondary heat exchanger).

6.3 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 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 manufacturers instructions.



The pH value of the system water must be less than 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 1bar.
- ▶ 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 obtain from the following manufacturers:

FERNOX	0870 601 5000 or www.fernox.com
SENTINEL	0800 389 4670 or www.sentinel-solutions.net

Table 7

6.3.1 Appliance drain points

- ▶ The appliance can be drained via the primary heat exchanger point [3]:
 - There is an additional drain point on the secondary heat exchanger [1].

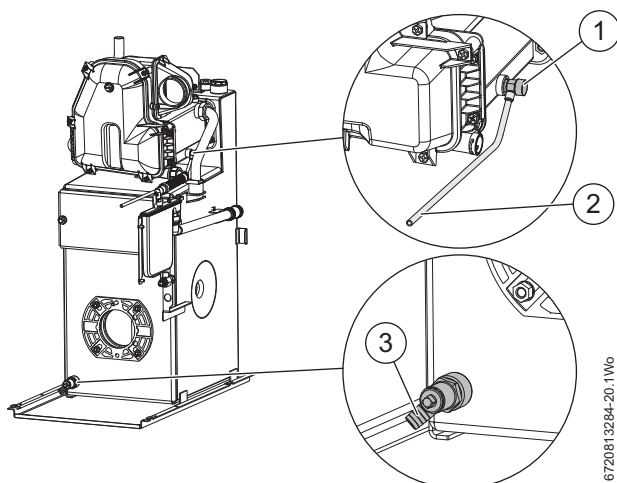


Fig. 42 Appliance drain points

- [1] Secondary heat exchanger drain point.
- [2] Secondary heat exchanger drain hose.
- [3] Primary heat exchanger drain point.

6.3.2 Appliance vent points

There are 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.

- ▶ Use a radiator key or suitable screwdriver to open the vent point.

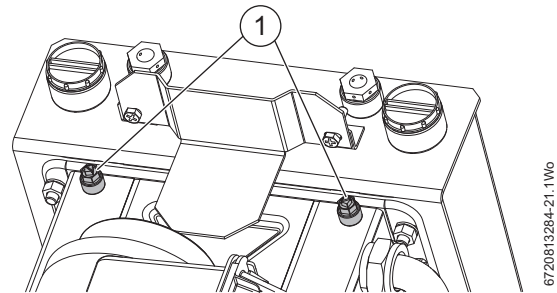


Fig. 43 Manual vent points

- [1] Manual vent points (each side of the secondary heat exchanger).

6.4 Starting the appliance



NOTICE:

- ▶ Never run the appliance when the appliance/system is unpressurised (sealed systems) or empty.

1. Check the oil supply is correctly fitted 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 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 procedure can be used - Single pipe gravity feed systems:

- ▶ Disconnect the flexible oil pipe 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 pipe.

Double pipe sub-gravity feed system and single pipe suction lift with de-aerator:

Refer to figure 44.

- ▶ 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 kerosene [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 as the oil is used until the oil is drawn from the tank. If the de-aerator empties and the burner locks out before the oil is drawn from the tank prime the de-aerator again.
- ▶ Open the isolating valve and the oil pump bleed valve [8] to discharge into a suitable container once the boiler is started up.

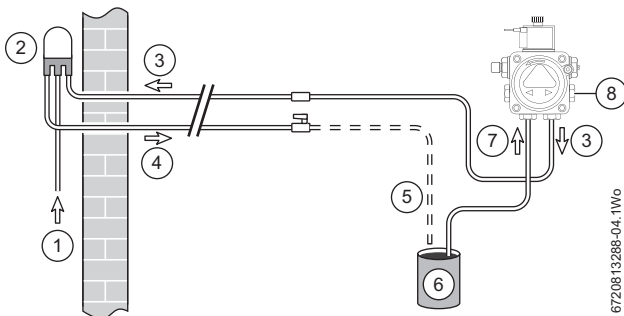


Fig. 44 Prime the oil supply pipework

- [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
- ▶ Switch on the electricity supply to the boiler.
 - ▶ Set the programmer to ON.
 - ▶ Turn on the boiler control thermostat.

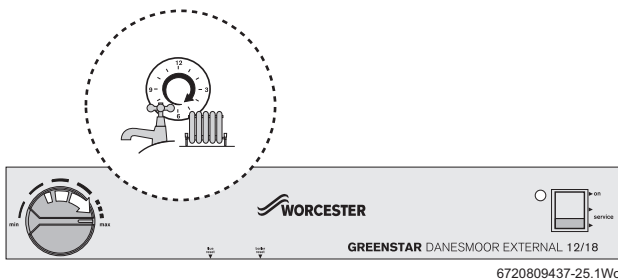


Fig. 45

- ▶ Allow the burner to run through to 'lock-out' indicated by the illumination of the lockout indicator on the lockout reset button [1], (note: some systems will not lock out).
- ▶ If lockout occurs wait 2 minutes then press the lockout reset button [1].

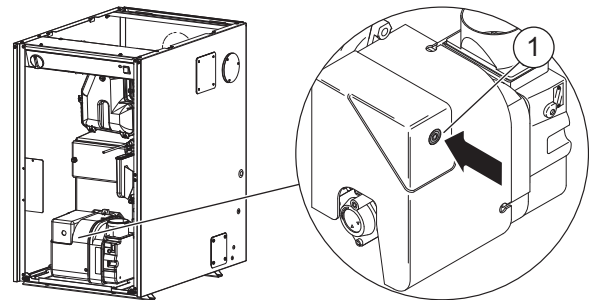


Fig. 46 Location of reset button

- ▶ Repeat the procedure at least 3 times or until a steady stream of oil, without air, runs from the bleed port.
- ▶ Switch off the boiler.
- ▶ Remove the oil pump filter, clean with kerosene and refit. The internal filter is accessed by removing the oil pump cover.
- ▶ Safely dispose of the container/discharge.
- ▶ Fit a suitable pressure gauge to port [3] on the oil pump.

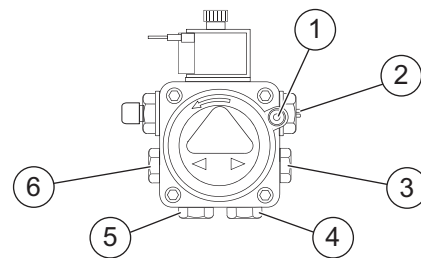


Fig. 47 Oil pump ports/connections

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

- ▶ Adjust the air shutter [3] figure 48 and pump pressure [2] figure 47 as shown in the table 8 on page 31. The burner should ignite following a pre-ignition period of approximately 15 seconds.
- ▶ If changing the burner output, check the position of the air damper disc is correct to the output as shown in the table below.

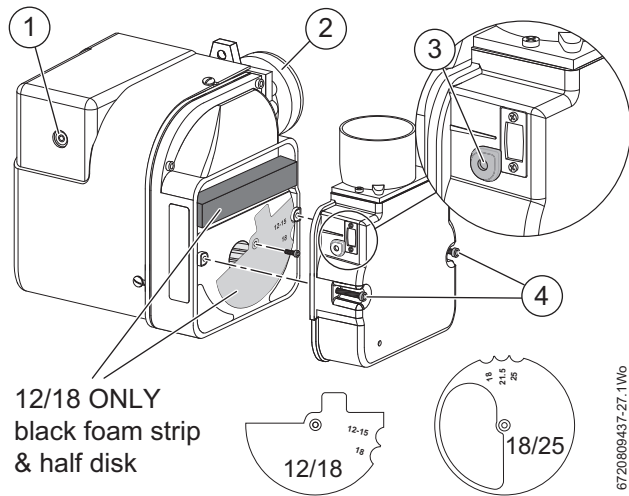


Fig. 48

- [1] Reset button
- [2] Blast tube
- [3] Air shutter adjuster
- [4] Captive screws air intake cover

i Adjust position of air damper discs to suit burner output (see table 8 on page 31), located as above. Access by undoing the two screws [4] to release the air inlet cover.

Boiler lock out indicator on:

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 by the illumination of the lockout indicator [1].

- ▶ Wait 2 minutes then press the lockout reset button [1] (see figure 49) to initiate another start sequence.
- ▶ Repeat procedure until a flame is established.

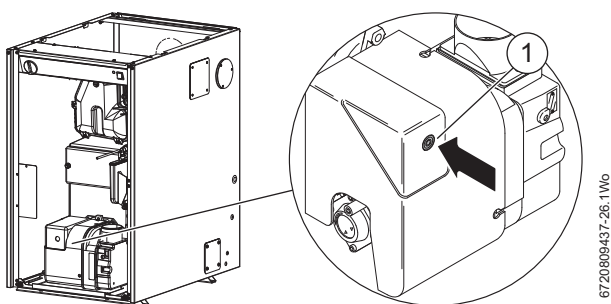


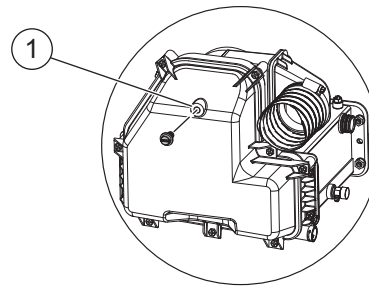
Fig. 49 Reset button

- ▶ Start and run for 3 minutes then switch off.
- ▶ Check for after-spurting from the nozzle, indicated by oil saturation on the combustion head [2] figure 51.

If after-spurting occurs:

- ▶ Release the burner retainer nut.
- ▶ Remove the burner, combustion head [2] figure 51 and electrodes, hold the burner vertical to unscrew the nozzle and fill the nozzle holder with kerosene.
- ▶ Refit nozzle, electrodes, combustion head [2] figure 51 and the burner.

- ▶ Restart and run for 3 minute intervals until after-spurting stops.
- ▶ Start and run for 20 minutes
- ▶ Remove sampling point plug [1] 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.



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Fig. 50

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

- ▶ Check the CO₂ levels and adjust the air shutter [6] figure 51 setting according to the table opposite.
- ▶ Check the flue gas temperature is close to the values shown in the table 8 on page 31.

i If the flue gas temperature is too high and the baffles are correctly fitted, then reduce the oil pump pressure [3] figure 51, 5-10 p.s.i. to compensate for nozzle variations. If the pump pressure has been changed, the CO₂ levels must be rechecked and air shutter adjusted if necessary.

- ▶ Turn off the electrical supply.
- ▶ Isolate the oil supply to the burner.
- ▶ Remove the oil pressure gauge.
- ▶ Refit the blanking plug [4] figure 51.
- ▶ Check and rectify any oil leaks.
- ▶ Switch on the oil supply.
- ▶ Switch on the electrical supply.
- ▶ Restart the boiler and run for 5 minutes.
- ▶ Recheck the CO₂ levels and if required, adjust the air shutter setting [6] figure 51 to obtain the correct CO₂ level.
- ▶ Refit the sample point cap (hand tighten only, do not over tighten) and refit the burner cover.

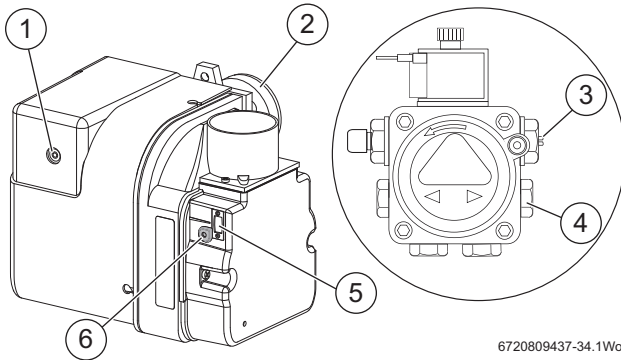


Fig. 51

- [1] Reset button
- [2] Combustion head
- [3] Pressure adjustment
- [4] Bleed and pressure gauge port
- [5] Air shutter display window
- [6] Air shutter adjuster

Central heating

- ▶ Open all radiator valves.
 - ▶ Set room thermostat to maximum.
 - ▶ Set programmer to ON for CH, OFF for DHW (if applicable).
 - ▶ Turn the thermostat control [1] to max.
- The demand indicator [2] should illuminate and the burner should be ON with the circulating pump.
- ▶ Ensure all radiators are heating up evenly and balance the system to the temperature difference required for the heating flow and return according to the heating load.
 - ▶ Set the room thermostat to minimum.
- The demand indicator light [3], burner and circulating pump should be off.
- ▶ Check that any other controls that are fitted to the system are operating properly.

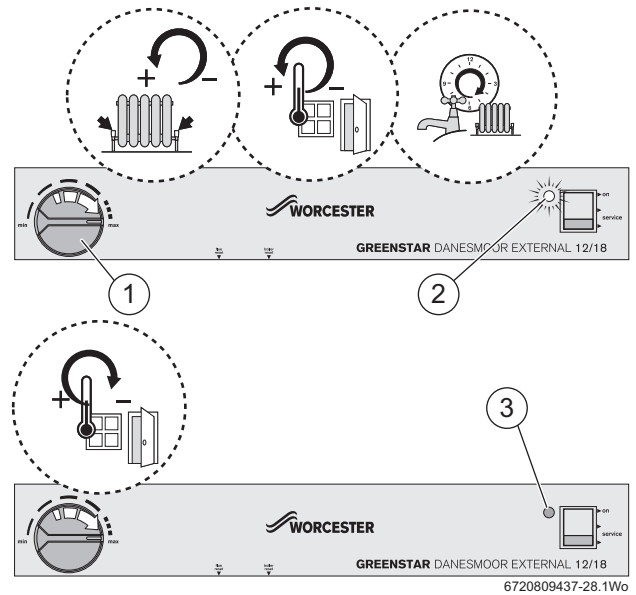


Fig. 52

Combustion settings

Nominal boiler rating at normal operating temperature using 28 second kerosene

Nozzle	Oil pump pressure (bar/psi)	Fuel flow rate		Approx. flue gas temp. °C	%CO ₂	Approx air setting	Input kW	Output kW	Air damper disk setting	Burner head
		kg/h	l/h							
Boiler 12/18 RDB 2.2										
0.35x80°SR	9/132	1.04	1.32	72	11.0	3.0	12.3	12.0	12/15	LD2X Short
0.45x60°ES	7.5/110	1.28	1.63	77	11.5	5.0	15.4	15.0	12/15	LD2X Short
0.55x80°EH	7.8/115	1.54	1.96	80	12.0	5.0	18.5	18.0	18	LD2X Short
Boiler 18/25 RDB 2.2										
0.50x80°ES	8.5/125	1.58	1.96	76	11.5	3.0	18.5	18.0	18	LD2SX Short
0.60x60°ES	8.5/125	1.84	2.33	81	12.0	3.5	22.1	21.5	21.5	LD2SX Short
0.75x80°ES	7.5/110	2.15	2.72	87	12.0	4.5	25.7	25.0	25	LD2SX Short
Boiler 25/32 RDB 2.2										
0.75x80°ES	7.5/110	2.15	2.72	79	11.5	3.5	25.7	25.0	N/A	T2 Short
0.75x80°ES	10/147	2.45	3.11	81	12.0	4.5	29.4	28.5	N/A	T2 Short
0.85x80°EH	9.5/140	2.75	3.48	86	12.5	5.0	33.0	32.0	N/A	T2 Short

Table 8 Burner information



APPLIANCE MUST BE SET TO CO₂ LEVELS.
AIR SETTINGS GIVEN ARE APPROXIMATE ONLY, AS FLUE LENGTH AND NOZZLE VARIATIONS WILL AFFECT THIS.

6.5 Finishing commissioning

- ▶ Refit the top panel [2] and press down to compress the seal when fitting the securing screws [1].
- ▶ Push the front panel [4] up behind the top panel and push in at the base to secure with the screws [3] using the tool provided. Always apply pressure at the edges of the boiler panels when securing to avoid accidental damage.

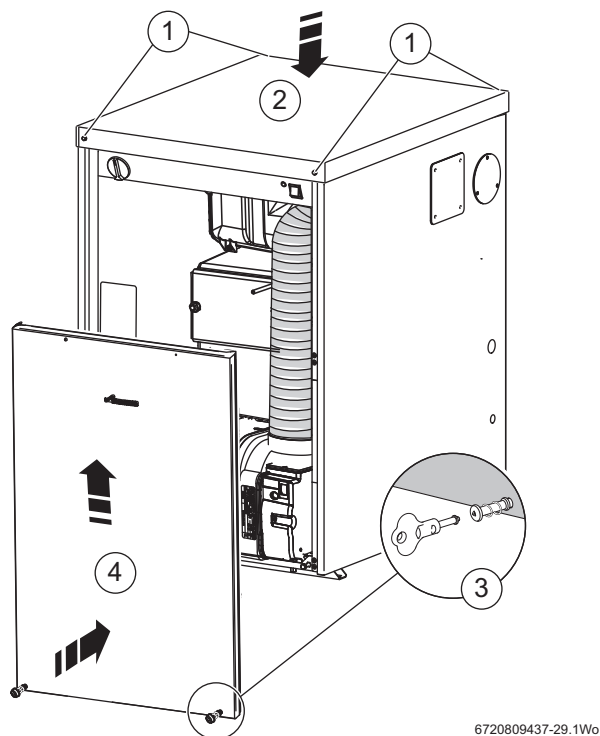


Fig. 53

6.5.1 Hand over

- ▶ Complete the Boiler commissioning checklist at the back of this manual and CD11 or an equivalent commissioning form.
- ▶ Set up the controls and show the customer how to operate all the controls shown in the User Guide plus any external controls.
- ▶ Instruct the customer on:
 - Sealed systems: The need to re-pressurise the appliance occasionally and the pressure expected at the pressure gauge.
 - Sealed systems: Location of the filling loop and system pressure gauge.
 - Sealed systems: The use of the filling loop and how to re-pressurise the system.
 - How to use the TRVs.
 - How to reset the appliance.
- ▶ Show the customer the fault finding information in the User guide.
- ▶ Show the customer where the serial number/appliance information is when they call in with a problem (Boiler commissioning checklist at the rear of the manual).
- ▶ Give the customer details of how to contact the installer/emergency numbers.
- ▶ Show the customer how to safely isolate the appliance.
- ▶ Advise the customer where they can find information on the Worcester, Bosch Group website www.worcester-bosch.co.uk.
- ▶ Advise the customer that the varying external temperatures will affect the output of the appliance, especially the DHW.
- ▶ Ensure that the User Guide and Installation, Commissioning and Service manual, with the Boiler commissioning checklist and service record, is left with the appliance or homeowner.

- ▶ If the appliance is unused and exposed to freezing conditions, shut off all the mains supplies and drain the system and appliance, label accordingly.
- ▶ Show the customer the location of the condensate pipe run for external/unheated areas that maybe at risk of prolonged cold temperatures.

6.5.2 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 components of the appliance which 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
- 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.

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

7 Service and Spares

7.1 Inspection and service - 18/25 Regular shown

	<p>CAUTION: MAINS SUPPLIES</p> <ul style="list-style-type: none"> ▶ 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.

Service requirements

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

- ▶ Check that the safety and regulation devices (3bar safety valve, air bleed, safety control box, etc.) are operating properly.
- ▶ Also check that neither the installation nor the appliance present any water or fuel leaks, (leaks may produce a risk safety and shorten the lifespan).
- ▶ Clean or replace all oil filters.
- ▶ When it is frequently necessary to add water to maintain pressure in the installation, even though no leaks have been discovered, perform an expansion vessel check.
- ▶ Check that the condensate system is not obstructed, clean and refill the condensate trap as necessary.
- ▶ Check the condition of the various seals (burner flange, burner door, flue outlet, etc.).
- ▶ Check and clean the burner.
- ▶ Replace the burner nozzle and flexible oil pipe/s.
- ▶ Check and clean the baffle retainers.
- ▶ Check the baffles.
- ▶ 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.

Sealed system only

The PRV is a safety device and must be checked for correct operation. The expansion vessel pressure must also be checked and adjusted if required.

Oil supply system and tank

- ▶ The oil pipeline, filters, fire valve and tank should be inspected and maintained in accordance with OFTEC regulations.

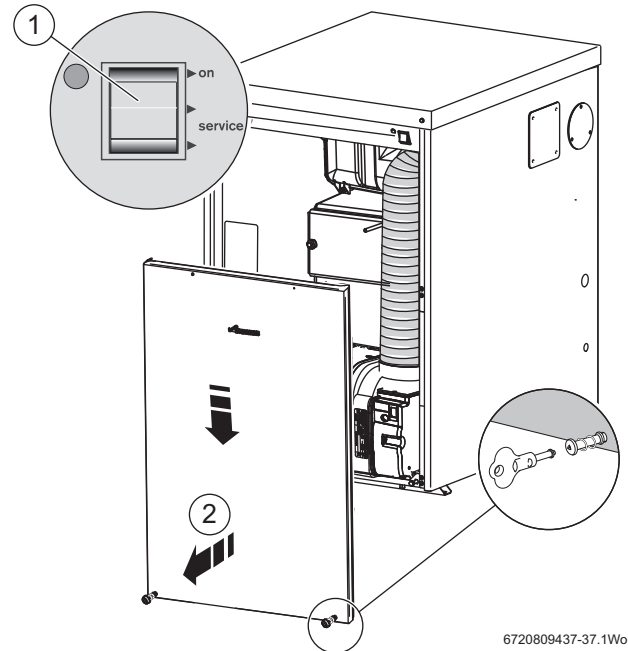
Fire valve

- ▶ 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 is provided for this purpose on the support bar between the side panels. The fire valve should be rated at 85 °C or above to avoid nuisance cut outs.

Pre-service checks

- ▶ Undo the screws at the base of the front panel [2] using the tool provided and pull the panel out and down to remove. 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.

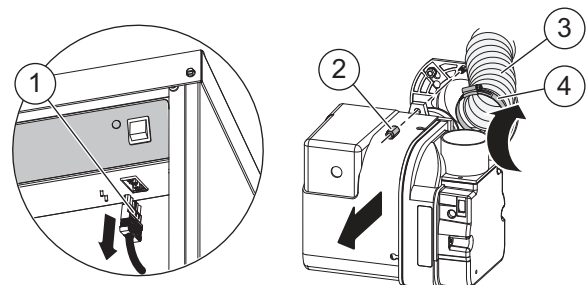
- ▶ Switch into service mode at switch [1].



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Fig. 54 Access to internal components

- ▶ Unplug burner lead [1] from control box.
- ▶ Unscrew to loosen the retaining ring [4] that secures the flexible air supply tube [3] to the burner and remove from the burner.
- ▶ Undo and remove the retaining nut [2] on the top of the burner. The burner can now be removed from the heat exchanger. Store the burner and retainer nut safely away from the boiler.



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Fig. 55 Disconnecting burner

7.2 Clean the appliance

7.2.1 Accessing the flue manifold and secondary heat exchanger

Flue manifold access and secondary heat exchanger:

Refer to figure 56

- ▶ Remove flue manifold access cover [1].

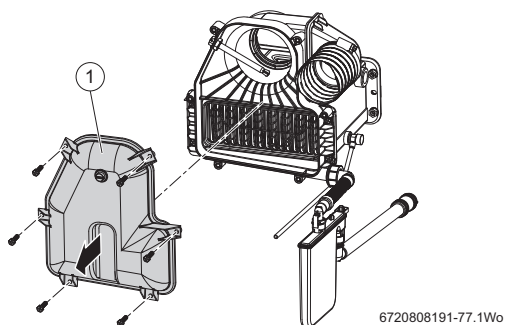


Fig. 56 Access to secondary heat exchanger

Flue system

- ▶ Check the flue system and clean if necessary.


Leaks can be detected through the appearance of condensate runoff traces on the outside of the flue.

- ▶ Check:
 - The inside of the outlet with an electric torch.
 - The connection to the flue manifold assembly.
 - The end of the outlet through and any joints.
 - Clean the burner air inlet tube.

7.2.2 Cleaning the flue manifold

Refer to figure 57

- ▶ Remove the baffle retainer [1] and baffles [2] from the secondary heat exchanger.
- ▶ Check and clean the secondary heat exchanger surfaces.
- ▶ Check that the condensate drain [3] is clear.



CAUTION: Damage to components!
Damage through use of wire brushes and cleaning agents to clean heat exchanger components.

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

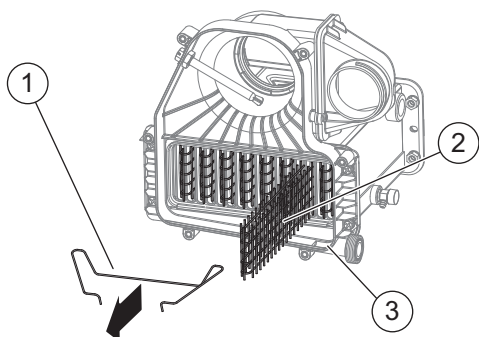


Fig. 57 Flue manifold cleaning

Secondary heat exchanger baffles and retainer checks

Refer to figure 58

- ▶ Refit all the baffles [2] and baffle retainer [3] are correctly fitted to the secondary heat exchanger. Making sure the retainer is hooked over the end baffle [1] of both sides.

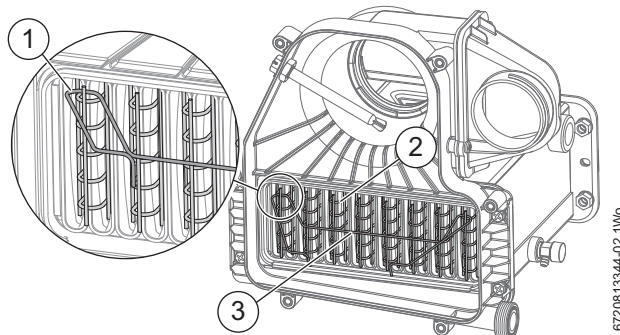


Fig. 58 Baffles and retainer checks

- ▶ Refit the manifold access cover once the cleaning (if required) and baffles and retainer checks are complete.

7.2.3 Combustion chamber baffle check

Refer to figure 59

- ▶ Release retaining nuts and washers [3] and remove baffle/combustion chamber access door [1].
- ▶ Ensure one piece baffle set [2] is in the right location, correctly resting on the baffle rests [4] on either side of the combustion chamber and pushed securely into place.

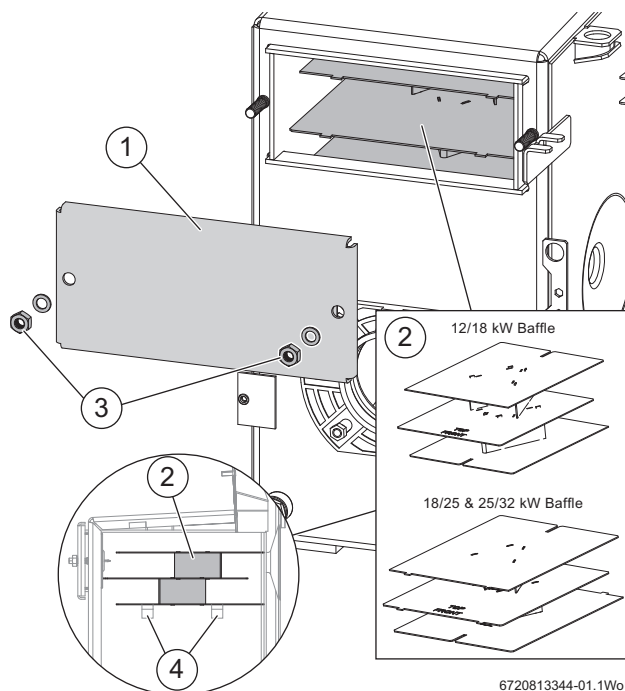
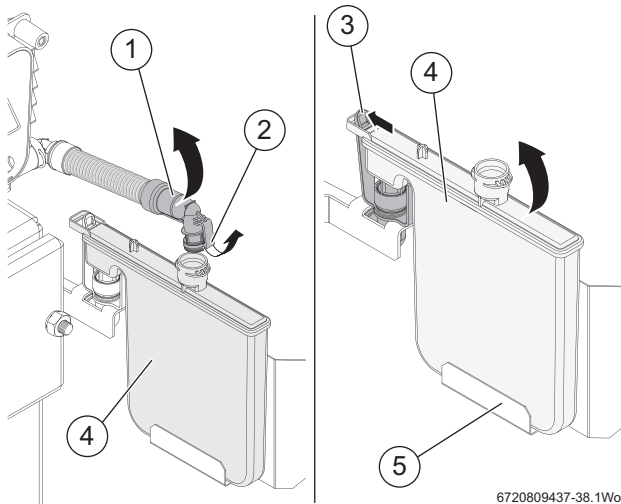


Fig. 59 Primary heat exchanger baffle check

- ▶ Secure baffle/combustion chamber access door [1] with nuts and washers [3]. Tighten until door is firmly secured. Do not overtighten the nuts.

7.2.4 Condensate system

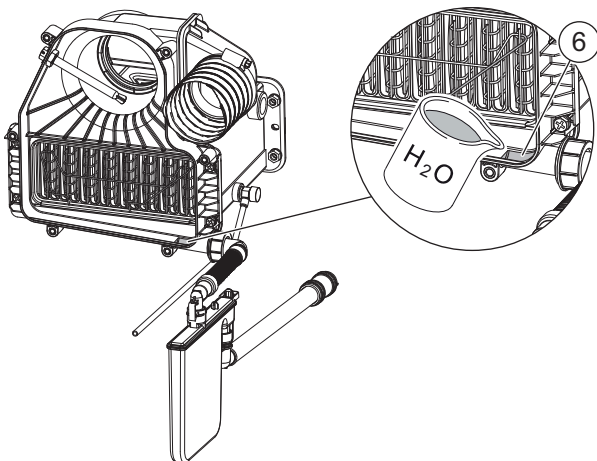
- ▶ Check the discharge pipe for leaks or damage. Condensate trap removal.
- ▶ Release the pipe locking tab [2] and lift connector [1] and flexible pipe away from the trap [4].
- ▶ Release the trap locking tab [3] and move the trap [4] up and back to remove from its mounting [5]
- ▶ Clean the trap by flushing with water and check pipework is free from obstruction.
- ▶ Check the O ring seals and replace if necessary, grease the seals with a solvent free grease.
- ▶ Refit the trap and connections, making sure that the locking tabs are locked in place.



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Fig. 60 Condensate trap removal

- ▶ Pour 500ml of water into drain [6] to refill the condensate trap. Ensure that the trap is discharging correctly and that all condensate pipework joints are water tight.



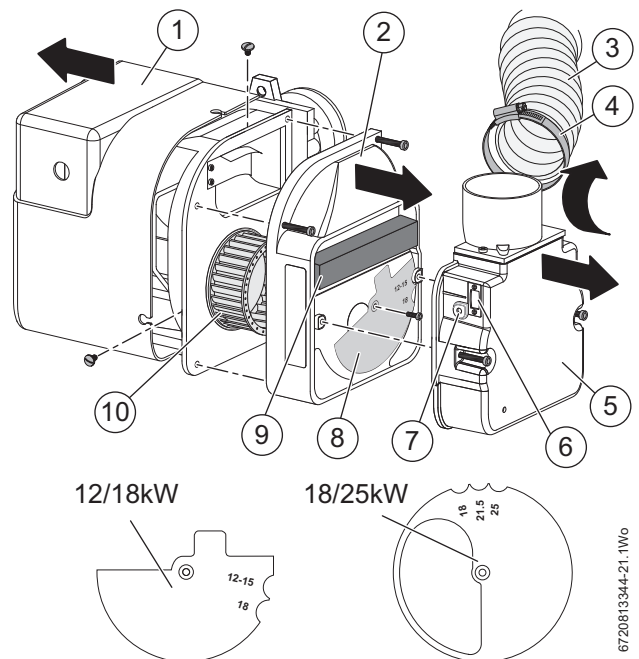
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Fig. 61 Refill the condensate trap

- ▶ Refit the flue manifold access cover item [1], figure 56, page 34 and secure with screws.

7.2.5 Clean the burner

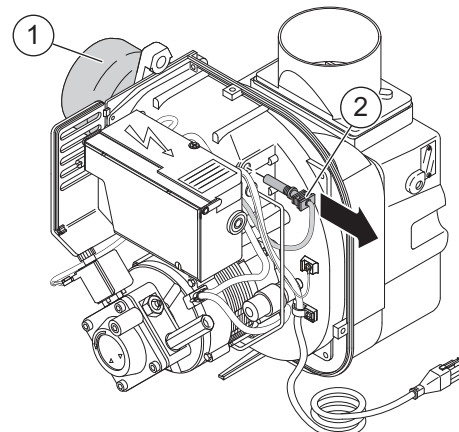
- ▶ Remove plastic cover [1] from the burner.
- ▶ Unscrew to loosen the retaining ring [4] that secures the flexible air supply tube [3] to the burner and remove from the burner.
- ▶ Loosen the 2 hex head screws and remove the air intake cover [5] and clear any debris from the air intake and air damper [2], (including the air damper disc [8], 12/18 & 18/25kW only).
- ▶ Check the condition of the black foam strip (12/18) [9].
- ▶ Note the position of the air damper adjustment [6] and check the air damper [7] moves freely.
- ▶ Loosen the 4 hex head screws to disassemble the burner [2] to allow access to the fan impeller [10].
- ▶ Check the condition of the gaskets between these parts and replace is necessary.
- ▶ Clean both sides of the fan impeller and remove any debris from the burner housing.
- ▶ Check the impeller [10] moves freely.
- ▶ Reassemble the components.



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Fig. 62 Disassemble burner for cleaning

- ▶ Withdraw the photocell [2] from its housing and wipe clean, then replace into housing. Ensure that the photocell is lined up with the sight hole.
- ▶ Remove combustion head [1], figure 63, page 35 and thoroughly clean any deposits.



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Fig. 63 Photocell cleaning

NOTICE:

- ▶ Before removing or fitting a nozzle [3], loosen and move the electrodes [1] forward.
- ▶ After refitting check that the electrode gaps are correct, as shown in figure 65, page 36

- ▶ Remove the nozzle [3].

i Do not dismantle the nozzle or clean the nozzle tip.

- ▶ Every annual service the nozzle should be replaced.

- ▶ Check the nozzle holder is clear of any debris and clean if necessary.
- ▶ Fit a new oil atomising nozzle [3].

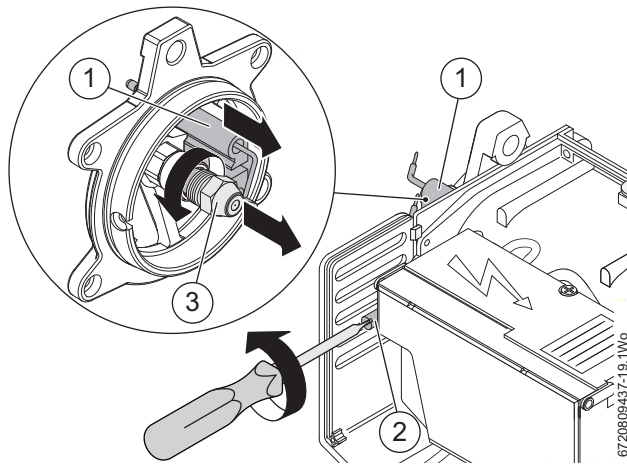


Fig. 64 Nozzle replacement

- ▶ Check the electrodes [2] and reset if necessary as shown.
- ▶ Refit the combustion head [3]. Check that the nozzle [1] is central in the combustion head [3] and the head settings are as shown.

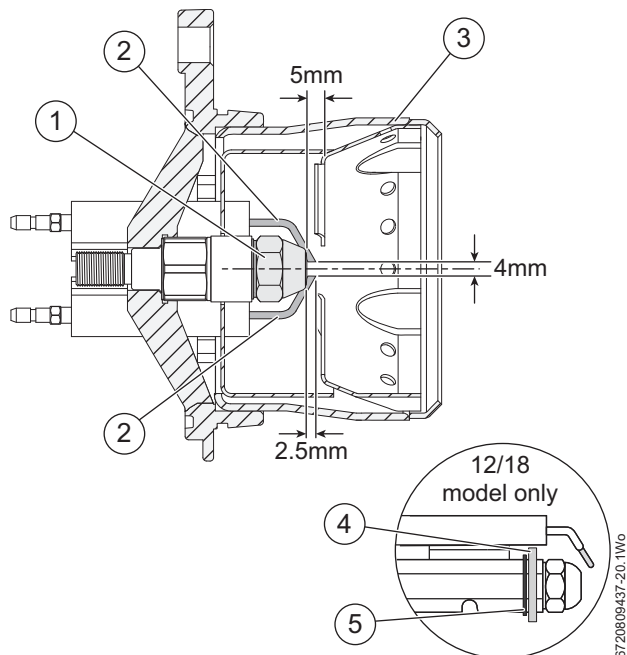


Fig. 65 Nozzle and electrode gaps

- ▶ Remove the oil pump internal filter [2], clean in fuel oil and reassemble.
- ▶ The internal filter is accessed by removing screws [3] and oil pump cover [1].

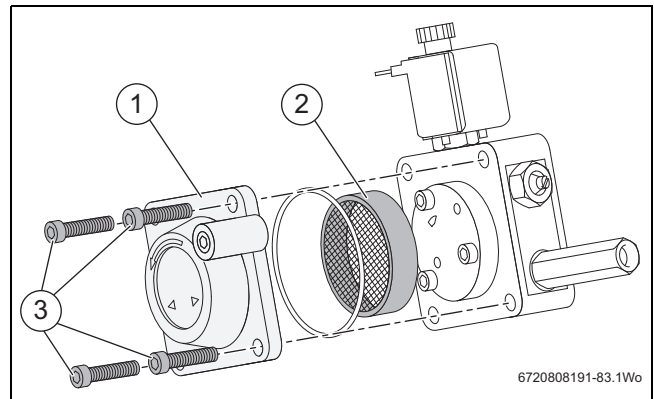


Fig. 66 Oil pump filter

NOTICE: Risk of oil leak!
Possibility of leakage due to ageing of oil supply pipe/s.

- ▶ Replace the standard flexible oil supply pipe/s at every annual service.

- ▶ Reassemble the burner components.
- ▶ Check the O-ring seal located around the combustion head and replace if necessary.

DANGER: Risk of escaping combustion gasses!
Leakage of combustions gasses from damaged or missing combustion head seal.

- ▶ Always check the seal around the combustion head before refitting the burner combustion head into appliance collar.

Re-commission the burner

i **Combustion settings**

- ▶ Refer to table 8, page 31.

- ▶ Remove plastic cover [1] from the burner.
- ▶ Fit a suitable pressure gauge to the bleed and pressure gauge port [2] on the oil pump.

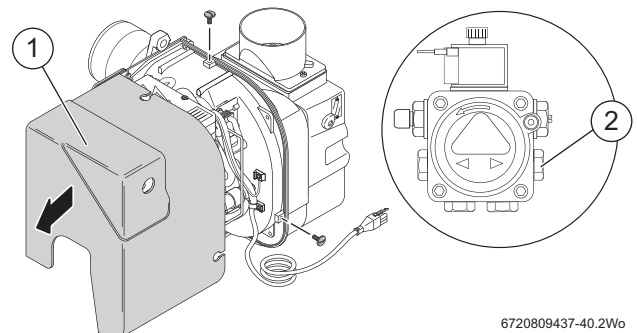


Fig. 67 Access to bleed and pressure gauge port

- ▶ Plug burner lead [1] into control box.
- ▶ Slide the burner into position in the heat exchanger and secure with the retaining nut [2] on top of the burner.
- ▶ Reposition the flexible air supply tube [3] over the burner air supply connection [5].
- ▶ Secures the flexible air supply tube [3] in place with the locking band [4].

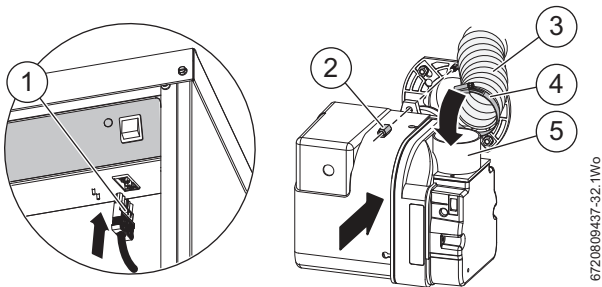


Fig. 68 Refitting the burner

- ▶ Create a demand, the burner should ignite following a pre-ignition period of approximately 15 seconds.
- ▶ Check:
 - Oil pressure is correct for the required appliance output.
 - Smoke reading is between 0 - 1.
 If the smoke reading is above 1:
 - ▶ Check the air setting.
 - If the air setting is correct:
 - ▶ Check that the burner has been reassembled correctly.
- ▶ Allow the appliance to warm up then:
 - Ensure that the CO₂ levels are correct as indicated in table 8, page 31.
 - Adjust the CO₂ if necessary using the air shutter.
 When the combustion settings are correct:
 - ▶ Remove the pressure gauge, refit the blanking plug and plastic cover.

Before hand over

- ▶ Make sure oil flexible line/s are routed correctly so to avoid being damaged or trapped.

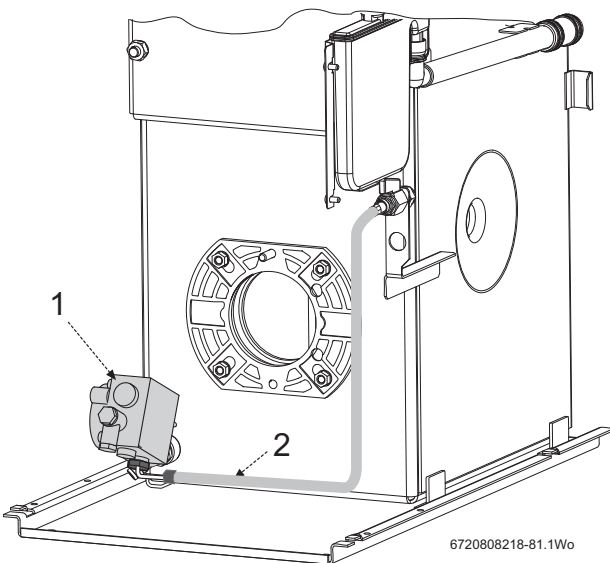


Fig. 69 Oil pump and hose detail

- [1] Oil pump
- [2] Flexible oil hose route. Ensure that the rigid 90° connection at the pump points to right when the boiler is viewed from the front and the flexible hose follows the route as show in the figure above.

- ▶ Refit the top panel [2] and press down to compress the seal when fitting the securing screws [1].
- ▶ Push the front panel [4] up behind the top panel and push in at the base to secure with the screws [3] using the tool provided. Always apply pressure at the edges of the boiler panels when securing to avoid accidental damage.

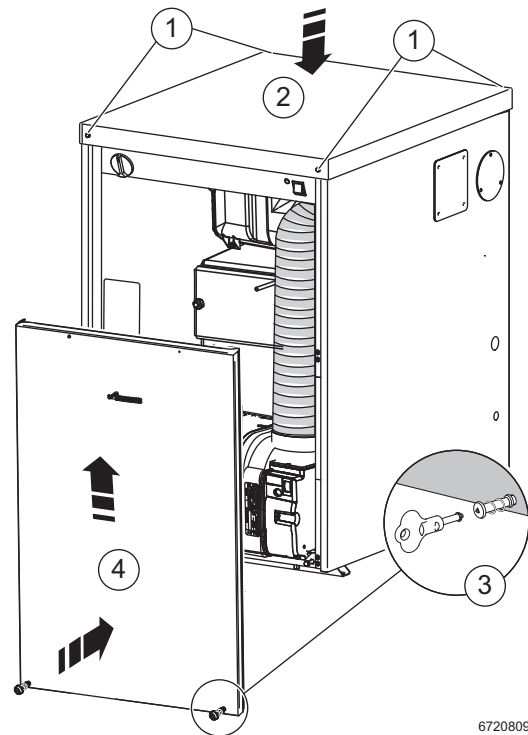


Fig. 70

After service hand over

- ▶ 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.

7.3 Short parts list 12/18

































 Cleaning tool 8 716 109 428 0	 Service lead 7 716 192 760
 Cabinet key 8 716 114 013 0	 Oil nozzle (12kW) 0.35 80° SR 8 716 112 628 0
 Oil nozzle (15kW) 0.45 60° ES 8 716 114 545 0	 Oil nozzle (18kW) 0.55 80° EH 8 716 156 671 0
 Flexible oil hose kit 8 716 115 310 0	 Combustion head O-ring seal 8 716 109 341 0
 Manifold access cover seal 8 716 107 536 0	 Secondary heat exchanger gasket 8 718 690 792 0
 Flue sample point screw 8 718 682 081 0	 Burner Riello RDB 2.2 12/18 8 718 690 333 0
 Combustion head LD2X SH12/18 8 716 112 731 0	 Control box 535 RSE/LD 8 716 109 203 0
 Photocell 8 716 109 193 0	 Ignition electrode 8 716 109 211 0
 Motor 8 716 110 522 0	 Riello RDB oil pump 8 718 689 342 0
 RDB pump drive coupling 8 716 109 245 0	 Nozzle holder 8 716 116 638 0
 Circlip 8 716 112 773 0	 Brass air restrictor washer 8 716 112 729 0
 Air damper disc 12/18 8 718 690 377 0	 Frost thermostat 8 716 142 393 0
 Control thermostat 7 716 107 621 0	 Auto reset overheat thermostat 8 716 107 623 0
 Manual reset overheat thermostat 8 716 107 625 0	 Manual reset flue thermostat 8 716 107 624 0
 Circulating pump 8 716 117 586	 Expansion vessel 8 715 407 288 0
 Pressure relief valve 8 718 681 163 0	 Pressure gauge 8 716 107 638 0

Table 9 Parts list

7.4 Short parts list 18/25































 Cleaning tool 8 716 109 428 0	 Service lead 7 716 192 760
 Cabinet key 8 716 114 013 0	 Oil nozzle (18kW) 0.50 80° ES 8 716 156 669 0
 Oil nozzle (21.5kW) 0.60 60° ES 8 716 156 680 0	 Oil nozzle (25kW) 0.75 80° ES 8 716 109 387 0
 Flexible oil hose kit 8 716 115 310 0	 Combustion head O-ring seal 8 716 109 341 0
 Manifold access cover seal 8 716 107 536 0	 Secondary heat exchanger gasket 8 718 690 725 0
 Flue sample point screw 8 718 682 081 0	 Burner Riello RDB 2.2 18/25 8 718 690 334 0
 Combustion head LD2X SH18/25 8 716 682 170 0	 Control box 535 RSE/LD 8 716 109 203 0
 Photocell 8 716 109 193 0	 Ignition electrode 8 716 109 211 0
 Motor 8 716 110 522 0	 Riello RDB oil pump 8 718 689 342 0
 RDB pump drive coupling 8 716 109 245 0	 Nozzle holder 8 716 116 638 0
 Air damper disc 18/25 8 718 690 458 0	 Frost thermostat 8 716 142 393 0
 Control thermostat 7 716 107 621 0	 Auto reset overheat thermostat 8 716 107 623 0
 Manual reset overheat thermostat 8 716 107 625 0	 Manual reset flue thermostat 8 716 107 624 0
 Circulating pump 8 716 117 586	 Expansion vessel 8 715 407 288 0
 Pressure relief valve 8 718 681 163 0	 Pressure gauge 8 716 107 638 0

Table 10 Parts list

7.5 Short parts list 25/32





























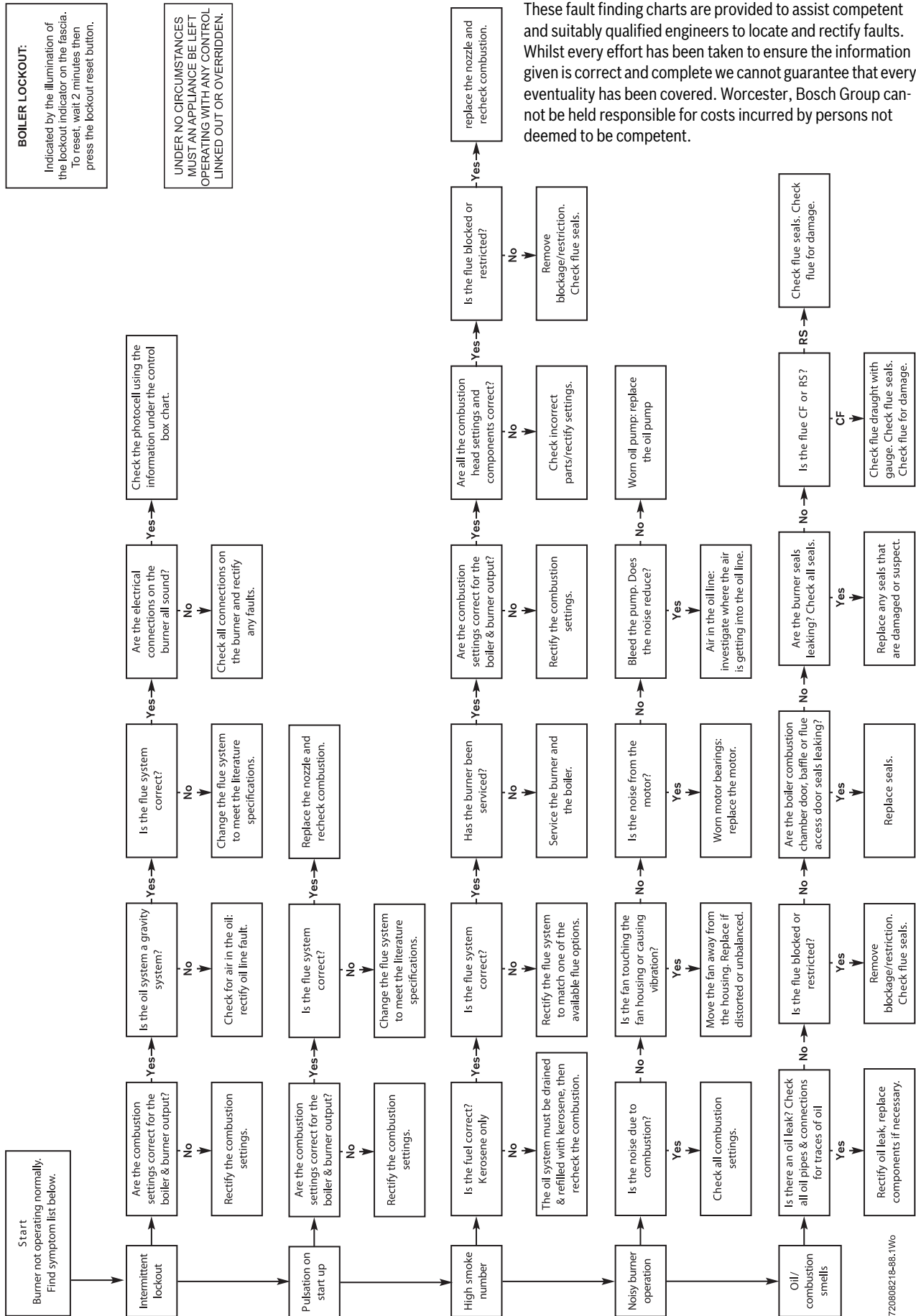
	Cleaning tool 8 716 109 428 0		Service lead 7 716 192 760
	Cabinet key 8 716 114 013 0		Oil nozzle (25 & 28.5kW) 0.75 80° ES 8 716 109 387 0
	Oil nozzle (32kW) 0.85 80° EH 8 716 156 644 0		Flexible oil hose kit 8 716 115 310 0
	Combustion head O-ring seal 8 716 109 341 0		Manifold access cover seal 8 718 682 849 0
	Secondary heat exchanger gasket 8 718 688 799 0		Flue sample point screw 8 718 682 081 0
	Burner Riello RDB 2.2 25/32 718 690 335 0		Combustion head LD2X SH 25/32 8 716 112 780 0
	Control box 535 RSE/LD 8 716 109 203 0		Photocell 8 716 109 193 0
	Ignition electrode 8 716 109 211 0		Motor 8 716 110 522 0
	Riello RDB oil pump 8 718 689 342 0		RDB pump drive coupling 8 716 109 245 0
	Nozzle holder 8 716 116 638 0		Frost thermostat 8 716 142 393 0
	Control thermostat 7 716 107 621 0		Auto reset overheated thermostat 8 716 107 640 0
	Manual reset overheated thermostat 8 716 107 625 0		Manual reset flue thermostat 8 716 107 624 0
	Circulating pump 8 716 117 586		Expansion vessel 8 715 407 288 0
	Pressure relief valve 8 718 681 163 0		Pressure gauge 8 716 107 638 0

Table 11 Parts list

8 Fault finding and diagnosis

8.1 Burner functions



These fault finding charts are provided to assist competent and suitably qualified engineers to locate and rectify faults. Whilst every effort has been taken to ensure the information given is correct and complete we cannot guarantee that every eventuality has been covered. Worcester, Bosch Group cannot be held responsible for costs incurred by persons not deemed to be competent.

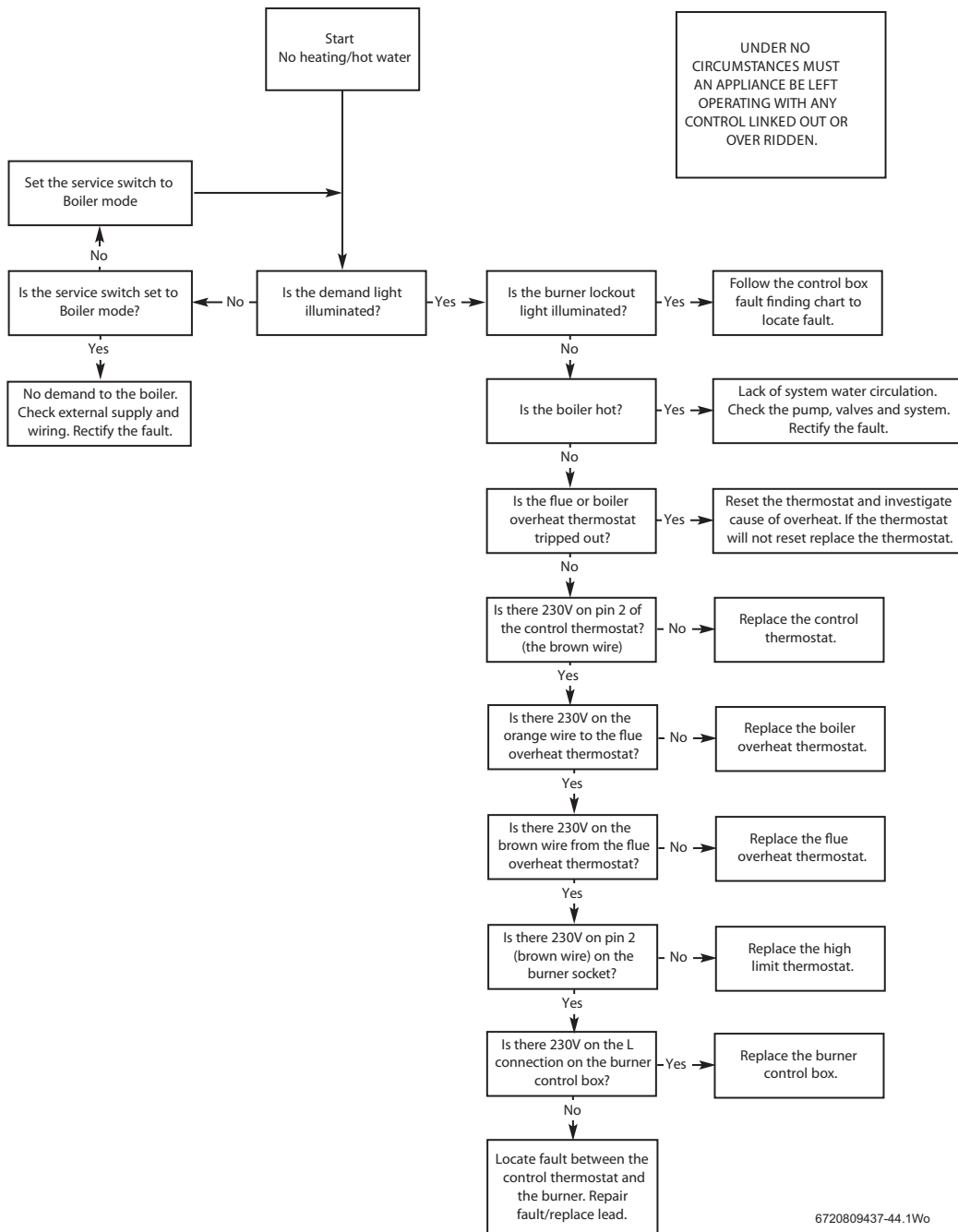
6720808216-68.1W0

8.2 Heating and hot water

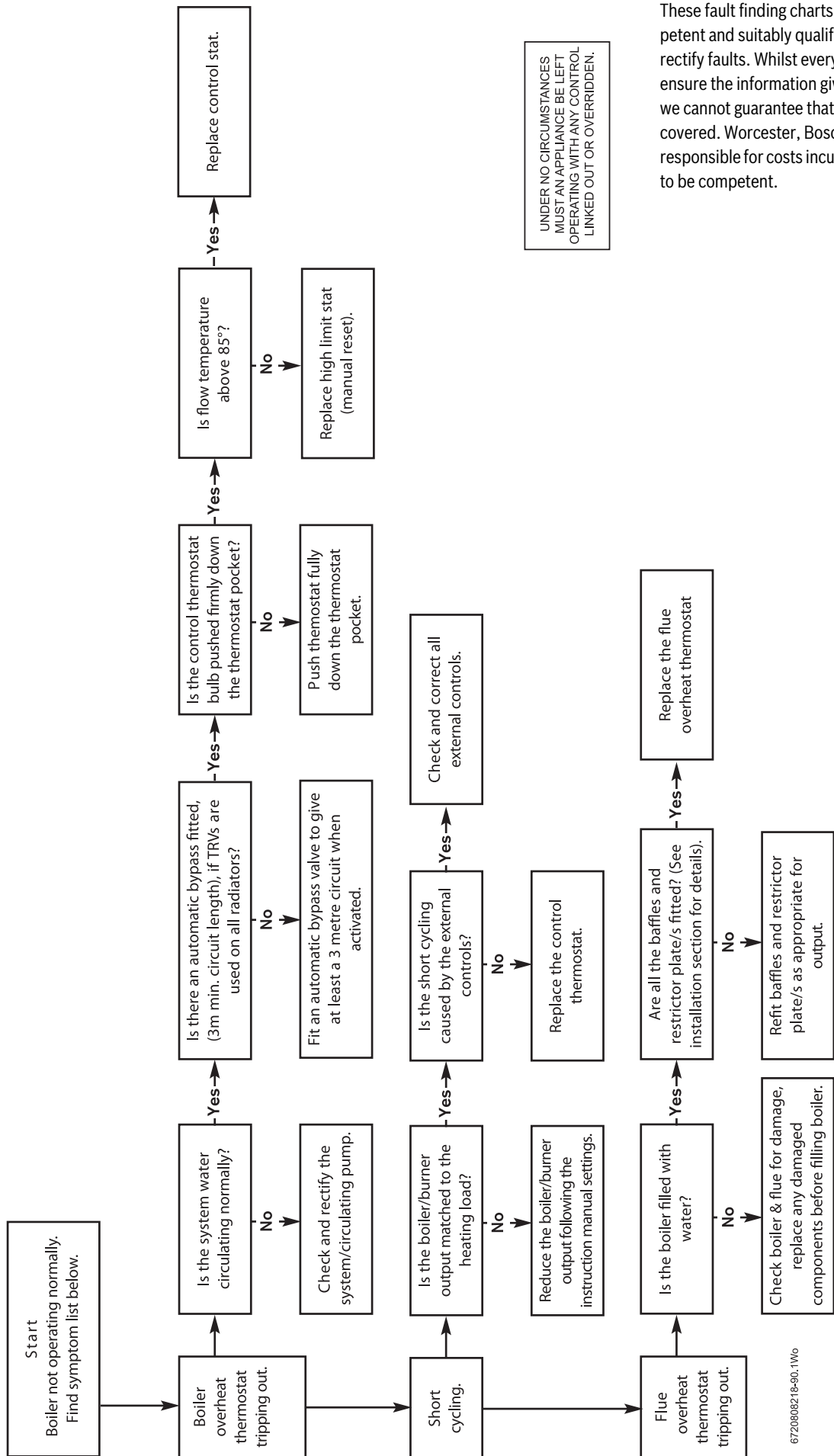
These fault finding charts are provided to assist competent and suitably qualified engineers to locate and rectify faults. Whilst every effort has been taken to ensure the information given is correct and complete we cannot guarantee that every eventuality has been covered.

Worcester, Bosch Group cannot be held responsible for costs incurred by persons not deemed to be competent.

Measure all 230V tests between Neutral (N) and the pin, wire or terminal specified.



8.3 Boiler function

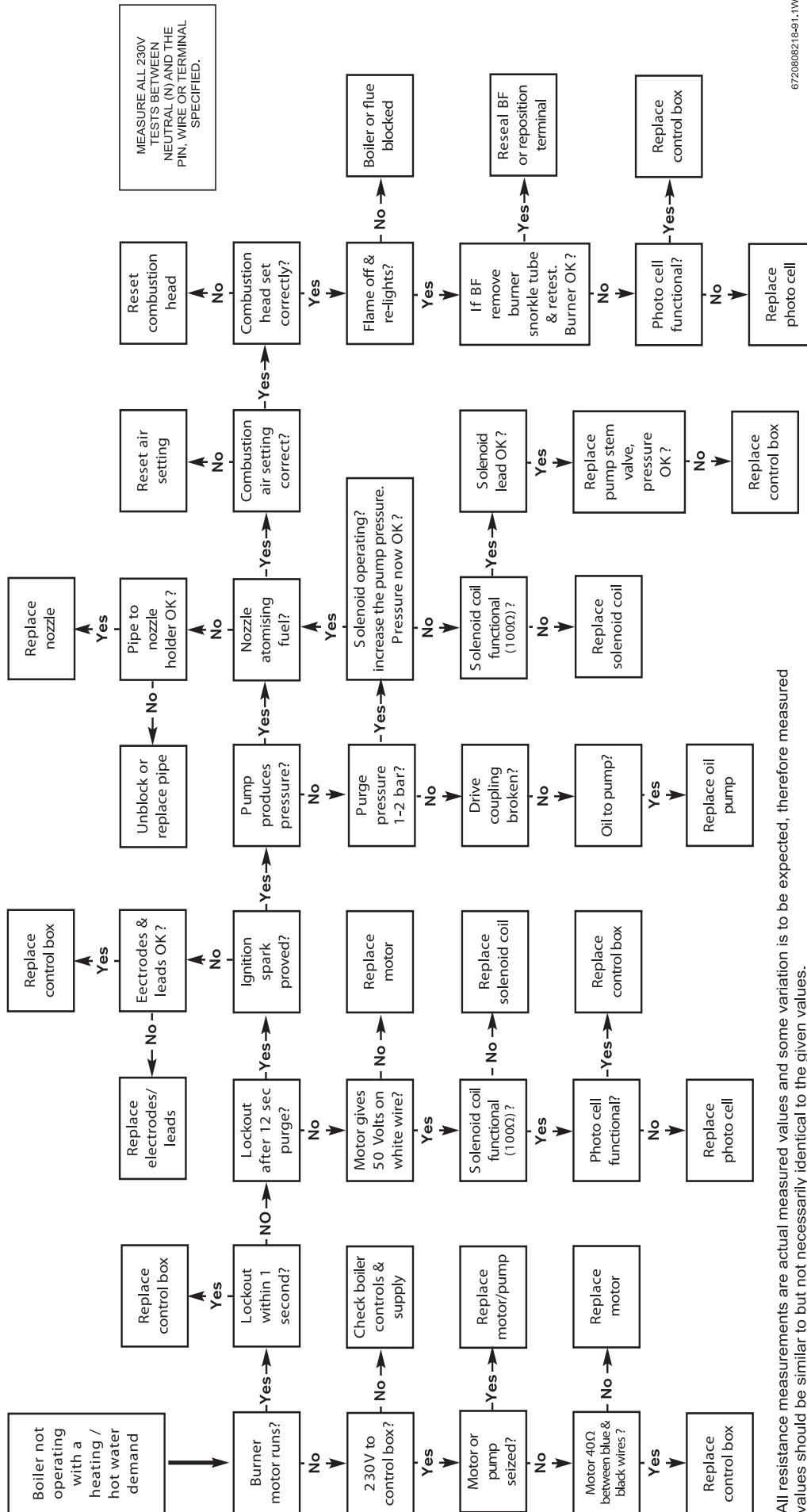


UNDER NO CIRCUMSTANCES MUST AN APPLIANCE BE LEFT OPERATING WITH ANY CONTROL LINKED OUT OR OVERRIDDEN.

These fault finding charts are provided to assist competent and suitably qualified engineers to locate and rectify faults. Whilst every effort has been taken to ensure the information given is correct and complete we cannot guarantee that every eventuality has been covered. Worcester, Bosch Group cannot be held responsible for costs incurred by persons not deemed to be competent.

672080218-90.1W6

8.4 Logic for the 535 SE/LD RDB control box



6720808215-91.1,1W0

All resistance measurements are actual measured values and some variation is to be expected, therefore measured values should be similar to but not necessarily identical to the given values.
The operation of the photo cell can be tested by measuring the resistance across the photo cell, it should be a high resistance (greater than 10MΩ or open circuit) in the dark and low resistance (3kΩ or less) in light.
Burners on balanced flue systems can recirculate flue products resulting in the burner cycling, if this happens check the flue system integrity and the terminal position.

8.5 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.

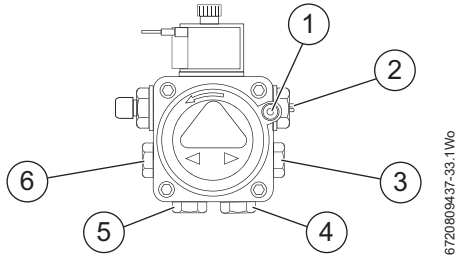


Fig. 71 Oil pump ports/connections

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

Notes

OIL BOILER COMMISSIONING CHECKLIST

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

Notes

BOILER DETAILS

Boiler Make and Model _____

Boiler 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

Pump Pressure PSI

CO₂ % CO ppm CO/CO₂ 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 Programmable Room Thermostat Load/Weather Compensation Optimum Start Control

Time and Temperature Control to Hot Water Cylinder Thermostat and Programmer/Timer Combination Boiler

Heating Zone Valves Fitted Not Required

Hot Water Zone Valves Fitted Not Required

Thermostatic Radiator Valves Fitted Not Required

Automatic Bypass Valve Fitted to System Fitted Not Required

Boiler Interlock Provided

ALL SYSTEMS

The system has been flushed and cleaned in accordance with BS7593 and boiler 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/BS6798 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

Cold Water Inlet Temperature °C

Hot Water Outlet Temperature °C

Water Flow Rate l/min

ALL INSTALLATIONS

Does the installation comply with current OFTEC Regulations? Yes No

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

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

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

IMPORTANT: LEAVE THIS MANUAL WITH THE HOMEOWNER

SERVICE INTERVAL RECORD

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

Service Provider

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

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

Service 1

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 2

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 3

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 4

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 5

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 6

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 7

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 8

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 9

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

Service 10

Date: _____

Engineer Name: _____

Company Name: _____

Telephone No. _____

OFTEC Register No. _____

Nozzle Changed? Yes No Pump Pressure: _____ *psi*

CO₂ _____ % CO _____ *ppm* CO/CO₂ ratio _____

F.G.T. _____ °C Flue Pressure: _____

Comments: _____

Signature: _____

In the unlikely event the boiler does not give complete satisfaction, before calling for a Service Engineer, the Installer should check the following:-

General checks

- ▶ Is the mode switch in boiler/ON mode?
- ▶ Is there 230V across the boiler live and neutral terminals?
- ▶ Is there 230V across the terminals 1 and N? If not there is no demand to the boiler from the controls or the control wiring is not correct.
- ▶ Is the polarity correct? (230V across live and earth, 0V across neutral and earth)
- ▶ Is the air bled from the primary system?
- ▶ Is the air bled from the oil supply?
- ▶ Is the flue sized and routed correctly?

Boiler runs straight to lockout

- ▶ Has the oil line been purged of air?
- ▶ 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.

No domestic hot water

- ▶ Is there a domestic hot water demand from the programmer and has the tank reached temperature?
- ▶ Is the circulating pump operating?
- ▶ Are the programmer, tank thermostat, circulating pump and diverter valve/zone valves wired correctly?
- ▶ Is there 230V across 1 and N? If not there is no demand to the boiler from the controls or the controls wiring is not correct.

No central heating

- ▶ Are both programmer and room thermostat on demand for central heating?
- ▶ Are the room thermostat, programmer, circulating pump and diverter valve/zone valves (if CH and DHW system) wired correctly?
- ▶ Is the circulating pump operating?
- ▶ Is there 230V across 1 and N? If not there is no demand to the boiler from the controls or the controls wiring is not correct.

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