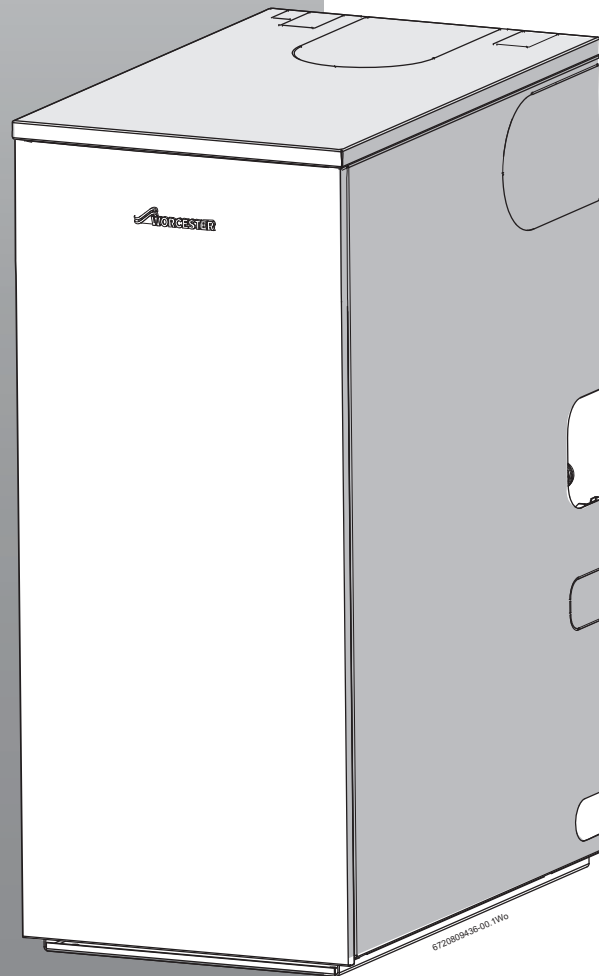


Installation, Commissioning and Servicing instruction manual

Floor Standing oil-fired Condensing Boiler Conventional Flue & Room Sealed Flue

# **Greenstar Danesmoor Utility Regular<sup>ErP</sup> & Utility System<sup>ErP</sup> 12/18, 18/25, & 25/32**

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



**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.

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

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

### Important information



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

### Additional symbols

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

Table 1 Symbols

### Examples of additional symbols used

#### A numbered step in an action sequence

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

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

#### A step in an action sequence

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

- ▶ Action
- ▶ Next action
- ▶ etc

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

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

→ e.g. figure 1.

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

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

### List entries, first and second levels

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

### Abbreviations used in this manual

|        |   |
|--------|---|
| Ø      | Diameter  |
| CH     | Central Heating   |
| DHW    | Domestic Hot Water  |
| DCW    | Domestic Cold water   |
| TRV    | Thermostatic Radiator Valve                                 |
| IP     | Ingress Protection  |
| CF     | Conventional Flue   |
| BF     | Balanced Flue   |
| N/A    | Not Allowed   |
| SEDBUK | Seasonal Efficiency of Domestic Boilers in the UK           |
| OFTEC  | Oil Firing Technical Association for the Petroleum Industry |
| IET    | Institute of Engineering and Technology                     |
| LABC   | Local Authority Building Control Body                       |
| DWTA   | Domestic Water Treatment Association                        |

### Read these instructions before starting any installation

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

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

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

## 1.2 General safety instructions

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

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

### Oil fumes or leaks from the appliance

If you smell oil fumes, observe the following rules.

- ▶ Extinguish any naked flames
- ▶ Isolate the electrical supply
- ▶ Isolate the fuel supply to the boiler
- ▶ 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: IET Wiring Regulations, current edition.
- BS 1362: Specification for general purpose fuse links for domestic and similar purposes.

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

Local water company bye-laws.

The Control of Pollution (Oil) Regulations.

OFTEC Standards.

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

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

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

Current Building Regulations - Republic of Ireland

ETCI rules for electrical installation

#### For further guidance see:

OFTEC Technical book three - Regional requirements: Republic of Ireland

### 3 Appliance information

#### 3.1 General information

##### Standard package:

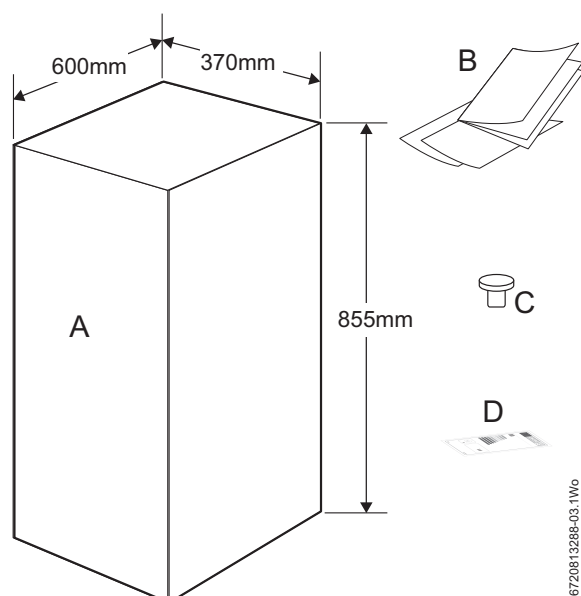
A - Floor standing oil fired condensing boiler

B - Literature pack:

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

C - BSP plug, one inch (Regular only)

D - ErP label



#### 3.2 Technical data

| Description   | Units             | 12/18 | 18/25 | 25/32 |
|---|-------------------|-------|-------|-------|
| <b>Central heating</b>  |                   |       |       |       |
| 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 <sub>2</sub> 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   |
| <b>Flue</b>   |                   |       |       |       |
| Exit flue gas mass flow   | kg/hr             | 29    | 40    | 51    |
| <b>Pipework connections</b>   |                   |       |       |       |
| 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    |
| <b>Electrical</b>   |                   |       |       |       |
| Electrical power supply voltage   | ac ..V            | 230   | 230   | 230   |
| Frequency   | Hz                | 50    | 50    | 50    |
| <b>Thermostats</b>  |                   |       |       |       |
| 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   |
| <b>General data</b>   |                   |       |       |       |
| Maximum hearth temperature  | °C                | <100  | <100  | <100  |
| SEDBUK 2009   | %                 | 91.1  | 90.9  | 90.7  |
| SEDBUK 2005   | %                 | 93.2  | 93.0  | 92.8  |
| Appliance protection rating   | IP                | 20    | 20    | 20    |
| Weight (excluding packaging) Utility Regular  | kg                | 104   | 108   | 115   |
| Weight (excluding packaging) Utility System   | kg                | 112   | 112   | 122   |

### 3.3 Energy efficiency

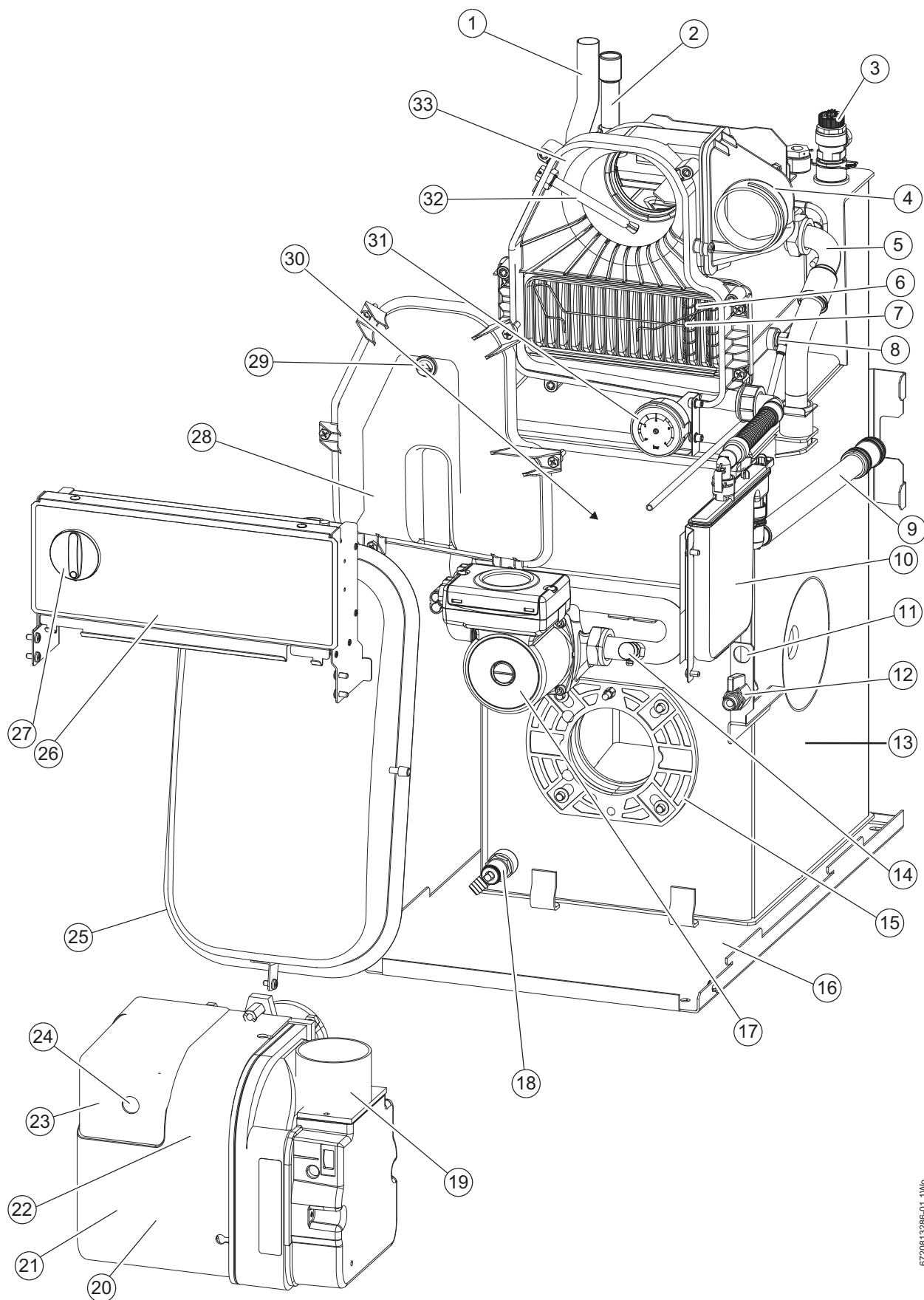
The following product data satisfy the requirements of the EU Regulations No. 811/2013 and No. 812/2013 supplementing Directive 2010/30/EU.

| Product data  | Symbol      | Unit   | 7731600056                          | 7731600057                          | 7731600058                          | 7731600065                         | 7731600066                         | 7731600067                         |
|---|-------------|--------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Product type  | –           | –      | Danesmoor Utility Regular ErP 12/18 | Danesmoor Utility Regular ErP 18/25 | Danesmoor Utility Regular ErP 25/32 | Danesmoor Utility System ErP 12/18 | Danesmoor Utility System ErP 18/25 | Danesmoor Utility System ErP 25/32 |
| Condensing boiler   | –           | –      | Yes                                 | Yes                                 | Yes                                 | Yes                                | Yes                                | Yes                                |
| Low temperature boiler  | –           | –      | No                                  | No                                  | No                                  | No                                 | No                                 | No                                 |
| B1 boiler   | –           | –      | No                                  | No                                  | No                                  | No                                 | No                                 | No                                 |
| Cogeneration space heater (CHP)                                       | –           | –      | No                                  | No                                  | No                                  | No                                 | No                                 | No                                 |
| Combination heater  | –           | –      | No                                  | No                                  | No                                  | No                                 | No                                 | No                                 |
| Rated heat output   | $P_{rated}$ | kW     | 18                                  | 25                                  | 32                                  | 18                                 | 25                                 | 32                                 |
| Seasonal space heating energy efficiency                              | $\eta_s$    | %      | 91                                  | 90                                  | 91                                  | 91                                 | 90                                 | 91                                 |
| Energy efficiency class   | –           | –      | A                                   | A                                   | A                                   | A                                  | A                                  | A                                  |
| <b>Useful heat output</b>   |             |        |                                     |                                     |                                     |                                    |                                    |                                    |
| At rated heat output and high temperature regime <sup>1)</sup>        | $P_4$       | kW     | 17.9                                | 24.9                                | 32.2                                | 17.9                               | 24.9                               | 32.2                               |
| At 30 % of rated heat output and low temperature regime <sup>2)</sup> | $P_1$       | kW     | 5.7                                 | 7.9                                 | 10.2                                | 5.7                                | 7.9                                | 10.2                               |
| <b>Useful efficiency</b>  |             |        |                                     |                                     |                                     |                                    |                                    |                                    |
| At rated heat output and high temperature regime <sup>1)</sup>        | $\eta_4$    | %      | 91.1                                | 90.9                                | 91.4                                | 91.1                               | 90.9                               | 91.4                               |
| At 30 % of rated heat output and low temperature regime <sup>2)</sup> | $\eta_1$    | %      | 96.8                                | 95.8                                | 96                                  | 96.8                               | 95.8                               | 96                                 |
| <b>Auxiliary electricity consumption</b>                              |             |        |                                     |                                     |                                     |                                    |                                    |                                    |
| At full load  | $el_{max}$  | kW     | 0.143                               | 0.16                                | 0.16                                | 0.143                              | 0.16                               | 0.16                               |
| At part load  | $el_{min}$  | kW     | 0.043                               | 0.048                               | 0.048                               | 0.043                              | 0.048                              | 0.048                              |
| In standby mode   | $P_{SB}$    | kW     | 0                                   | 0                                   | 0                                   | 0                                  | 0                                  | 0                                  |
| <b>Other items</b>  |             |        |                                     |                                     |                                     |                                    |                                    |                                    |
| Standby heat loss   | $P_{stby}$  | kW     | 0.123                               | 0.16                                | 0.16                                | 0.123                              | 0.123                              | 0.16                               |
| Ignition burner power consumption                                     | $P_{ign}$   | kW     | -                                   | -                                   | -                                   | -                                  | -                                  | -                                  |
| Emissions of nitrogen oxides  | NOx         | mg/kWh | 243                                 | 193                                 | 136                                 | 243                                | 193                                | 136                                |
| Annual energy consumption   | $Q_{HE}$    | kWh    | -                                   | -                                   | -                                   | -                                  | -                                  | -                                  |
| Sound power level, indoors  | $L_{WA}$    | dB(A)  | 53                                  | 54                                  | 56                                  | 55                                 | 55                                 | 55                                 |

Table 2 Product data for energy consumption

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

### 3.4 Layout and components - 18/25 System appliance shown



6720813286-01.1Wo

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 3 Appliance component details

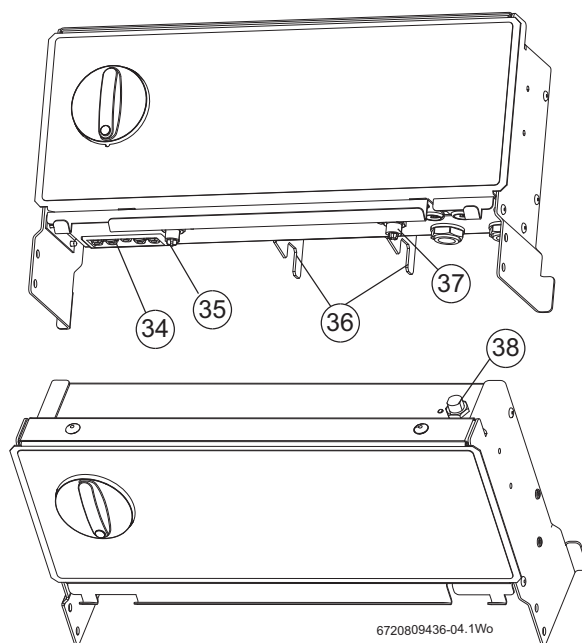


Fig. 2 Control panel thermostat detail

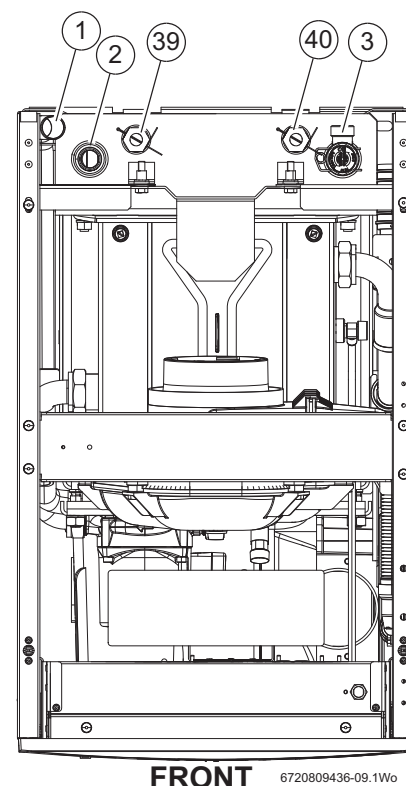


Fig. 3 Top view connections

### 3.5 Layout and components - 18/25 Regular appliance shown

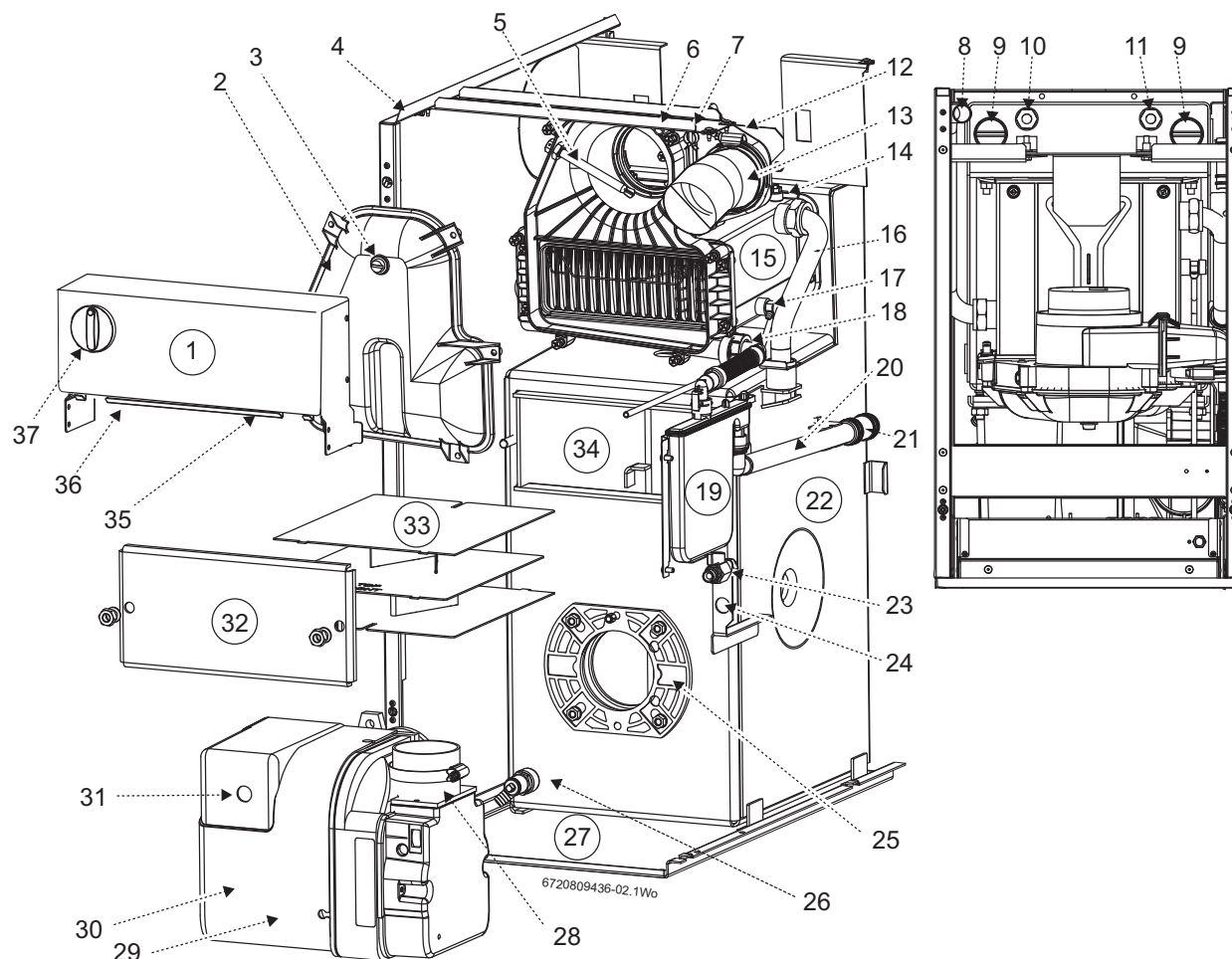


Fig. 4 18/25 Regular appliance shown

**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



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

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



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

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



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

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

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

#### 4.1.1 Before cleaning the system:

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

#### Follow the guidance of BS7593:

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

#### 4.1.2 Flushing the system

- ▶ Fill the system with cold water and check for leaks.
- ▶ Open vented systems only:
  - Turn off the water to the system header tank.
- ▶ Open all drain cocks and drain the system.
  - See figure 5 for appliance drain points.
- ▶ Close drain cocks and add a suitable flushing agent at the correct strength for the system conditions in accordance with the manufacturer's instructions.
- ▶ Circulate the flushing agent before the boiler is fired up.
- ▶ Run the boiler/system at normal operating temperature as directed by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system to remove the flushing agent and debris.
- ▶ It may be necessary to use a power flushing machine to aid the cleansing procedure in some circumstances.
- ▶ Close the drain cocks and manual air vents.
- ▶ Add a suitable inhibitor to the system in accordance with the manufacturers instructions.
- ▶ Open vented systems only:
  - Turn on the water to the system header tank and allow the system to fill.

- ▶ Sealed systems only:
  - Fill the system to between 1 and 1.5 bar via a WRAS approved filling loop.
- ▶ Vent any air from the boiler and system.
  - See figure 6 for appliance manual vent points.

#### 4.1.3 Appliance drain points

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

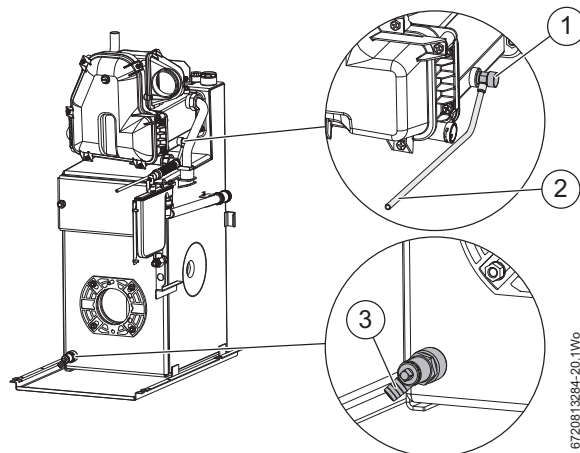


Fig. 5 Appliance drain points

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

#### 4.1.4 Appliance vent points

There are two vent points at the top of the secondary heat exchanger. Only one may be in use, the other may be obscured by side fluing.

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

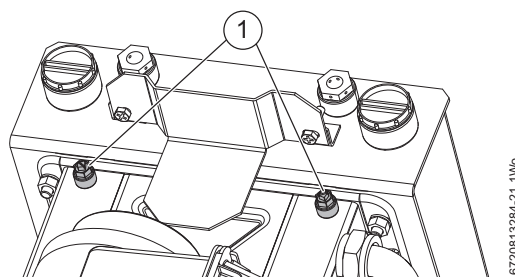


Fig. 6 Manual vent points

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

#### 4.1.5 Inhibitor

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



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

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



**WARNING:** Sealing agents

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

#### Water treatment products

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

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

#### 4.1.6 Artificially softened water

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

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



**NOTICE:**

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

#### 4.2 Mains supply

##### 4.2.1 Electrical supply

- Supply: 230V - 50 Hz
- Cable: PVC insulated 0.75 mm<sup>2</sup> (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.
- Wiring must comply with the latest IET wiring regulations.
- It must be possible to isolate the appliance from the electrical supply with at least a 3mm contact separation in both poles supplying the appliance.
- Wiring between the appliance and the electrical supply must comply with IET wiring regulations and any local regulations that may apply for fixed wiring to a stationary appliance.
- Any system connected to the boiler must not have a separate electrical supply.

#### 4.3 Oil supply



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

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

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

- **This appliance is suitable for Kerosene (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.**

#### Key to Oil supply illustrations, figures 7, 8 & 9

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

Table 4 Key to oil supply feed system

##### 4.3.1 Single pipe gravity feed system:

The oil storage tank [1] must be positioned so that the oil level does not exceed 4 metres above the level of the burner oil pump [9] and in addition the oil level must be at least 300mm above the oil pump [9].

Where the maximum oil level in the oil storage tank exceeds 4 metres, a head breaking device must be installed between the tank [1] and the burner oil pump [9].

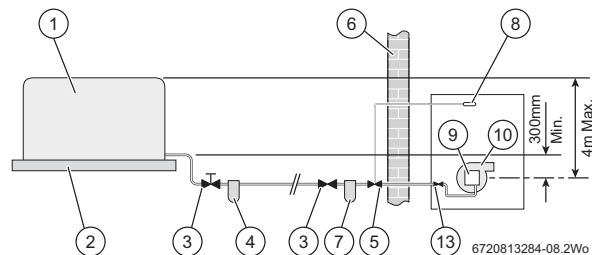


Fig. 7 Single pipe feed



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



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

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

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

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

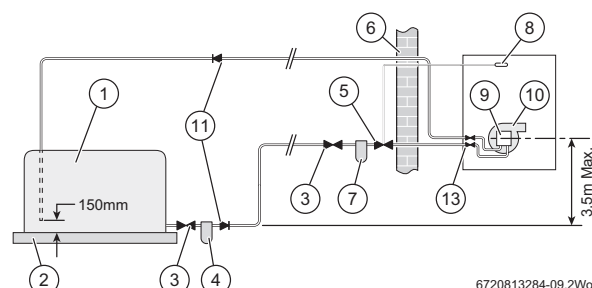


Fig. 8 Double pipe feed

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

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

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

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

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

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

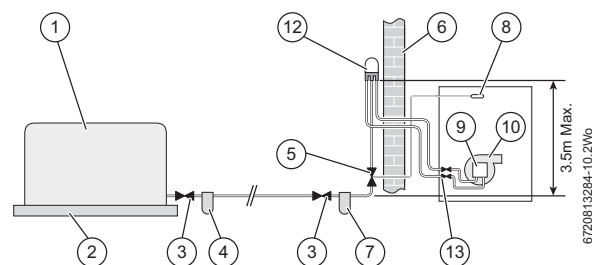


Fig. 9 De-aerator feed

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

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

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

#### 4.3.4 Pipework

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

Oil supply pipework considerations:

- Lay the oil supply pipe as straight and level as possible to avoid air pockets and unnecessary friction losses.
  - Route away from the boiler access door or other hot surfaces.
- Install a manual isolating valve to the oil supply pipe, as close to the oil storage tank as possible.
- Fit an oil strainer and water separator to the oil supply pipe, near the oil storage tank.
  - Fit an additional oil filter (70 µm max filtration size) close to the boiler, but not inside the boiler casing.
- Fit a fire valve in accordance with BS 5410.
  - The fire valve should be fitted externally to the building with the fire valve sensor located within the appliance case.
  - A fire valve with a shut off temperature of 85°C or higher must be fitted to avoid the possibility of nuisance shut offs.
  - A capillary type valve provides a neat and simple installation. Alternatively, a fusible link or electrical system may be used.
- Under no circumstances should a combination isolating/fire valve be used as the sole fire protection device.

#### 4.3.5 Boiler isolation valve

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

- Offer the pipe to the fitting [2] and tighten the nut [1].

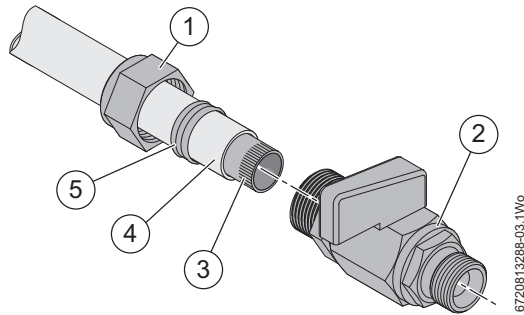


Fig. 10 Isolation valve bracket removed for clarity

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

#### 4.4 Water systems and pipework



##### NOTICE:

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

##### Primary system plastic pipework:

- Any plastic pipework used for the CH system must have a polymeric barrier, complying with BS 7921 and installed to BS 5955 with 1000mm (minimum) length of copper or steel pipe connected to the boiler.
- Plastic pipework used for underfloor heating must be correctly controlled with a thermostatic blending valve limiting the temperature of the circuits to approximately 50°C with 1000mm (minimum) length of copper or steel pipe connected to the boiler, and a 20K differential must be maintained at the appliance.

##### Primary system/connections/valves:

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

##### Open vent primary system (Regular only)

- The open vent pipe (F) and feed and expansion pipe (H) must rise continuously from the appliance.
- The feed and expansion cistern (E) must be positioned to provide a static head (S) of at least 1 metre above the highest point in the heating system to the water level in the feed and expansion cistern.
- 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.

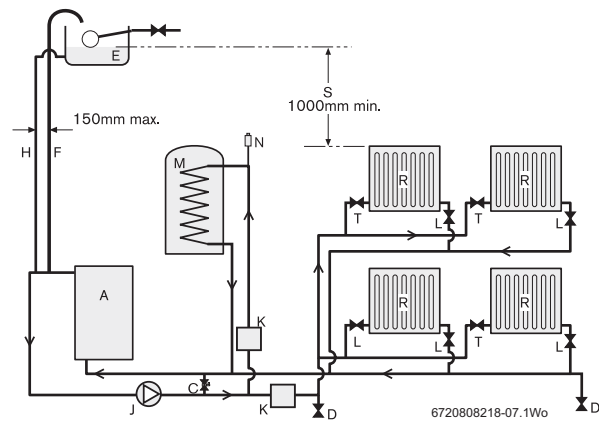


Fig. 11 Regular boiler, open vent system layout

|        |  |
|--------|--|
| [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.

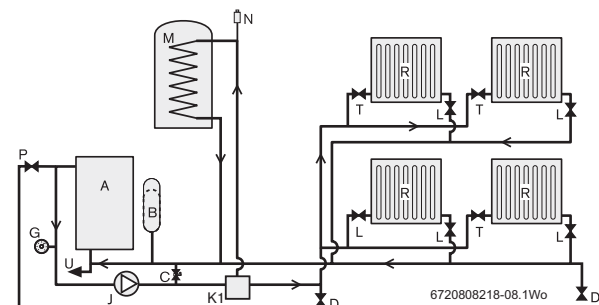


Fig. 12 Regular boiler system layout

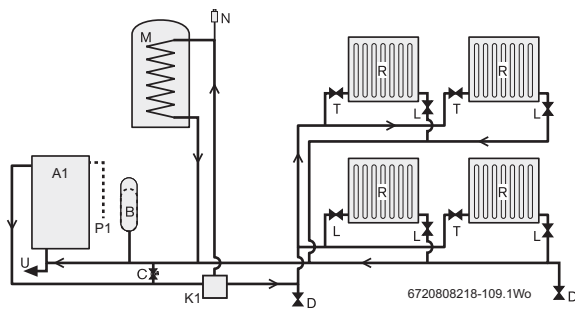


Fig. 13 System boiler system layout

### Filling primary sealed systems

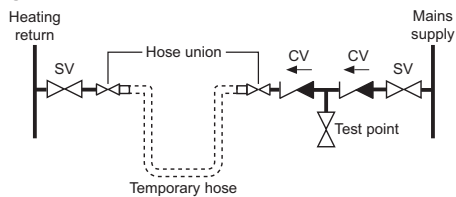


#### NOTICE: FILLING THE SYSTEM

- 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.

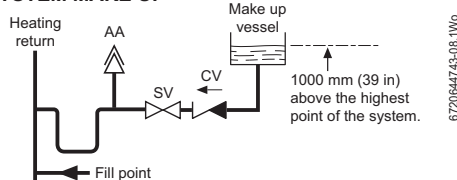
#### SYSTEM FILL



CV = Check Valve  
SV = Stop Valve

AA = Auto Air vent  
CV = Check Valve

#### SYSTEM MAKE UP



67206447-03-08.1W6

#### 4.5 Condensate pipework


**NOTICE:**

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

**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 |

##### 4.5.1 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.

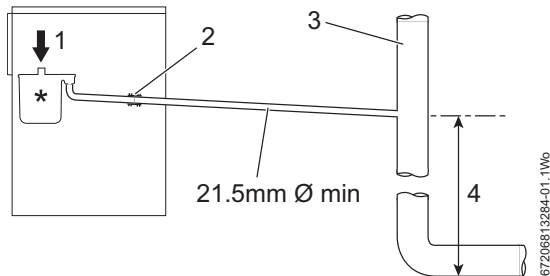


Fig. 14 Disposal to a soil vent stack

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.

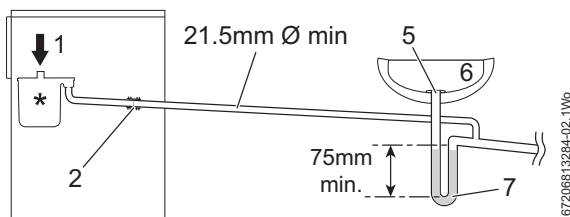


Fig. 15 Disposal to a waste pipe

##### 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.

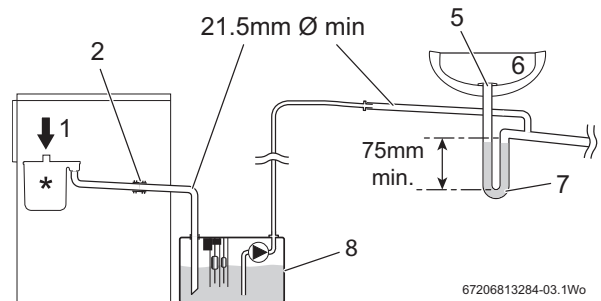


Fig. 16 Disposal via a condensate pump

##### 4.5.2 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 17 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.

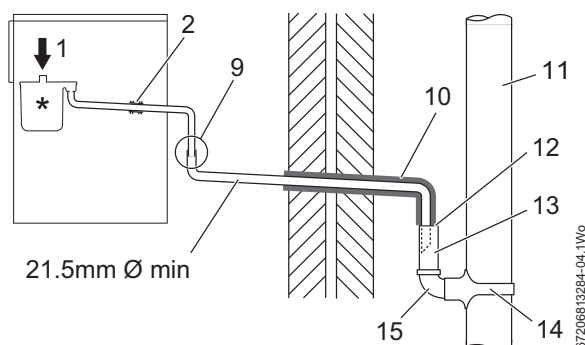


Fig. 17 Disposal into a rainwater down pipe



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.

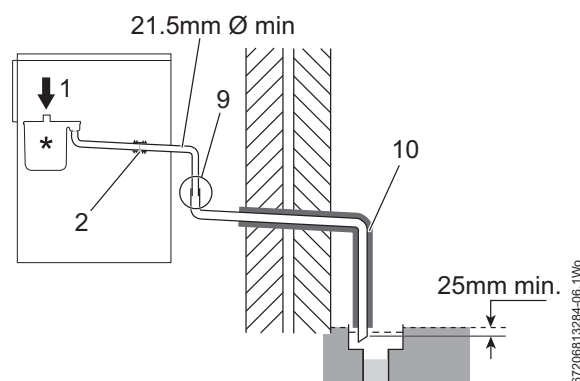


Fig. 18 External disposal

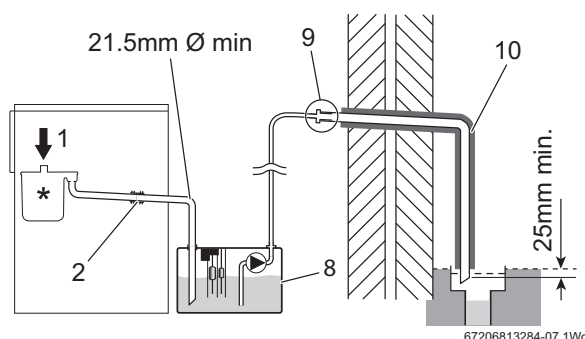


Fig. 19 Condensate pump to external disposal

### Continued - Key to condensate illustrations

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

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



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

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



### 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.

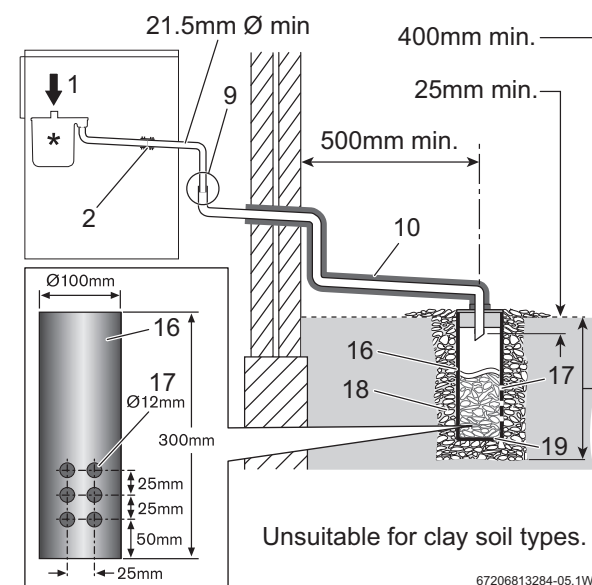


Fig. 20 Disposal to a soakaway

### 4.6 Pressure relief pipework

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

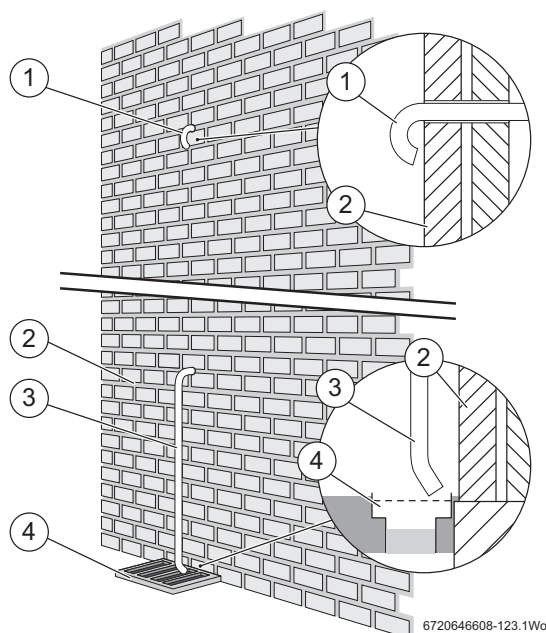


Fig. 21 Pressure relief pipe work

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

#### 4.7 Boiler locations and clearances

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

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

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

Roof space installations must fully conform to BS 5410 part 1 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 <sup>2</sup> | 99    | 138   | 165   |

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

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

The minimum free area of each vent is shown 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 22 shows the minimum space recommended to install the boiler only.

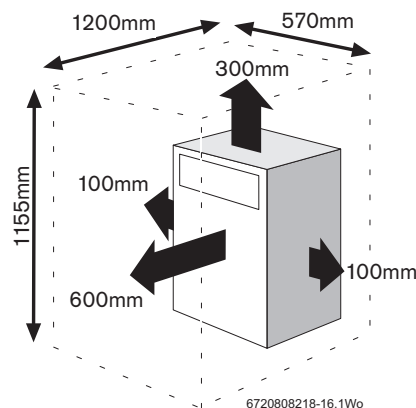


Fig. 22 Installation clearances

#### Service clearances

Figure 23 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.

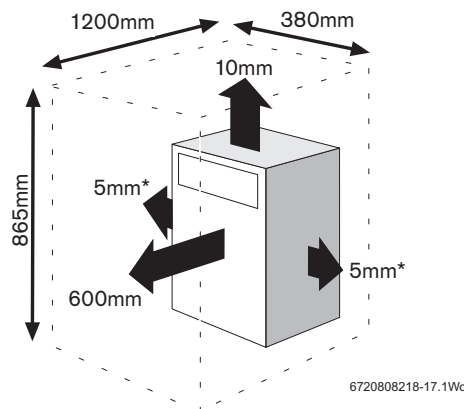


Fig. 23 Service clearances



## Maintenance clearances

Figure 24 shows the clearances required for maintenance.

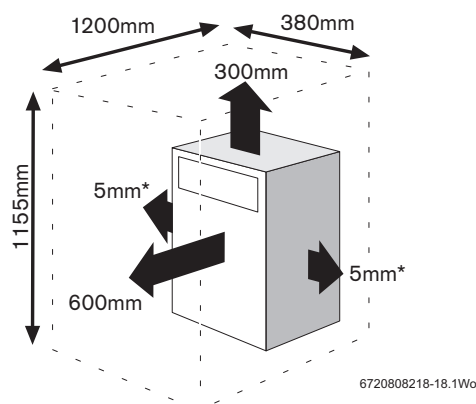


Fig. 24 Maintenance and repair clearances

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

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

Table 5 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 6 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 IET 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

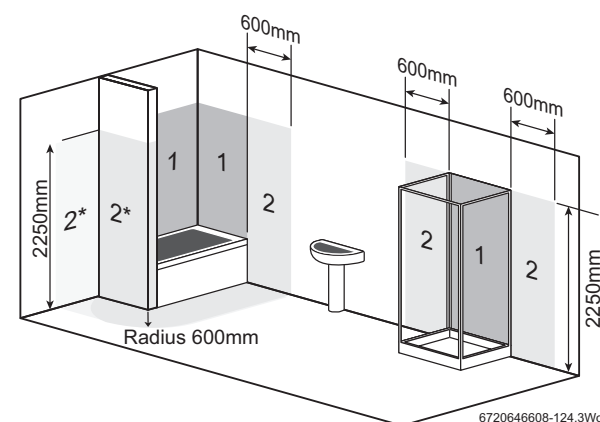


Fig. 25 Bathroom zones

## 4.8 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.

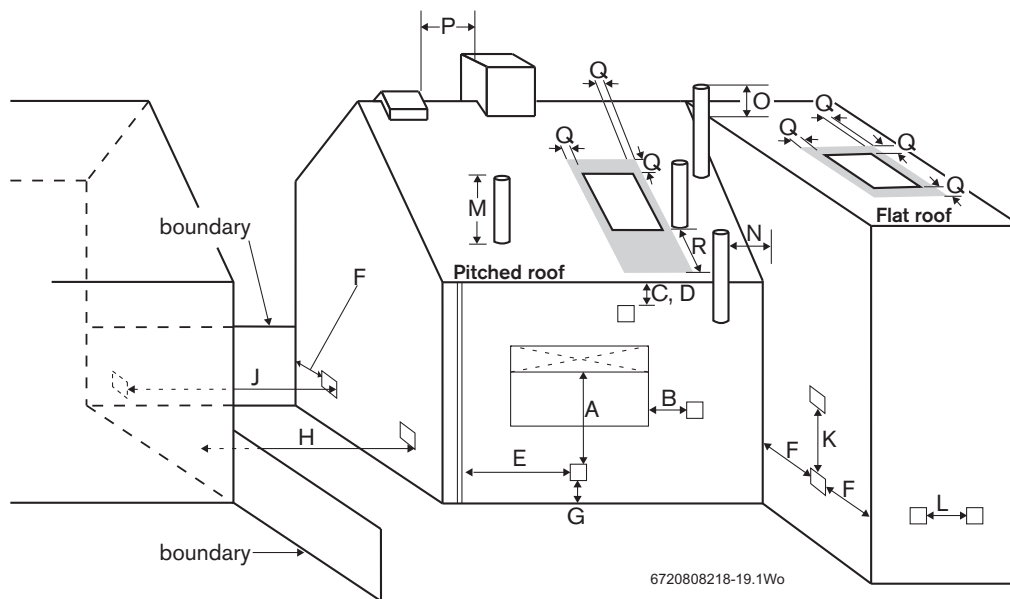
There should be no restriction preventing the clearance of combustion products from the terminal.

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.



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| Terminal position |   | CF     | RS(H)    | RS(V)  |
|-------------------|---|--------|----------|--------|
| A <sup>1,2</sup>  | Directly below an opening, air brick, opening window etc.   | N/A    | 600mm    | N/A    |
| B <sup>1,2</sup>  | 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 <sup>3</sup>    | 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.



## 4.9 Flue options

### 4.9.1 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.

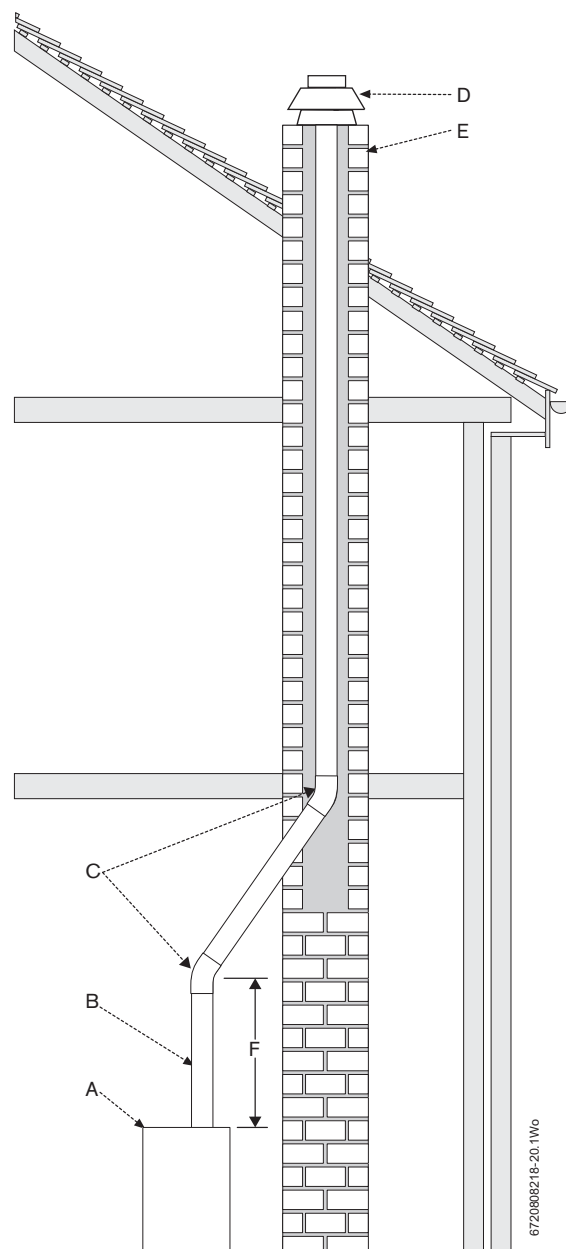


Fig. 26 Conventional flue

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

#### 4.9.2 Room sealed flue options

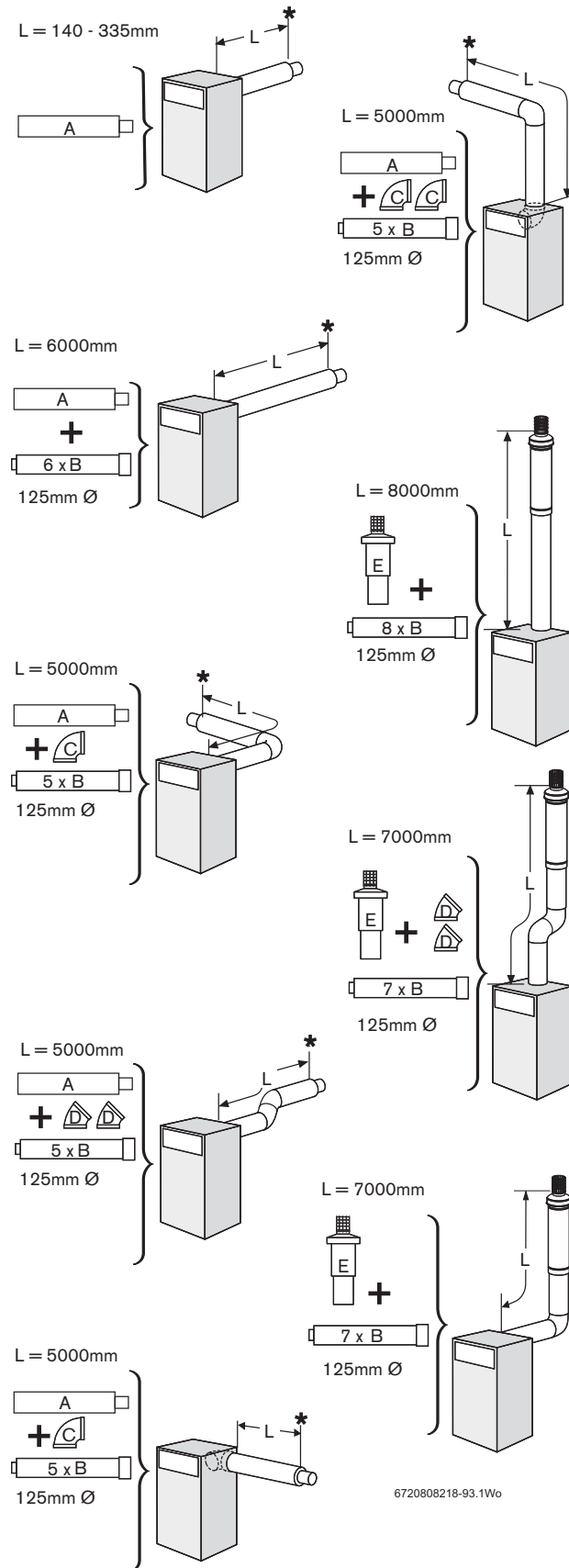


Fig. 27 Room sealed flue options

Figure 27 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.

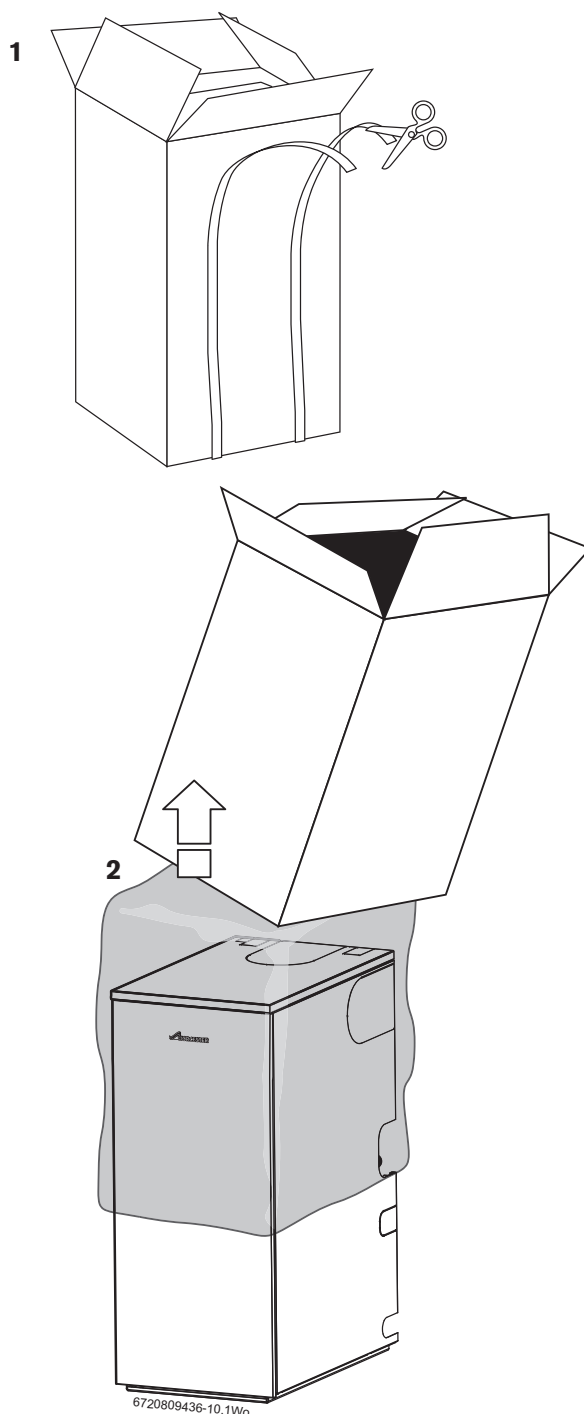


Fig. 28 Unpacking

### 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.

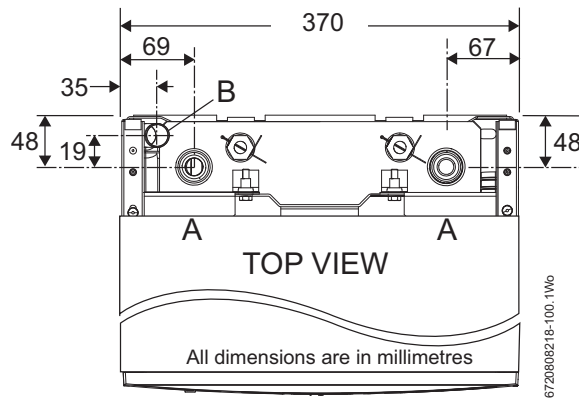


Fig. 29 Top view of Regular boiler pipe connections

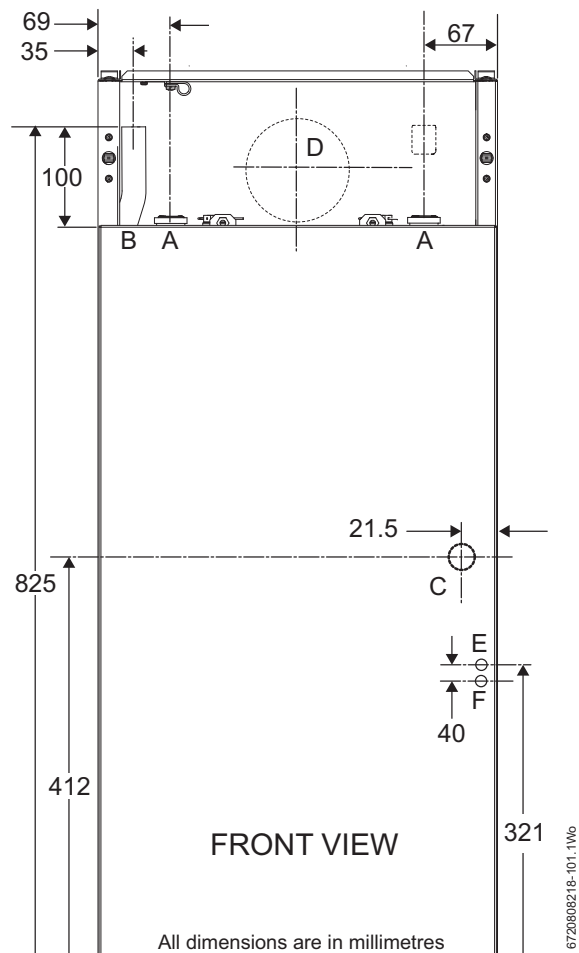


Fig. 30 Front view of Regular boiler pipe connections

### 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.

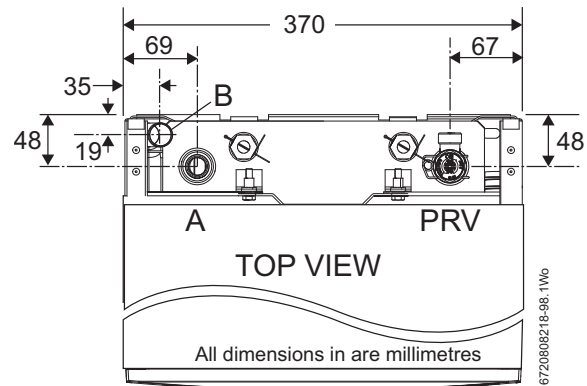


Fig. 31 Top view of System boiler pipe connections

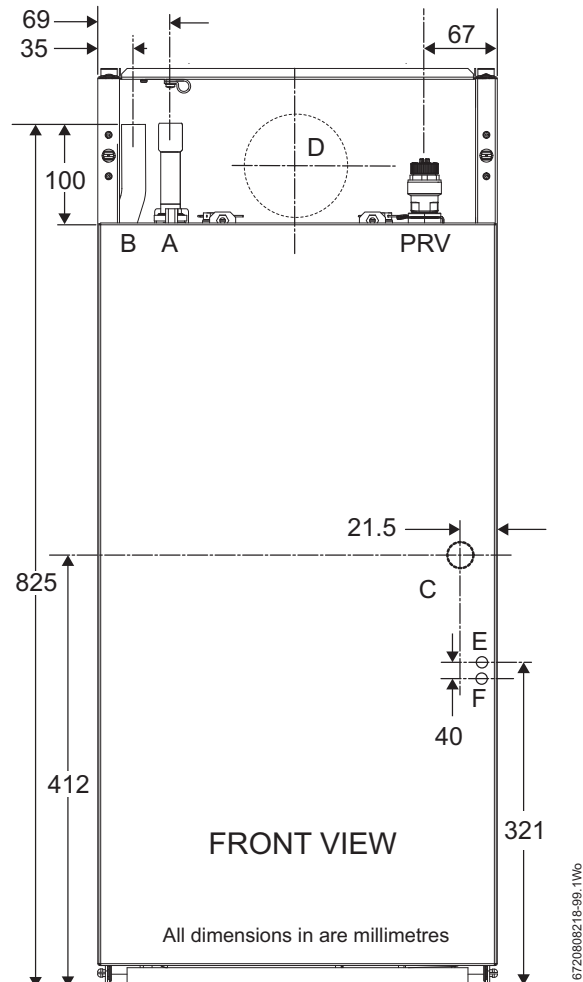


Fig. 32 Front view of System boiler pipe connections

## Flue centres

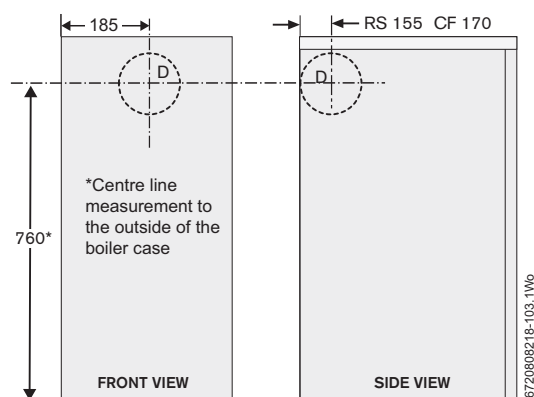


Fig. 33 Flue centres

## Flue opening

- Follow figure 34 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                 |

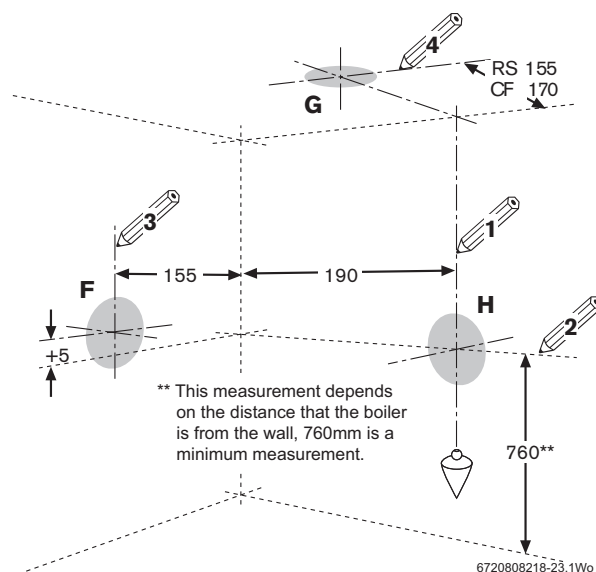
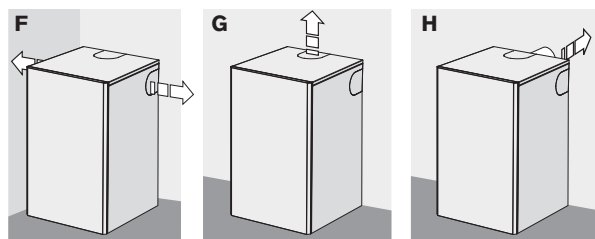


Fig. 34 Flue opening

## 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.

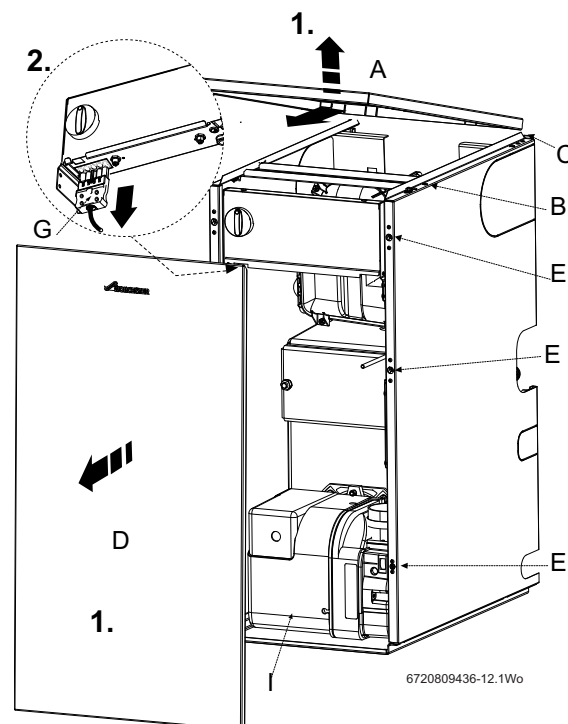


Fig. 35 Boiler installation

## 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.

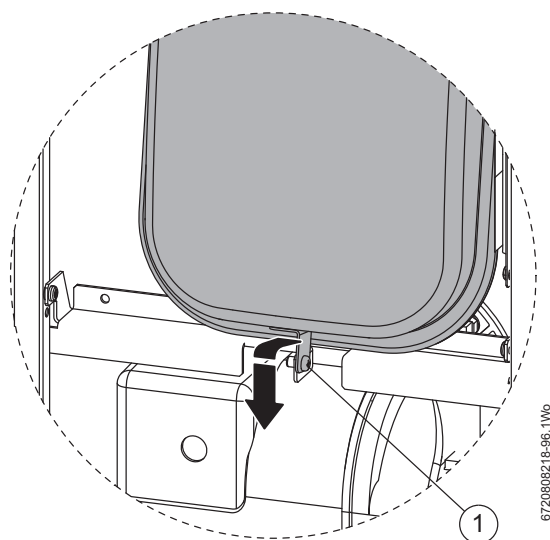


Fig. 36

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 37).

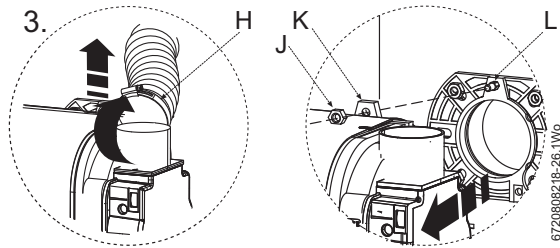


Fig. 37

- 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:

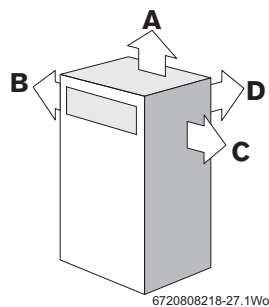


Fig. 38 Flue outlet options

#### 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).

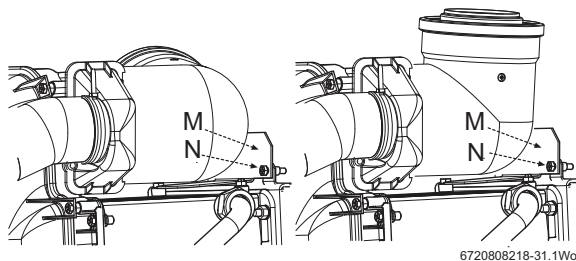


Fig. 39 Elbow retaining bracket

- 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.

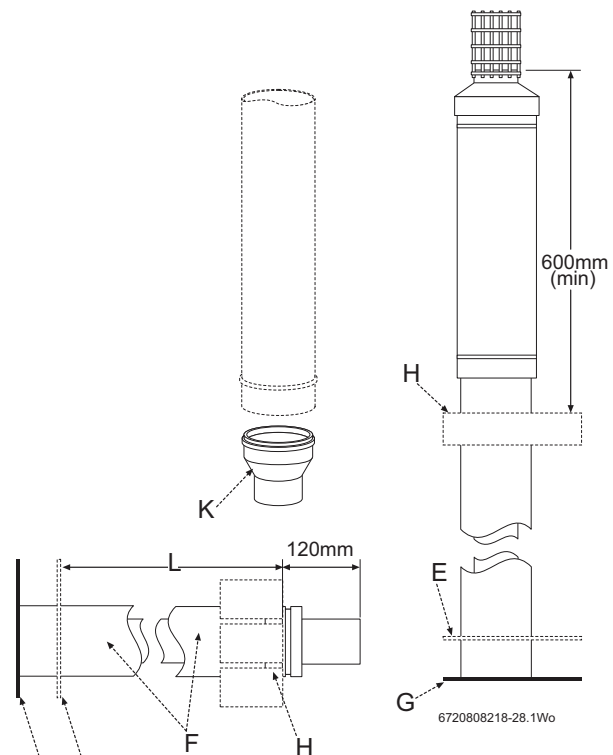


Fig. 40

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

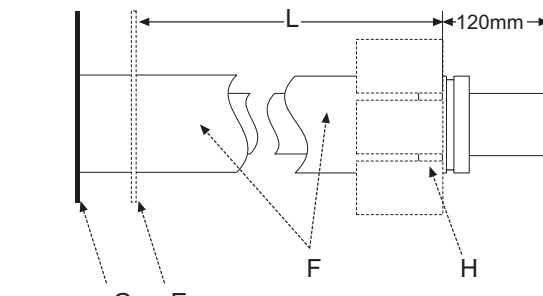


Fig. 41

- 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.

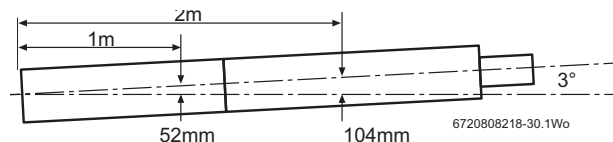


Fig. 42

### 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.

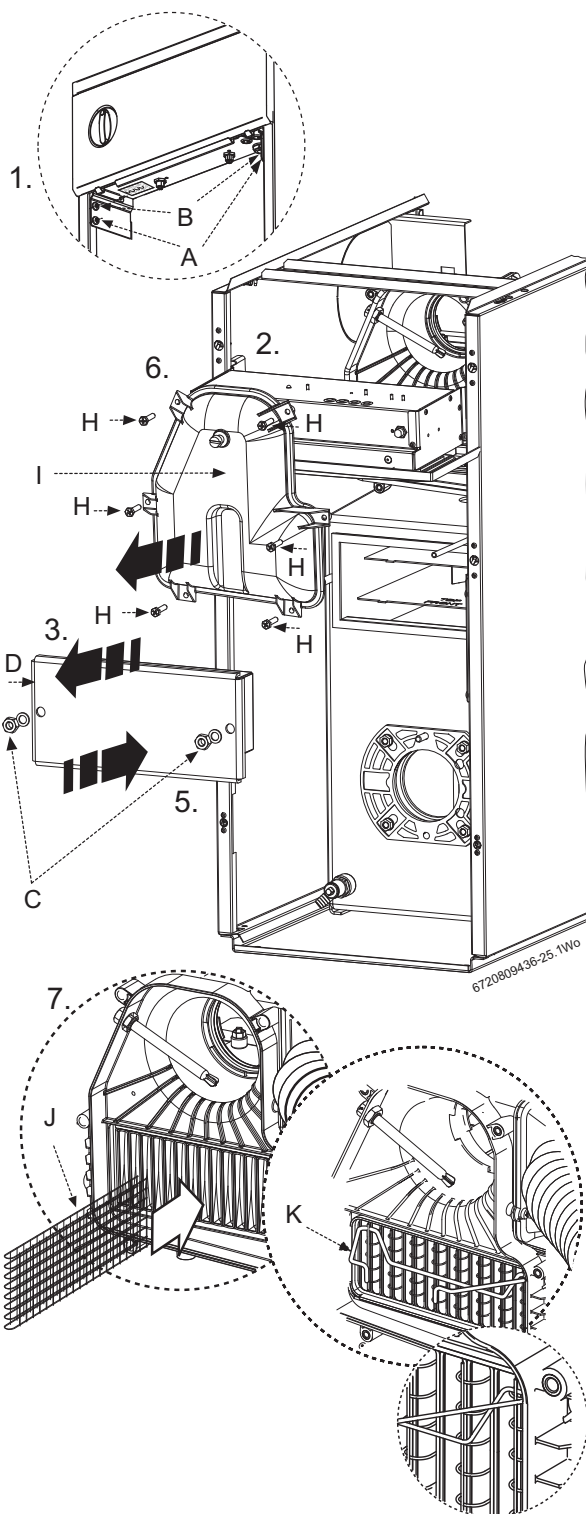


Fig. 43 Combustion chamber

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.

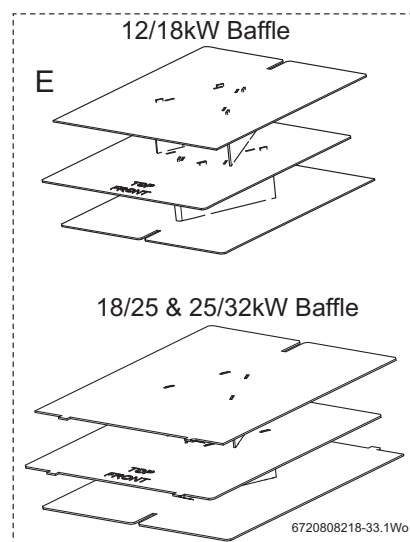


Fig. 44 Baffle arrangement

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.

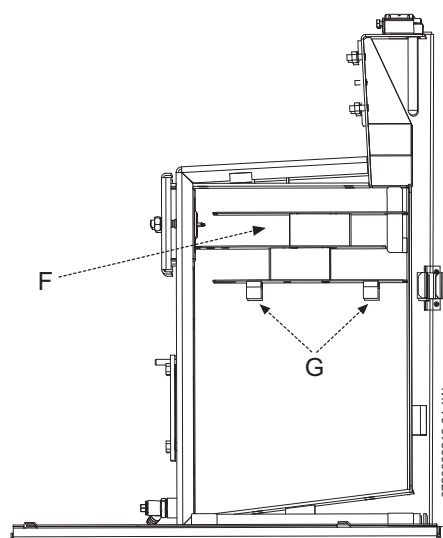


Fig. 45



## 5.6 Pipework connections



### CAUTION: MAINS SUPPLIES

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

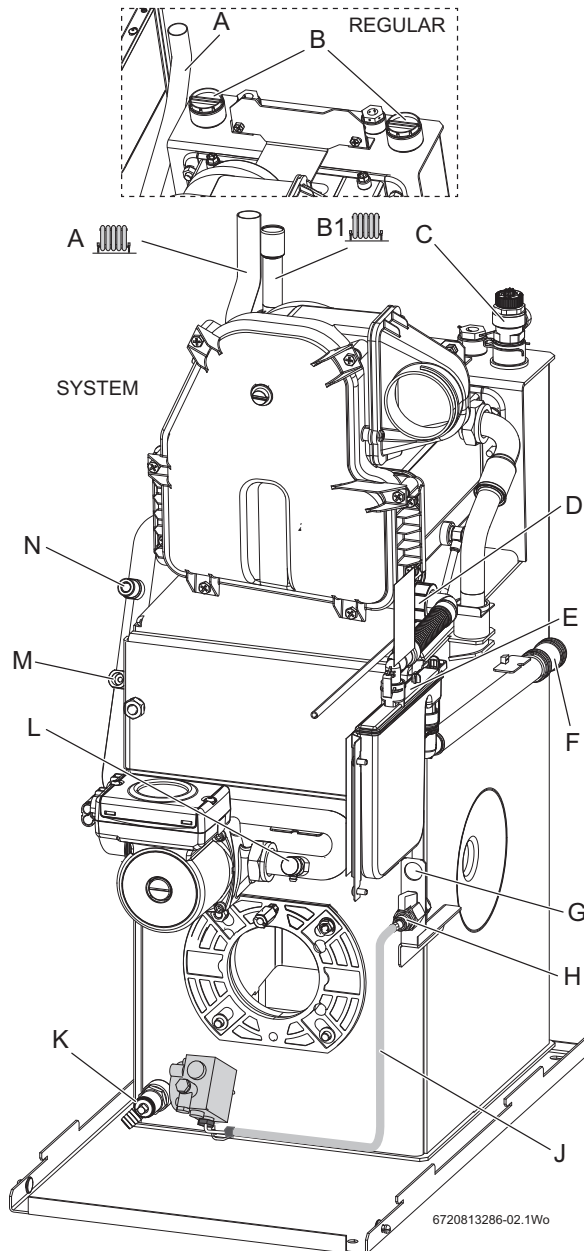


Fig. 46 Pipework connections

- [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 the 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

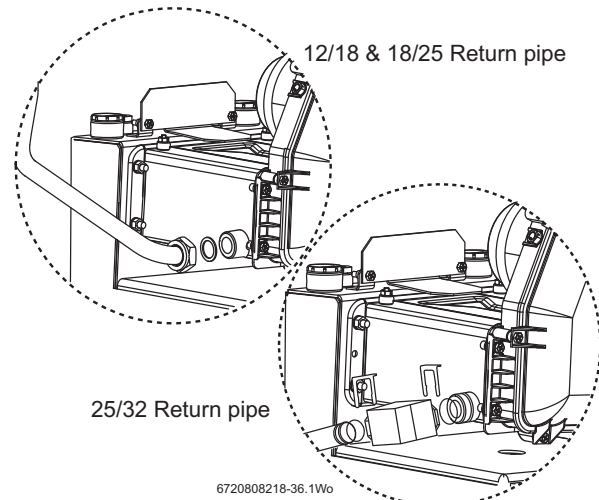


Fig. 47 Return pipes

### Oil supply connections

- ▶ Refer to figure 46 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).

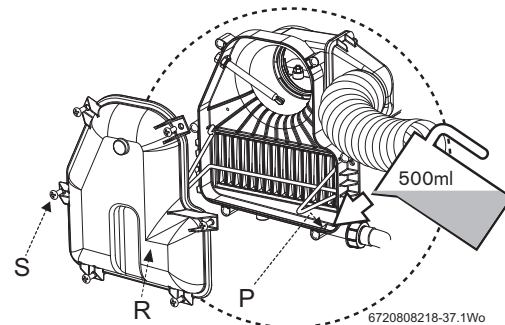


Fig. 48 Condensate

- [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 49.
- 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 50) and move the electrodes (B) forward. After refitting check that the electrode gaps are correct, as shown in figure 49.
- 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.

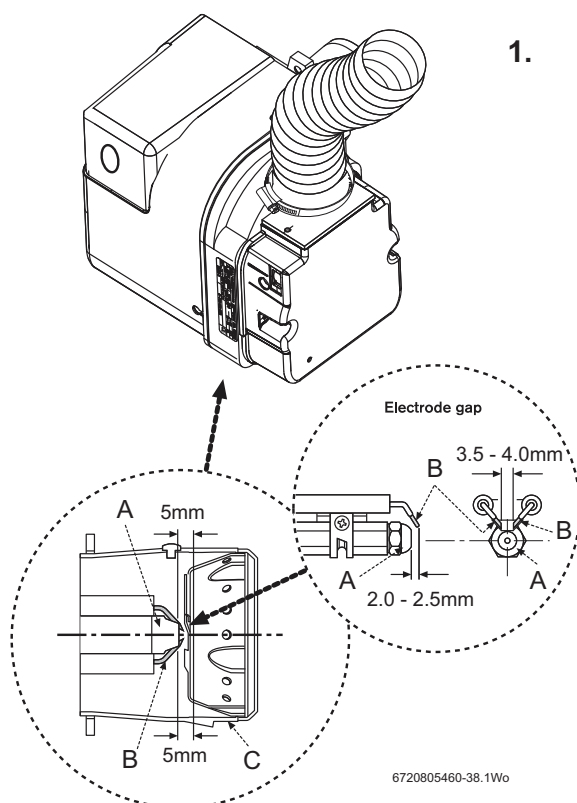


Fig. 49 Nozzle and electrode alignment

### 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.

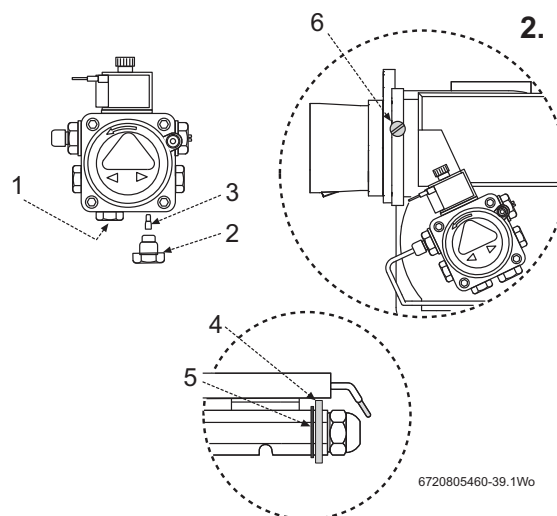


Fig. 50

- [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

## 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.

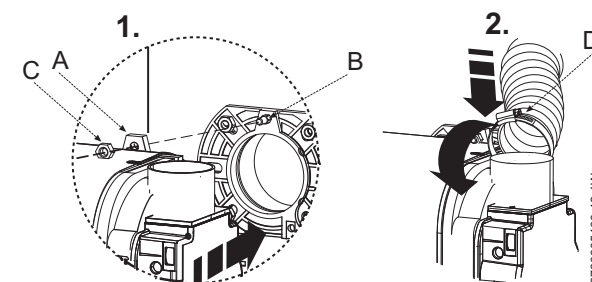


Fig. 51 Refitting the burner

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.

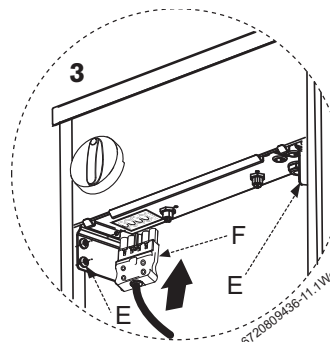


Fig. 52 Refitting the control panel

## 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



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.

### External 230V programmer

4. Remove link (G).

- ▶ Connect wires as shown.

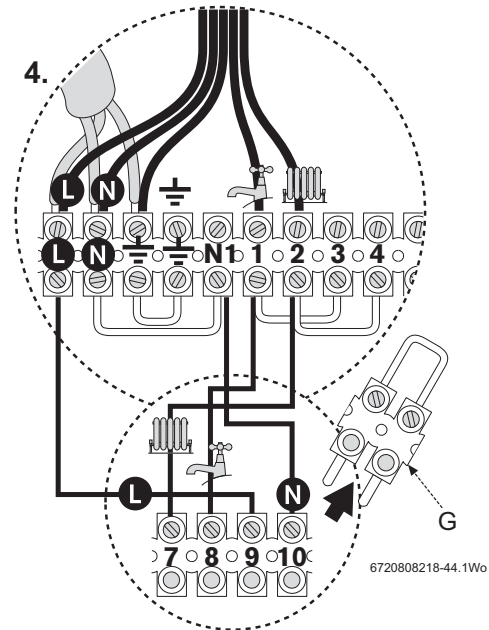


Fig. 54

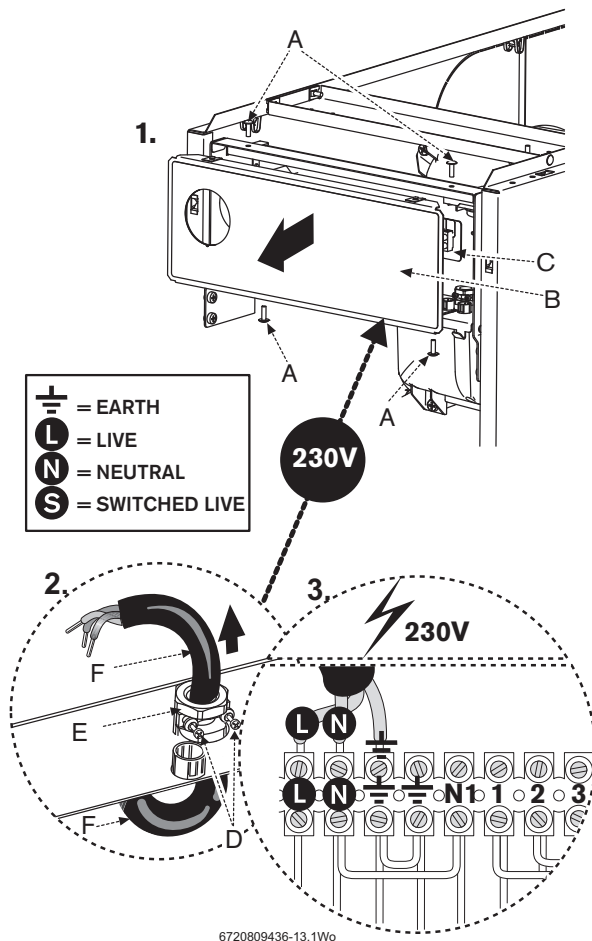
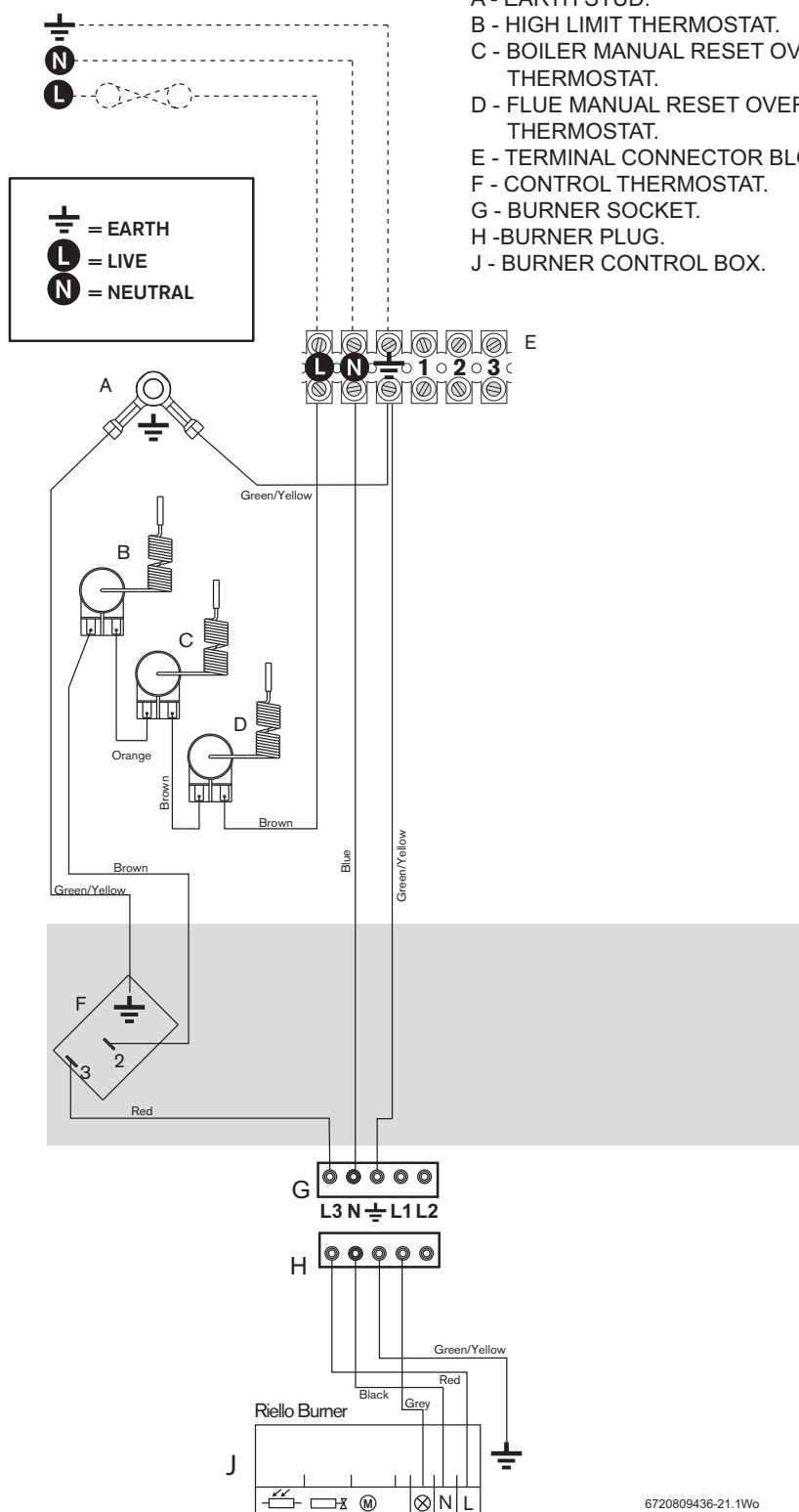


Fig. 53

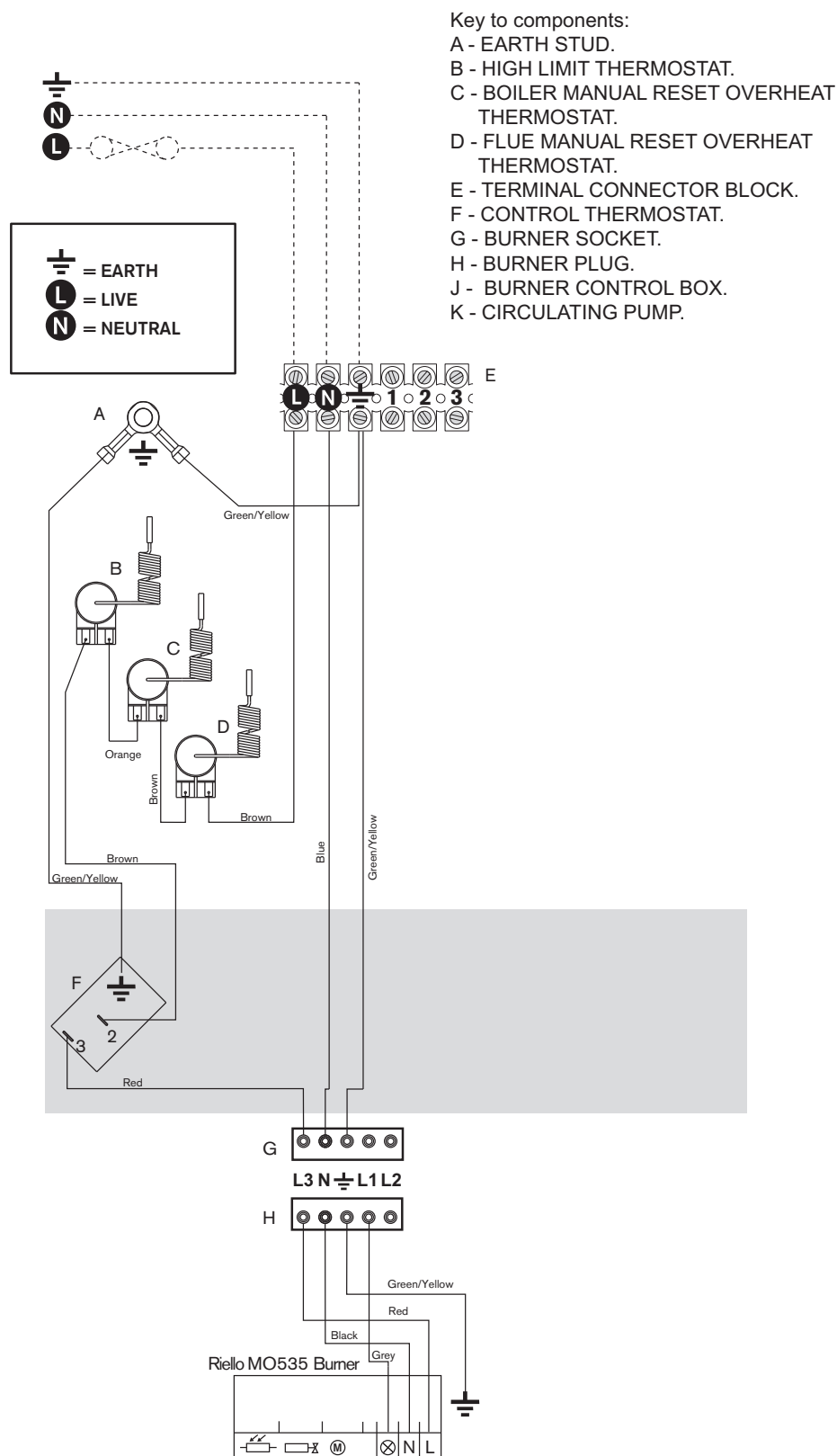
Key to components:

- 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.



*Fig. 55 230V Standard wiring diagram*

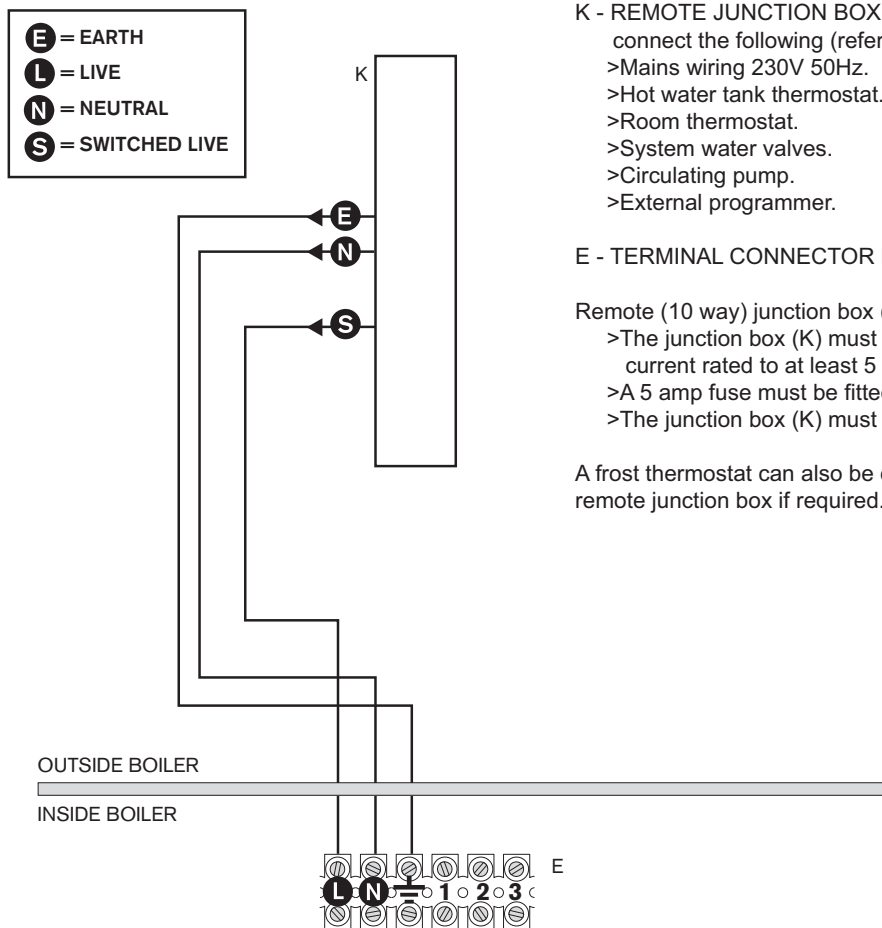
## Utility System - 230V Standard wiring diagram



6720809436-22.1Wo

Fig. 56

**Utility - 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.

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

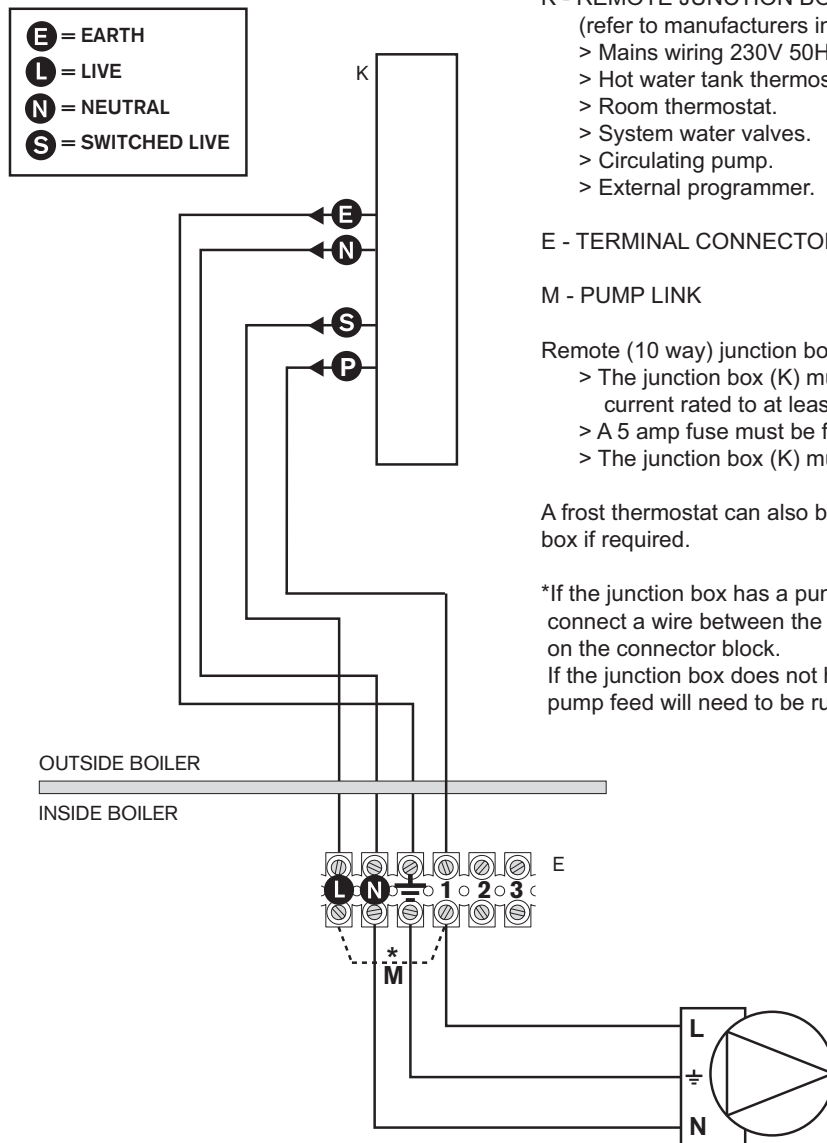
- >The junction box (K) must be a terminal block type, current rated to at least 5 amps.
- >A 5 amp fuse must be fitted to the mains supply.
- >The junction box (K) must be fitted externally to the boiler.

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

6720809436-23.1Wo

Fig. 57

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



6720809436-24.1W0

Fig. 58

## 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 45, figure 85 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.

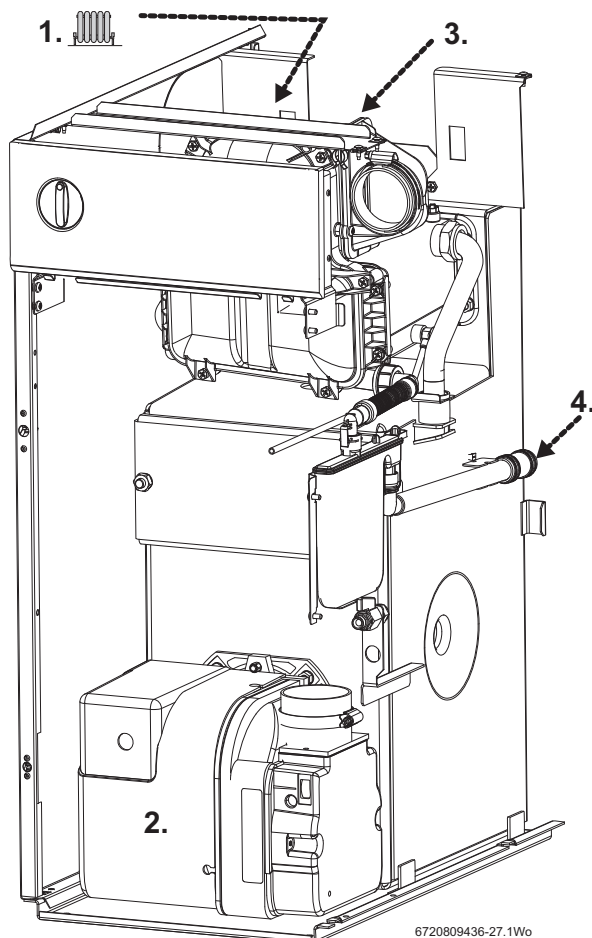


Fig. 59 Pre-Commissioning checks

### 6.2 Filling the system

- ▶ Open all system and radiator valves.
- ▶ Turn on the water main stop cock.
- ▶ Open vented systems only:
  - Turn on the water to the system feed and expansion cistern and allow the system to fill.
- ▶ Sealed systems only:
  - Check and if required, adjust the expansion vessel pressure using the Schraeder type valve.
- ▶ Fill the system to between 1 and 2 bar pressure via a WRAS approved filling link.
- ▶ Monitor the pressure gauge during venting and repressurise if required.
- ▶ Vent all radiators, retighten when completed.



**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 [1] on the top of the secondary heat exchanger. Only one can be used if fluing to the side.

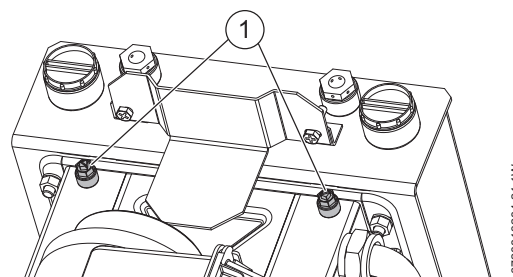


Fig. 60 Manual vent points

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

### 6.3 Water treatment


**NOTICE:**

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

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

**Flushing (Central Heating)**

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

**Inhibitor (Central Heating)**

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



The pH value of the system water must be less than 8 or the appliance warrantee will be invalidated.

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


**NOTICE:**

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

**Water treatment products**

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

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

Table 7

### 6.4 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.

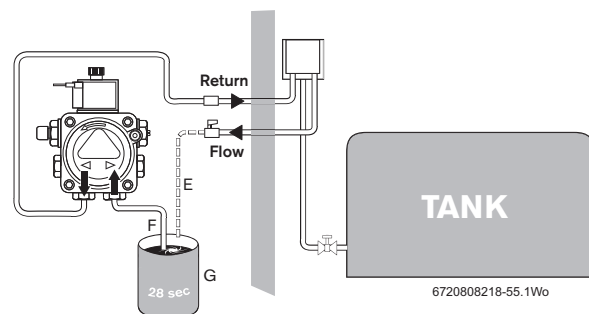


Fig. 61

- ▶ 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).



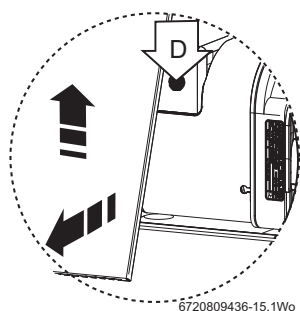


Fig. 62

- ▶ 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 8 on page 38. 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.

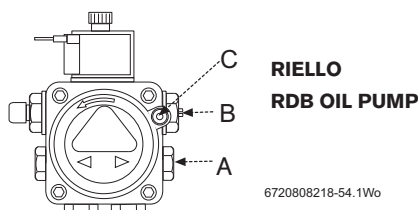


Fig. 63

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

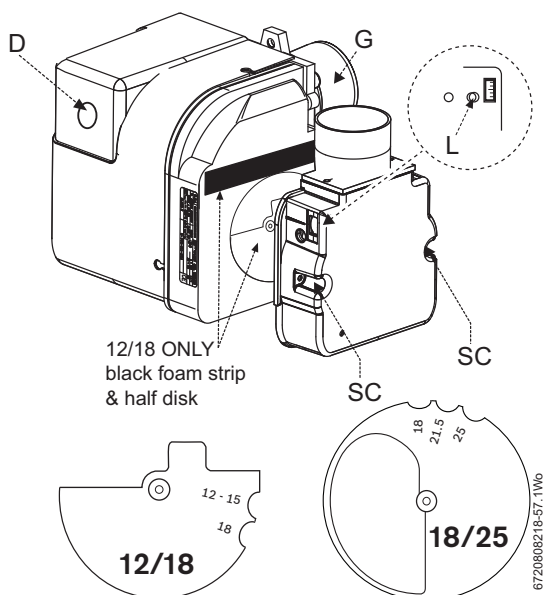


Fig. 64



Adjust position of air damper discs to suit burner output (see table 8 on page 38), 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 67) 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 67).

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.

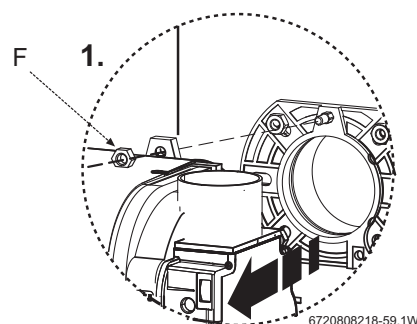


Fig. 65

- 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.

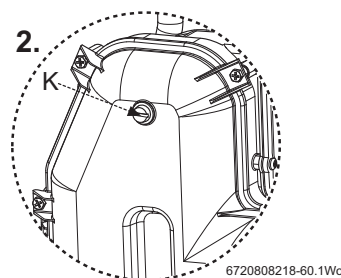


Fig. 66



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

- ▶ Check the CO<sub>2</sub> 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 8 on page 38.



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 CO<sub>2</sub> levels and if required, adjust the air shutter setting (L) to obtain the correct CO<sub>2</sub> level.
  - ▶ Refit the sample point cap (hand tighten only, do not over tighten) and refit the burner cover.

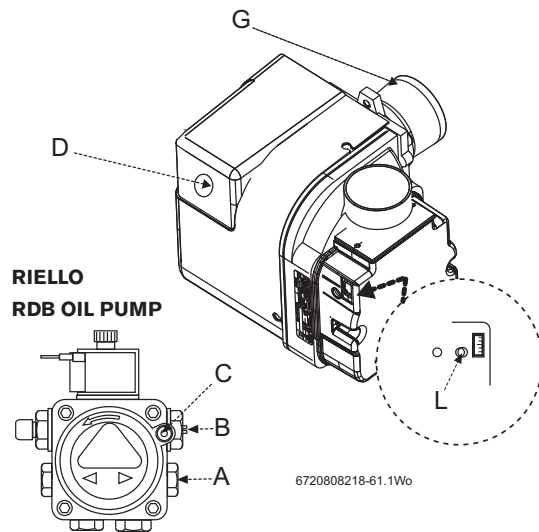


Fig. 67

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

Table 8 Burner information



**APPLIANCE MUST BE SET TO CO<sub>2</sub> 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.

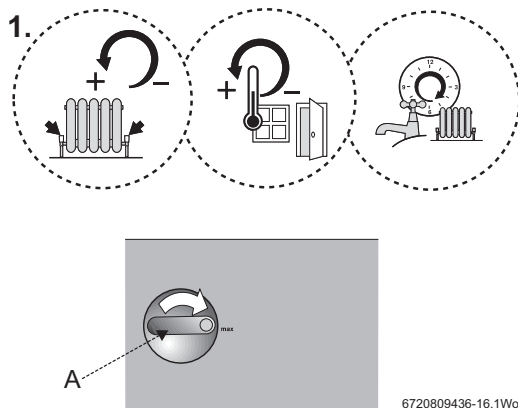


Fig. 68

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

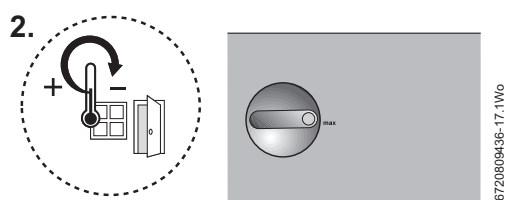


Fig. 69

### 6.5 Finishing commissioning

- ▶ Pivot the control box (A) figure 71 up and into the boiler. Secure with screws (B).

#### Utility system only:

Refer to figure 70

- ▶ 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.

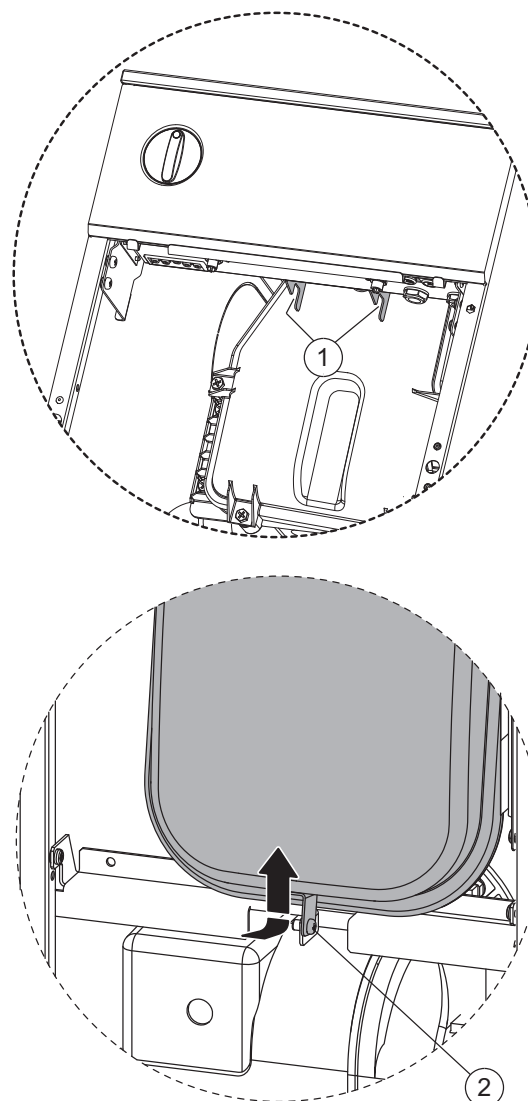


Fig. 70 Expansion vessel location

- ▶ 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.
- ▶ 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.

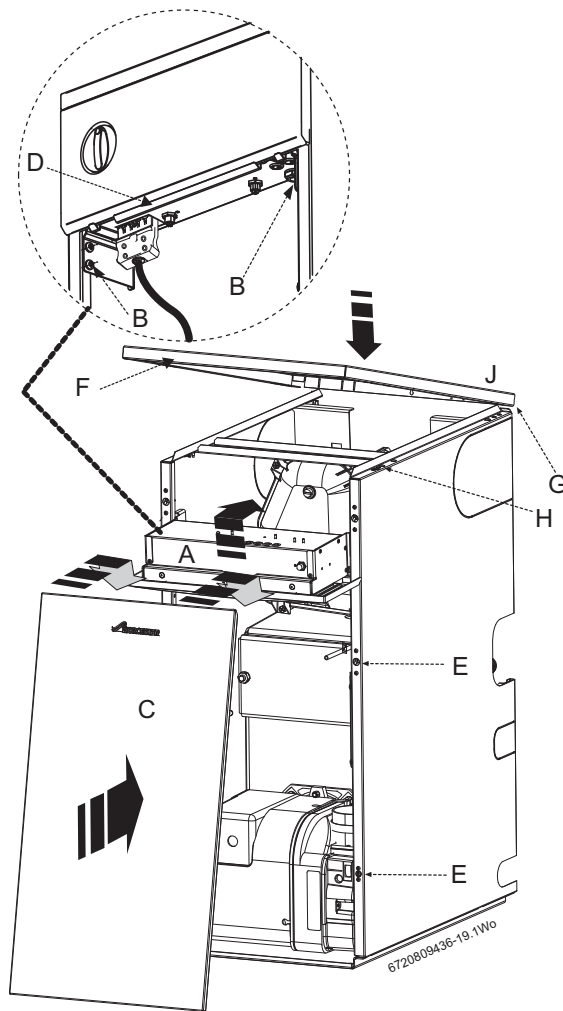


Fig. 71

### 6.5.1 Hand over

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

- ▶ Ensure that the User Guide and Installation, Commissioning and Service manual, with the Boiler commissioning checklist and service record, is left with the appliance or homeowner.
- ▶ If the appliance is unused and exposed to freezing conditions, shut off all the mains supplies and drain the system and appliance, label accordingly.
- ▶ Show the customer the location of the condensate pipe run for external/unheated areas that maybe at risk of prolonged cold temperatures.

### 6.5.2 Appliance guarantee

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

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

This guarantee does not affect your statutory rights.

### Guarantee registration

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

Guarantee Registration can be completed:

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

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

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

## 7 Service and Spares

### 7.1 Inspection and service - 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.

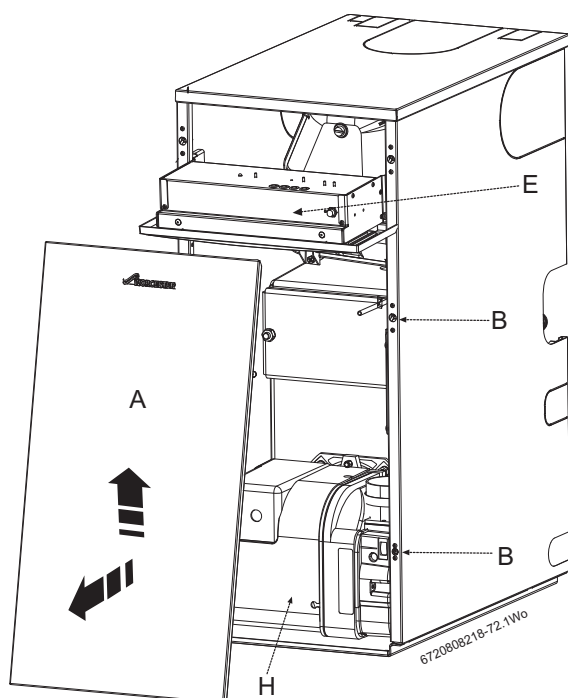


Fig. 72 Access to internal components

#### 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.

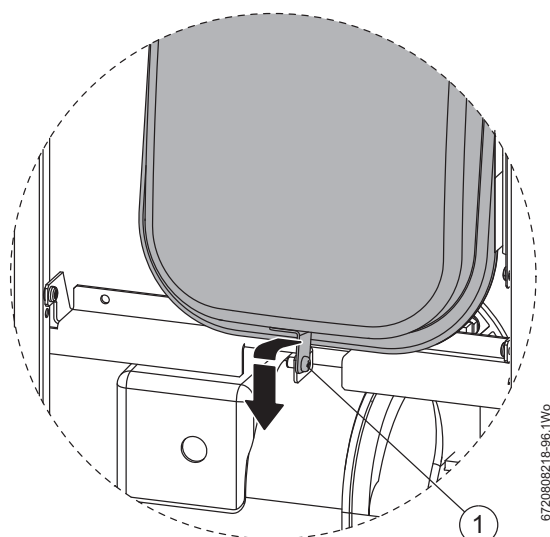


Fig. 73 Expansion vessel removal

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

#### 2. & 3.

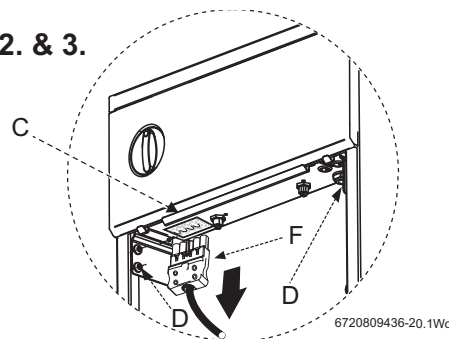


Fig. 74 Burner lead

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).

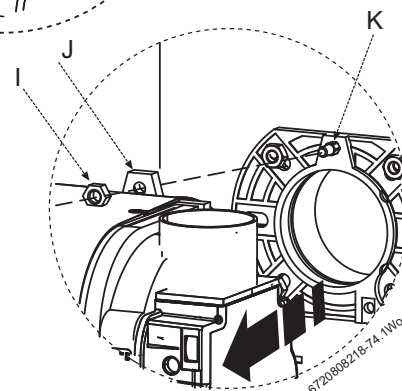
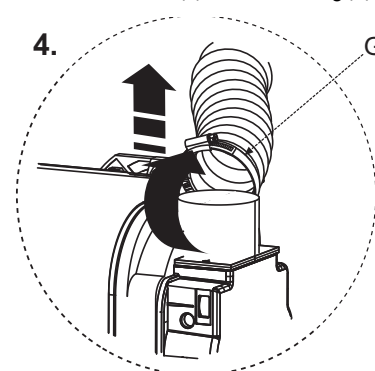


Fig. 75 Burner removal

### 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

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

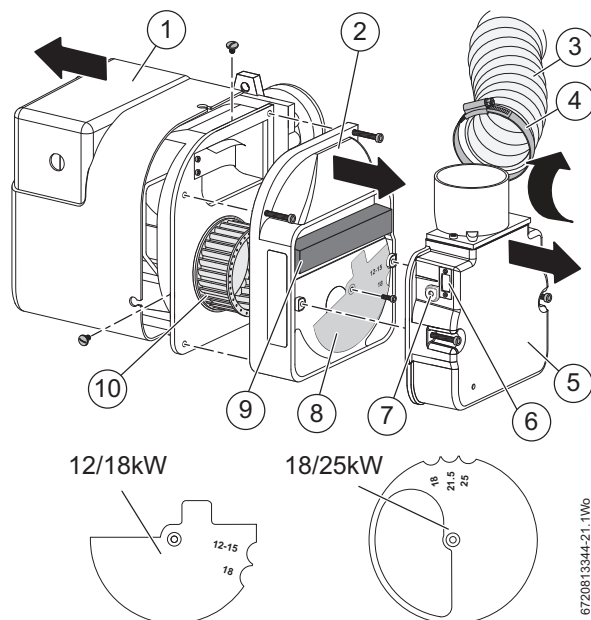


Fig. 76 Disassemble burner for cleaning

|   |                          |    |                          |
|---|--------------------------|----|--------------------------|
| 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  | Black foam strip (12/18) |
| 5 | Air intake cover         | 10 | Impeller                 |

Refer to figure 77

- ▶ 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.



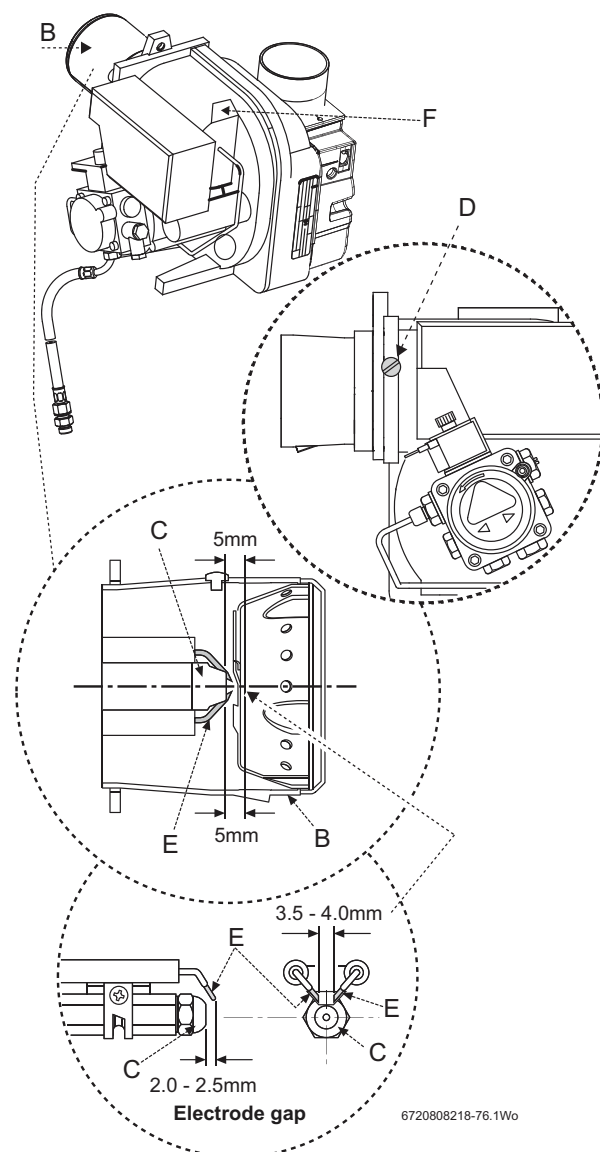


Fig. 77 Burner removal

- ▶ The internal filter is accessed by removing screws (G) and the oil pump cover (H), refer to figure 78.
- ▶ 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.

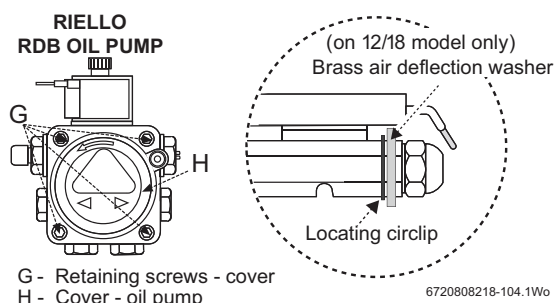


Fig. 78 Pump detail

#### 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.

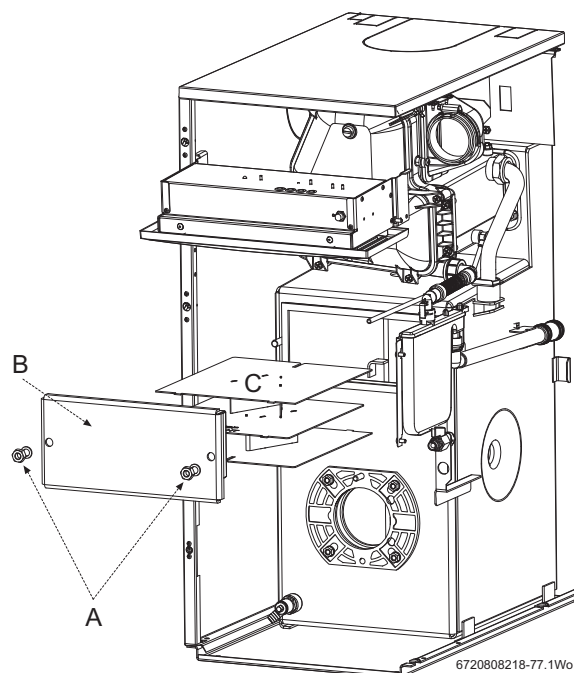


Fig. 79 Combustion chamber



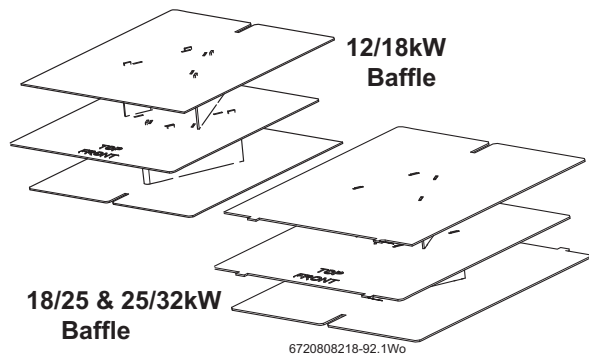


Fig. 80 Baffle detail

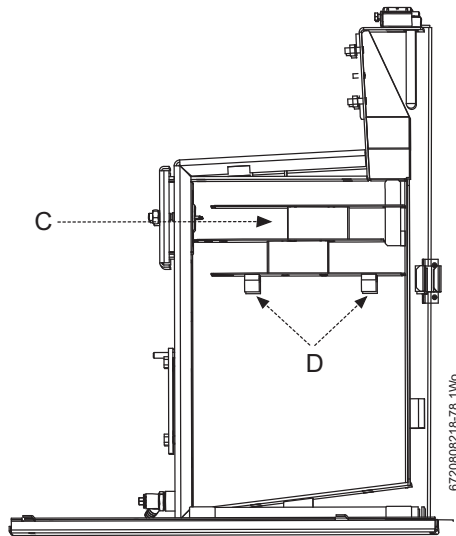


Fig. 81 Baffle positioning

### 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.

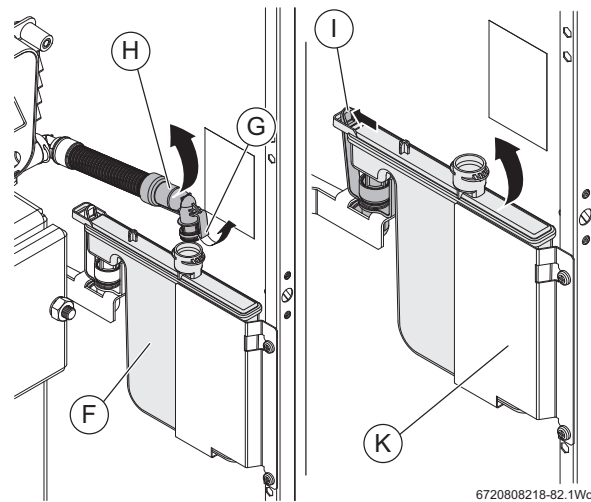


Fig. 82 Condensate trap removal

- [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).

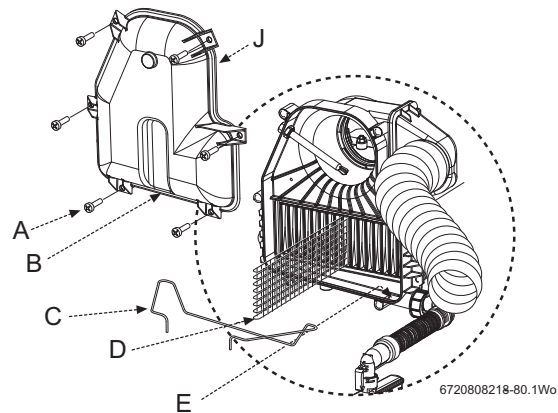


Fig. 83 Heat exchanger baffles

### Re-commissioning the burner

1. 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.

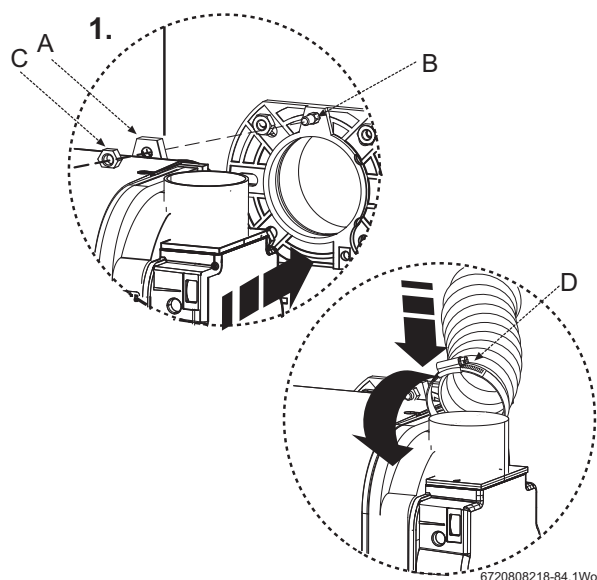


Fig. 84 Refitting the burner

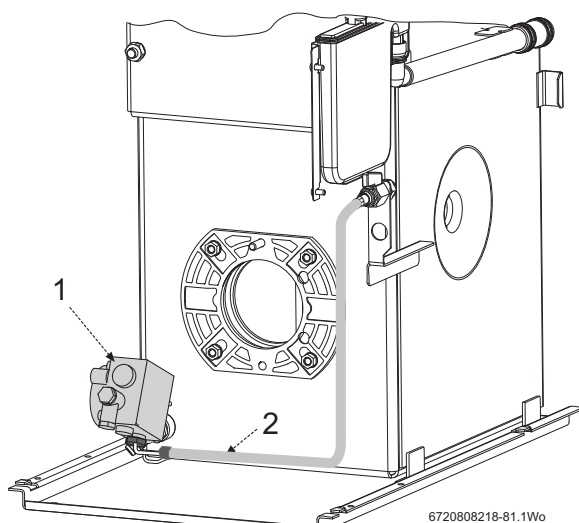


Fig. 85 Oil pump and hose detail

- [1] Oil pump
  - [2] Flexible oil hose route. Ensure that the rigid 90° connection at the pump points to right when the boiler is viewed from the front and the flexible hose follows the route as show in the figure above.
2. 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 8 on page 38, ensure CO<sub>2</sub> levels are correct. Adjust the air shutter if necessary see page 38, figure 67 for details.

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

3. 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.

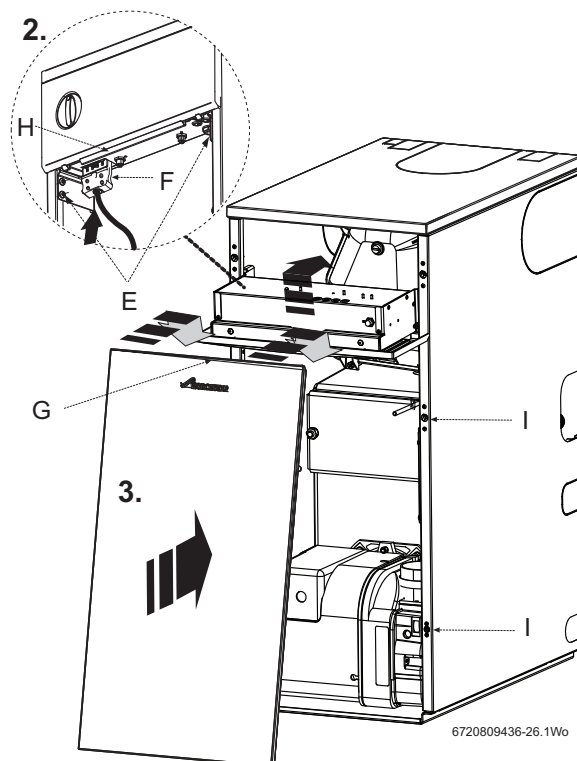


Fig. 86 Refitting panels

### 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 list 12/18**





























|   |  |
|---|--|
|  Cleaning tool<br>8 716 109 428 0                      |  Oil nozzle (12kW)<br>0.35 80° SR<br>8 716 112 628 0    |
|  Oil nozzle (15kW)<br>0.45 60° ES<br>8 716 114 545 0   |  Oil nozzle (18kW)<br>0.55 80° EH<br>8 716 156 671 0    |
|  Flexible oil hose kit<br>8 716 115 310 0              |  Combustion head O-ring seal<br>8 716 109 341 0         |
|  Manifold access cover seal<br>8 716 107 536 0         |  Secondary heat exchanger gasket<br>8 718 690 792 0     |
|  Flue sample point screw<br>8 718 682 081 0            |  Burner<br>Riello RDB 2.2 12/18<br>8 718 690 333 0      |
|  Combustion head LD2X SH12/18<br>8 716 112 731 0       |  Control box 535 RSE/LD<br>8 716 109 203 0              |
|  Photocell<br>8 716 109 193 0                          |  Ignition electrode<br>8 716 109 211 0                  |
|  Motor<br>8 716 110 522 0                              |  Riello RDB oil pump<br>8 718 689 342 0                 |
|  RDB pump drive coupling<br>8 716 109 245 0          |  Nozzle holder<br>8 716 116 638 0                     |
|  Circlip<br>8 716 112 773 0                          |  Brass air restrictor washer<br>8 716 112 729 0       |
|  Air damper disc 12/18<br>8 718 690 377 0            |  Frost thermostat<br>8 716 142 393 0                  |
|  Control thermostat 7 716 107 621 0                  |  Auto reset overheating thermostat<br>8 716 107 623 0 |
|  Manual reset overheating thermostat 8 716 107 625 0 |  Manual reset flue thermostat 8 716 107 624 0         |
|  Circulating pump 8 716 117 586                      |  Expansion vessel 8 715 407 296 0                     |
|  Pressure relief valve 8 718 681 163 0               |  Pressure gauge 8 716 107 638 0                       |

Table 9 Parts list

**7.3 Short parts list 18/25**





























|   |   |
|---|---|
|  Cleaning tool<br>8 716 109 428 0                      |  Oil nozzle (18kW)<br>0.50 80° ES<br>8 716 156 669 0 |
|  Oil nozzle (21.5kW)<br>0.60 60° ES<br>8 716 156 680 0 |  Oil nozzle (25kW)<br>0.75 80° ES<br>8 716 109 387 0 |
|  Flexible oil hose kit<br>8 716 115 310 0              |  Combustion head O-ring seal<br>8 716 109 341 0      |
|  Manifold access cover seal<br>8 716 107 536 0         |  Secondary heat exchanger gasket<br>8 718 690 725 0  |
|  Flue sample point screw<br>8 718 682 081 0            |  Burner<br>Riello RDB 2.2 18/25<br>8 718 690 334 0   |
|  Combustion head LD2X SH18/25<br>8 716 682 170 0       |  Control box 535 RSE/LD<br>8 716 109 203 0           |
|  Photocell<br>8 716 109 193 0                          |  Ignition electrode<br>8 716 109 211 0               |
|  Motor<br>8 716 110 522 0                              |  Riello RDB oil pump<br>8 718 689 342 0              |
|  RDB pump drive coupling<br>8 716 109 245 0          |  Nozzle holder<br>8 716 116 638 0                  |
|  Air damper disc 18/25<br>8 718 690 458 0            |  Frost thermostat<br>8 716 142 393 0               |
|  Control thermostat 7 716 107 621 0                  |  Auto reset overheating thermostat 8 716 107 623 0 |
|  Manual reset overheating thermostat 8 716 107 625 0 |  Manual reset flue thermostat 8 716 107 624 0      |
|  Circulating pump 8 716 117 586                      |  Expansion vessel 8 715 407 296 0                  |
|  Pressure relief valve 8 718 681 163 0               |  Pressure gauge 8 716 107 638 0                    |

Table 10 Parts list

#### 7.4 Short parts list 25/32



























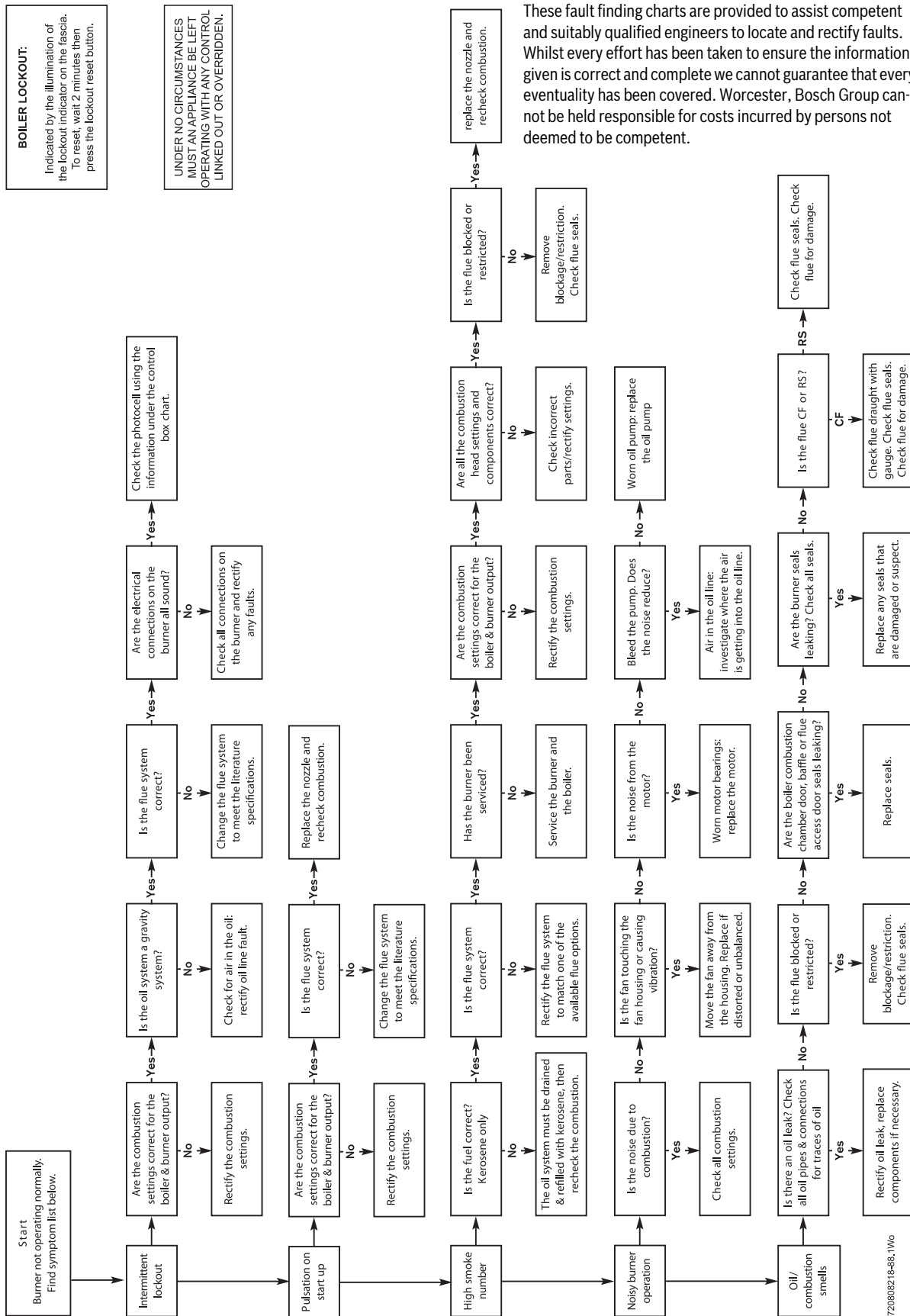
|   |  |   |   |
|---|--|---|---|
|    | Cleaning tool<br>8 716 109 428 0                       |    | Oil nozzle<br>(25 & 28.5kW)<br>0.75 80° ES<br>8 716 109 387 0 |
|    | Oil nozzle (32kW)<br>0.85 80° EH<br>8 716 156 644 0    |    | Flexible oil hose kit<br>8 716 115 310 0                      |
|    | Combustion head O-<br>ring seal<br>8 716 109 341 0     |    | Manifold access<br>cover seal<br>8 718 682 849 0              |
|    | Secondary heat<br>exchanger gasket<br>8 718 688 799 0  |    | Flue sample point<br>screw<br>8 718 682 081 0                 |
|    | Burner<br>Riello RDB 2.2 25/32<br>718 690 335 0        |    | Combustion head<br>LD2X SH 25/32<br>8 716 112 780 0           |
|    | Control box 535<br>RSE/LD<br>8 716 109 203 0           |    | Photocell<br>8 716 109 193 0                                  |
|    | Ignition electrode<br>8 716 109 211 0                  |    | Motor<br>8 716 110 522 0                                      |
|    | Riello RDB oil pump<br>8 718 689 342 0                 |    | RDB pump drive<br>coupling<br>8 716 109 245 0                 |
|  | Nozzle holder<br>8 716 116 638 0                       |  | Frost thermostat<br>8 716 142 393 0                           |
|  | Control thermostat<br>7 716 107 621 0                  |  | Auto reset overheat<br>thermostat<br>8 716 107 640 0          |
|  | Manual reset<br>overheat thermostat<br>8 716 107 625 0 |  | Manual reset flue<br>thermostat<br>8 716 107 624 0            |
|  | Circulating pump<br>8 716 117 586                      |  | Expansion vessel<br>8 715 407 296 0                           |
|  | Pressure relief valve<br>8 718 681 163 0               |  | Pressure gauge<br>8 716 107 638 0                             |

Table 11 Parts list

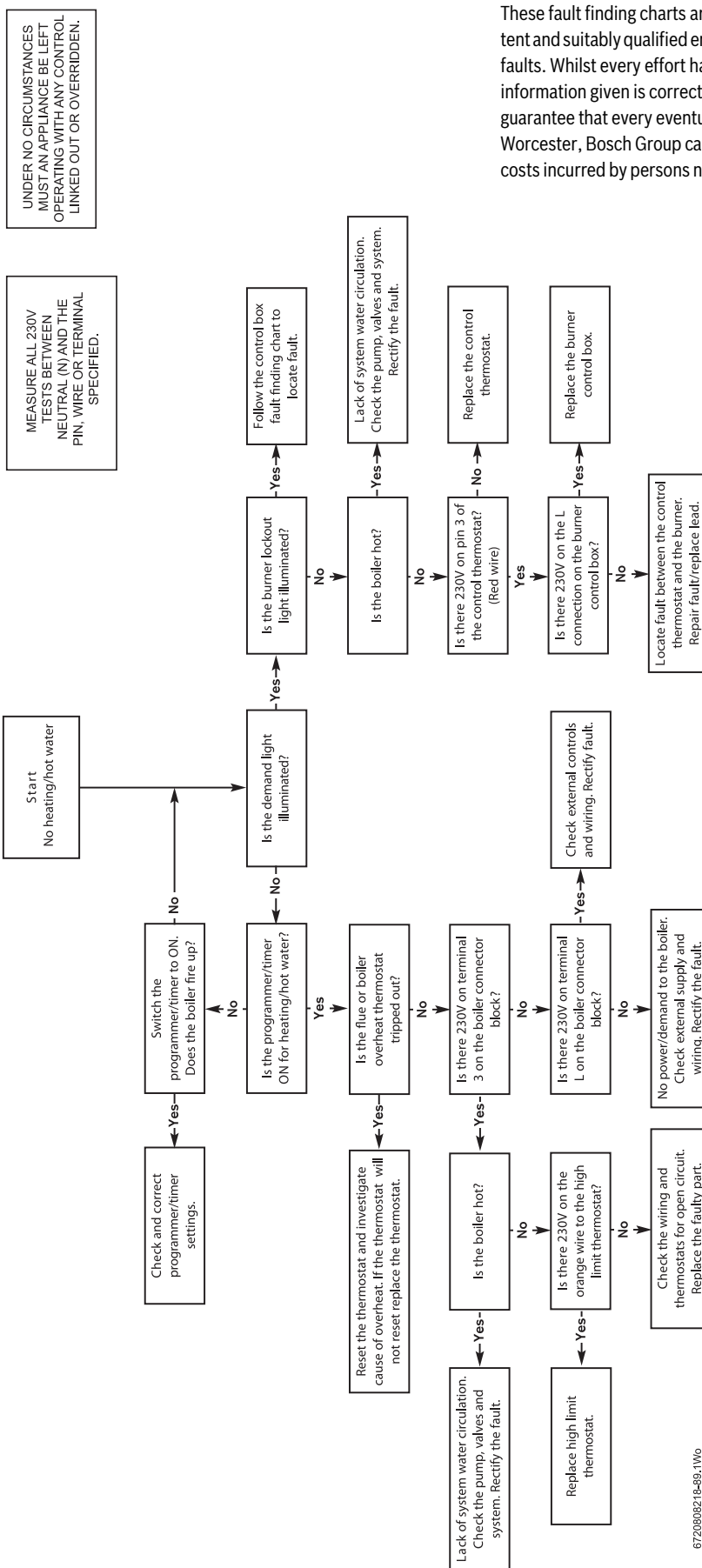
## 8 Fault finding and diagnosis

### 8.1 Burner functions



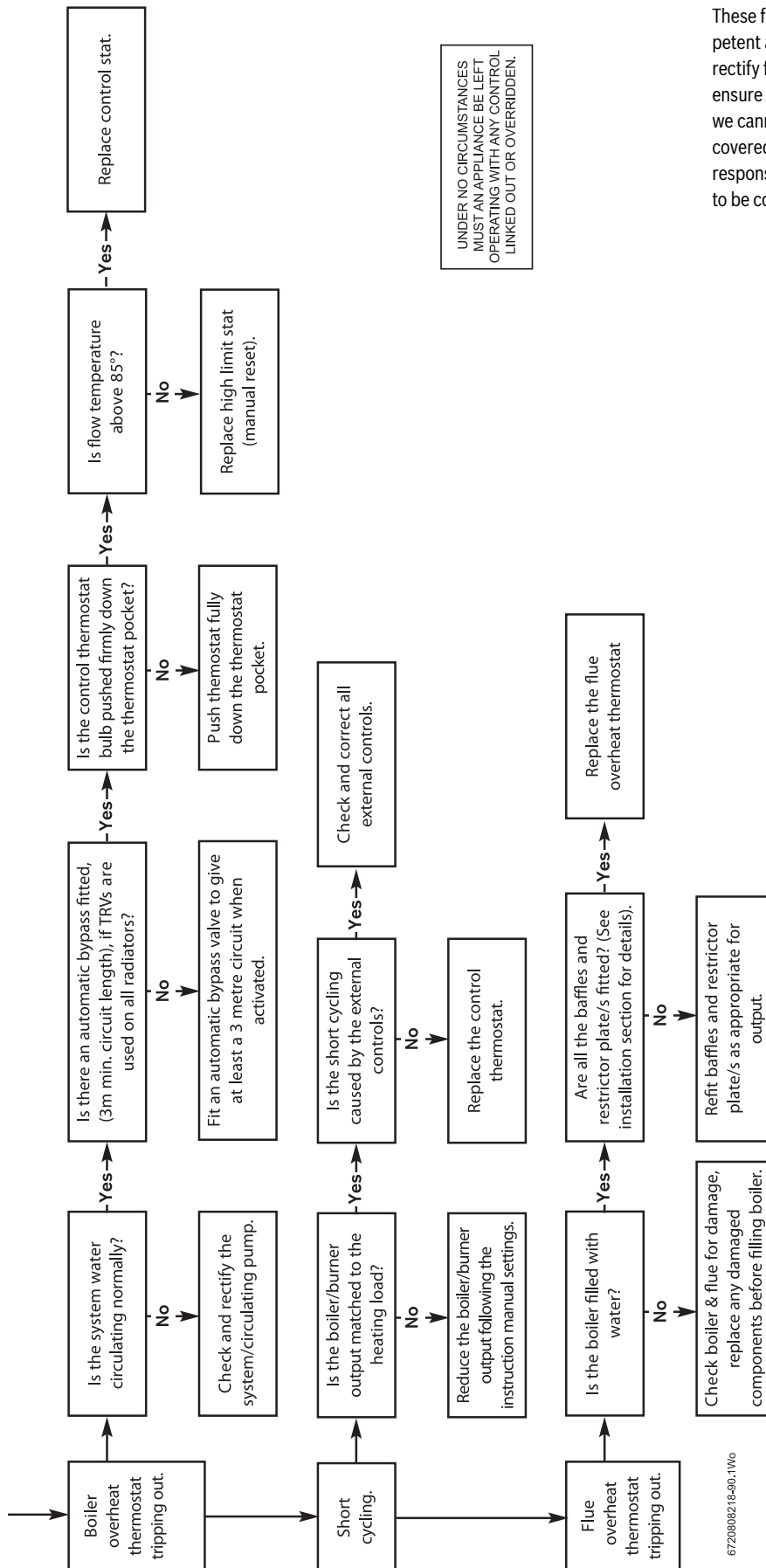
These fault finding charts are provided to assist competent and suitably qualified engineers to locate and rectify faults. Whilst every effort has been taken to ensure the information given is correct and complete we cannot guarantee that every eventuality has been covered. Worcester, Bosch Group cannot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

## 8.2 Heating and hot water



6720808218-89.1Wo

### 8.3 Boiler function





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 10M $\Omega$  or open circuit) in the dark and low resistance (3k $\Omega$  or less) in light.

Burners on balanced flue systems can recirculate flue products resulting in the burner cycling, if this happens check the flue system integrity and the terminal position.

## 8.5 Oil supply vacuum testing

A vacuum gauge can be attached to the oil pump vacuum test port [1] and the boiler operated to check the vacuum readings. Oil pumps can operate if readings are between plus 0.4 bar and minus 0.35 bar.

This means oil tanks can be 4 metres higher (to top of oil) or 3.5 metres lower (if fitted with a de-aerator or two-pipe oil delivery system) than the oil pump.

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

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

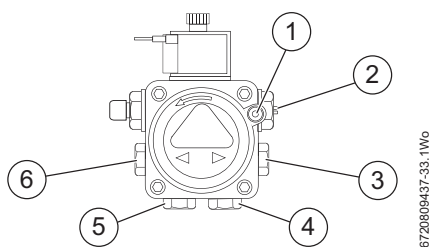


Fig. 87 Oil pump ports/connections

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



# 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  
CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ ppm CO/CO<sub>2</sub> ratio \_\_\_\_\_  
Smoke Reading \_\_\_\_\_  
Flue Gas Temperature \_\_\_\_\_ °C  
Flue Pressure \_\_\_\_\_  
Burner Model \_\_\_\_\_

## CONTROLS Tick the appropriate boxes

|   |   |   |  |  |
|---|---|---|--|--|
| Time and Temperature Control to Heating   | Room Thermostat and Programmer/Timer <input type="checkbox"/>     | Programmable Room Thermostat <input type="checkbox"/> | Load/Weather Compensation <input type="checkbox"/> | Optimum Start Control <input type="checkbox"/> |
| Time and Temperature Control 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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*

CO<sub>2</sub> \_\_\_\_\_ % CO \_\_\_\_\_ *ppm* CO/CO<sub>2</sub> 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 over-night for example)**

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

**No domestic hot water**

1. Is 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 |
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6 720 813 286 (2014/09)

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