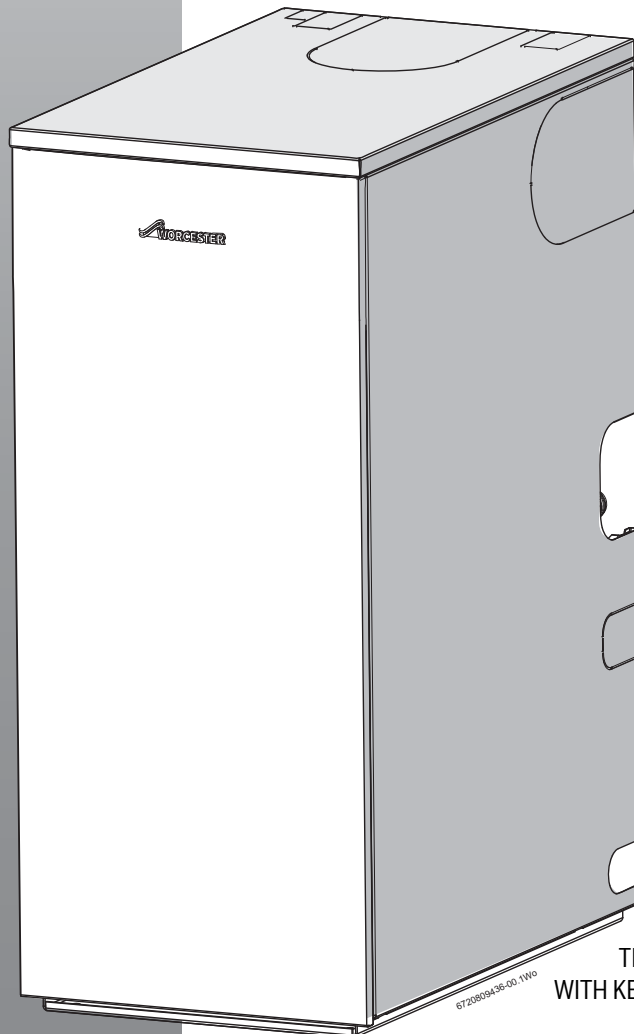


Installation, Commissioning and Servicing instruction manual
Floor Standing oil-fired Condensing Boiler Conventional Flue & Room Sealed Flue

Greenstar Danesmoor Utility Regular & Utility System 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 (28SECOND OIL) ONLY

UK


WORCESTER
Bosch Group


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1 Key to symbols and safety instructions

1.1 Key to symbols


Warnings

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

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

Additional symbols

Symbol	Explanation
▶	Step in an action sequence
→	Cross-reference to another part of the document
•	List entry
–	List entry (second level)

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
IEE	Institute of Electrical Engineers
DWTA	Domestic Water Treatment Association
LABC	Local Authority Building Control Body

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
- ▶ Open windows and doors
- ▶ Rectify the fault

Health and safety

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

Combustible and corrosive materials

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

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

Handling instructions and guidelines

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

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

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

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

Intended use

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

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

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: IEE 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

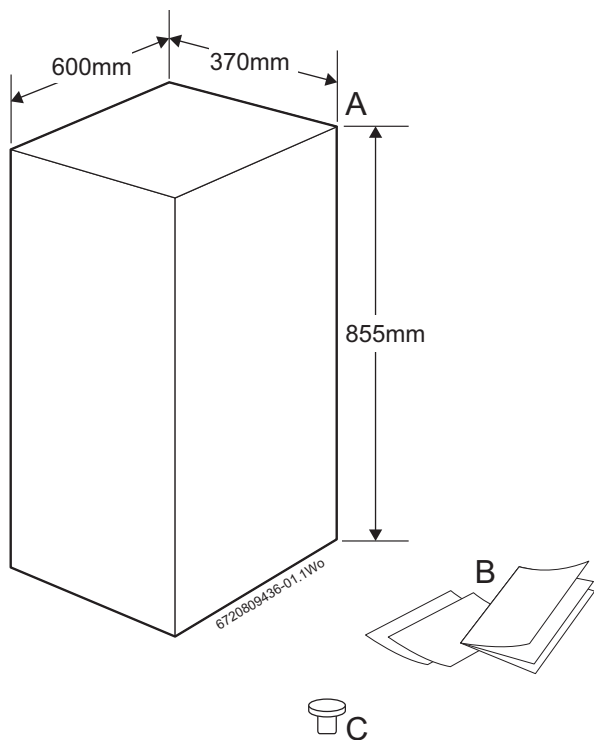
Standard package:

A - Floor standing oil fired condensing boiler

B - Literature pack:

- Greenstar Danesmoor Installation, Commissioning and Servicing instruction manual
- User Instructions
- Fascia information card
- Guarantee registration card

C - BSP plug, one inch (Regular only)



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
Maximum static head	metres	30	30	30
Minimum static head	metres	1	1	1
Water side resistance (20°C difference)	mbar	20	30	56
Maximum available pump head (20°C difference) Utility System	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 Utility	BSP	1"	1"	1"
Flow Utility System	mm	22	22	28
Utility 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 - Utility System	mm	15	15	15
Electrical				
Electrical power supply voltage	ac ..V	230	230	230
Frequency	Hz	50	50	50
Max. power consumption Utility Regular	W	150	150	150
Max. power consumption Utility System	W	208	208	208
Standby power consumption (without timer fitted)	W	0	0	0
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
Appliance protection rating	IP	20	20	20
Weight (excluding packaging) Utility Regular	kg	86	89	93
Weight (excluding packaging) Utility System	kg	95	98	102
Emissions class for NO _x and CO	class	3	3	3
Typical NO _x emission figures	mg/kWhr	215	182	143

3.3 Layout and components - 18/25 System appliance shown

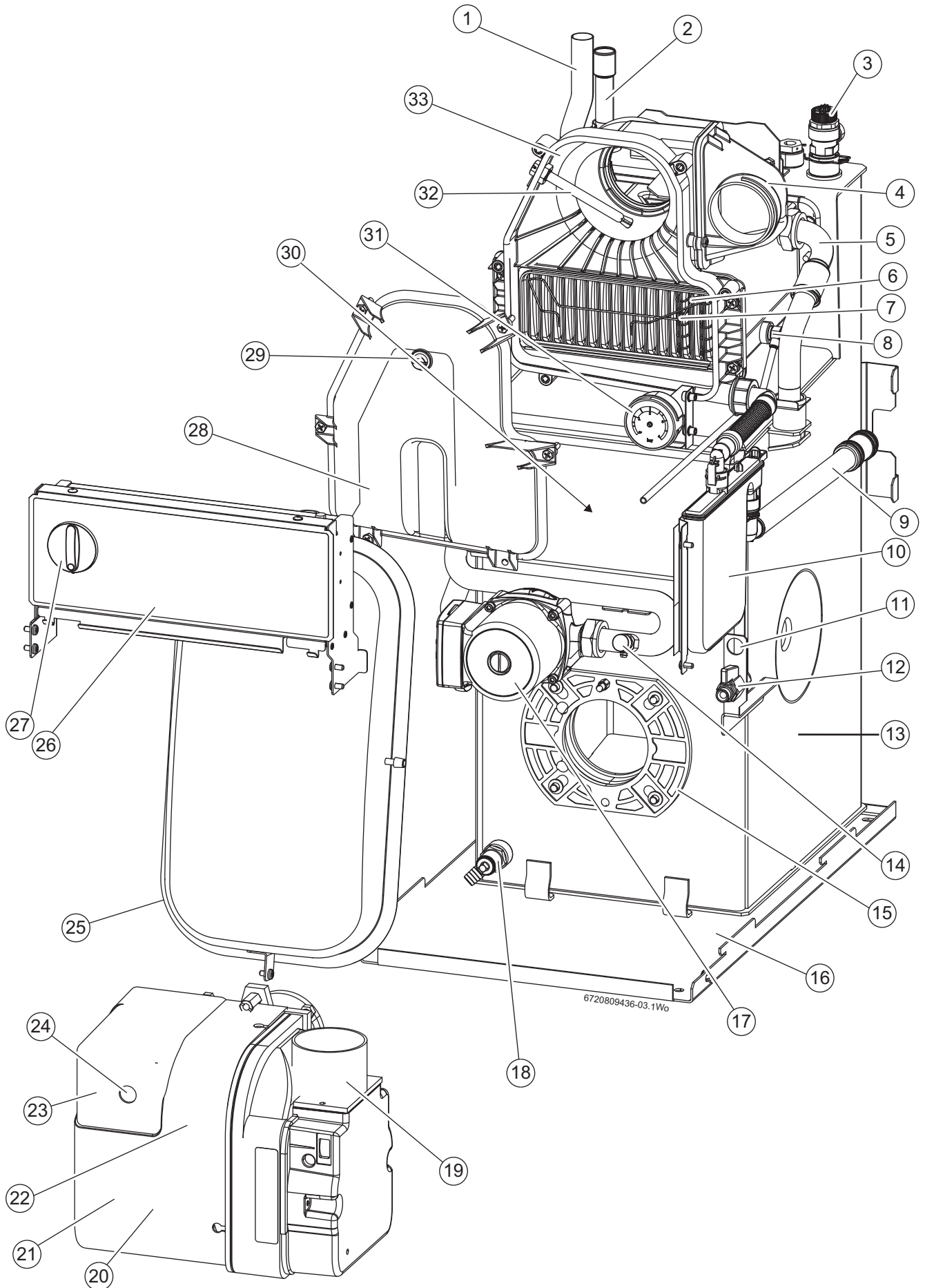


Fig. 1 System appliance shown

Figure 1 does not include the top, front, left, and right hand side panel			
1	Return connection	21	Oil pump (behind plastic cover)
2	Flow connection	22	Burner control box (behind plastic cover)
3	Pressure relief valve	23	Riello RDB burner
4	Air inlet casing	24	Lock out reset button (on the front of the burner control box)
5	Secondary heat exchanger flow pipe	25	Expansion vessel
6	Secondary heat exchanger baffles	26	Control box assembly
7	Baffle retaining clip	27	Temperature control knob
8	Secondary Heat exchange drain point	28	Flue manifold access cover
9	Condensate discharge	29	Flue gas sampling point
10	Condensate trap	30	Combustion chamber access door (primary baffle inside)
11	Optional oil return position	31	System pressure gauge
12	Oil isolating valve	32	Flue overheat thermostat phial
13	Primary heat exchanger	33	Secondary heat exchanger
14	Pump drain point	34	Burner lead connector socket
15	Burner mount plate	35	Flue thermostat reset
16	Base plate and oil drip tray	36	Expansion vessel retaining bracket
17	Circulating three speed pump	37	High limit thermostat reset
18	Primary heat exchanger drain point	38	Auto reset thermostat
19	Burner air intake	39	Control & manual reset overheat thermostat phial
20	Burner motor (behind plastic cover)	40	Auto-reset high-limit thermostat phial

Table 1 Appliance component details

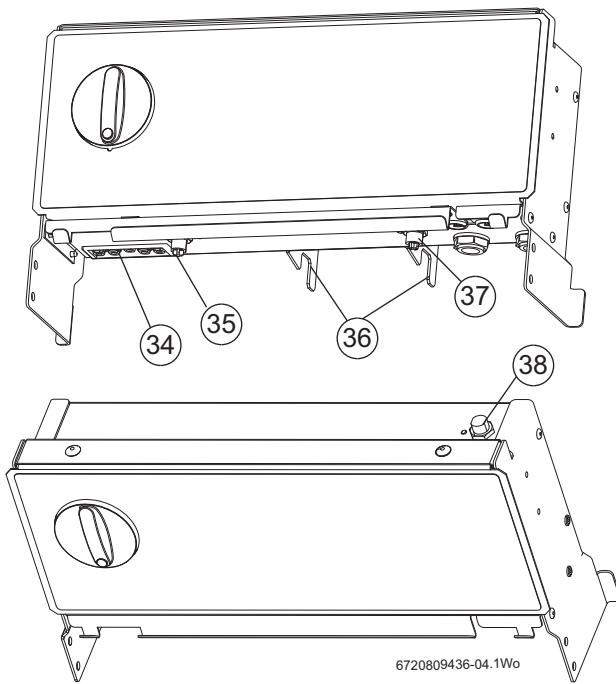


Fig. 2 Control panel thermostat detail

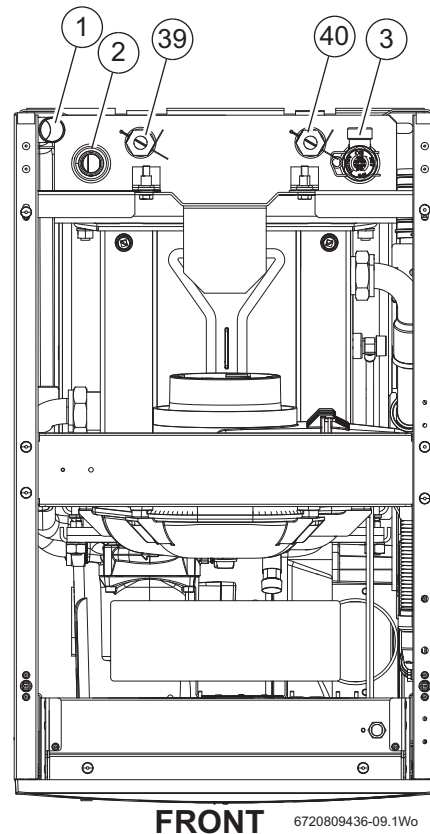


Fig. 3 Top view connections

3.4 Layout and components - 18/25 Regular appliance shown

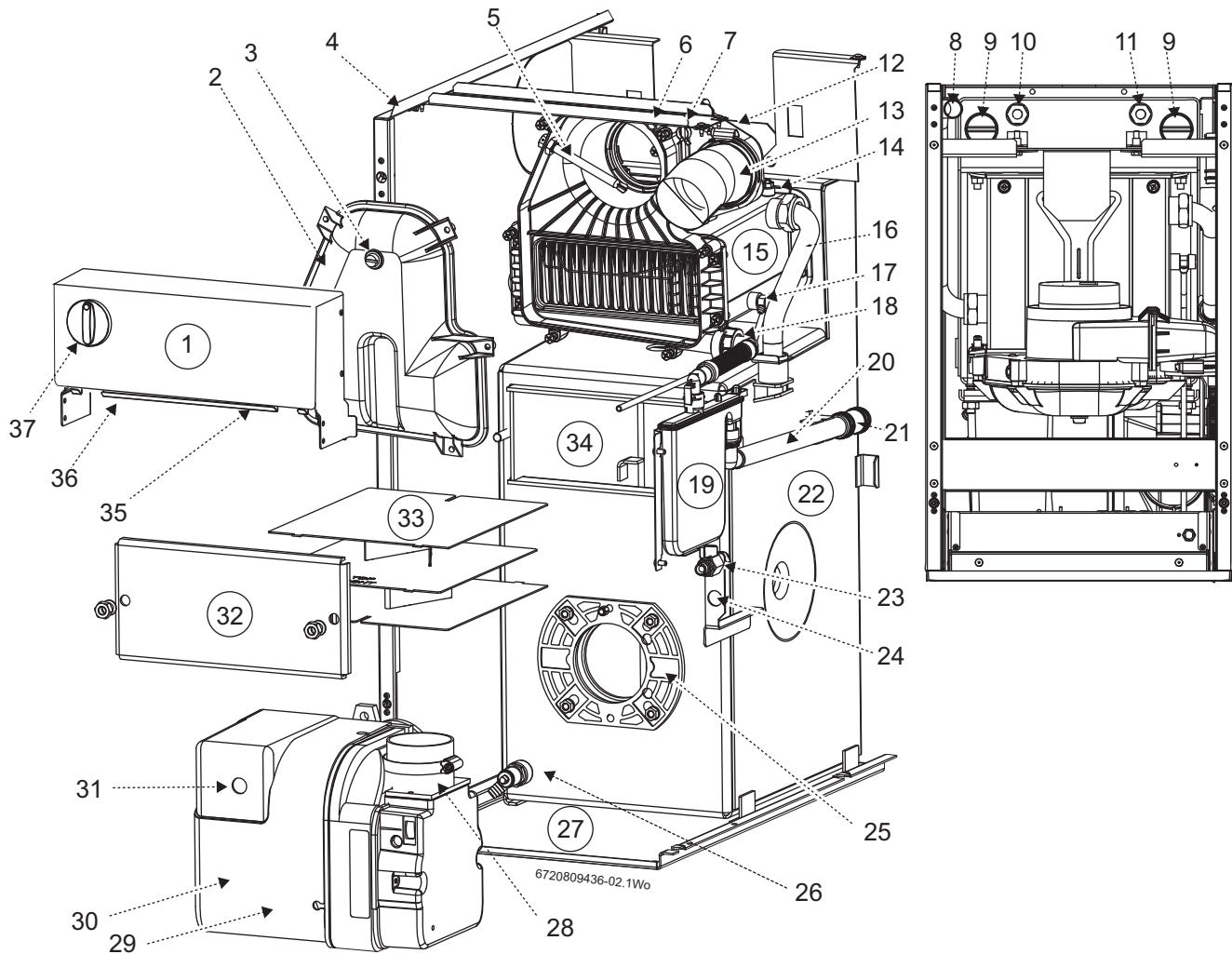



Fig. 4 18/25 Regular appliance shown

Figure 4 does not include the top, front, and right hand side panel.


1	Control box assembly	20	Condensate drain pipe
2	Flue manifold access cover	21	Flexible condensate drain pipe connection
3	Flue gas sampling point	22	Primary heat exchanger
4	Casing side panel	23	Oil isolating valve
5	Flue overheat thermostat phial	24	Optional oil return position
6	Power cable clip	25	Burner mounting plate
7	Fire valve sensor clip	26	Primary heat exchanger drain
8	Return	27	Base plate and oil drip tray
9	Flow/Optional combined feed and vent	28	Burner air intake - connected by flexible duct (12) to air inlet casing (13)
10	Control & manual reset overheat thermostat phial	29	Burner motor - behind plastic cover
11	Auto-reset high-limit thermostat phial	30	Oil pump - behind plastic cover
12	Air inlet casing	31	Lockout reset button (on front of burner control box)
13	Flexible air duct (connecting to air intake on burner)	32	Combustion chamber access door
14	Secondary heat exchanger bleed point (one on either side)	33	One piece baffle arrangement
15	Secondary heat exchanger	34	Combustion chamber
16	Heat exchanger flow pipe	35	Boiler overheat reset button
17	Secondary heat exchanger drain	36	Flue overheat reset button
18	Condensate outlet	37	Temperature control knob
19	Condensate trap		

4 Pre-Installation


4.1 Cleaning primary systems

 **NOTICE:** Before installation

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

 **CAUTION:** MAINS POWER

- ▶ ISOLATE THE MAINS SUPPLIES BEFORE STARTING ANY WORK AND OBSERVE ALL RELEVANT SAFETY PRECAUTIONS.

 **NOTICE:** Protect the boiler


- ▶ Debris from the system can damage the boiler and reduce efficiency. Failure to comply with the guidelines for the use of water treatment with the appliance will invalidate the appliance warranty.
- ▶ It is recommended that a primary water cleanser is fitted to the system. Worcester offers a filter that helps remove both magnetite and non-magnetic debris.

BEFORE CLEANING THE SYSTEM:

- ▶ Ensure that the system and pipe work is in good working order.
- ▶ Where possible keep the existing boiler/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.


 **NOTICE:** ARTIFICIALLY SOFTENED WATER MUST NOT BE USED TO FILL THE CENTRAL HEATING SYSTEM.

FLUSHING THE SYSTEM

- ▶ Fill the system with cold water and check for leaks.
- ▶ 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 refill with fresh water and a suitable inhibitor.
- ▶ Vent any air from the boiler and system.

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.

 **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

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

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.

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.
- External 5A fuse to BS1362.
- The appliance must be earthed.
- This appliance must not be connected to a three phase supply.
- IP20
- Wiring must comply with the latest IEE 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 IEE 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.

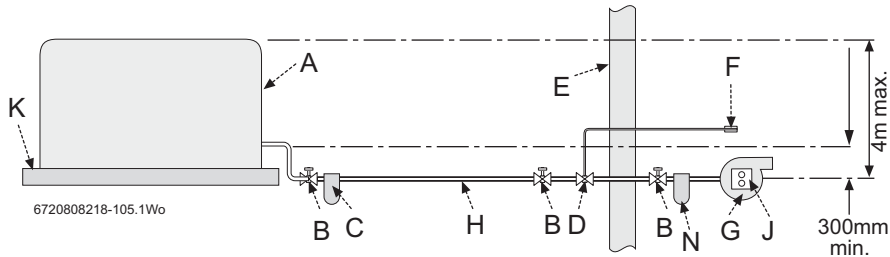
4.2.2 Oil supply

- **This appliance is suitable for Kerosene (28 second oil) 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.**

a) Single pipe gravity feed system:

The oil storage tank (A) must be positioned so that the oil level does not exceed 4 metres above the level of the burner oil pump (J) and in addition the oil level must be at least 300mm above the oil pump (J).

Where the maximum oil level in the oil storage tank exceeds 4 metres, a head breaking device must be installed between the tank (A) and the burner oil pump (J).



- [A] Oil storage tank
- [B] Isolating valve
- [C] Oil strainer and water separator
- [D] Fire valve to BS 5410
- [E] External wall
- [F] Fire valve sensor
- [G] Oil burner
- [H] Oil supply pipe
- [J] Oil pump
- [K] Full base (plastic tank)
- [L] Non-return valve
- [M] De-aerator
- [N] Oil filter (70µm max filtration size)

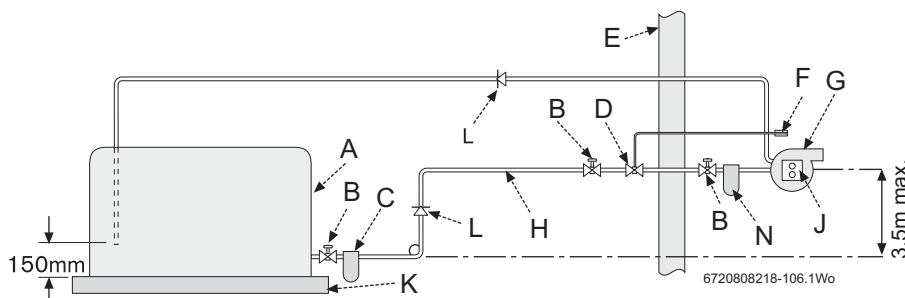
All dimensions are in metres unless otherwise stated.
The maximum pipe run figures are based on using copper pipe with an inside diameter of 2mm less than the outside diameter.

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

b) Double pipe sub-gravity fed system:

Maximum suction height 3.5 metres. Non-return valves must be fitted to the inlet and return oil line between the oil pump (J) and oil storage tank (A).



Maximum pipe run for double pipe sub-gravity fed system

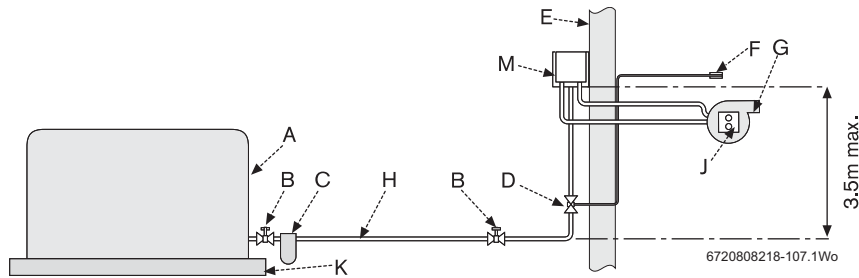
Head (m)	10mmØ	12mmØ	Head (m)	10mmØ	12mmØ
0	50	100	2.0	26	66
0.5	44	100	2.5	20	50
1.0	38	95	3.0	14	37
1.5	32	80	3.5	8	22

c) Single pipe suction lift with de-aerator

Maximum suction height 3.5 metres. The oil tank (A) must be positioned below the oil pump (J). Create an inlet and return loop between the de-aerator (M) and oil pump (J).

A non-return valve must be incorporated within the de-aerator or fitted to the oil line between the oil storage tank (A) and the de-aerator (M).

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.



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

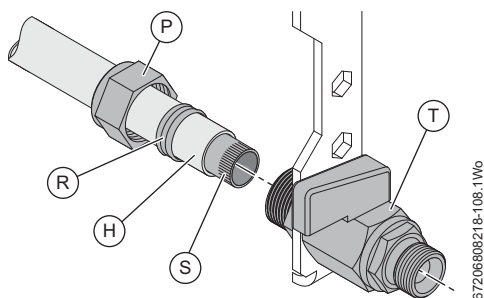
Head (m)	FUEL FLOW RATE				Head (m)	FUEL FLOW RATE			
	2.5kg/h 8mmØ	5kg/h 8mmØ	10kg/h 8mmØ	10kg/h 10mmØ		2.5kg/h 8mmØ	5kg/h 8mmØ	10kg/h 8mmØ	10kg/h 10mmØ
0	100	55	26	100	2.0	60	30	14	65
0.5	95	45	23	100	2.5	45	25	11	50
1.0	80	40	20	90	3.0	35	15	8	35
1.5	70	35	17	75	3.5	25	10	5	20

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

Pipework

- ▶ Use copper pipe of the correct diameter according to the information shown opposite.
 - 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 (P) and olive (R) onto the oil supply pipe (H).
- ▶ Slide insert (S) into the pipe.
- ▶ Offer the pipe to the fitting (T) and tighten the nut (P).
- ▶ Use flexible hoses to connect to the oil pump (J).
- ▶ Lay the oil supply pipe (H) 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 (B) to the oil supply pipe (H), as close to the oil storage tank (A) as possible.
- ▶ Fit an oil strainer and water separator (C) to the oil supply pipe, near the oil storage tank. Fit an additional oil filter (N, 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 (D) should be fitted externally to the building with the fire valve sensor (F) 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 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.
- 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 (H).
- The open vent pipe (F) must be at least 22mmØ.

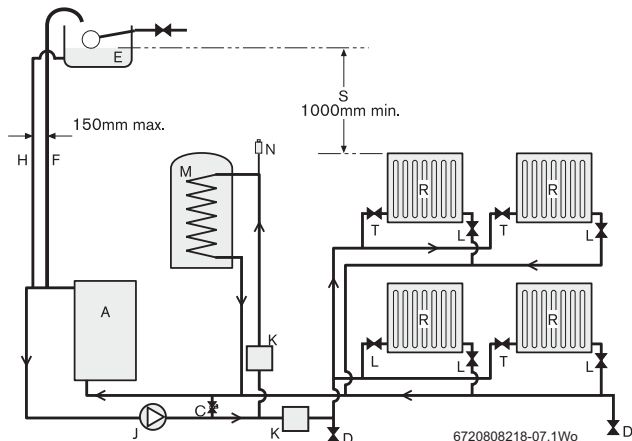


Fig. 5 Regular boiler, open vent system layout

- [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 in 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.

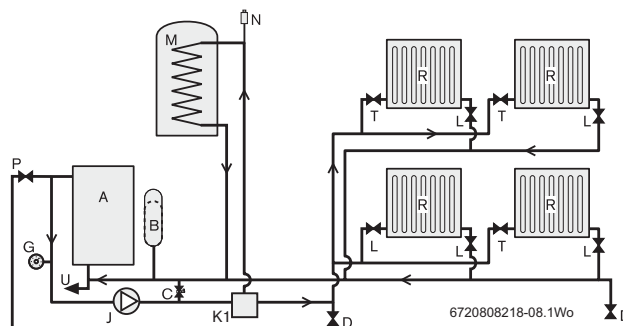


Fig. 6 Regular boiler system layout

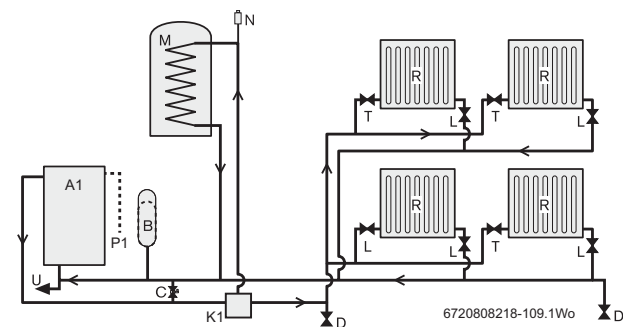


Fig. 7 System boiler system layout

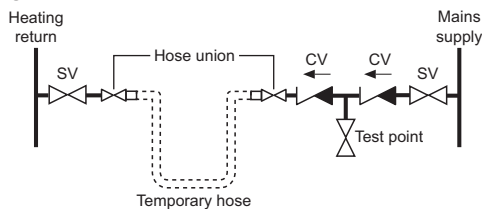
Filling primary sealed systems

NOTICE: FILLING THE SYSTEM

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

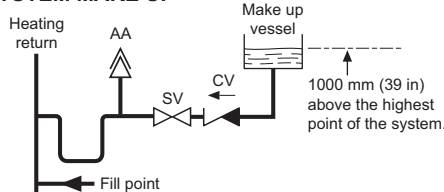
- Where the system volume is more than 180 litres at 0.5 bar or exceeds 2.65 bar at maximum heating temperature an extra expansion vessel (B) must be fitted as close as possible to the appliance in the central heating return.
- Pressurise the extra expansion vessel (B) to the same figure as the expansion vessel built into the appliance (system boilers).
- Filling the system must comply with one of the methods shown in the figure below.
- The filling point must be at low level and must never be a permanent connection to the mains water supply.
- Filling loops must be WRAS approved.

SYSTEM FILL



- CV = Check Valve
- SV = Stop Valve
- AA = Auto Air vent
- CV = Check Valve

SYSTEM MAKE UP



4.4 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.

Key to condensate illustrations	
1	Condensate discharge from boiler
2	Pipe work transition
3	Soil and vent stack
4	Minimum 450mm and up to three storeys
5	Basin waste
6	Sink or basin with integrated overflow
7	75mm sink waste trap
8	Condensate pump
*	Condensate trap of 75mm already incorporated into the boiler

4.4.1 Internal connections

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

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

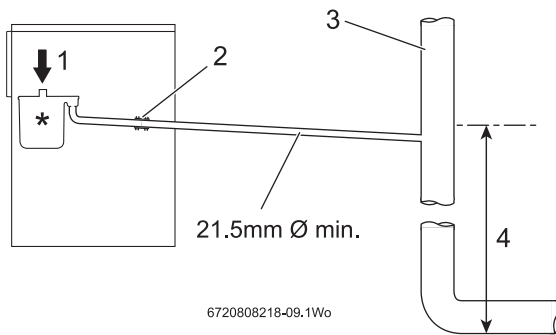


Fig. 8 Disposal to a soil vent stack

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

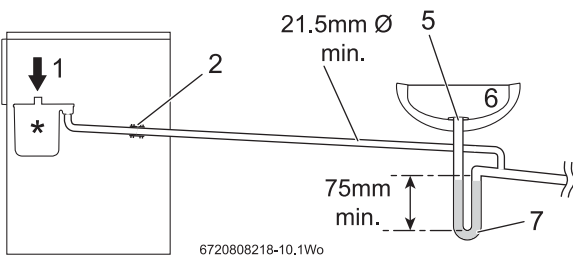


Fig. 9 Disposal to a waste pipe

Condensate pump

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

The pump outlet pipe should discharge to a suitable internal foul water discharge point such as an internal soil and vent stack, internal kitchen or bathroom waste pipe, washing machine waste pipe etc.

A suitable permanent connection to the foul waste pipe should be used.

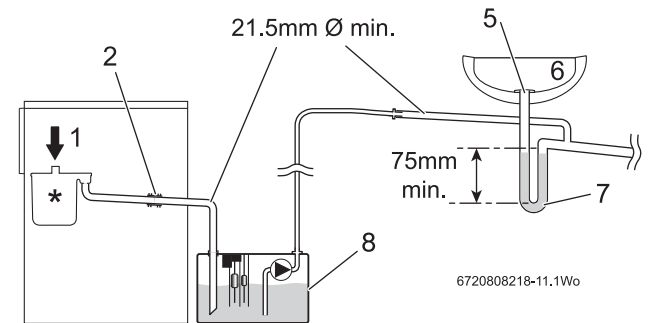


Fig. 10 Disposal via a condensate pump

4.4.2 External connections

NOTICE: Freezing conditions

- ▶ Ideally run the pipework internally if possible.
- ▶ Pipe work length should be kept to a minimum and the route as vertical as possible.
- ▶ Weather proof insulation must be used.

NOTICE: Condensate waste

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

Continued - Key to condensate illustrations	
9	Increase pipe size
10	Weather proof insulation
11	Rain water down pipe
12	External air break
13	43mm pipe (min 100mm upstand)
14	PVCu strap on fitting
15	43mm 90° male/female bend

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

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

FITTING AN EXTERNAL AIR BREAK

- Refer to figure 11 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.

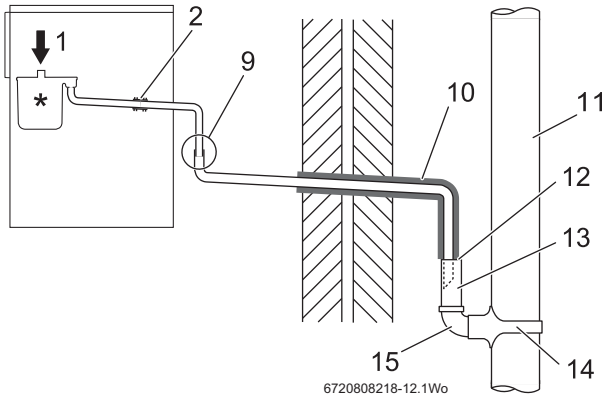


Fig. 11 Disposal into a rainwater down pipe



Condensate drainage pipe can be run above or below ground.

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.

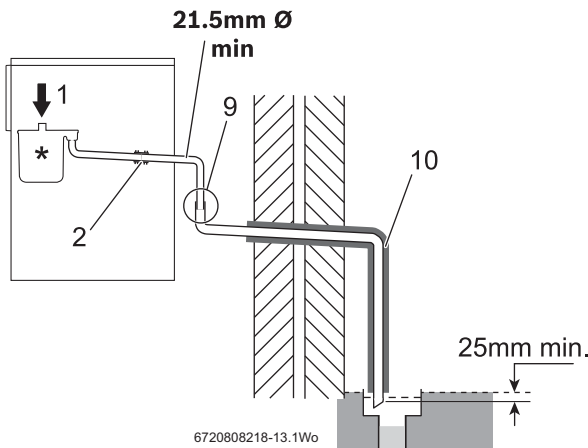


Fig. 12 External disposal

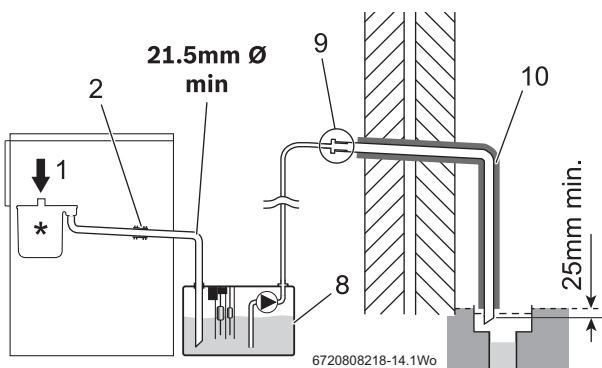


Fig. 13 Condensate pump to external disposal

Continued - Key to condensate illustrations

16	100mm Ø minimum plastic pipe
17	Drainage holes
18	Limestone chippings (25kg min.)
19	Bottom of sealed tube

4.4.3 Soak away

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



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

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



NOTICE: Unheated internal areas.

- ▶ Internal pipe runs in unheated areas such as lofts, basements and garages should be treated as external runs and insulate as necessary.

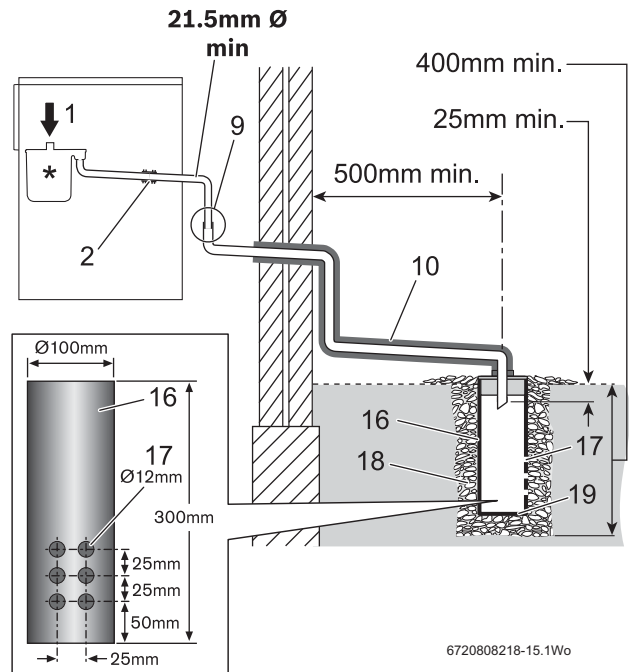


Fig. 14 Disposal to a soakaway

4.5 Pressure relief pipework

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

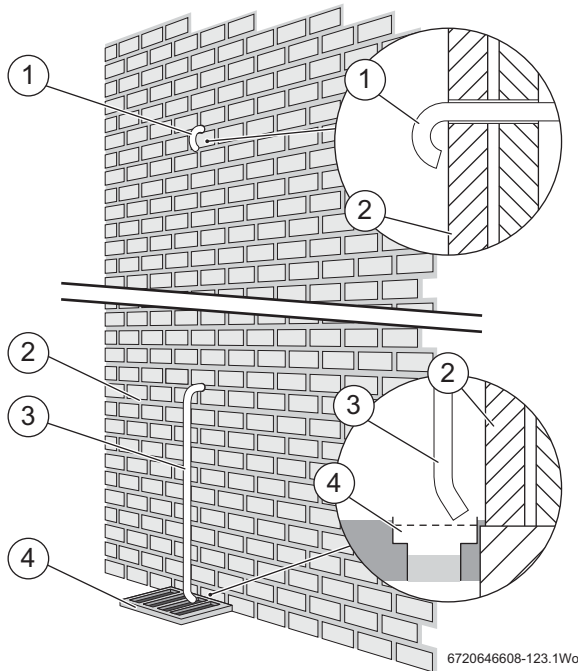


Fig. 15 Pressure relief pipe work

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

4.6 Boiler locations and clearances

This boiler is only suitable for installing internally within a property at a suitable location onto a fixed rigid surface of the same size as the boiler and capable of supporting the boiler weight.

The boiler must be installed on a flat surface to ensure condensate does not enter the primary heat exchanger.

The boiler is not suitable for external installation unless a suitable enclosure is provided.

Roof space installations must fully conform to BS 5410 part 1 section 4.6.9.

Open flue model (CF)

In order to ensure clean and efficient combustion an adequate supply of air must be delivered to the combustion chamber.

To provide sufficient air a suitable inlet must be provided into the room or space in which the boiler is situated.

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

An air brick or other form of continuous air supply may have to be built into the installation in order to ensure an adequate supply of air.

If the appliance is to be installed in a confined space or compartment two air vents are required, one at high level and one at low level.

The minimum free area of each vent is shown opposite and depends whether the air is taken from another room or from outside the building.

Where the air is taken from another room that room must contain an air inlet as described above.

Room sealed balanced flue models (RS)

The appliance does not require a separate vent for combustion air.

Installation in cupboards or compartments require permanent vents for cooling purposes, one at high level and one at low level, either direct to outside air or to a room.

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

The minimum air vent free area is given in the table opposite.

Installation clearances

Figure 16 shows the minimum space recommended to install the boiler only.

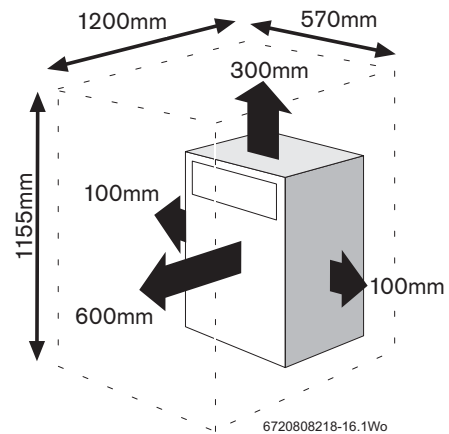


Fig. 16 Installation clearances

Service clearances

Figure 17 shows the minimum space required to carry out an annual service.

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

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

** Due to changes to BS 5410 and modern building design, these figures no longer incorporate the adventitious ventilation allowance.

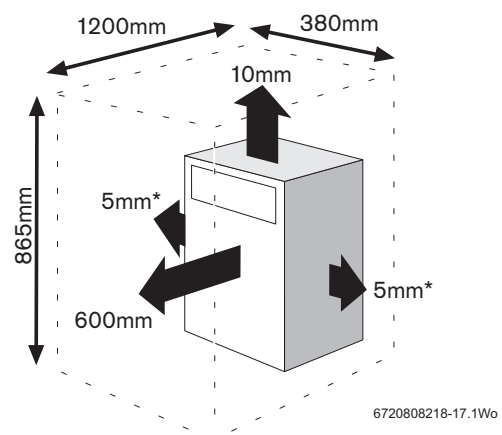


Fig. 17 Service clearances

Maintenance clearances

Figure 18 shows the clearances required for maintenance.

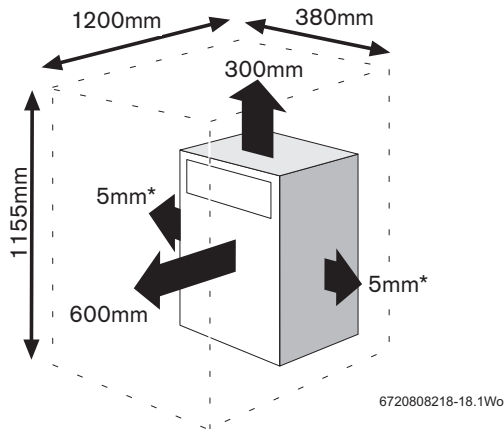


Fig. 18 Maintenance and repair clearances

Minimum air vent area (cm³) for appliances installed in compartments

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

Table 2 Conventional flue

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

Table 3 Room sealed flue

Compartments

Follow the requirements of BS 5410 and note:

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

Venting compartments

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

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

Showers/bathrooms

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

WARNING: Electrical
 ▶ Any appliance using mains electricity must not be able to be touched by a person using the bath or shower.
 ▶ Electrical switches, fused spur and socket outlets must not be fitted in a bathroom.
 ▶ In all cases the IEE wiring regulations must be consulted.
 ▶ All pipework in bathrooms must be cross bonded

The boiler must not be installed in the bath or shower or in zones 1 or 2 (the shaded areas shown on the diagrams opposite).

The boiler can be installed outside the shaded areas.

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

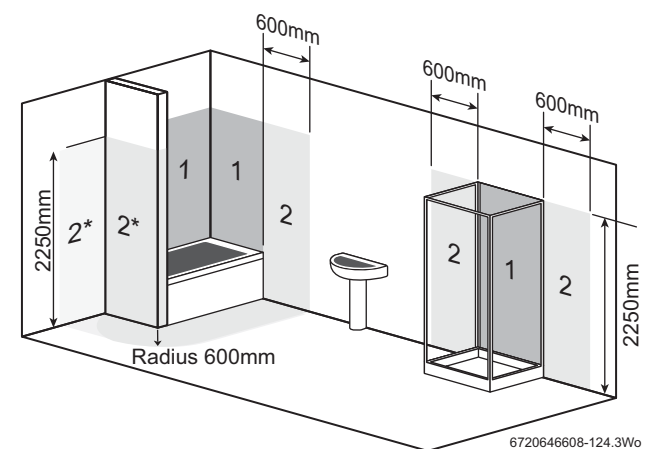


Fig. 19 Bathroom zones

4.7 Flue terminal positions

Flue terminals must be positioned to avoid combustion products 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.

See 'Contact Information' on the back cover for flue guard information.

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.

	Terminal position	CF	RS(H)	RS(V)
A ^{1,2}	Directly below an opening, air brick, opening window etc.	N/A	600mm	N/A
B ^{1,2}	Horizontally to an opening, air brick, opening window, etc.	N/A	600mm	N/A
C	Below a plastic/painted gutter, drainage pipe or eaves if combustible material is protected	N/A	75mm	N/A
D ³	Below a plastic/painted gutter, drainage pipe or eaves without protection to combustible material	N/A	600mm	N/A
E	From vertical sanitary pipework	N/A	300mm	N/A
F	From an external or internal corner or from a surface or boundary alongside a terminal	N/A	300mm	N/A
G	Above ground or balcony level	N/A	300mm*	N/A
H	From a surface or boundary facing a terminal	N/A	600mm**	N/A
J	From a terminal facing a terminal	---	1200mm**	---
K	Vertically from terminal on the same wall	N/A	1500mm	N/A
L	Horizontally from a terminal on the same wall	---	750mm	---
M	Above the point of highest intersection with the roof	600mm	---	600mm
N	From a vertical structure on the side of the terminal	750mm	---	750mm
O	Above a vertical structure less than 750mm from the side of a terminal	600mm	---	600mm
P	From a ridge terminal to a vertical structure on the roof	1500mm	---	N/A
Q	Above or the side of any opening on a flat or sloping roof	300mm	---	300mm
R	Below any opening on a sloping roof	1000mm	---	1000mm

[N/A] Not allowed

[CF] Conventional flue

[RS(H)] Room sealed (horizontal)

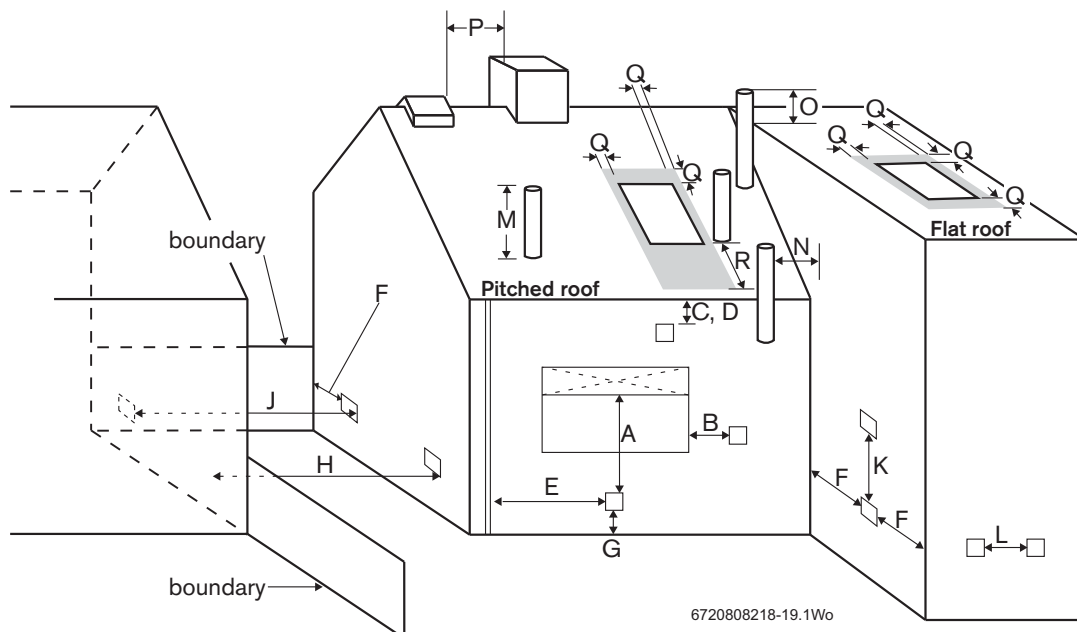
[RS(V)] Room sealed (vertical)

[*] 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.
- Vertical structure in N, O and P includes tank or lift rooms, parapets, dormers etc.
- 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.

- Where a flue is terminated less than 600mm away from a projection above it and the projection consists of plastics or has a combustible or painted surface, then a heat shield of at least 750mm wide should be fitted.
- If the lowest part of the terminal is less than 2m above the ground, balcony, flat roof or other place to which any person has access, the terminal should be protected by a guard.
- Notwithstanding the dimensions given above, a terminal should not be sited closer than 300mm to combustible material. In the case of a thatched roof, double this separation distance should be provided. It is also advisable to treat the thatch with a fire retardant material and close wire in the vicinity of the flue.
- It is essential that a flue or chimney does not pass through the roof within the shaded area delineated by dimensions Q and R.
- Where protection is provided for plastic components, such as guttering, it is essential that this is to the standard specified by the manufacturer of the plastic components.



4.8 Flue options

4.8.1 Conventional flue (CF)

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



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

CF Sizing:

- ▶ 12/18 and 18/25 = 100/103mmØ
- ▶ 25/32 = 130mmØ*

* Unless installing a Worcester Greenstar Oilfit Conventional Flexible flue.

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

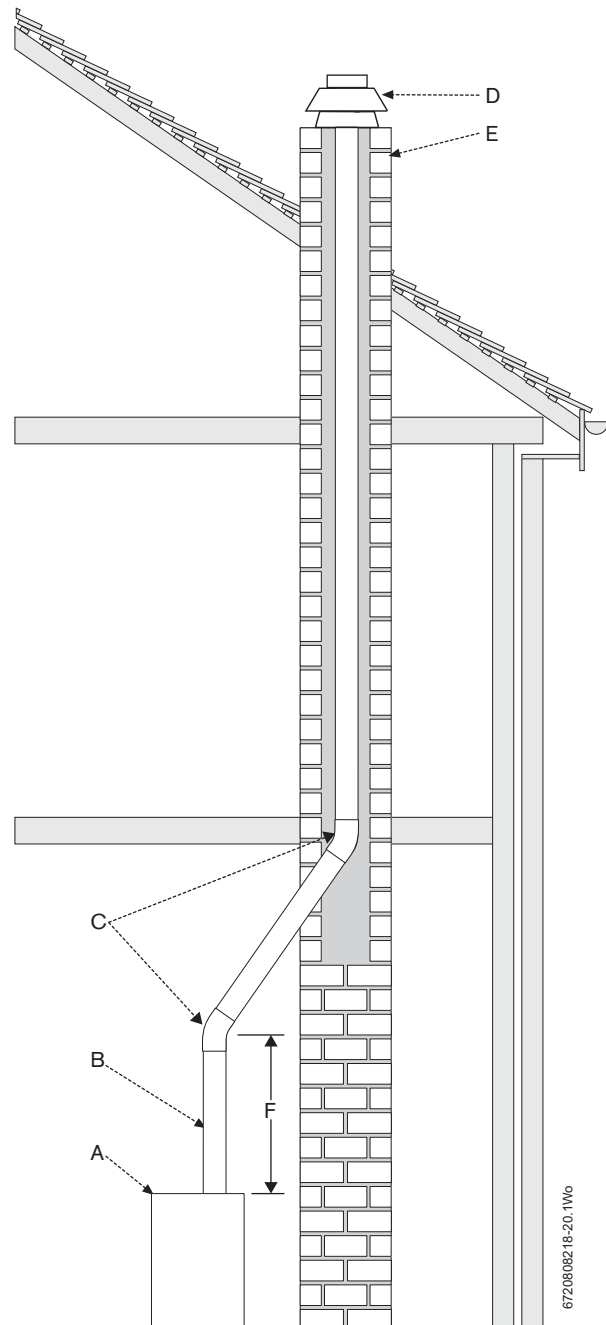
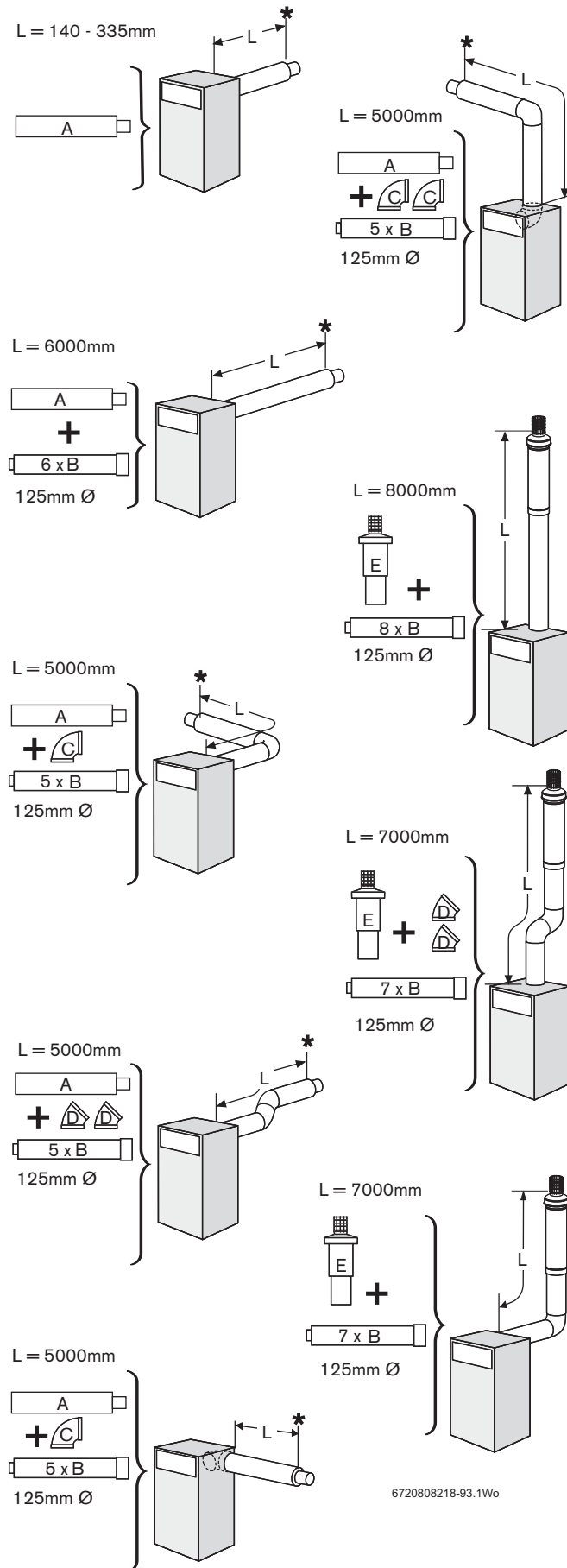


Fig. 20 Conventional flue

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

4.8.2 Room sealed flue options



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Fig. 21 Room sealed flue options

Figure 21 shows the components used and the maximum flue length (L) for each flue configuration.

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

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



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

Calculating the flue length

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

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

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

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

- 1000mm for 90°
- 500mm for 45°

Flue extension lengths

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

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

Flue terminal lengths

Horizontal 80/125mm Ø: 720mm

Vertical 80/125mm Ø: 1080mm + cage

* to outside wall.

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.

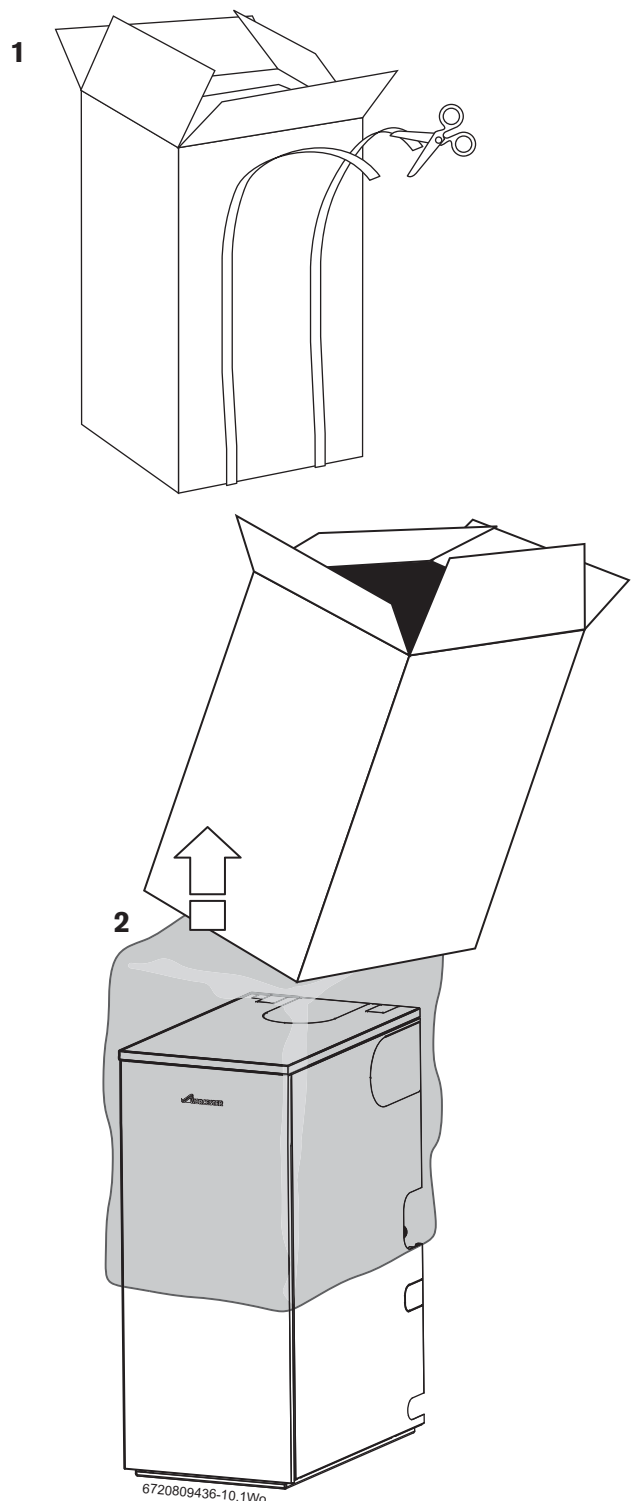


Fig. 22 Unpacking

5.2 Pipework positions and flue opening



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.

Pipework connections - Regular

- A - Flow connections (optional combined feed and vent) 1" BSP
- B - Return connections 22mmØ copper on 12/18, 18/25 models and 28mmØ copper on 25/32 models
- C - Condensate outlet 21.5mm Ø
- D - Flue outlet
- E - Oil pipe optional centres
- F - Optional oil line return line connection



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

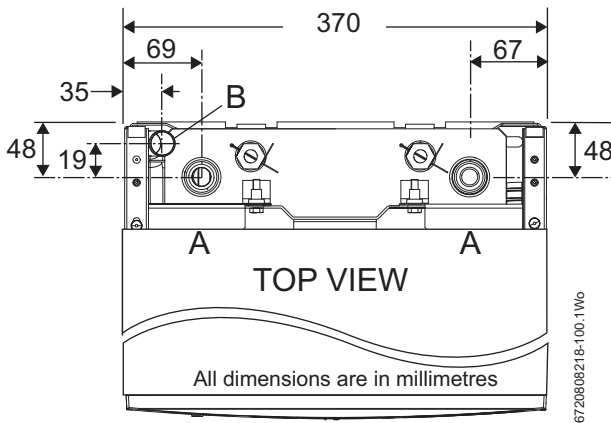


Fig. 23 Top view of Regular boiler pipe connections

Pipework connections - System

- A - Flow connections 12/18 & 18/25 - 22mm Ø , 25/32 - 28mm Ø
- B - Return connections 22mmØ copper on 12/18, 18/25 models and 28mmØ copper on 25/32 models
- C - Condensate outlet 21.5mm Ø
- D - Flue outlet
- E - Oil pipe optional centres
- F - Optional oil line return line connection
- PRV - 15mm Ø



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

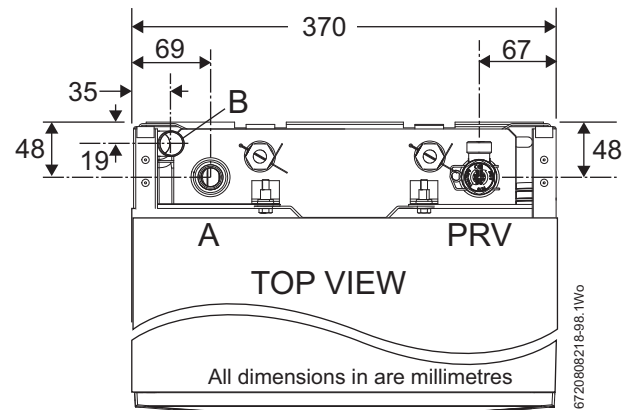


Fig. 25 Top view of System boiler pipe connections

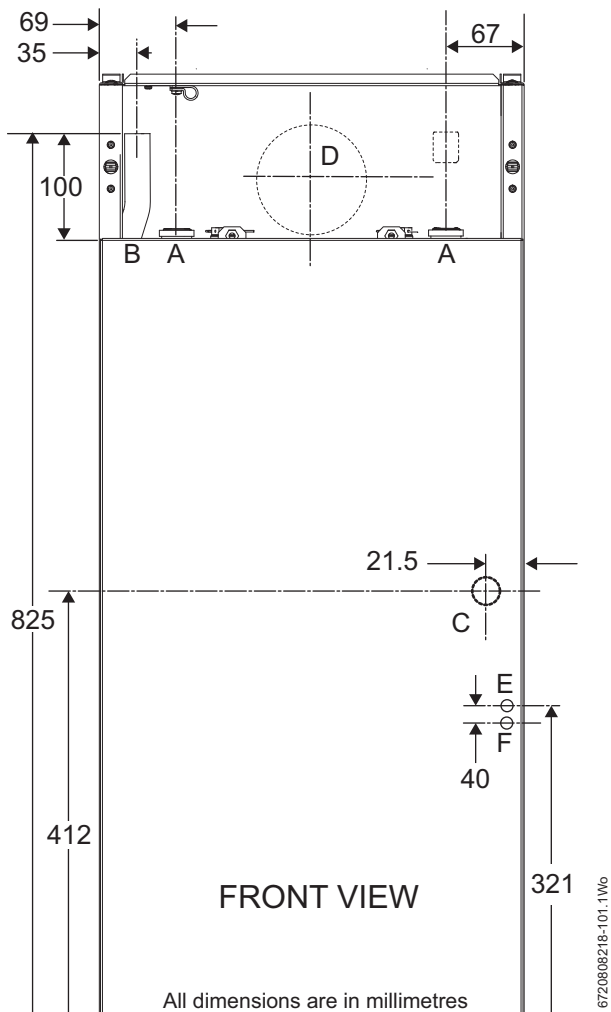


Fig. 24 Front view of Regular boiler pipe connections

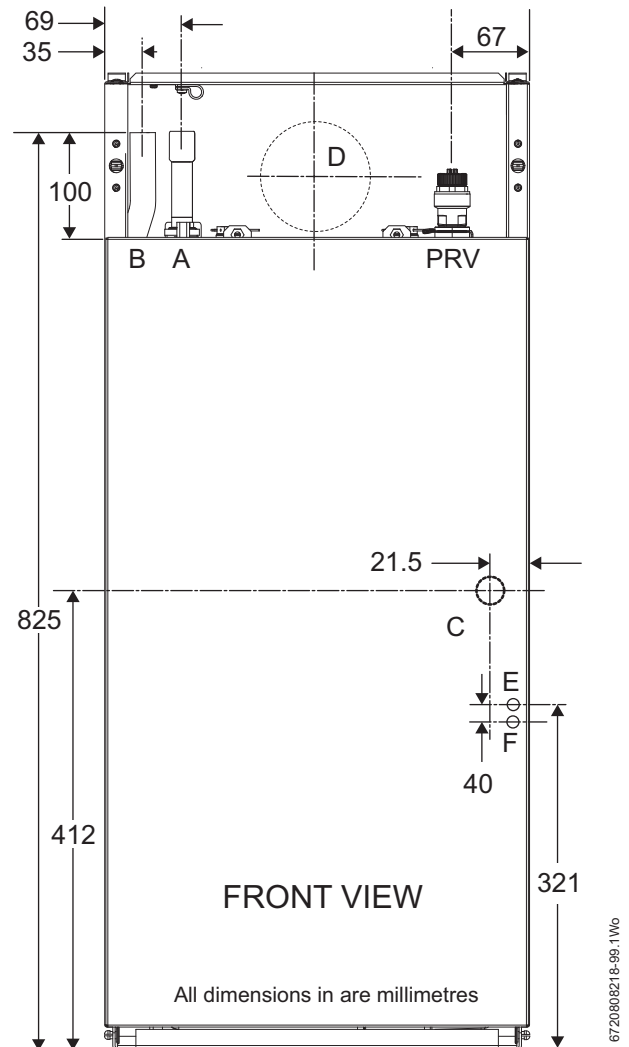


Fig. 26 Front view of System boiler pipe connections

Flue centres

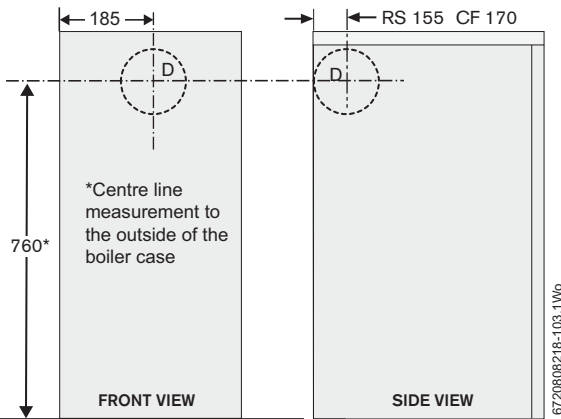


Fig. 27 Flue centres

Flue opening

- ▶ Follow figure 28 to mark the centre of the flue (1, & 2) for rear opening, (2 & 3) for side opening or (1 & 4) for top opening.



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

- ▶ Make an opening (F, G or H) using a core drill or similar at a size relative to the wall thickness as shown below:

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

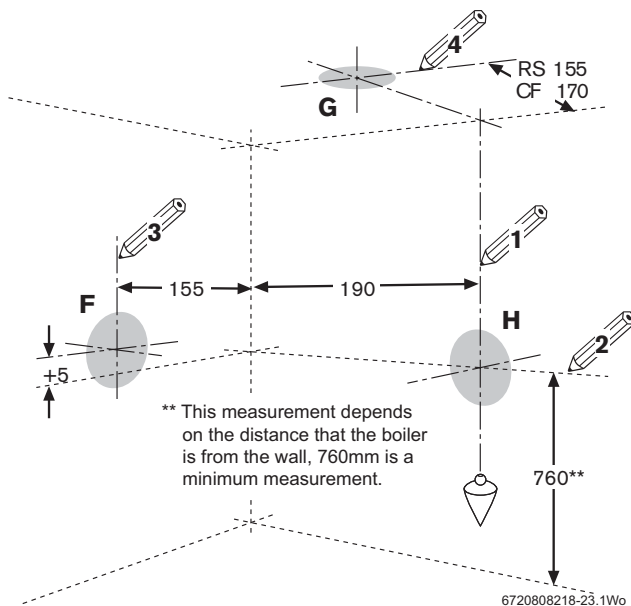
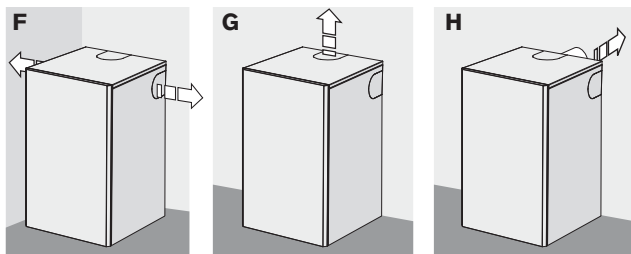


Fig. 28 Flue opening

5.3 Boiler installation

1. Lift the front of the top panel (A) upwards to disengage the ball stud connections (B) and pull forwards to release from the brackets (C) at the back to remove. Pull front panel (D) forward from the bottom and near the top disengaging the ball studs from their connections (E) and lift off the ledge (F) that runs along the bottom of the fascia to remove.
2. Unplug burner lead (G) from control box.

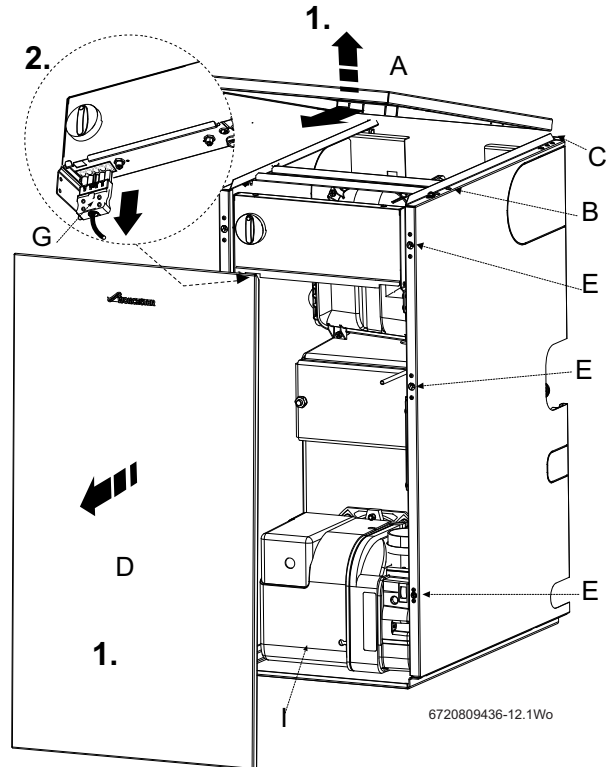


Fig. 29 Boiler installation

Utility system only:

- ▶ In the case of the Utility system boiler, remove the retaining screw [1] at the base of the expansion vessel.
- ▶ Pull the expansion vessel forward slightly and down to remove. Place to expansion vessel outside of the boiler, taking care not to kink or stretch the flexible hose.

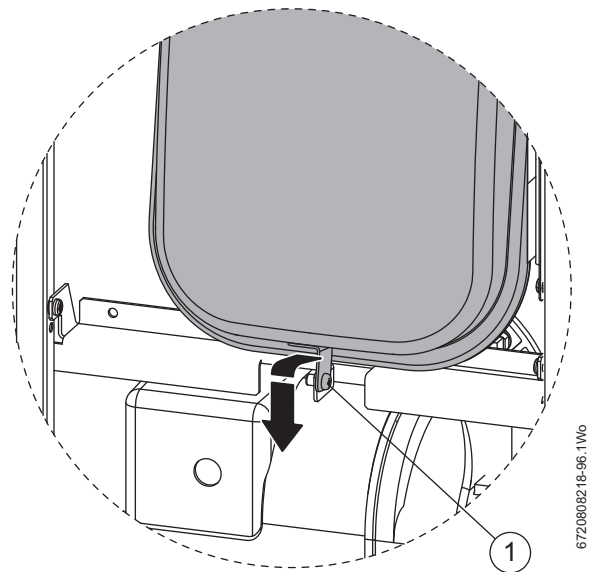


Fig. 30

3. Unscrew to loosen the retaining ring (H) that secures the flexible air supply tube to the burner (I) and pull the flexible air supply tube free from the burner (see figure 31).

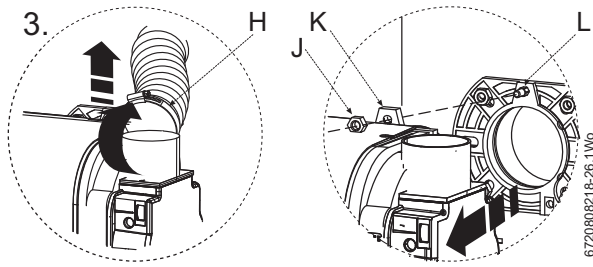


Fig. 31

- ▶ Undo and remove the retaining nut (J) on top of the burner. The burner mounting (K) can now be eased off the lug (L) on the burner collar to remove the burner from the heat exchanger. Store the burner and retaining nut safely away from the boiler.
- ▶ Carefully move the boiler into position observing at all times the correct method for handling heavy objects.

5.4 Flue installation

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

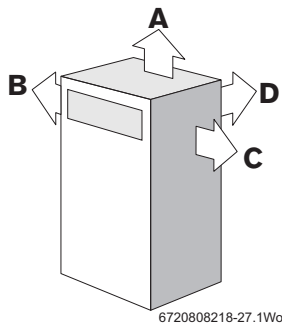


Fig. 32 Flue outlet options

Installation notes

- ▶ When connecting a flue elbow directly to the boiler flue outlet, loosen the flue elbow retaining bracket screws (N) before fitting the flue elbow.
- ▶ Insert the flue elbow with its clamp loosely fitted, then tighten the bracket screws (N). Clamp the elbow when adjusted to its required orientation.
- ▶ If using an extension or horizontal terminal onto the boiler flue outlet, remove the flue elbow retaining bracket (M).

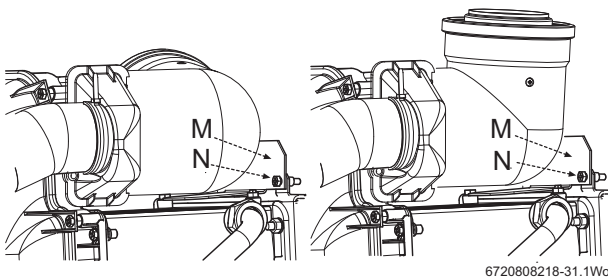


Fig. 33 Elbow retaining bracket

- ▶ Ensure all flue seals are in good condition and seated properly.
- ▶ To ease assembly of flue components, grease seals lightly with the solvent-free grease supplied.
- ▶ A clamp should be installed for every 1m and at every change of direction.



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

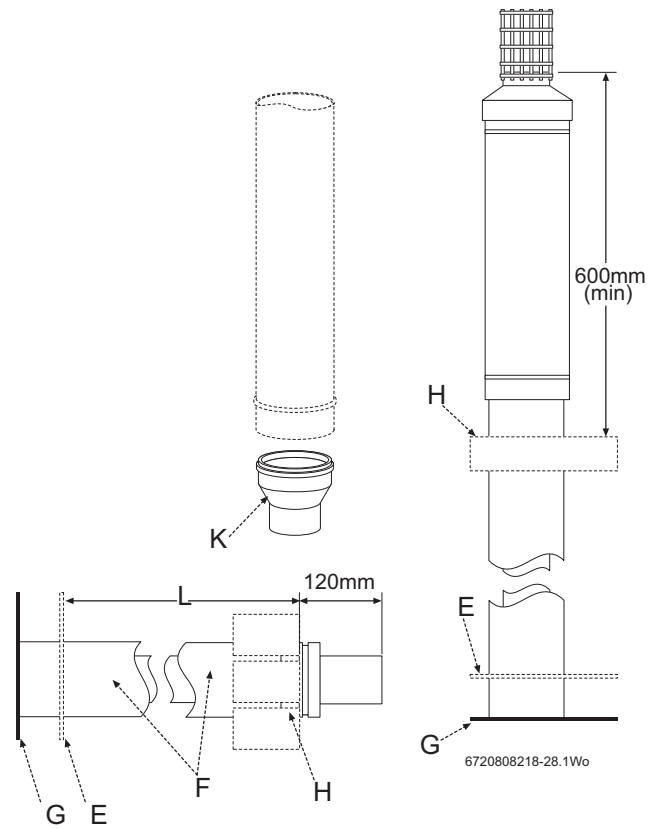


Fig. 34

- [E] Boiler outer casing
- [F] Outer flue tube
- [G] Outlet/elbow connection
- [H] Outside wall/roof
- [K] CF adapter

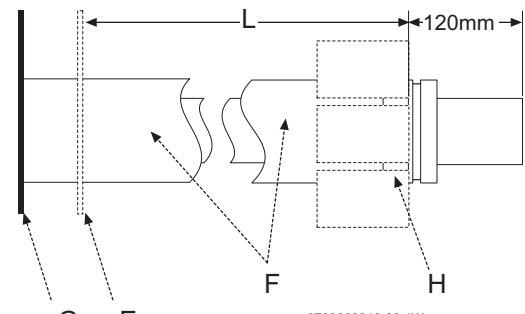


Fig. 35

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

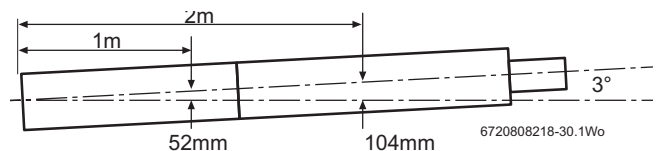


Fig. 36

5.5 Combustion chamber (18/25 Regular shown)

1. Remove the control box securing screws (A, bottom screw both sides) and loosen the pivot screws (B, top screw both sides).
2. Pivot down control box.

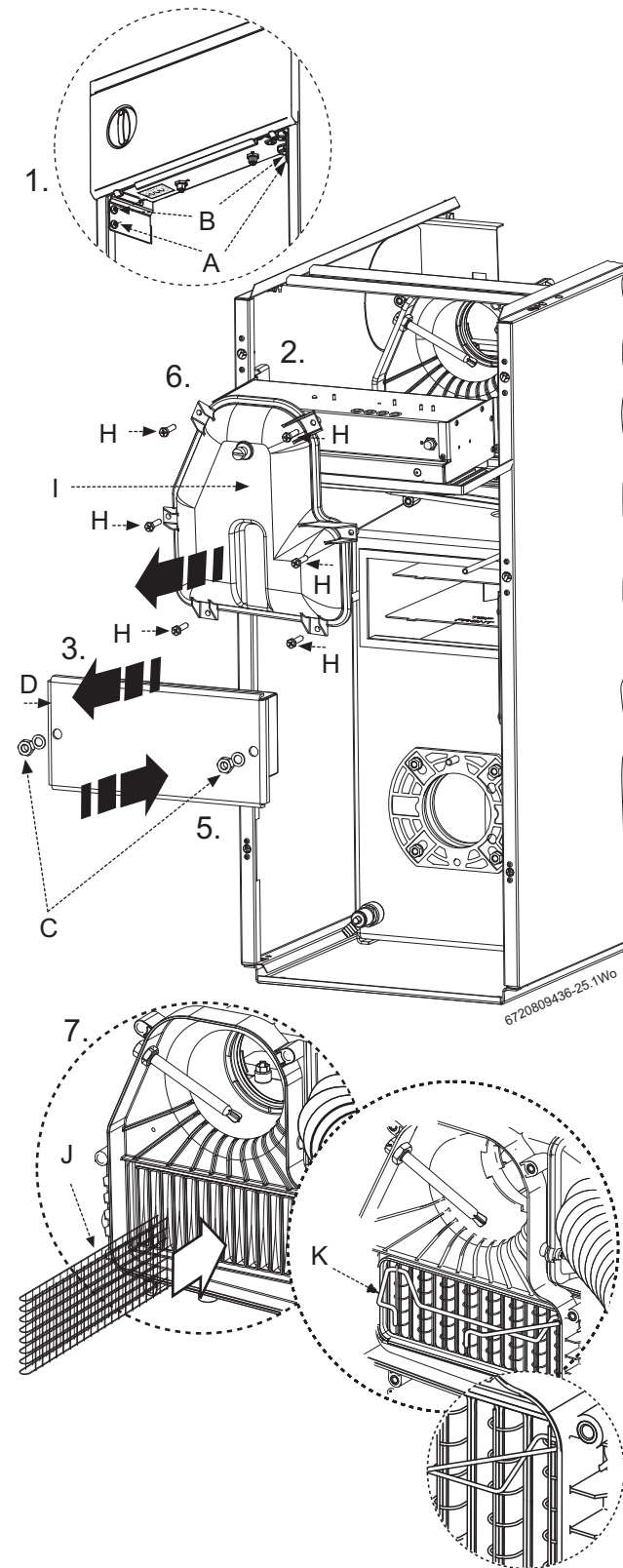


Fig. 37 Combustion chamber

3. Release retaining nuts and washers (C).
Remove baffle/combustion chamber access door (D).

4. Ensure one piece baffle set (E) is in the right location (F), correctly resting on the baffle rests (G) on either side of the combustion chamber and pushed securely into place.

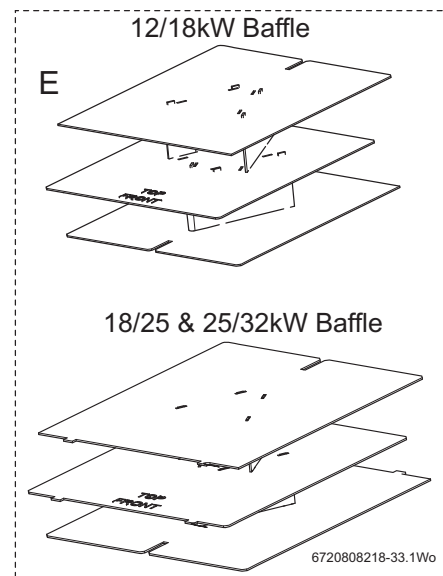


Fig. 38 Baffle arrangement

5. Secure baffle/combustion chamber access door (D) with nuts and washers (C). Tighten until door is firmly secured. Do not overtighten the nuts.
6. Unscrew screws (H) and remove flue manifold access cover (I).
7. Check that all the baffles (J) and baffle retainer (K) are correctly fitted to the secondary heat exchanger.
Hook the retainer (K) over the end two baffles.

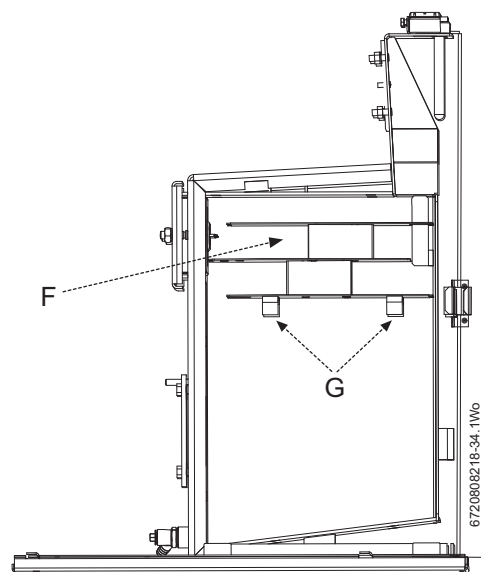


Fig. 39

5.6 Pipework connections

CAUTION: MAINS SUPPLIES

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

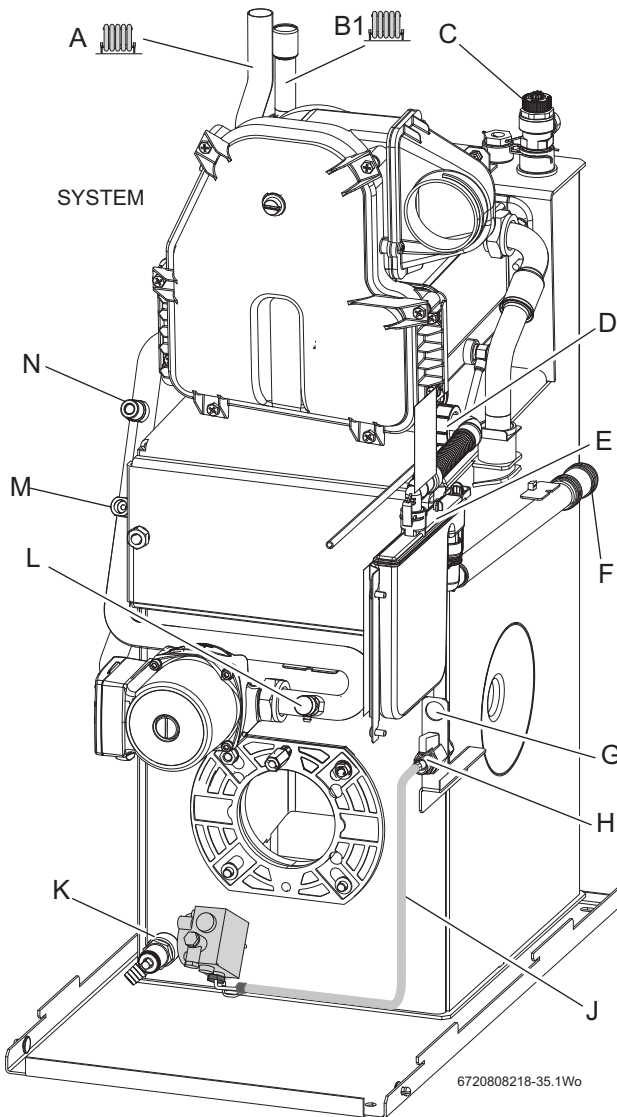
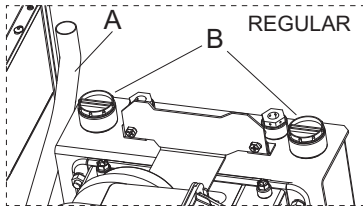


Fig. 40 Pipework connections

- [A] Return connection 22mm Ø copper (28mm Ø on 25/32 models)
- [B] Flow & optional combined feed and vent 1" BSP
- [B1] Flow connection 22mm copper (28mm on 25/32 models)
- [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. The 12/18 and 18/25 return pipe only, may be cut to simplify pipe routing externally to the boiler.
- ▶ Check that all the unused sockets have been capped.

Return pipe connection

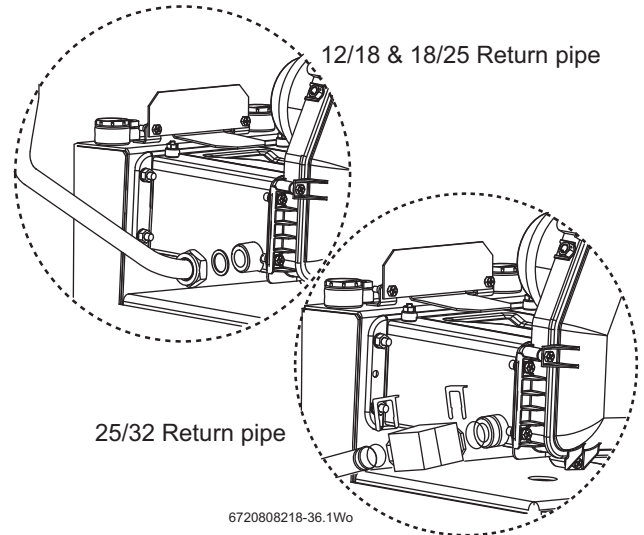


Fig. 41 Return pipes

Oil supply connections

- ▶ Refer to figure 40 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) and terminate to waste. Do not use any solvents, adhesives or lubricants when pushing the pipe into the flexible push fit connector (F).
- ▶ 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).

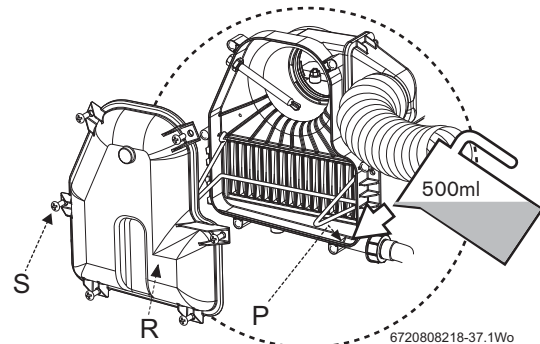


Fig. 42 Condensate

- [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

1. Check that the nozzle (A) and the electrode (B) alignment settings are correct as shown in figure 43.
- ▶ Ensure that the nozzle (A) is aligned centrally within the combustion head (C).
- ▶ Inspect for any visible defects.



NOTICE: IMPORTANT INFORMATION

- ▶ Before removing or fitting a nozzle (A), loosen screw (6 figure 44) and move the electrodes (B) forward. After refitting check that the electrode gaps are correct, as shown in figure 43.
- ▶ 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 and locating circlip behind the nozzle. These must be in place for the correct operation of the burner.

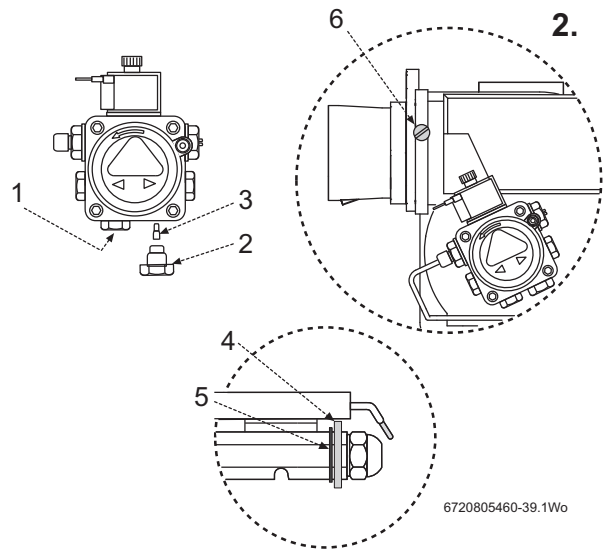


Fig. 44

- [1] Inlet pipe connection
- [2] Return plug
- [3] By-pass screw
- [4] Brass air deflector washer (12/18 models only)
- [5] Locating circlip
- [6] Electrode fixing screw

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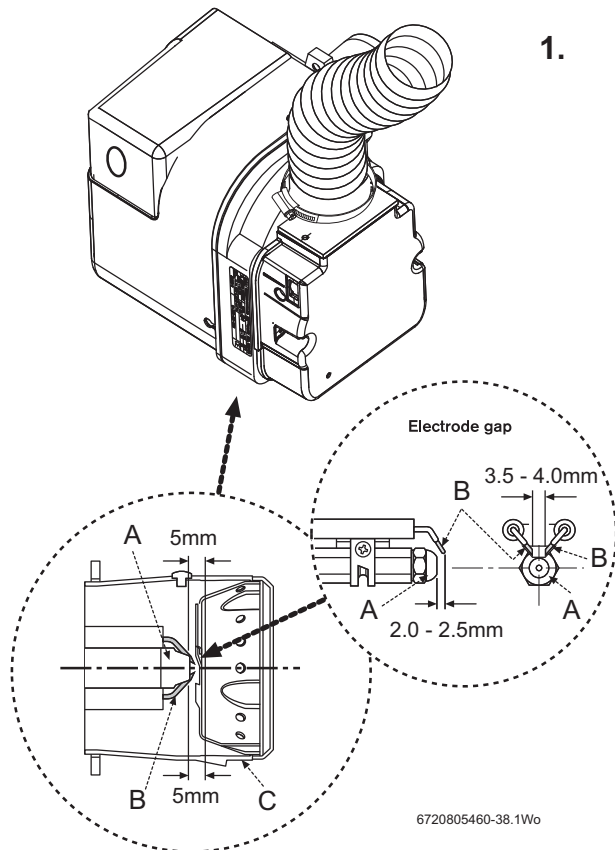


Fig. 43 Nozzle and electrode alignment

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:

1. Check the inlet pipe connection (1).
 - ▶ Unscrew return plug (2).
 - ▶ Screw in by-pass screw (3) which will be found attached to the oil pump.
2. Connect the flexible oil pipe return hose (not supplied) to the oil pump and return pipe fixing and tighten to secure.

5.8 Refitting components

1. Align burner combustion head into boiler collar.
 - ▶ Locate the burner retainer (A) over the threaded lug on the collar (B), push the burner firmly onto the flange and secure in place with the retaining nut (C). Tighten sufficiently but do not overtighten.
 - ▶ Check that the burner is seated correctly on its mounting flange and that the oil hose/s are not trapped in front of or underneath the burner.
2. Attach air duct and tighten clip (D) to secure to the burner air intake.

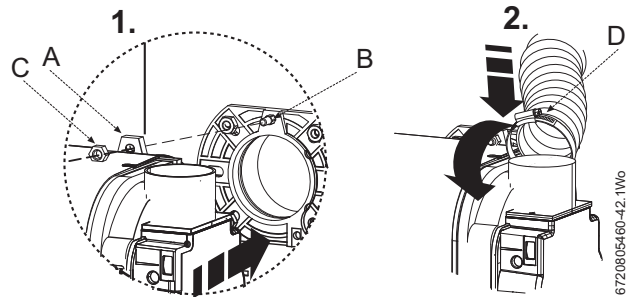


Fig. 45 Refitting the burner

3. Swing control box back up into operating position and retain in place by replacing the two securing screws (E) in the bottom locations.
 - ▶ Plug burner lead (F) into control box.

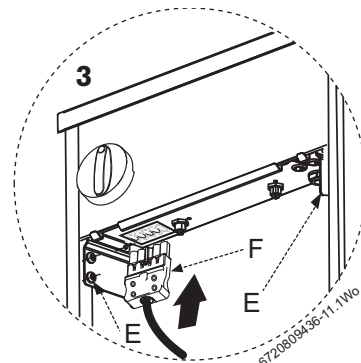


Fig. 46 Refitting the control panel

5.9 Electrical

CAUTION: 230 Volts

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

Access to 230V connections

1. Remove the four fascia retaining screws (A) and position the fascia assembly (B) on the two fascia location lugs (C) as shown.
 2. Release screws (D) from cable clamp (E).
- ▶ Feed sufficient power cable (F) through the cable clamp (E) and secure grip with screws (D).
 - ▶ Separate wires from cable end and strip to 6mm.

230V connections

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

i 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.

NOTICE: External devices

- ▶ The boiler and any external devices connected to the boiler must have a single point of isolation. See the following pages of electrical diagrams for details of different systems.

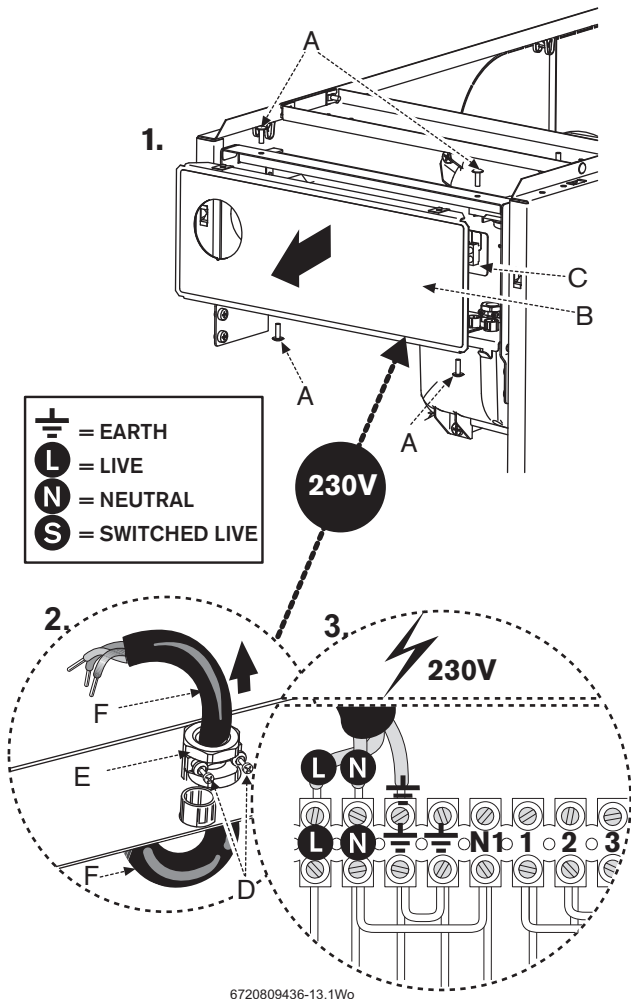


Fig. 47

External 230V programmer

4. Remove link (G).
- ▶ Connect wires as shown.

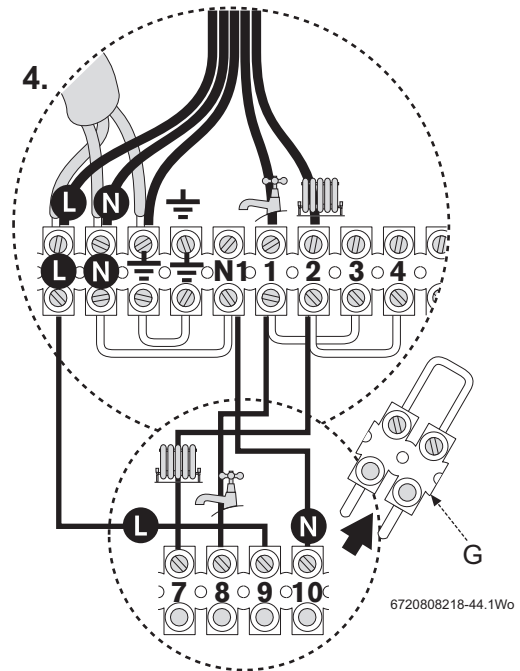


Fig. 48

Utility - 230V Standard wiring diagram

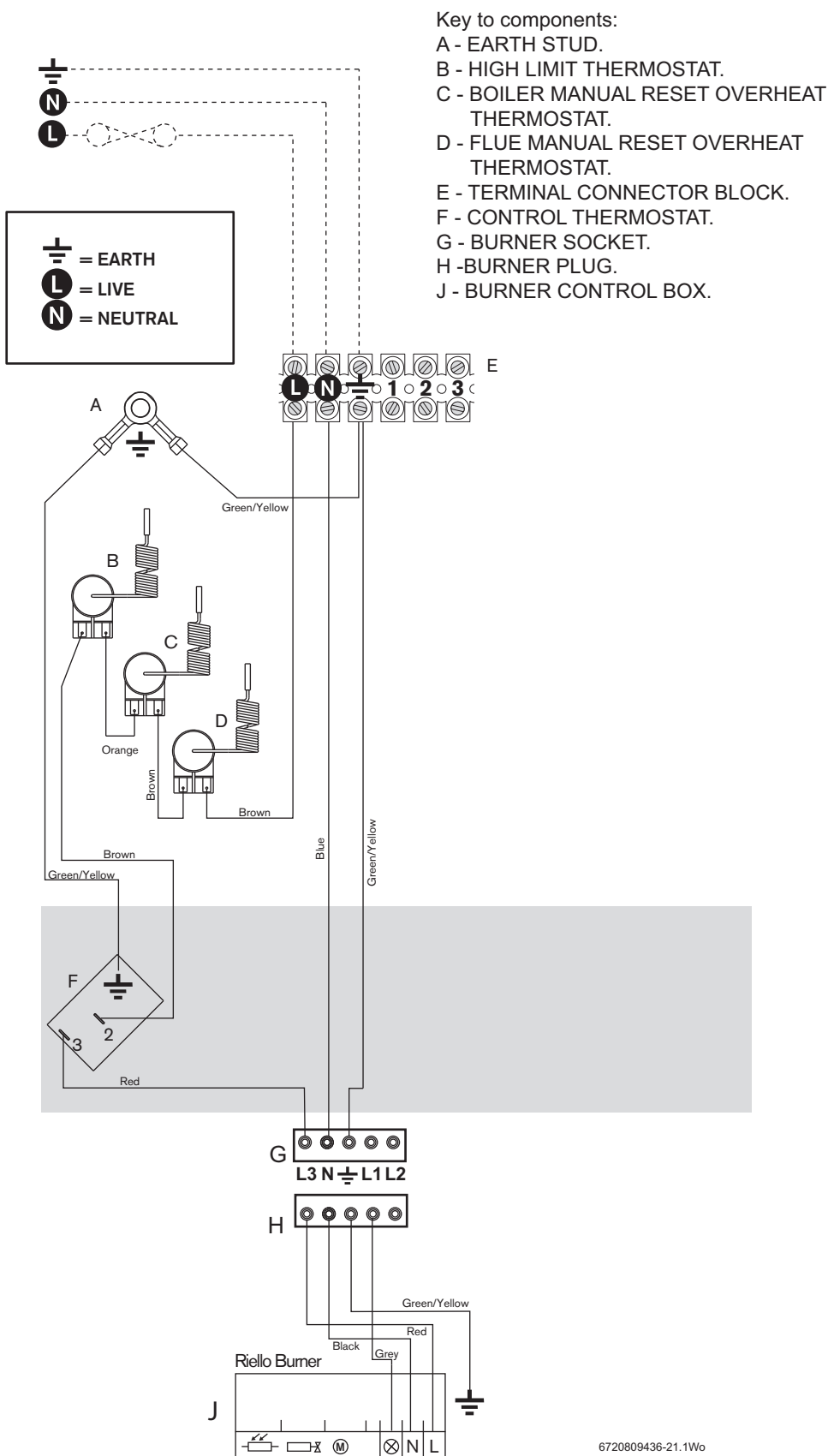
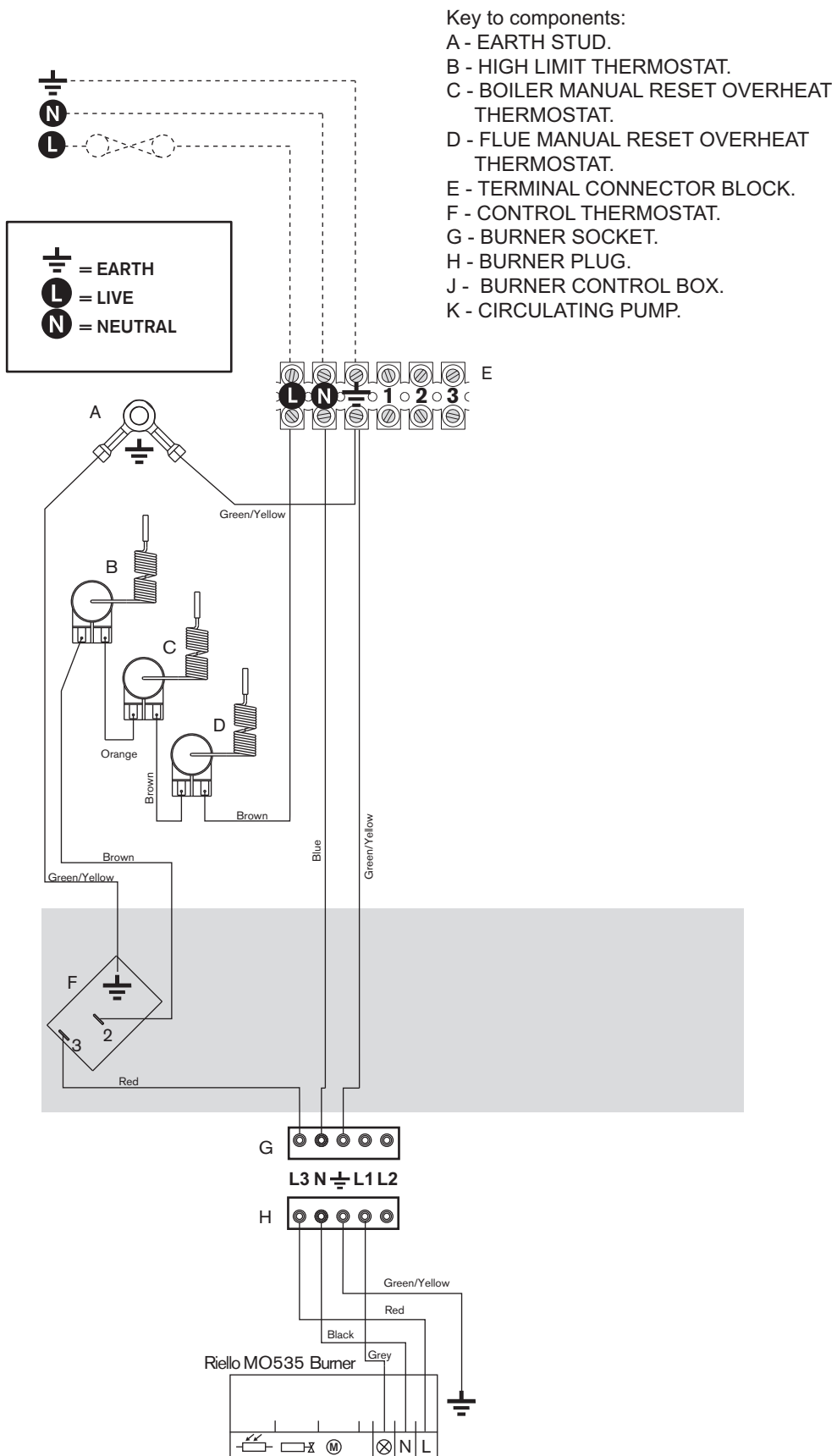


Fig. 49 230V Standard wiring diagram

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Utility System - 230V Standard wiring diagram

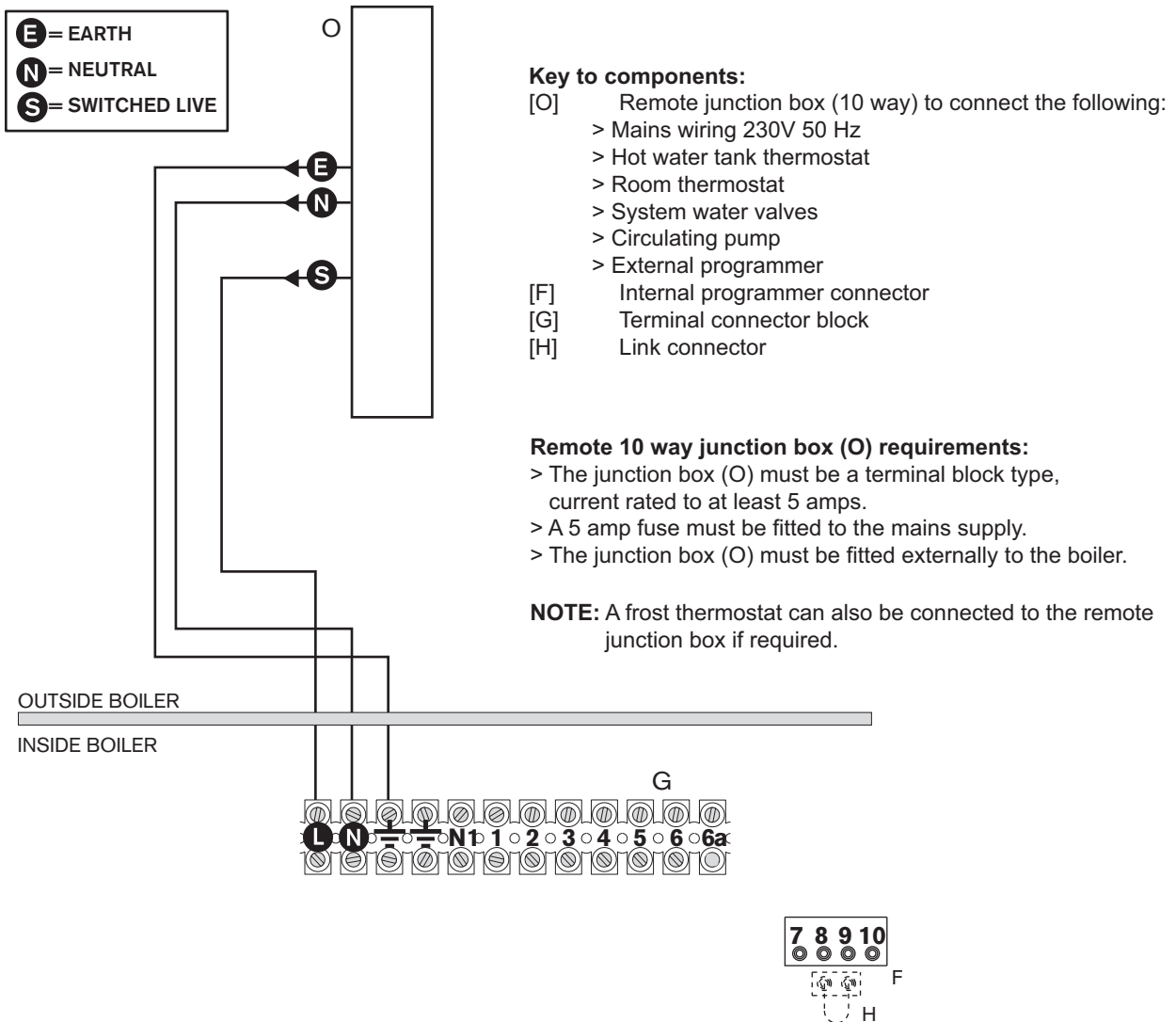


- Key to components:
- A - EARTH STUD.
 - B - HIGH LIMIT THERMOSTAT.
 - C - BOILER MANUAL RESET OVERHEAT THERMOSTAT.
 - D - FLUE MANUAL RESET OVERHEAT THERMOSTAT.
 - E - TERMINAL CONNECTOR BLOCK.
 - F - CONTROL THERMOSTAT.
 - G - BURNER SOCKET.
 - H - BURNER PLUG.
 - J - BURNER CONTROL BOX.
 - K - CIRCULATING PUMP.

Fig. 50

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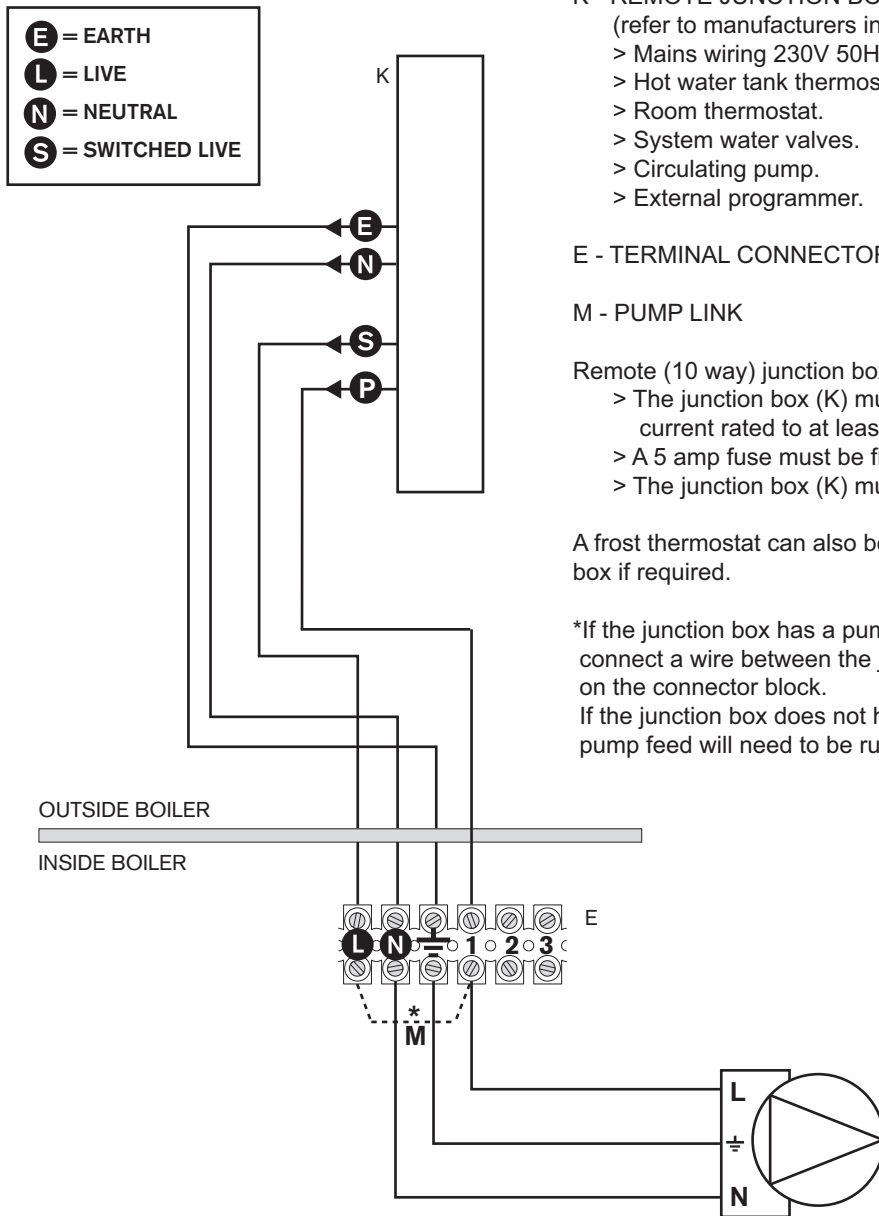
Utility - Remote 2 or 3 port valve control set using remote programmer



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Fig. 51

Utility System - Remote 2 or 3 port valve control set using remote programmer



Key to components:

K - REMOTE JUNCTION BOX (10-way) to connect the following (refer to manufacturers instructions):

- > Mains wiring 230V 50Hz.
- > Hot water tank thermostat.
- > Room thermostat.
- > System water valves.
- > Circulating pump.
- > External programmer.

E - TERMINAL CONNECTOR BLOCK.

M - PUMP LINK

Remote (10 way) junction box (K) requirements:

- > The junction box (K) must be a terminal block type, current rated to at least 5 amps.
- > A 5 amp fuse must be fitted to the mains supply.
- > The junction box (K) must be fitted externally to the boiler.

A frost thermostat can also be connected to the remote junction box if required.

*If the junction box has a pump overrun feature remove link (M) and connect a wire between the junction box pump feed and terminal 1 on the connector block.

If the junction box does not have a pump overrun feature no separate pump feed will need to be run to the boiler, leave link (M) in place.

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Fig. 52

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.

1. Check that the service and water pipes are connected correctly.
 - ▶ Check that all unused sockets are capped.
2. 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.
 - ▶ Check that the burner is seated correctly on its mounting flange and that the oil hose/s are routed correctly.
See page 42, figure 79 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.
3. Check the flue is correctly fitted and the connections are secure.
4. Check the condensate pipework is correctly fitted and connected.
 - ▶ Check the condensate trap is filled with water.

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.

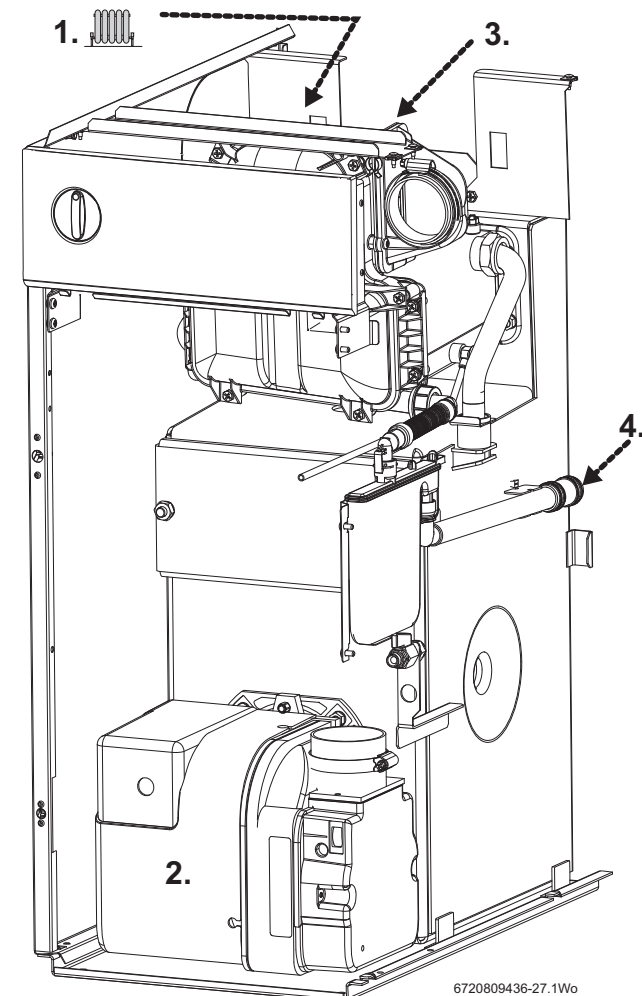


Fig. 53 Pre-Commissioning checks

6.2 Filling the system

1. 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.
2. Sealed systems only:
 - ▶ Check and if required, adjust the expansion vessel pressure using the Schraeder type valve (C).
 - ▶ 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.
3. Vent all radiators, retighten when completed.

i System boiler only

The charge pressure of the built-in 10 litre expansion vessel is 0.5 bar as supplied, which is equivalent to a static head of 5 metres. At 1 bar pressure the vessel will provide 92 litres expansion capacity, the boiler has a primary water capacity of 20 to 22 litres and therefore additional system expansion capacity may be required.

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.

- ▶ 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 (A) on the top of the secondary heat exchanger. Only one can be used if fluing to the side.

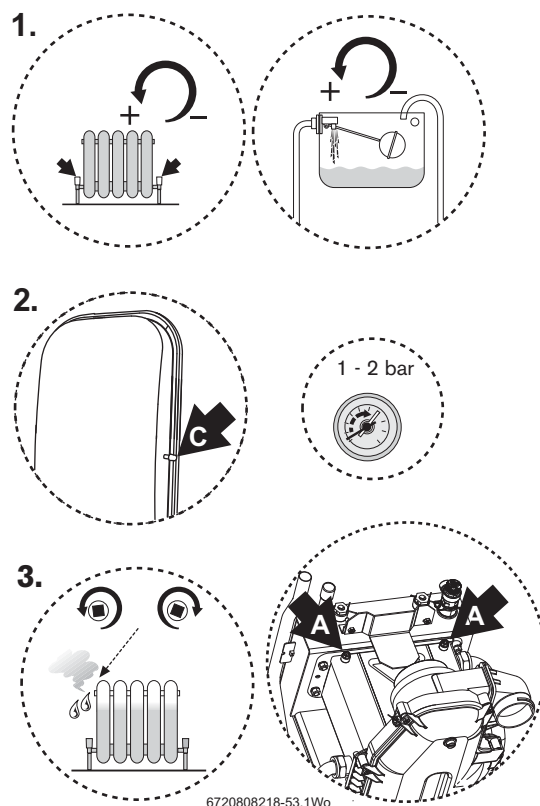


Fig. 54 Filling the system

6.3 Starting the appliance

NOTICE:

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

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:

- ▶ Prime the oil supply pipework to prevent oil pump damage.
- ▶ To prime a de-aerator, disconnect the flexible oil inlet hose (F) from the isolation valve and place in a container of kerosene (G). Connect a spare flexible oil hose (E), to discharge into container (G). 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 (G). Turn off the boiler then reconnect the flexible oil inlet hose (F).
- ▶ 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 (A) to discharge into a suitable container once the boiler is started up.

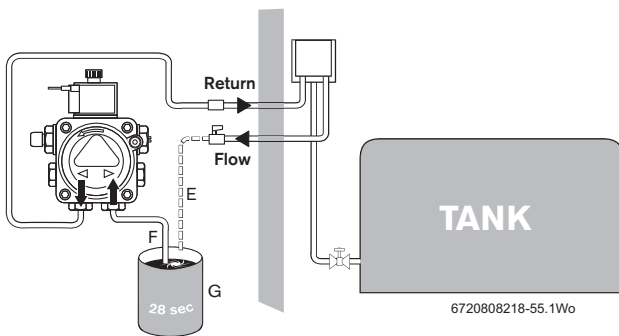


Fig. 55

- ▶ Switch on the electricity supply to the boiler.
- ▶ Set the programmer to ON.
- ▶ Turn on the boiler control thermostat.
- ▶ Allow the burner to run through to 'lock-out' indicated by the illumination of the lockout indicator (D), (note: some systems will not lock out).
- ▶ If lockout occurs wait 2 minutes then press the lockout reset button (D).

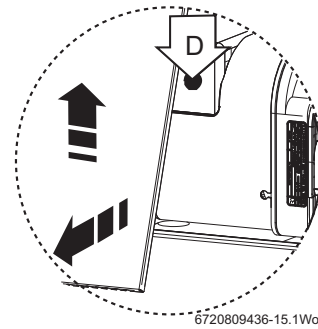


Fig. 56

- ▶ Repeat the procedure at least 3 times or until a steady stream of oil, without air, runs from the bleed port, then lock 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 (A) on the oil pump.
- ▶ Adjust the air shutter (L) and pump pressure (B) as shown in the table 4 on page 35. 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.

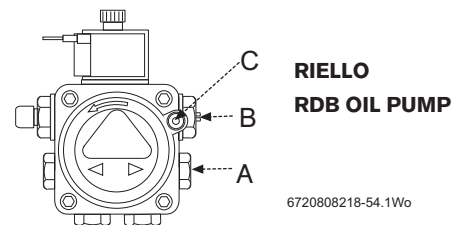


Fig. 57

- [A] Bleed and pressure gauge port
- [B] Pressure adjustment
- [C] Vacuum gauge port

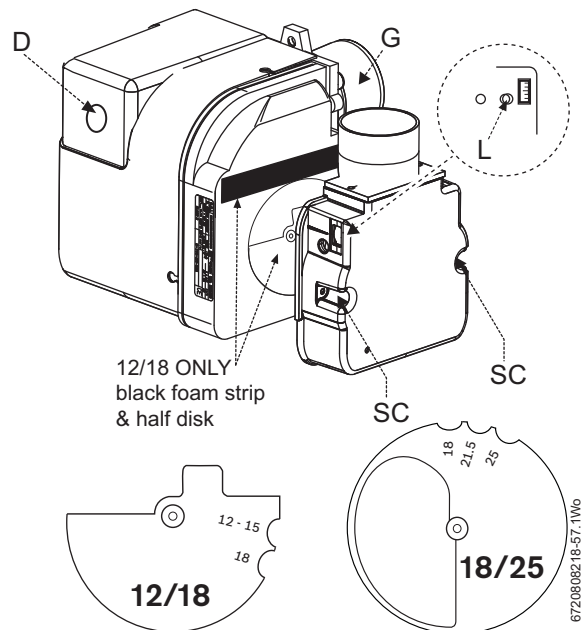


Fig. 58



Adjust position of air damper discs to suit burner output (see table 4 on page 35), located as above. Access by removing the two star screws (SC) to release the air inlet manifold.

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 (D).

- ▶ Wait 2 minutes then press the lockout reset button D (see figure 61) to initiate another start sequence.
- ▶ Repeat procedure until a flame is established.

1. Start and run for 3 minutes then switch off.

- ▶ Check for after-spurting from the nozzle, indicated by oil saturation on the combustion head (G figure 61).

If after-spurting occurs:

- ▶ Release the burner retainer nut (F).
- ▶ Remove the burner, combustion head (G) and electrodes, hold the burner vertical to unscrew the nozzle and fill the nozzle holder with kerosene.
- ▶ Refit nozzle, electrodes, combustion head (G) and the burner.
- ▶ Restart and run for 3 minute intervals until after-spurting stops.

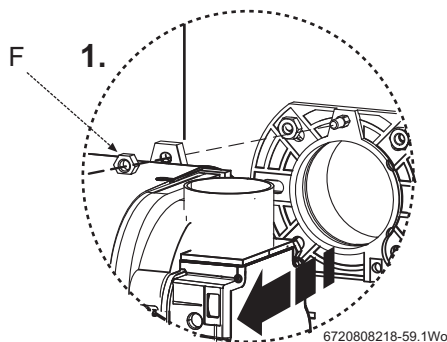


Fig. 59

2. Start and run for 20 minutes

- ▶ Remove sampling point plug (K) to check the smoke reading is between 0-1. If the smoke level is above 1, check the combustion settings are correct and the oil nozzle is in good condition.

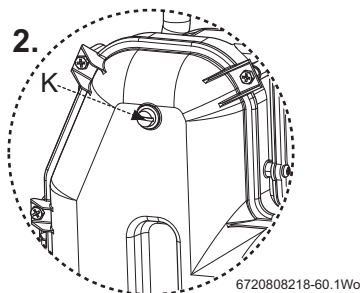


Fig. 60



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 (L) setting according to the table opposite.
- ▶ Check the flue gas temperature is close to the values shown in the table 4 on page 35.



If the flue gas temperature is too high and the baffles are correctly fitted, then reduce the oil pump pressure (B) 5-10p.s.i. to compensate for nozzle variations.

- ▶ Turn off the electrical supply.

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

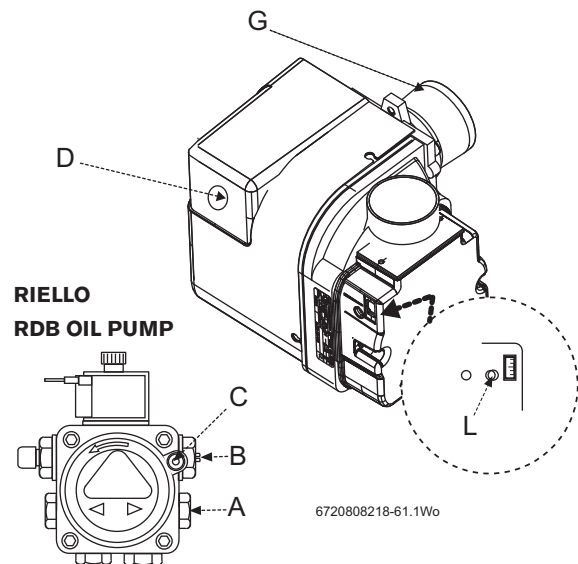


Fig. 61

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 4 Burner information



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

Central heating

1. Open all radiator valves.
 - ▶ Set room thermostat to maximum.
 - ▶ Set programmer to ON for CH, OFF for DHW (if applicable).
 - ▶ Turn the thermostat control (A) to max.
 - ▶ 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.

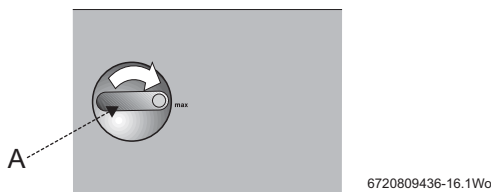
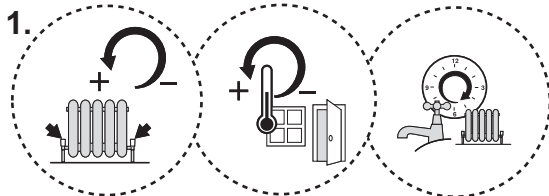


Fig. 62

2. Set the room thermostat to minimum.
 - ▶ Check that any other controls that are fitted to the system are operating properly.

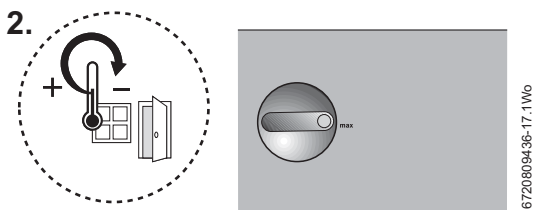


Fig. 63

6.4 Water treatment



Debris from the system can damage the boiler and reduce efficiency.

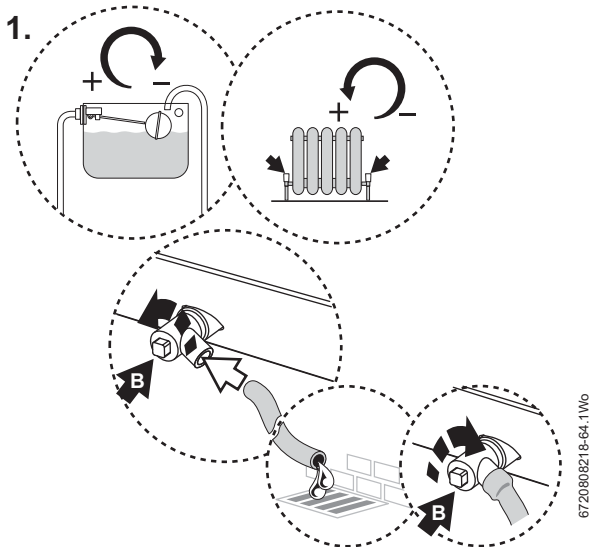
Failure to comply with the guidelines for the use of water treatment with the appliance will invalidate the appliance guarantee.

The use of a magnetic system filter such as the Worcester Greenstar System Filter is recommended.

Flushing (Central heating)

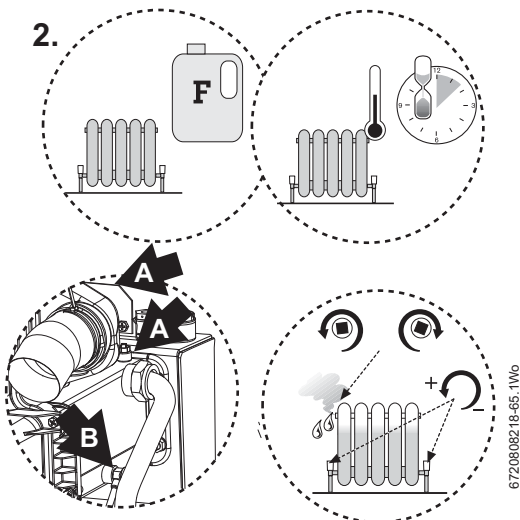
1. Switch off the boiler.

- ▶ Open vented systems only: turn off the water to the system header tank.
- ▶ Open all radiator valves/drain cocks (B) and drain the system while the appliance is hot.
- ▶ Close drain cocks (B).

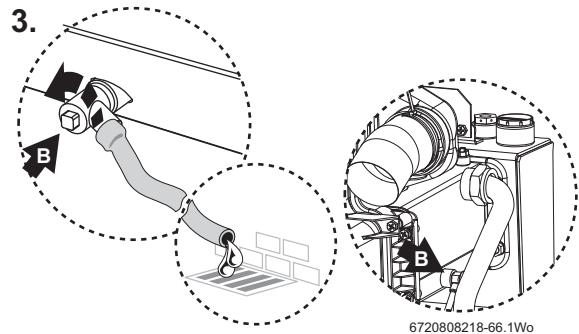


2. Add a suitable flushing agent (F) and refill the system at the correct strength for the system condition in accordance with the manufacturer's instructions.

- ▶ Vent the boiler using a radiator key or suitable screwdriver (there are two vent points (A) at the top of the secondary heat exchanger. Only one may be in use, the other may be obscured by side fluing. Always vent (A) and all radiators.
- ▶ Run the boiler/system at normal operating temperature for the time stated by the flushing agent manufacturer.



3. Drain (B) and thoroughly flush the system to remove the flushing agent and debris.



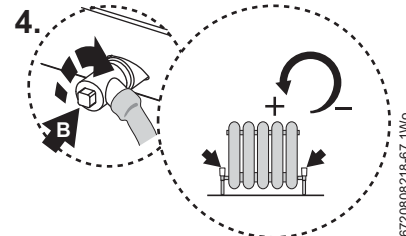
Inhibitor (Central heating)



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.

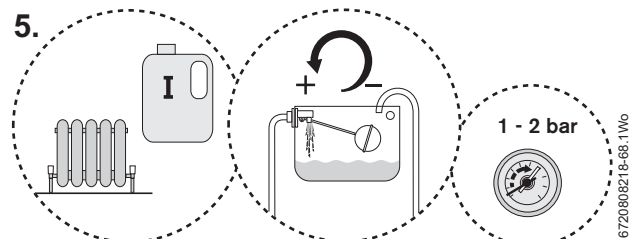
- ▶ The concentration level of inhibitor in the system should be checked every 12 months or sooner if system content is lost.

4. Check drain cocks (B) and manual air vents are closed and all radiator valves are open.

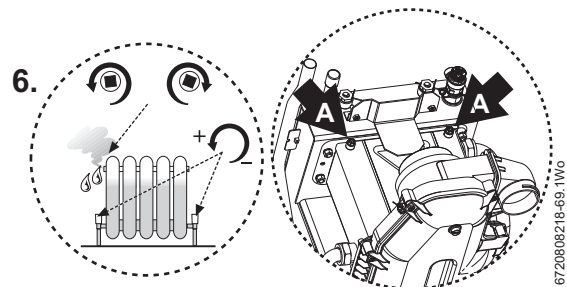


5. Add a suitable inhibitor (I), (or combined inhibitor/anti-freeze if the system is exposed to freezing conditions) to the heating system in accordance with the manufacturers instructions.

- ▶ 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 2 bar via a WRAS approved filling loop.



6. Vent the boiler, (there are two vent points (A) at the top of the secondary heat exchanger). Only one may be in use, the other may be obscured by side fluing. Always vent (A) and all radiators; retighten vents when complete.



7. Record the date when the inhibitor was added to the system on the guarantee card.

6.5 Finishing commissioning

1. Pivot the control box (A) up and into the boiler. Secure with screws (B).

Utility system only:

- ▶ Slide the expansion vessel up and locate the top edge into the bracket [1] located under the control panel.
- ▶ Push the expansion vessel in until the bracket on the expansion vessel aligns with the bracket on the cross member.
- ▶ Secure with the screw [2] removed earlier.

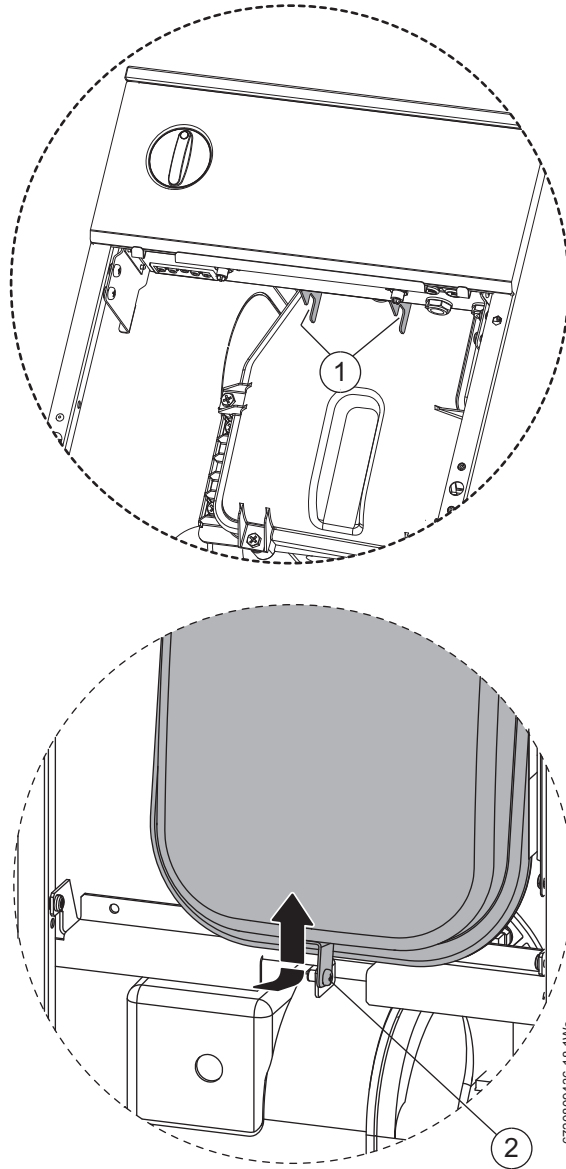


Fig. 64 Expansion vessel location

2. Locate the top edge of panel (C) onto the supporting ledge (D) and secure near the top and at the bottom by gently pushing home the ball studs into the retaining slots (E). Remember always to apply pressure at the edges of the panels to avoid damage.
3. Locate the top panel (F) onto the rear brackets (G) and press down to secure the ball stud connections (H). Always apply pressure at the edges of the boiler panels when securing to avoid accidental damage.

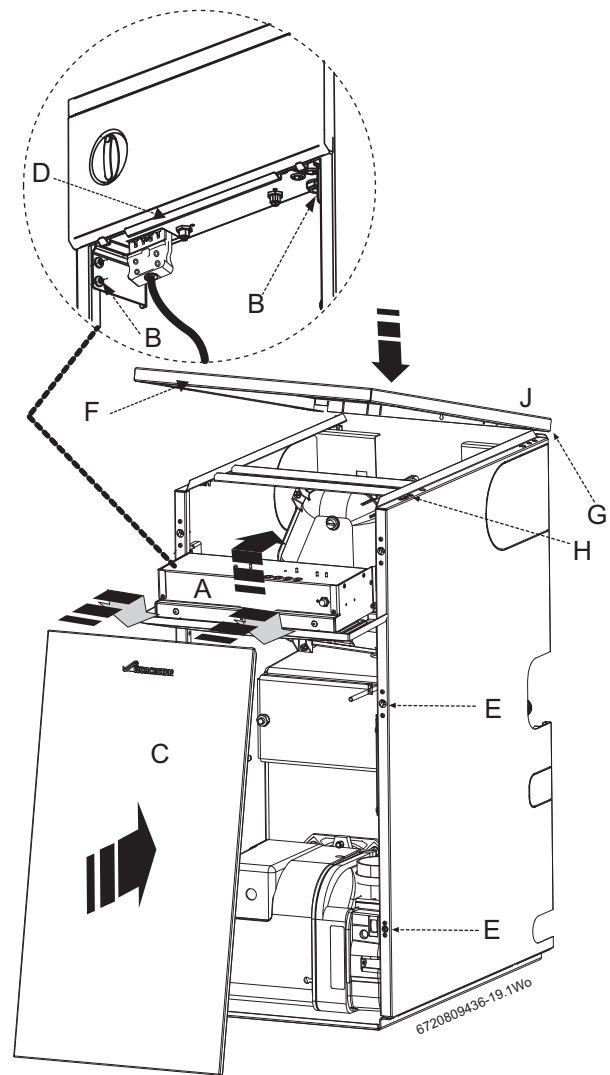



Fig. 65

Handover

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

7 Service and Spares

7.1 Inspection and service - 18/25 Regular shown



CAUTION: MAINS SUPPLIES

- ▶ Isolate the water, electricity, and oil mains supplies before starting any work and observe all relevant safety precautions.

Routine servicing

To maintain efficient boiler operation, the following should be carried out at least once a year, carry out a pre-service check and note any operational faults.

Pre-service checks

1. Pull front panel (A) forward from the bottom and near the top disengaging the ball studs from their connections (B) and lift off the ledge (C) that runs along the bottom of the fascia to remove and store safely away from the working area.

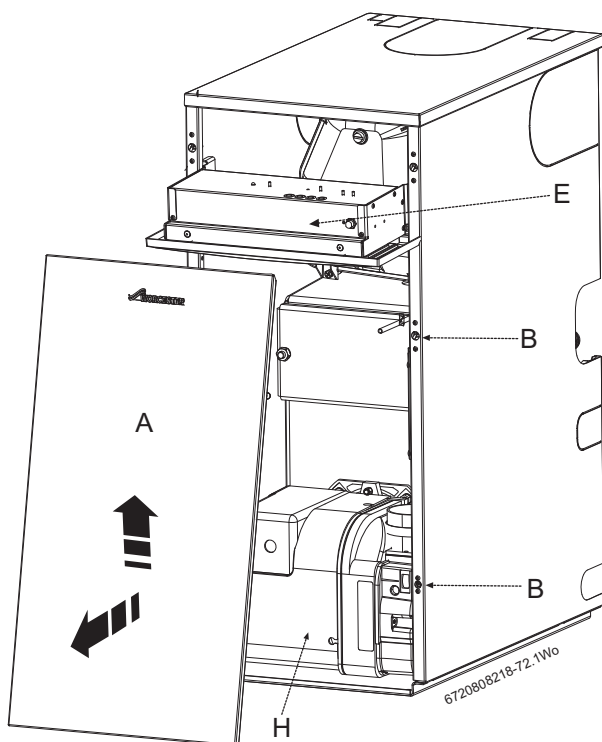


Fig. 66 Access to internal components

Utility system only:

- ▶ In the case of the Utility system boiler, remove the retaining screw [1] at the base of the expansion vessel.
 - ▶ Pull the expansion vessel forward slightly and down to remove. Place to expansion vessel outside of the boiler, taking care not to kink or stretch the flexible hose.
2. Remove securing screws (D) from each side of control box (E).
 - ▶ Pivot control box (E) downwards into the service position as shown. Operate the appliance and system and note any faults which may need to be corrected during the service.
 - ▶ Switch off and electrically isolate the boiler.

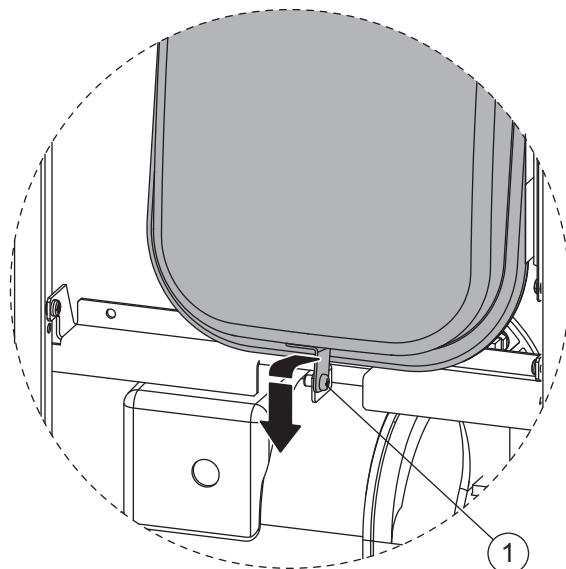


Fig. 67 Expansion vessel removal

3. Unplug burner lead (F) from control box (E).

2. & 3.

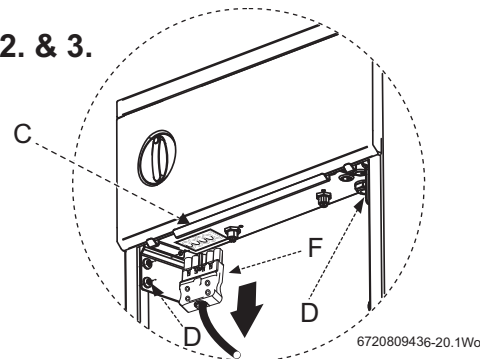


Fig. 68 Burner lead

4. Loosen clip (G) to detach air duct pipe from burner (H).
- ▶ Unscrew burner retainer nut (I) and gently pull burner forward so that the retainer (J) is free of the lug (K).

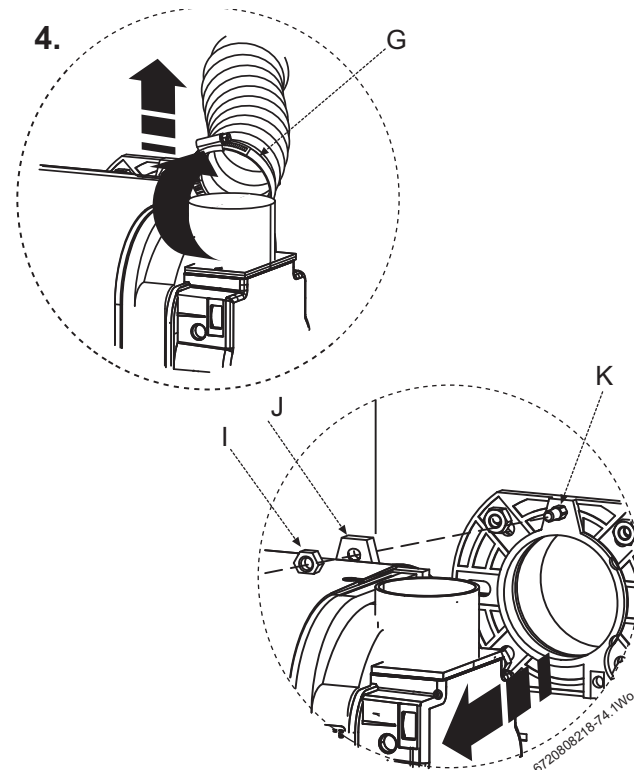


Fig. 69 Burner removal

Service requirements

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

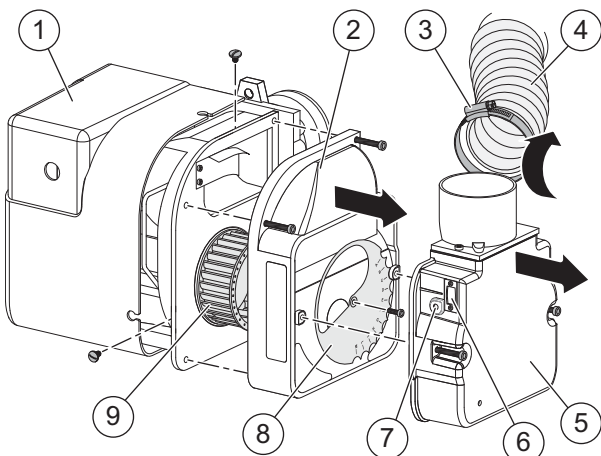
- ▶ Check and clean the burner.
- ▶ Replace the burner nozzle and flexible oil pipe/s.
- ▶ Check and clean the baffle retainers.
- ▶ Check and clean the baffles.
- ▶ Check and clean the heat exchangers surfaces.
- ▶ Check the combustion chamber access door insulation board.
- ▶ Check that the flue system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

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.

Clean the burner

- ▶ Loosen the two screws and remove the air intake cover (5), clear any debris away from the air intake and air damper.
- ▶ Disassemble the burner to allow access to the fan impeller.
- ▶ Check the condition of the gaskets between these parts and replace if necessary.
- ▶ Note the position of the air damper adjustment and check the air damper moves freely.
- ▶ Clean both sides of the fan impeller and remove any debris from the burner housing.
- ▶ Check that the impeller rotates freely.
- ▶ Reassemble the components.



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Fig. 70 Burner detail

1	Plastic cover	6	Air shutter scale
2	Air damper	7	Air shutter adjuster
3	Hose clamp	8	Air shutter disk
4	Flexible air supply hose	9	Impeller
5	Air intake cover		

- ▶ Remove the combustion head (B) and thoroughly clean any deposits.



Before removing or fitting a nozzle (C), loosen screw (D) and move the electrodes (E) forward.

After refitting check that the electrode gaps are correct, as shown opposite.

- ▶ Remove the nozzle (C).
- ▶ Check the nozzle holder is clear of any debris and clean if necessary.
- ▶ Fit a new oil atomising nozzle (C).



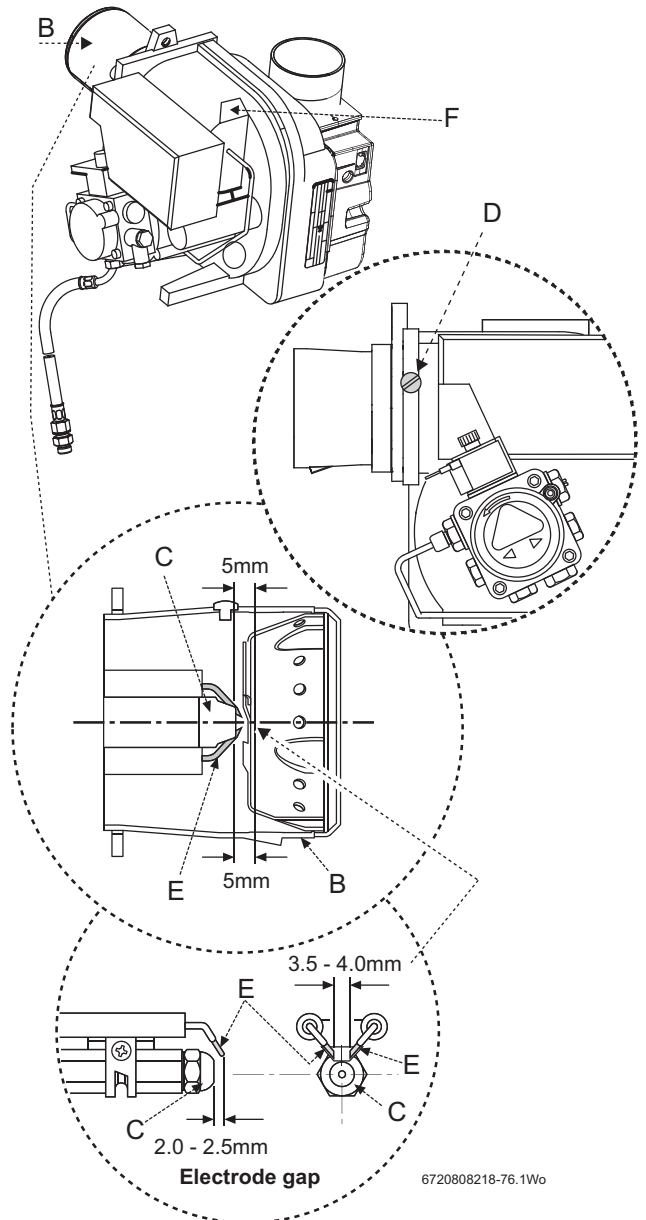
DO NOT dismantle the nozzle and DO NOT clean the nozzle tip.

- ▶ Check the electrodes (E) and reset if necessary as shown opposite.



The 12/18 model has a brass air deflection washer and locating circlip behind the nozzle. These must be in place for the correct operation of the burner.

- ▶ Refit the combustion head (B). Check that the nozzle (C) is central in the combustion head (B) and the head settings are as shown. Ensure that the photocell is lined up with the sight hole.
- ▶ Withdraw the photocell (F) from its housing and wipe clean.
- ▶ Remove the oil pump internal filter, clean in kerosene and reassemble.



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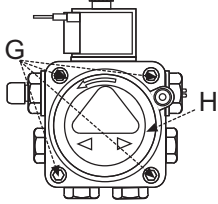
Fig. 71 Burner removal

- ▶ The internal filter is accessed by removing screws (G) and the oil pump cover (H), refer to figure 72.
- ▶ Replace the standard flexible oil line/s at every annual service to prevent the possibility of leakage due to ageing.
- ▶ Reassemble the burner components.
- ▶ Check the O-ring seal located around the combustion head and replace if necessary.

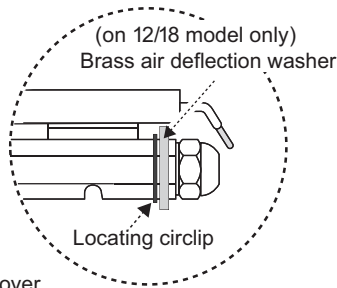


This seal must be in good condition, seal failure will cause flue gases to escape into the room.

**RIELLO
RDB OIL PUMP**



G - Retaining screws - cover
H - Cover - oil pump



6720808218-104.1W6

Fig. 72 Pump detail

Combustion chamber - 18/25 Regular shown

- ▶ Release the M10 retaining nuts and washers (A) and remove baffle/combustion chamber access door (B).
- ▶ Check the fibreglass rope seal on the baffle/combustion chamber access door (B) and replace if necessary.
- ▶ Remove the one piece baffle set (C), clean and check the condition. Replace if considered to be badly corroded/degraded.
- ▶ Thoroughly clean all of the heat exchanger surfaces using a suitable brush and clear all loose debris from the combustion chamber.
- ▶ Check the condition of the baffle/combustion chamber access door insulation. If the insulation is damaged the door assembly must be replaced.
- ▶ Check the condition of the baffle/combustion chamber access door seal.
- ▶ Refit the one piece baffle set (C) making sure it is seated correctly on the 4 rests (D) and pushed into the correct position as shown in the plan view opposite.
- ▶ Refit baffle/combustion chamber access door (B).
- ▶ Secure with nuts and washers (A) and tighten until the door is firmly secured. Do not over tighten the nuts.

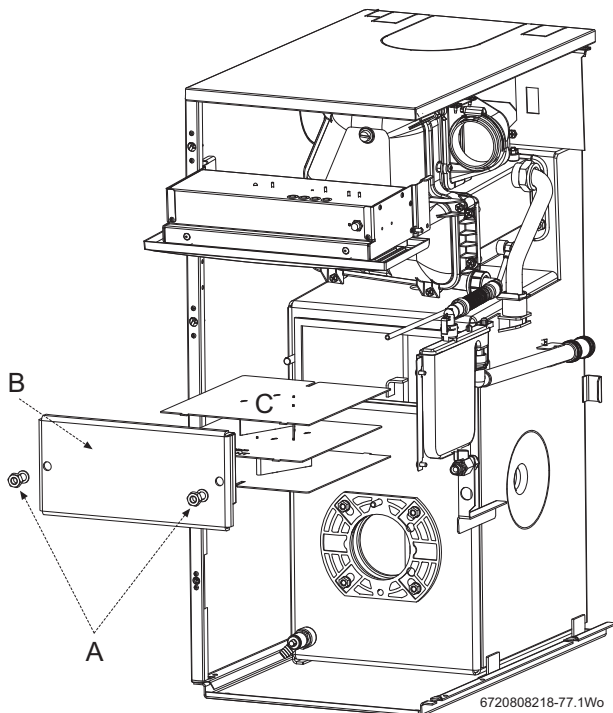
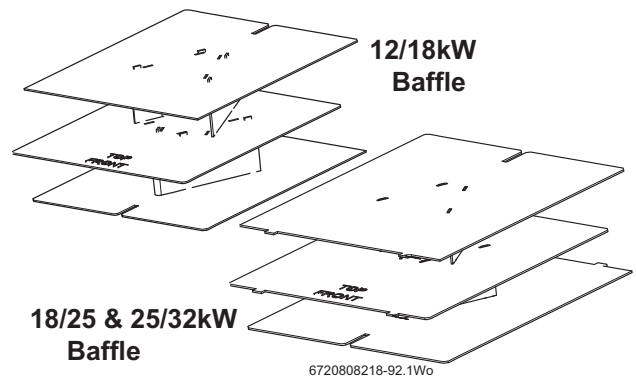
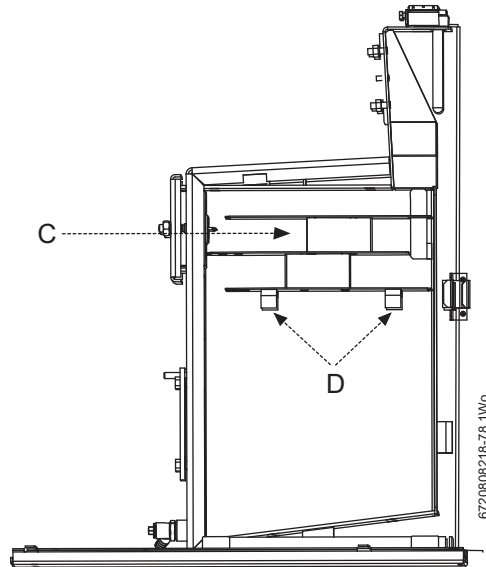


Fig. 73 Combustion chamber



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Fig. 74 Baffle detail



6720808218-78.1W6

Fig. 75 Baffle positioning

Oil supply system and tank

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

Cleaning the boiler, manifold access:



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

- ▶ Release screws (A) to remove the flue manifold access cover (B) and clear any debris.
- ▶ Check the flue system and clean if necessary.
- ▶ Remove the baffle retainer (C) and baffles (D) from the secondary heat exchanger.
- ▶ Check and clean the secondary heat exchanger surfaces.
- ▶ Check the condensate route (E) is clear.
- ▶ The condensate trap (F) should be removed and checked for debris.
- ▶ Release the pipe locking tab (G) and disconnect the flexible pipe (H) from the top of the trap and move the flexible pipe up away from the trap.
- ▶ Release the trap locking tab (I) and move the trap up and back to remove from its mountings.
- ▶ Clean the trap by flushing with water.
- ▶ Check the O ring seals and replace if necessary, grease the seals with a solvent free grease.
- ▶ Refit the trap making sure that the locking tabs are locked in place.

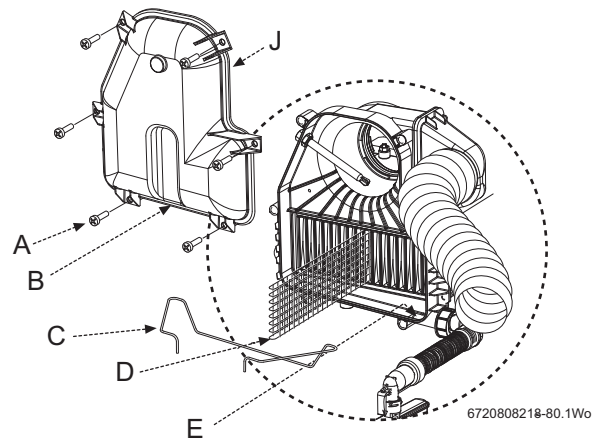


Fig. 77 Heat exchanger baffles

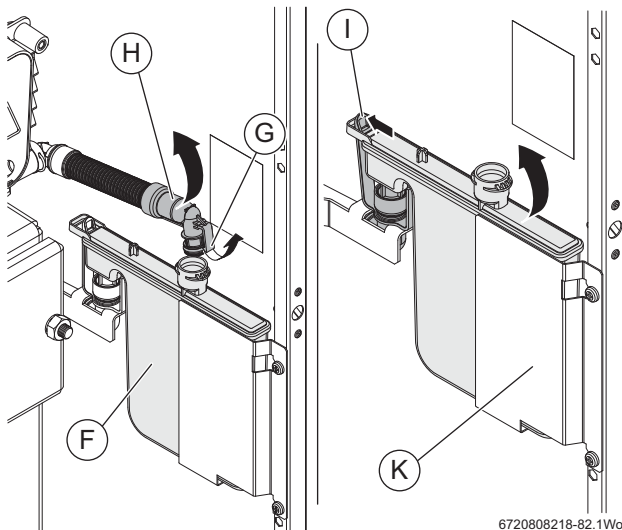


Fig. 76 Condensate trap removal

- [F] Condensate trap
- [G] Pipe locking tab
- [H] Flexible pipe
- [I] Trap locking tab
- [K] Trap retaining bracket

- ▶ Pour 500ml of water into drain (E) to refill the condensate trap. Ensure that the trap is discharging correctly and that all condensate pipework joints are water tight.
- ▶ Clean the secondary heat exchanger baffles (D) if necessary and refit correctly.
- ▶ Refit the baffle retainer (C).
- ▶ Check the seal on the manifold access cover (J) and replace if necessary.
- ▶ Refit the flue manifold access cover (B) and secure with screws (A).

Re-commissioning the burner

- Align burner combustion head into burner collar.
 - ▶ Locate the burner retainer (A) over the threaded lug on the collar (B). Push the burner firmly onto the flange and secure in place with the retaining nut (C). Tighten but do not over-tightening.
 - ▶ Check that the burner is seated correctly on its mounting flange and that the oil pipe/s are correctly routed.
 - ▶ Attach air duct pipe and tighten clip (D) to secure to the burner air intake.

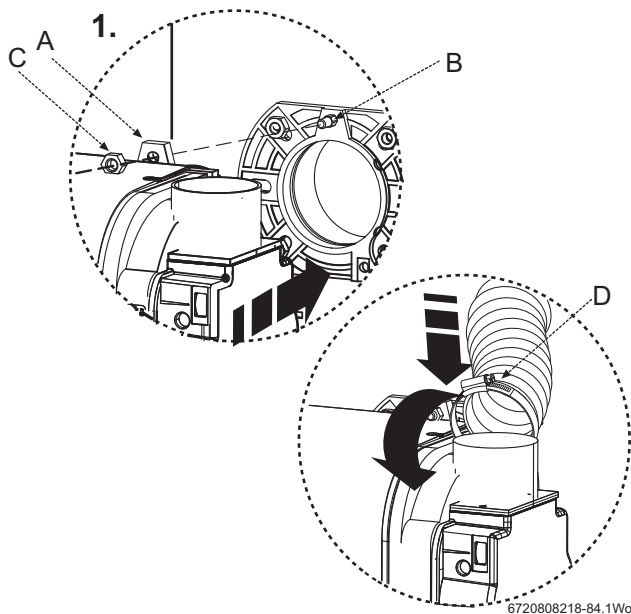


Fig. 78 Refitting the burner

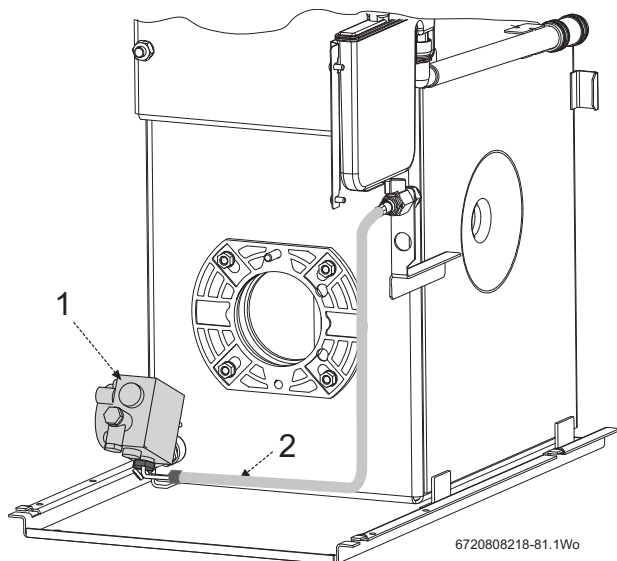


Fig. 79 Oil pump and hose detail

- Oil pump
 - 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.
 - Swing control box back up into operating position and retain in place by replacing the two securing screws (E) in the bottom locations.
 - ▶ Plug burner lead (F) into control box.
 - ▶ Connect an oil pressure gauge to the oil pump, run the burner and check the oil pressure is correct for the required boiler output. Check that the smoke reading is between 0 - 1. If above 1 check the air setting. If the air setting is correct check that the burner has been reassembled correctly.
- Allow the boiler to warm up then check the combustion settings are

correct as indicated in table 4 on page 35, ensure CO₂ levels are correct. Adjust the air shutter if necessary see page 34, figure 61 for details.

When the combustion is correct turn off the boiler, remove the pressure gauge and refit the blanking plug and plastic cover.

- Locate the top edge of panel (G) onto the supporting ledge (H) and secure near the top and at the bottom by gently pushing home the ball studs into the retaining slots (I). Remember always to apply pressure at the edges of the panels to avoid damage.

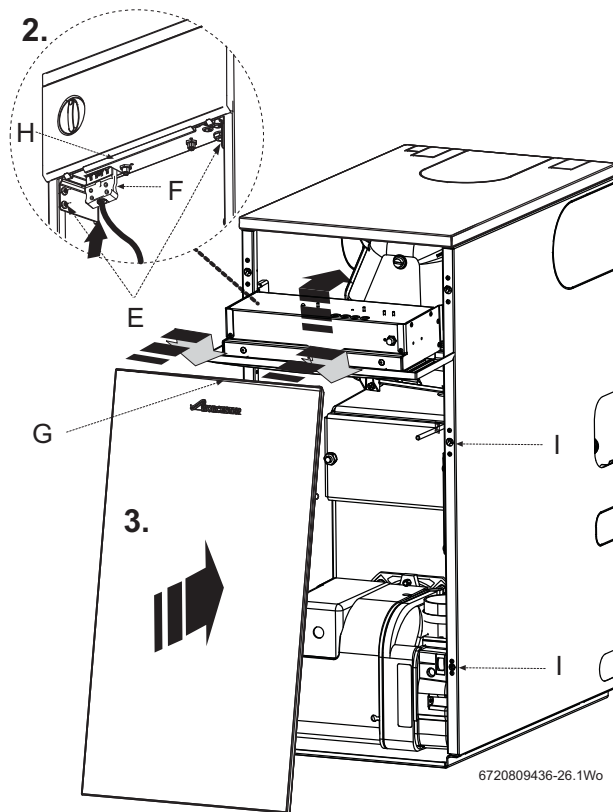
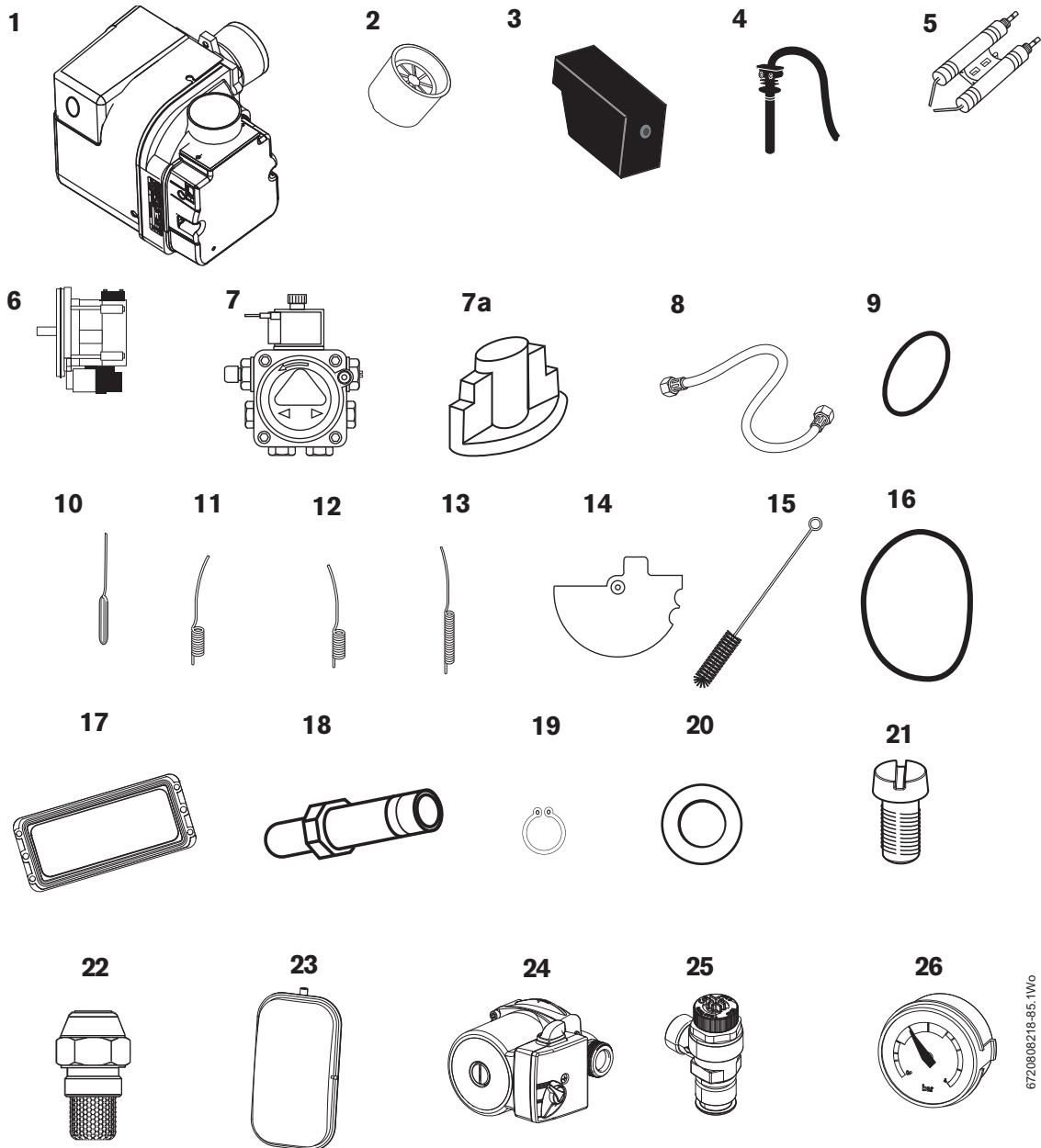


Fig. 80 Refitting panels

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.

7.2 Short parts lists 12/18



6720808218-85.11Wo

Fig. 81 Short parts list 12/18

1	Burner - Riello RDB 2.2 12/18	Part No.: 8 718 690 333 0	15	Cleaning brush	Part No.: 8 716 109 428 0
2	Combustion head - LD2X SH12/18	Part No.: 8 716 112 731 0	16	Manifold access cover seal	Part No.: 8 716 107 536 0
3	Control box 535 RSE/LD	Part No.: 8 716 109 203 0	17	Secondary Heat Exchanger gasket	Part No.: 8 718 690 792 0
4	Photocell	Part No.: 8 716 109 193 0	18	Nozzle holder	Part No.: 8 716 116 638 0
5	Ignition electrode	Part No.: 8 716 109 211 0	19	Circlip	Part No.: 8 716 112 773 0
6	Motor	Part No.: 8 716 110 522 0	20	Brass air restrictor washer	Part No.: 8 716 112 729 0
7	Oil pump - Riello RDB	Part No.: 8 718 689 342 0	21	Flue sample point screw	Part No.: 8 718 682 081 0
7a	Pump coupling	Part No.: 8 716 109 245 0	22	Oil nozzle	
8	Flexible oil hose kit	Part No.: 8 716 115 310 0		0.35 80° SR (12kW output)	Part No.: 8 716 112 628 0
9	Burner 'O' ring	Part No.: 8 716 109 341 0		0.45 60° ES (15kW output)	Part No.: 8 716 114 545 0
10	Control thermostat	Part No.: 7 716 107 621 0		0.55 80° EH (18kW output)	Part No.: 8 716 156 671 0
11	Auto reset overhear thermostat	Part No.: 8 716 107 623 0	23	Expansion vessel	Part No.: 8 715 407 296 0
12	Manual reset overhear thermostat	Part No.: 8 716 107 625 0	24	Pump three speed	Part No.: 8 718 691 831 0
13	Manual reset flue thermostat	Part No.: 8 716 107 624 0	25	Pressure relief valve	Part No.: 8 718 681 163 0
14	Air damper disc 12 15-18	Part No.: 8 718 690 377 0	26	Pressure gauge	Part No.: 8 716 107 638 0

7.3 Short parts list 18/25

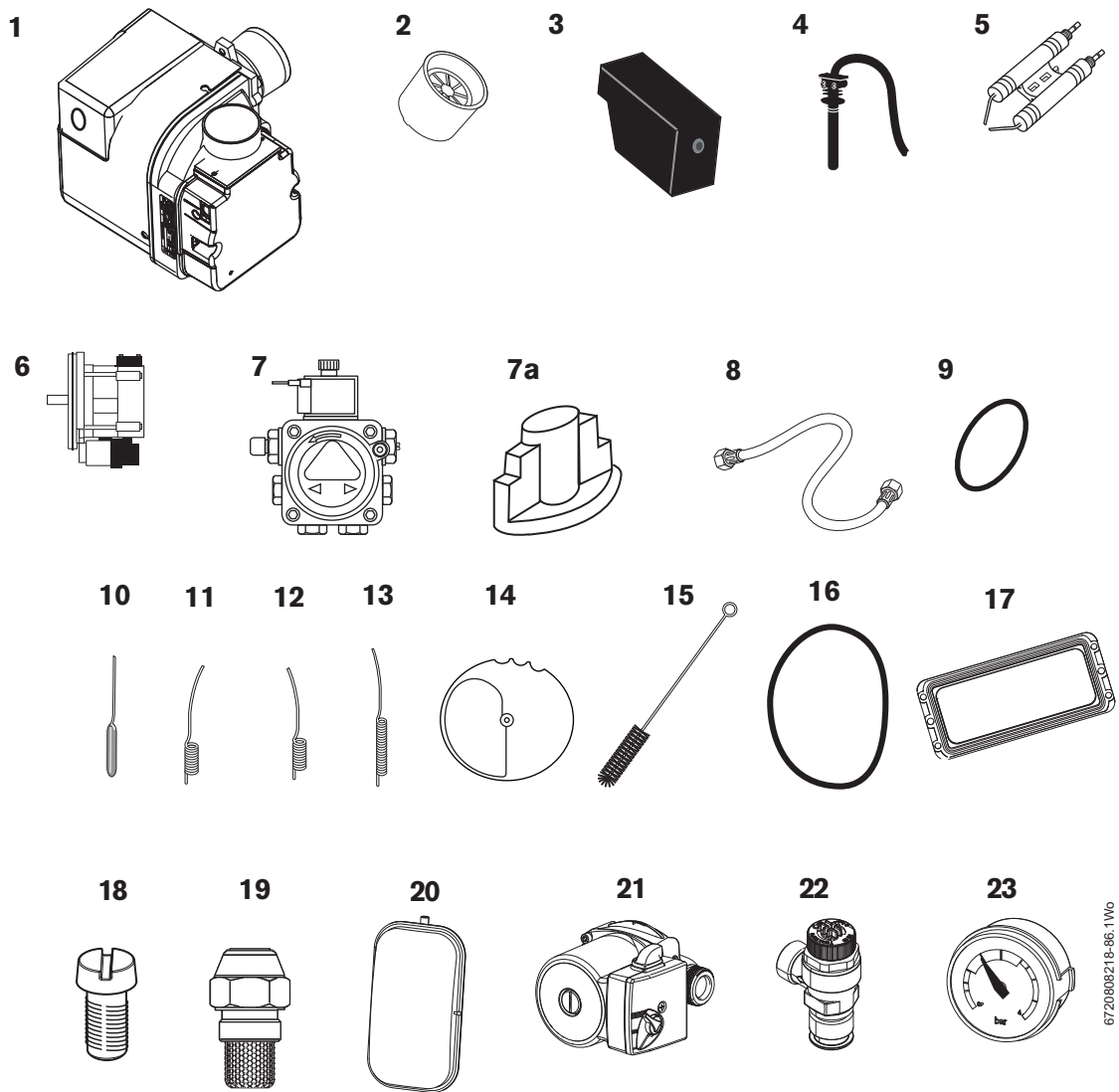
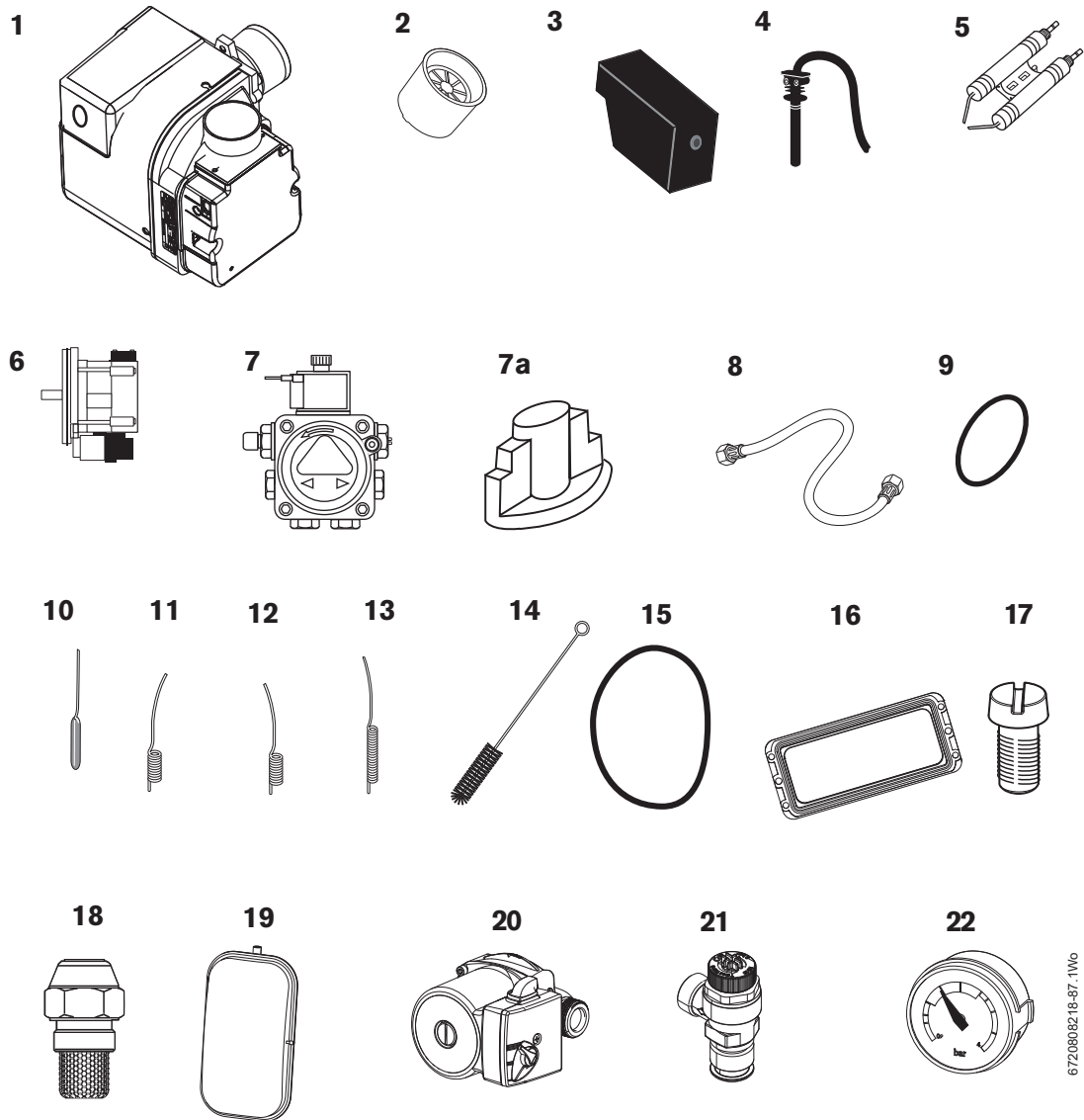


Fig. 82 Short parts list 18/25

1	Burner - Riello RDB 2.2 18/25	Part No.: 8 718 690 334 0	14	Air damper disc 18 21.5-25	Part No.: 8 718 690 458 0
2	Combustion head - LD2X SH18/25	Part No.: 8 718 682 170 0	15	Cleaning brush	Part No.: 8 716 109 428 0
3	Control box 535 RSE/LD	Part No.: 8 716 109 203 0	16	Manifold access cover seal	Part No.: 8 716 107 536 0
4	Photocell	Part No.: 8 716 109 193 0	17	Secondary Heat Exchanger gasket	Part No.: 8 747 009 725 0
5	Ignition electrode	Part No.: 8 716 109 211 0	18	Flue sample point screw	Part No.: 8 718 682 081 0
6	Motor	Part No.: 8 716 110 522 0	19	Oil nozzle	
7	Oil pump - Riello RDB	Part No.: 8 718 689 342 0		0.50 80° ES (18kW output)	Part No. 8 716 156 669 0
7a	Pump coupling	Part No.: 8 716 109 245 0		0.60 60° ES (21.5kW output)	Part No.: 8 716 156 680 0
8	Flexible oil hose kit	Part No.: 8 716 115 310 0		0.75 80° ES (25kW output)	Part No.: 8 716 109 387 0
9	Burner 'O' ring	Part No.: 8 716 109 341 0			
10	Control thermostat	Part No.: 8 716 107 621 0	20	Expansion vessel	Part No. 8 715 407 296 0
11	Auto reset overheat thermostat	Part No.: 8 716 107 623 0	21	Pump three speed	Part No. 8 718 691 831 0
12	Manual reset overheat thermostat	Part No.: 8 716 107 625 0	22	Pressure relief valve	Part No. 8 718 681 163 0
13	Manual reset flue thermostat	Part No.: 8 716 107 624 0	23	Pressure gauge Part Number	Part No. 8 716 107 638 0

6720808218-96-1W6

7.4 Short parts list 25/32



6720808216-87-1W6

Fig. 83 Short parts list 25/32

1	Burner - Riello RDB 2.2 25/32	Part No.: 8 718 690 335 0	13	Manual reset flue thermostat	Part No.: 8 716 107 624 0
2	Combustion head - T2 SH 25/32	Part No.: 8 716 112 780 0	14	Cleaning brush	Part No.: 8 716 109 428 0
3	Control box 535 RSE/LD	Part No.: 8 716 109 203 0	15	Manifold access cover seal	Part No.: 8 718 682 849 0
4	Photocell	Part No.: 8 716 109 193 0	16	Secondary Heat Exchanger gasket	Part No.: 8 718 688 799 0
5	Ignition electrode	Part No.: 8 716 109 211 0	17	Flue sample point screw	Part No.: 8 718 682 081 0
6	Motor	Part No.: 8 716 110 522 0	18	Oil nozzle 0.75 80° ES (25 & 28.5kW output) 0.85 80° EH (32kW output)	Part No.: 8 716 109 387 0
7	Oil pump - Riello RDB	Part No.: 8 718 689 342 0			Part No.: 8 716 156 644 0
7a	Pump coupling	Part No.: 8 716 109 245 0			
8	Flexible oil hose kit	Part No.: 8 716 115 310 0	19	Expansion vessel	Part No.: 8 715 407 296 0
9	Burner 'O' ring	Part No.: 8 716 109 341 0	20	Pump three speed	Part No.: 8 718 691 831 0
10	Control thermostat	Part No.: 8 716 107 621 0	21	Pressure relief valve	Part No.: 8 718 681 163 0
11	Auto reset overhear thermostat	Part No.: 8 716 107 640 0	22	Pressure gauge	Part No.: 8 716 107 638 0
12	Manual reset overhear thermostat	Part No.: 8 716 107 625 0			

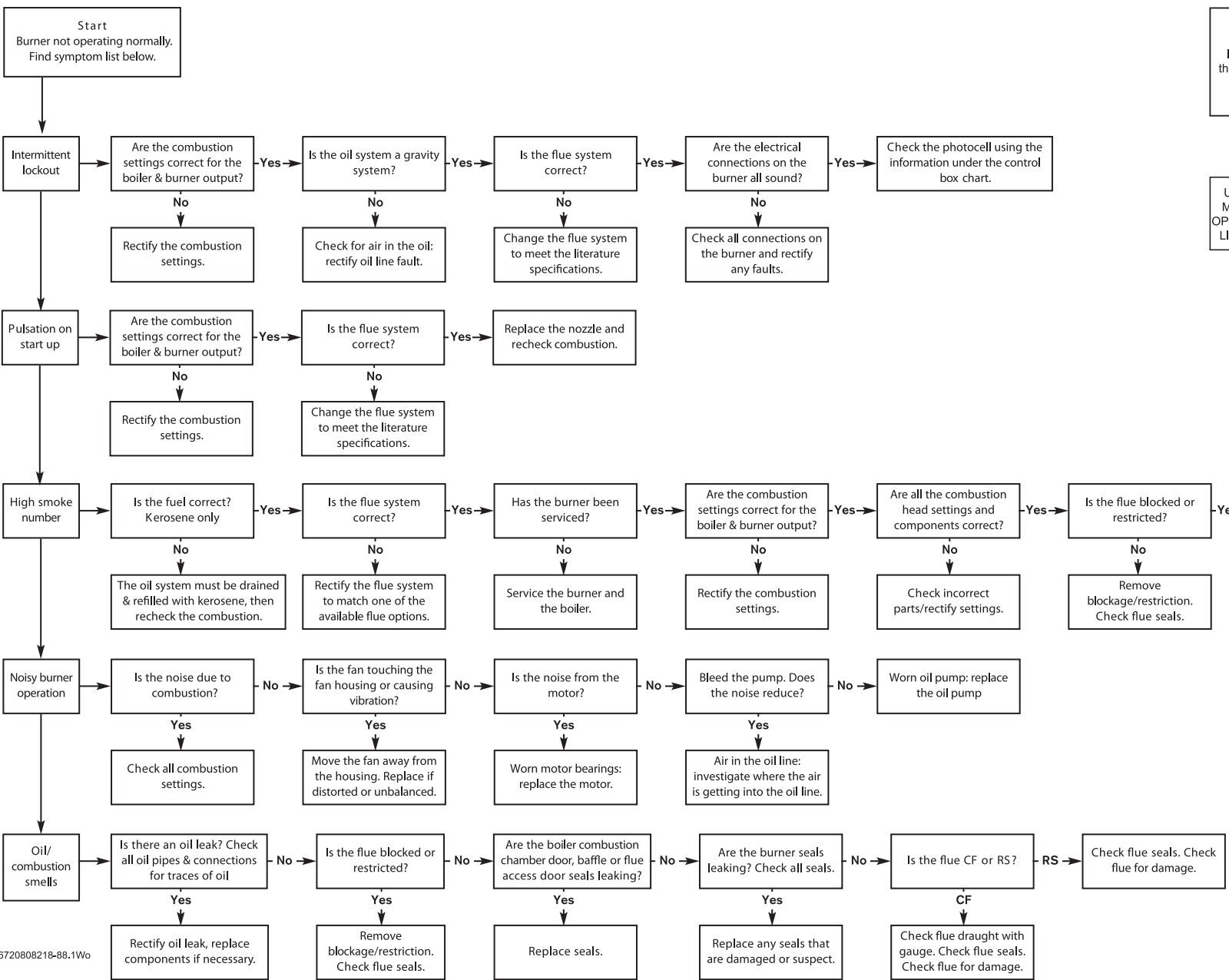
8 Fault finding and diagnosis

8.1 Burner functions

BOILER LOCKOUT:
Indicated by the illumination of the lockout indicator on the fascia. To reset, wait 2 minutes then press the lockout reset button.

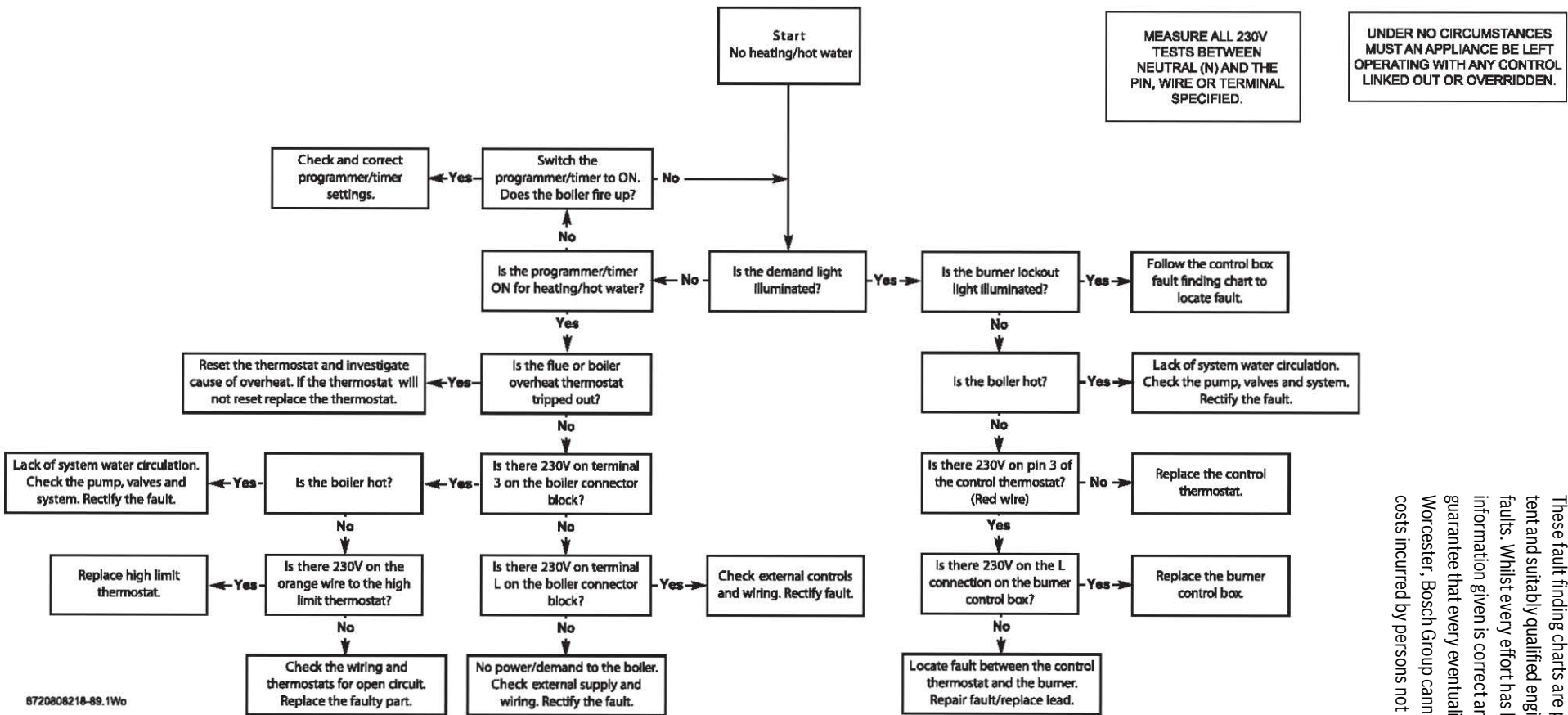
UNDER NO CIRCUMSTANCES MUST AN APPLIANCE BE LEFT OPERATING WITH ANY CONTROL LINKED OUT OR OVERRIDDEN.

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.



6720808218-88.1Wo

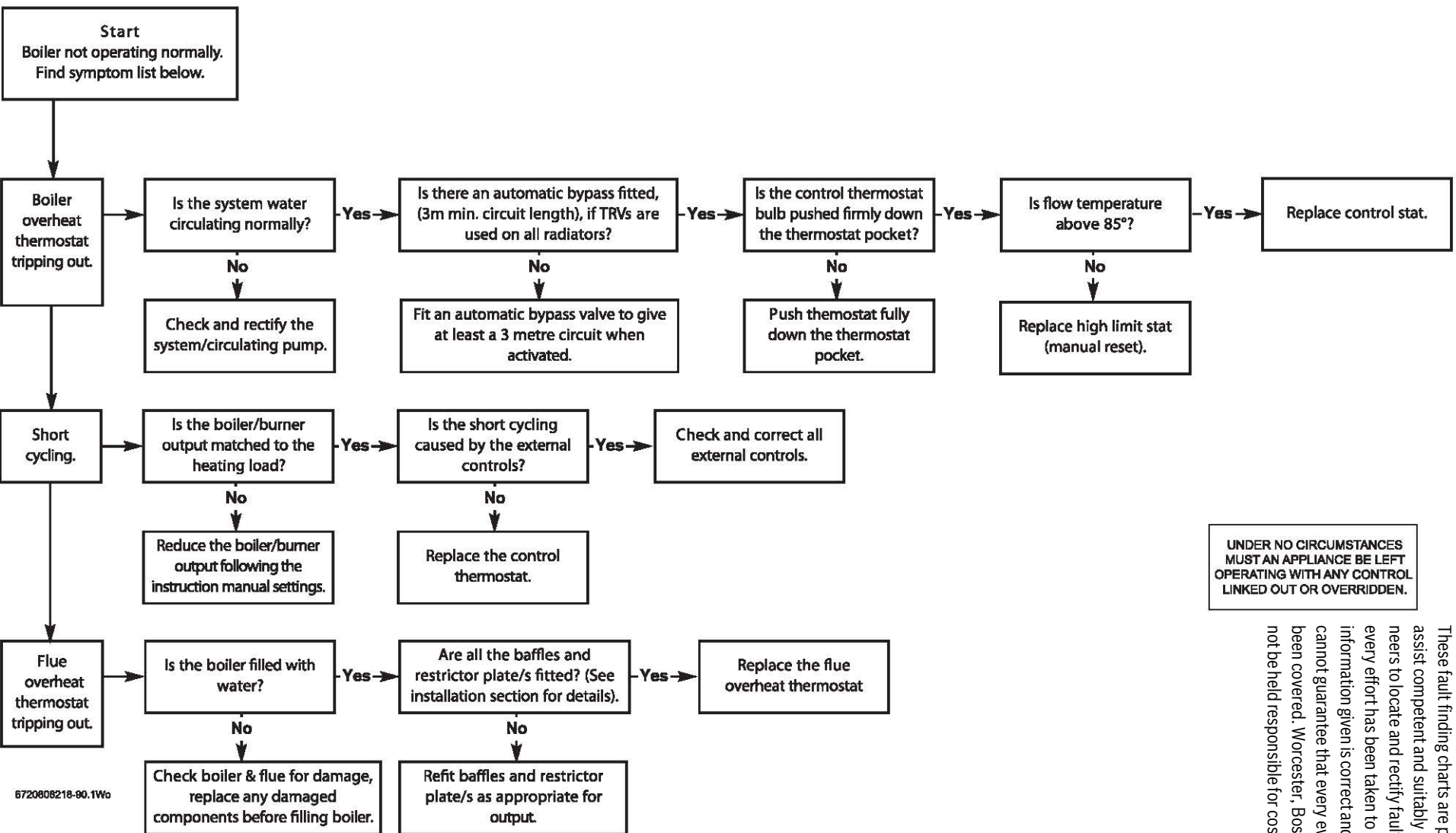
8.2 Heating and hot water



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.

6720808218-89.1Wo

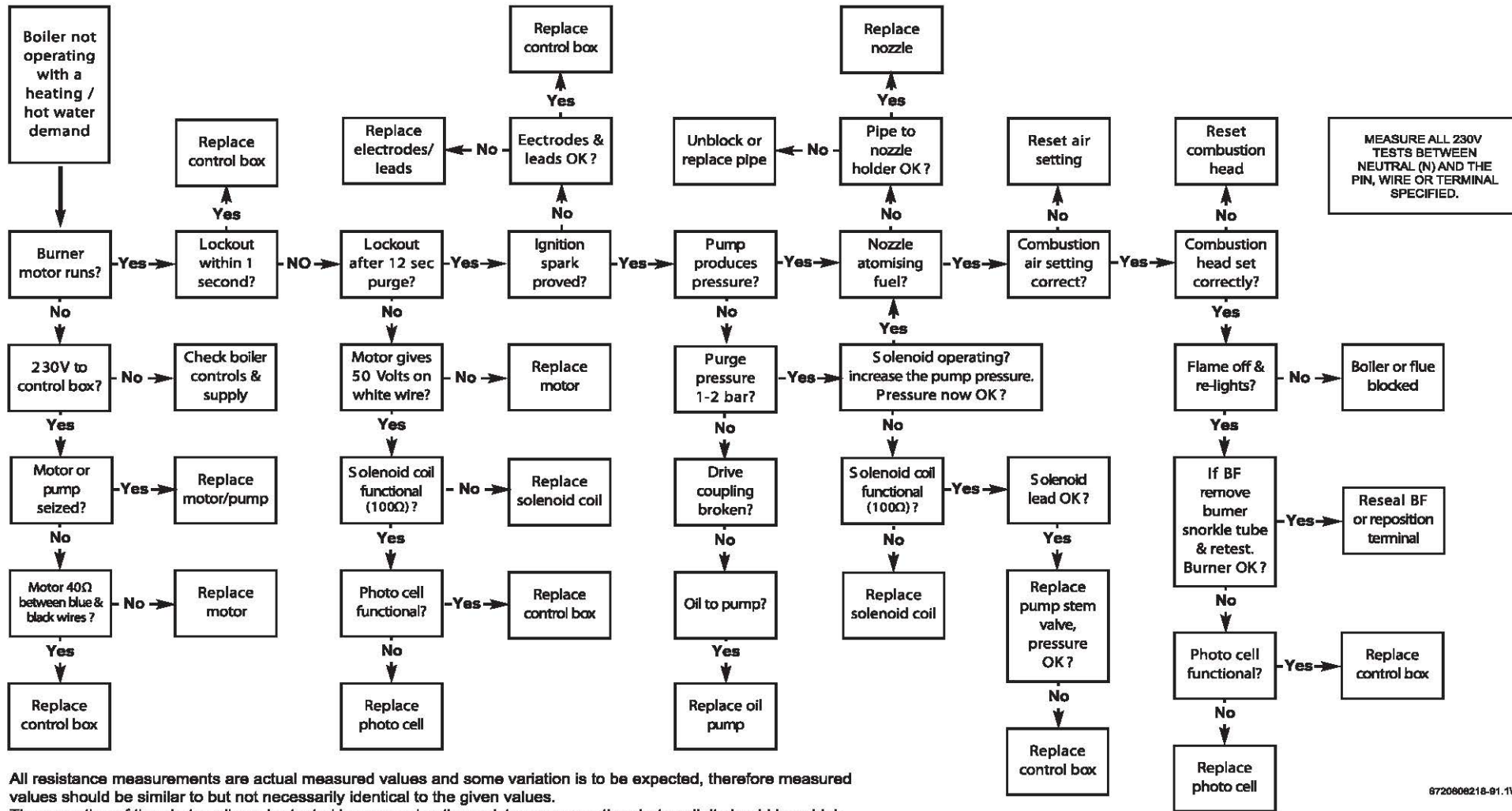
8.3 Boiler function



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

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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.

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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.

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 <input type="checkbox"/>	Programmable Room Thermostat <input type="checkbox"/>	Load/Weather Compensation <input type="checkbox"/>	Optimum Start Control <input type="checkbox"/>
Time and Temperature Control to Hot Water		Cylinder Thermostat and Programmer/Timer <input type="checkbox"/>		Combination Boiler <input type="checkbox"/>
Heating Zone Valves		Fitted <input type="checkbox"/>		Not Required <input type="checkbox"/>
Hot Water Zone Valves		Fitted <input type="checkbox"/>		Not Required <input type="checkbox"/>
Thermostatic Radiator Valves		Fitted <input type="checkbox"/>		Not Required <input type="checkbox"/>
Automatic Bypass Valve Fitted to System		Fitted <input type="checkbox"/>		Not Required <input type="checkbox"/>
Boiler Interlock				Provided <input type="checkbox"/>

ALL SYSTEMS

The system has been flushed and cleaned in accordance with BS7593 and 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: _____

If 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:

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

Boiler runs straight to lockout

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

Boiler locks out at the start of a demand (Heating off overnight for example)

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

No domestic hot water

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

No central heating

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



NOTICE: APPLIANCE OPERATION
UNDER NO CIRCUMSTANCES MUST AN
APPLIANCE BE LEFT TO OPERATE WITH ANY
CONTROL LINKED OUT OR OVER RIDDEN.

WORCESTER, BOSCH GROUP:

TECHNICAL SUPPORT:	0330 123 3366
APPOINTMENTS:	0330 123 9339
SPARES:	0330 123 9779
LITERATURE:	0330 123 9119
TRAINING:	0330 123 0166
SALES:	0330 123 9669

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