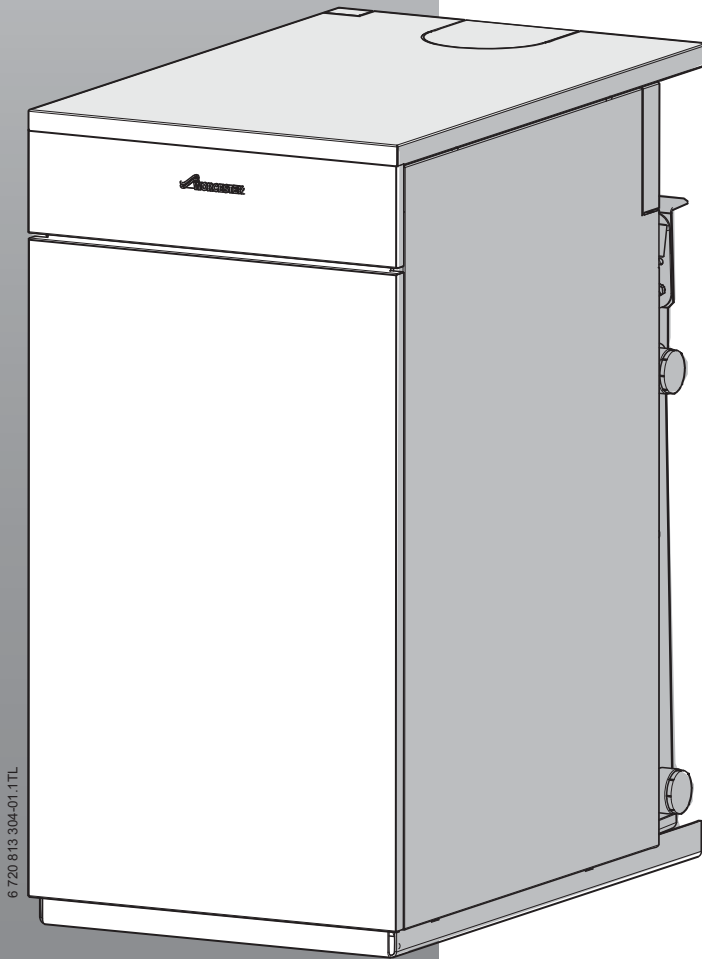


# Installation, Commissioning and Servicing instruction manual

Floor Standing oil-fired condensing boiler conventional flue & room sealed flue

## Greenstar Utility<sup>ErP</sup> 32/50 & 50/70

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



UK


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## 1 Key to symbols and safety instructions

### 1.1 Key to symbols


#### Warnings

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

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

#### Important information

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

#### Additional symbols

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

Table 1 Symbols

#### Examples of additional symbols used

##### A numbered step in an action sequence

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

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

##### A step in an action sequence

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

- ▶ Action
- ▶ Next action
- ▶ etc

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

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

→ e.g. figure 1.

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

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

#### List entries, first and second levels

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

#### Abbreviations used in this manual

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

#### Read these instructions before starting any installation

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

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

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

## 1.2 General safety instructions

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

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

### Oil fumes or leaks from the appliance

If you smell oil fumes, observe the following rules.

- ▶ Extinguish any naked flames
- ▶ Isolate the electrical supply
- ▶ Isolate the fuel supply to the boiler
- ▶ 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 EN 12828: 2012 +A1: 2014	Heating systems in buildings. Design for water-based heating systems
BS 7291:	Thermoplastic pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings
BS 7074: part 1:	Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems.
BS 1254-2:	Copper and copper alloys plumbing fittings part 2: Fittings with compression ends for use with copper tubes.
BS 7671:	IET Wiring Regulations, current edition.
BS 1362:	Specification for general purpose fuse links for domestic and similar purposes.

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

Local water company bye-laws.

The Control of Pollution (Oil) Regulations.

OFTEC Standards.

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

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

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

Current Building Regulations - Republic of Ireland

ETCI rules for electrical installation

#### For further guidance see:

OFTEC Technical book three - Regional requirements: Republic of Ireland

### 3 Appliance information

#### 3.1 General information

##### Standard package

A - Floor standing oil fired condensing boiler

B - Literature pack:

- Greenstar Utility Installation, Commissioning and Servicing instruction manual
- User Instructions
- Guarantee registration card

C - Return pipe kit

D - ErP labe

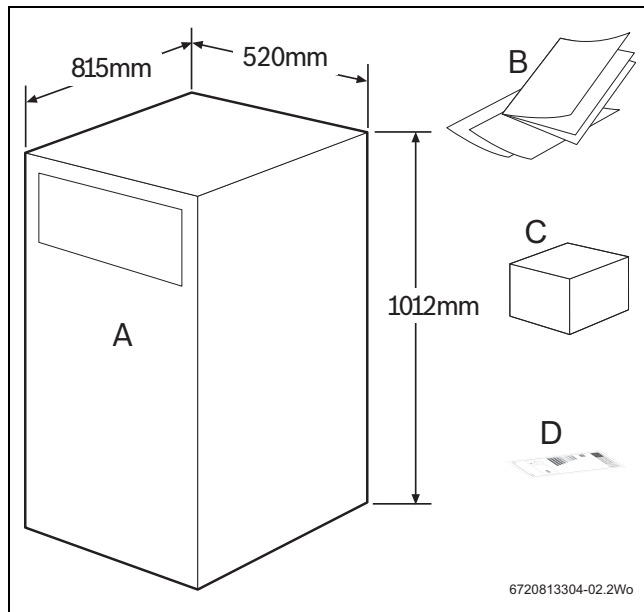


Fig. 1

#### 3.2 Technical data

Description	Units	32/50	50/70
<b>Central heating</b>			
Primary water capacity (total)	litres	50	51
Maximum static head	metres	30	30
Minimum static head	metres	1	1
Water side resistance (20°C difference)	mbar	26	40
Water side resistance (10°C difference)	mbar	52	104
<b>Flue</b>			
Exit flue gas mass flow	kg/hr	76	106
Conventional flue (minimum diameter required)	mm	130	130
Room sealed flue (diameter)	mm	100/ 150	100/ 150
<b>Pipework connections</b>			
Fuel line (compression)	mm	10	10
CH flow	inch BSP	1½	1½
CH return	mm	28	28
CH vent	inch BSP	1½	1½
CH make up	inch BSP	1½	1½
Condensate (polypropylene)	mm	21.5	21.5
<b>Electrical</b>			
Electrical power supply voltage	AC...V	230	230
Frequency	Hz	50	50
<b>Thermostats</b>			
Boiler flow temperature range (cut out)	°C	60/82	60/82
CH control thermostat differential	°C	5	5
Boiler high limit thermostat set point (+ 0.6°C)	°C	100	100
Boiler manual reset overheat thermostat (cut out)	°C	110	110
Flue manual reset overheat thermostat (+ 0.6°C)	°C	120	120
<b>General data</b>			
Maximum hearth temperature	°C	100	100
SEDBUK 2005 (Band A)	%	93.0	92.5
SEDBUK (2009)	%	90.7	90.5
Appliance protection rating	IP	20	20
Weight (excluding packaging)	kg	271	281

### 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	7731600073	7731600074
Product type	-	-	Danesmoor Utility <sup>ErP</sup> 32/50	Danesmoor Utility <sup>ErP</sup> 50/70
Condensing boiler	-	-	No	No
Low temperature boiler	-	-	Yes	Yes
B1 boiler	-	-	No	No
Cogeneration space heater (CHP)	-	-	No	No
Combination heater	-	-	No	No
Rated heat output	$P_{\text{rated}}$	kW	50	70
Seasonal space heating energy efficiency	$\eta_s$	%	89	88
Energy efficiency class	-	-	B	B
<b>Useful heat output</b>				
At rated heat output and high temperature regime <sup>1)</sup>	$P_4$	kW	50.5	70
At 30 % of rated heat output and low temperature regime <sup>2)</sup>	$P_1$	kW	15.3	21.3
<b>Useful efficiency</b>				
At rated heat output and high temperature regime <sup>1)</sup>	$\eta_4$	%	91.6	91
At 30% of rated heat output and low temperature regime <sup>2)</sup>	$\eta_1$	%	93.3	92.5
<b>Auxiliary electricity consumption</b>				
At full load	$e_{\text{max}}$	kW	0.188	0.176
At part load	$e_{\text{min}}$	kW	0.063	0.057
In standby mode	$P_{\text{SB}}$	kW	0	0
<b>Other items</b>				
Standby heat loss	$P_{\text{stby}}$	kW	0.253	0.262
Ignition burner power consumption	$P_{\text{ign}}$	kW	-	-
Emissions of nitrogen oxides	NO <sub>x</sub>	mg/kWh	130	100
Annual energy consumption	$Q_{\text{HE}}$	kWh	-	-
Sound power level, indoors	$L_{\text{WA}}$	dB(A)	61	65

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).





**Legend to figure 2:**

- [1] CH THERMOSTAT CONTROL
- [2] RESET BUTTON BOILER OVERHEAT
- [3] RESET BUTTON FLUE OVERHEAT
- [4] CONTROL BOX ASSEMBLY
- [5] CASING SIDE PANEL
- [6] CASING SUPPORT PANEL
- [7] CLIP - FIRE SENSOR
- [8] CONTROL, AUTOMATIC HIGH LIMIT & MANUAL HIGH LIMIT THERMOSTATS
- [9] CLIP - POWER CABLE
- [10] FLUE MANIFOLD ACCESS COVER
- [11] CH RETURN PIPE
- [12] MANUAL RESET FLUE OVERHEAT THERMOSTAT
- [13] FLUE MANIFOLD
- [14] FLUE GAS SAMPLING POINT
- [15 - 16] SECONDARY HEAT EXCHANGER
- [17] MANUAL AIR VENT - SECONDARY HEAT EXCHANGER
- [18] MANUAL AIR VENT - SECONDARY TO PRIMARY HEAT EXCHANGER RETURN PIPE
- [19] SECONDARY TO PRIMARY HEAT EXCHANGER RETURN PIPE
- [20] DRAIN-SECONDARY HEAT EXCHANGER
- [21] CH FLOW CONNECTION LEFT & RIGHT HAND SIDE
- [22] CONDENSATE OUTLET
- [23] INTERNAL CONDENSATE TRAP
- [24] CONDENSATE DRAIN
- [25] CONDENSATE DRAIN PUSH-FIT CONNECTOR
- [26] OPTIONAL COLD FEED/DRAIN LEFT & RIGHT HAND SIDE
- [27] PRIMARY HEAT EXCHANGER
- [28] BASE PLATE
- [29] COMBUSTION CHAMBER ACCESS DOOR
- [30] OILDRIP TRAY
- [31] TOP FRONT PANEL
  
- [32] RIELLO RDB 3.2 (32/50)  
RIELLO RDB 4.2 (50/70)
- [i] Control box
- [ii] Motor
- [ii] Air intake casing
- [iv] Oil pump
- [v] Combustion head
  
- [33] LOCKOUT INDICATOR/RESET BUTTON
- [34] CLIP - AIR INTAKE HOSE
- [35] AIR INTAKE HOSE

## 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 re-connection.



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

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



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

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

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

#### 4.1.1 Before cleaning the system:

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

#### Follow the guidance of BS7593:

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

#### 4.1.2 Flushing the system

- ▶ Fill the system with cold water and check for leaks.
- ▶ Open vented systems only:
  - Turn off the water to the system header tank.
- ▶ Open all drain cocks and drain the system.
- ▶ Close drain cocks and add a suitable flushing agent at the correct strength for the system conditions in accordance with the manufacturer's instructions.
- ▶ Circulate the flushing agent before the boiler is fired up.
- ▶ Run the boiler/system at normal operating temperature as directed by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system to remove the flushing agent and debris.
- ▶ It may be necessary to use a power flushing machine to aid the cleansing procedure in some circumstances.
- ▶ Close the drain cocks and manual air vents.
- ▶ Add a suitable inhibitor to the system in accordance with the manufacturer's instructions.
- ▶ Open vented systems only:
  - Turn on the water to the system header tank and allow the system to fill.
- ▶ Sealed systems only:
  - Fill the system to between 1 and 1.5 bar via a WRAS approved filling loop.
- ▶ Vent any air from the boiler and system

**Pre-Installation**

**4.1.3 Inhibitor**

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



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

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



**WARNING:** Sealing agents

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

**Water treatment products**

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

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

**4.1.4 Artificially softened water**

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

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



**NOTICE:**

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

**4.2 Mains supply**

**4.2.1 Electrical supply**

- Supply: 230 V - 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.
- Refer to IET regulations for cross bonding requirements.
- 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 which may apply for fixed wiring to a stationary appliance.
- Any system connected to the boiler must not have a separate electrical supply.

**4.3 Oil supply**



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

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

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

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

**Key to Oil supply illustrations, figures 3, 4 & 5**

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 3 Key to oil supply feed system

**4.3.1 Single pipe gravity feed system:**

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

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

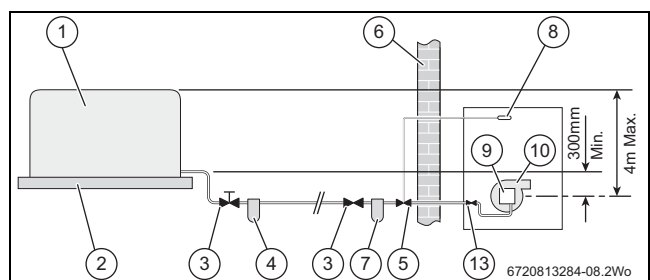


Fig. 3 Single pipe feed



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].

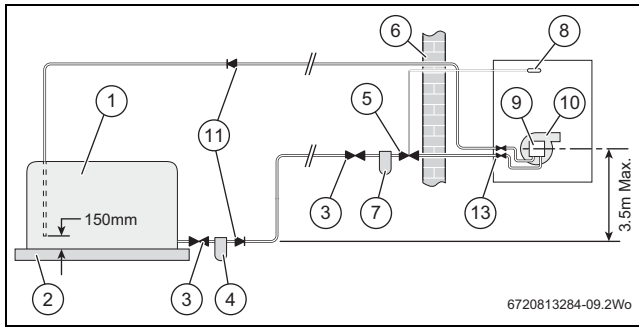


Fig. 4 Double pipe feed

**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.

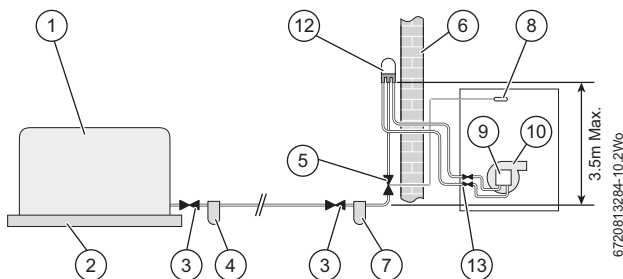


Fig. 5 De-aerator feed

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

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



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

**4.3.4 Pipework**

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

Oil supply pipework considerations:

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

**4.3.5 Boiler isolation valve**

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

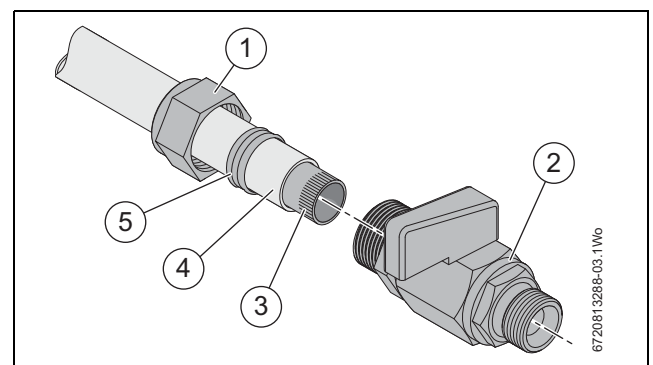


Fig. 6 Isolation valve bracket removed for clarity

- 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 37°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**

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

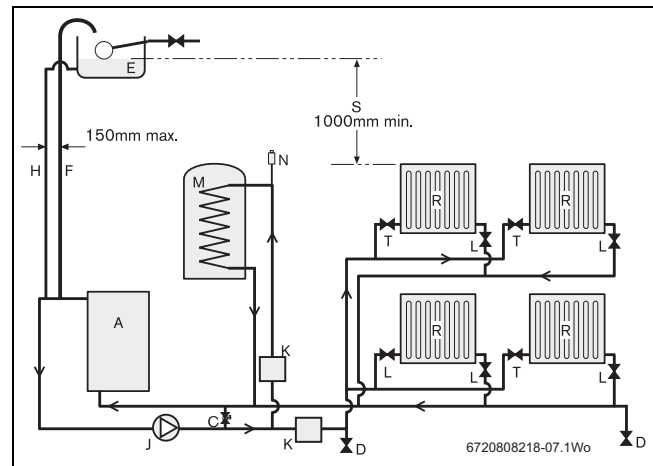


Fig. 7 Typical open vent system

[A]	Appliance
[B]	Expansion vessel
[C]	Automatic bypass valve
[D]	Drain cock
[E]	Feed and expansion cistern
[F]	Feed and expansion 15mmØ min.
[G]	Pressure gauge
[H]	Open vent 22mmØ min.
[J]	Circulating pump
[K]	Zone valves
[L]	Lockshield valve
[M]	Hot water cylinder
[N]	Automatic air vent
[P]	Pressure relief discharge
[R]	Radiators
[S]	Static head
[T]	Thermostatic radiator valve (TRV)
[U]	To filling system

**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 1/2" 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 1/2" BSP outlets.
- An automatic air vent [N] must be fitted.

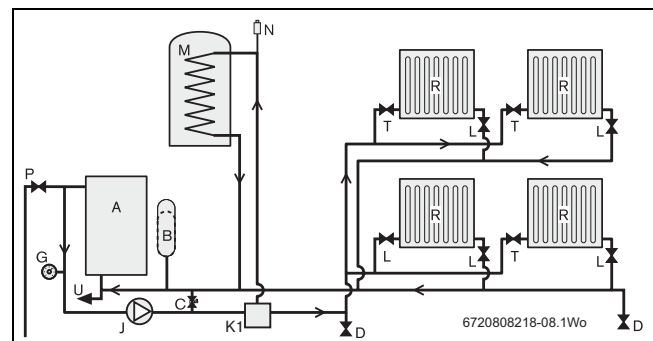


Fig. 8 Typical sealed system

**Filling primary sealed systems**

- 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 direct fixing to the mains water supply.
- Filling links must be WRAS approved.

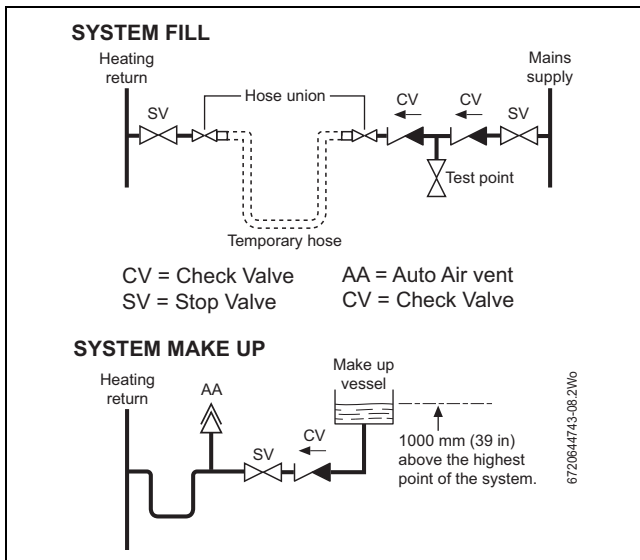


Fig. 9

#### 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.

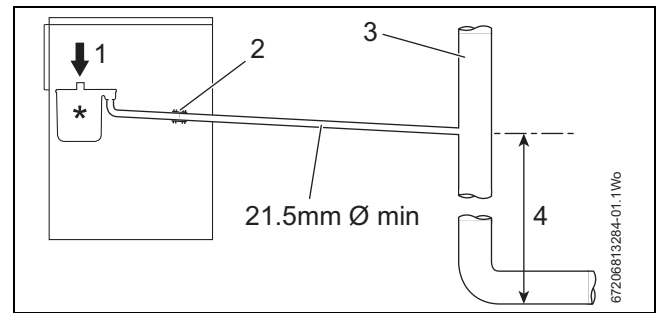


Fig. 10 Disposal to a soil vent stack

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.

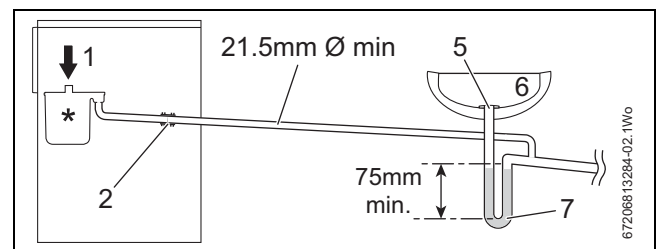


Fig. 11 Disposal to a waste pipe

##### 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.

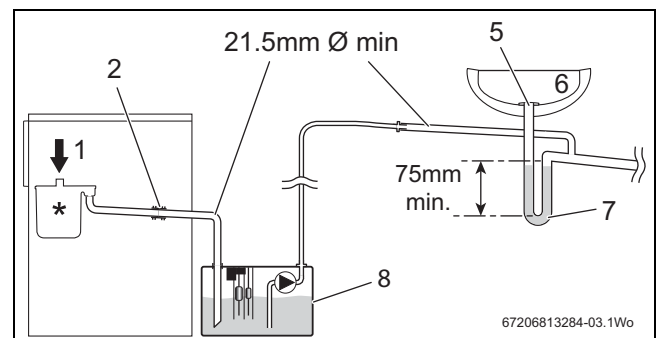


Fig. 12 Disposal via a condensate pump

**Pre-Installation**

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

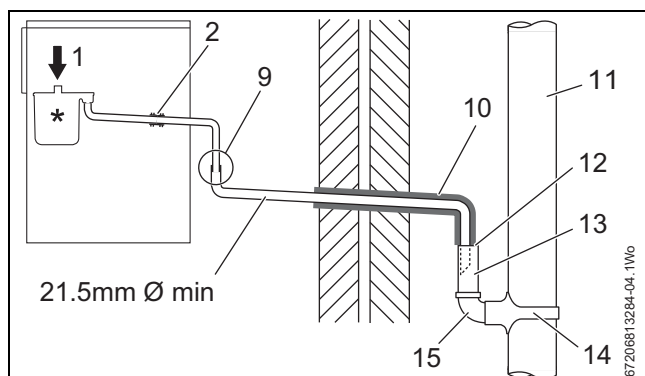


Fig. 13 Disposal into a rainwater down pipe

**i** 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.

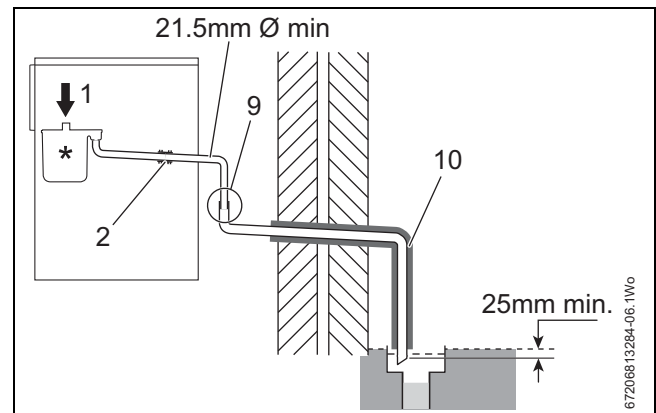


Fig. 14 External disposal

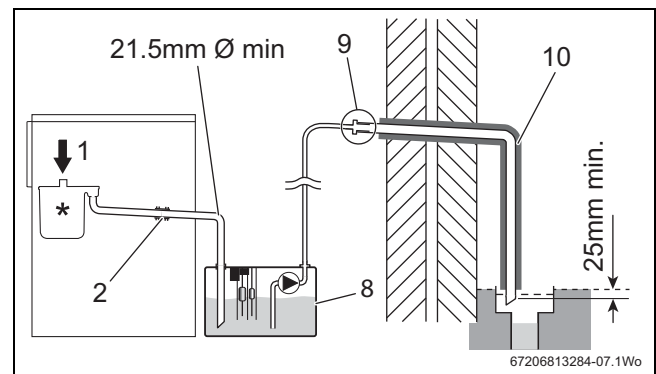


Fig. 15 Condensate pump to external disposal

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.

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

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

**NOTICE:** Unheated internal areas.  
▶ Internal pipe runs in unheated areas such as lofts, basements and garages should be treated as external runs and insulate as necessary.

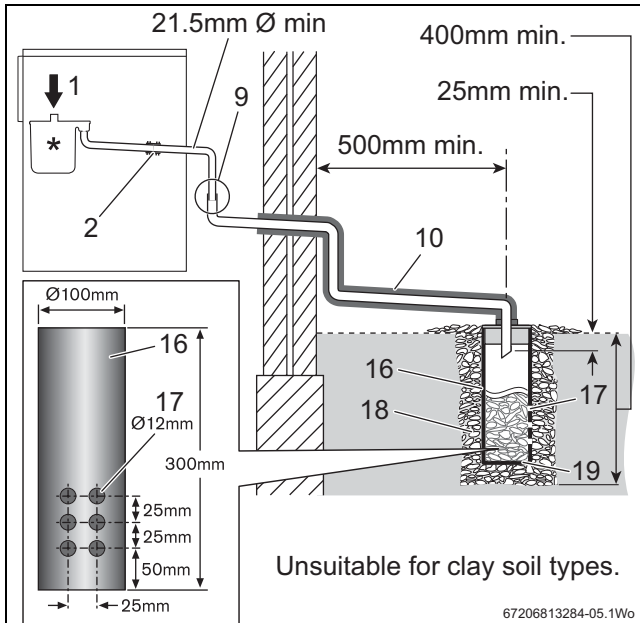


Fig. 16 Disposal to a soakaway

**4.6 Pressure relief pipework**

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

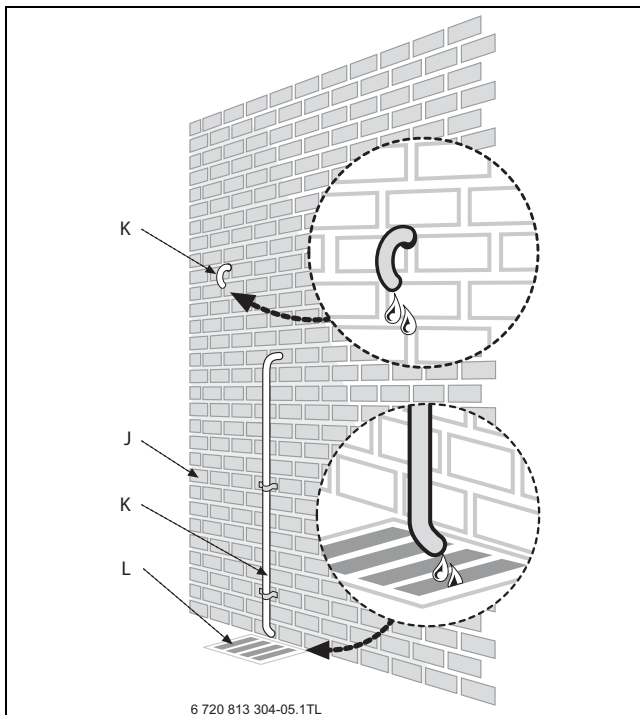


Fig. 17 Pressure relief pipe work

- [J] Outside wall
- [K] Drain pipe
- [L] External drain

**!** The pressure relief valve is a safety device for the boiler and if activated may discharge boiling water or steam through the relief valve drain pipe. Care should be taken when siting the outlet pipe so that it does not cause an obstruction or discharge above a window, entrance or other public access where it could cause a hazard.

**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.
- ▶ The boiler is not suitable for roof space installations.

**Open flue model (CF)**

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

CF minimum air inlet sizes\*

Output	32/50kW	50/70kW
Size cm <sup>2</sup>	248	358

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.

**a: Installation clearances**

Diagram [A] shows the minimum space recommended to install the boiler only.

**b: Service clearances**

Diagram [B] shows the minimum space required to carry out an annual service.

**c: Maintenance & repair clearances**

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.

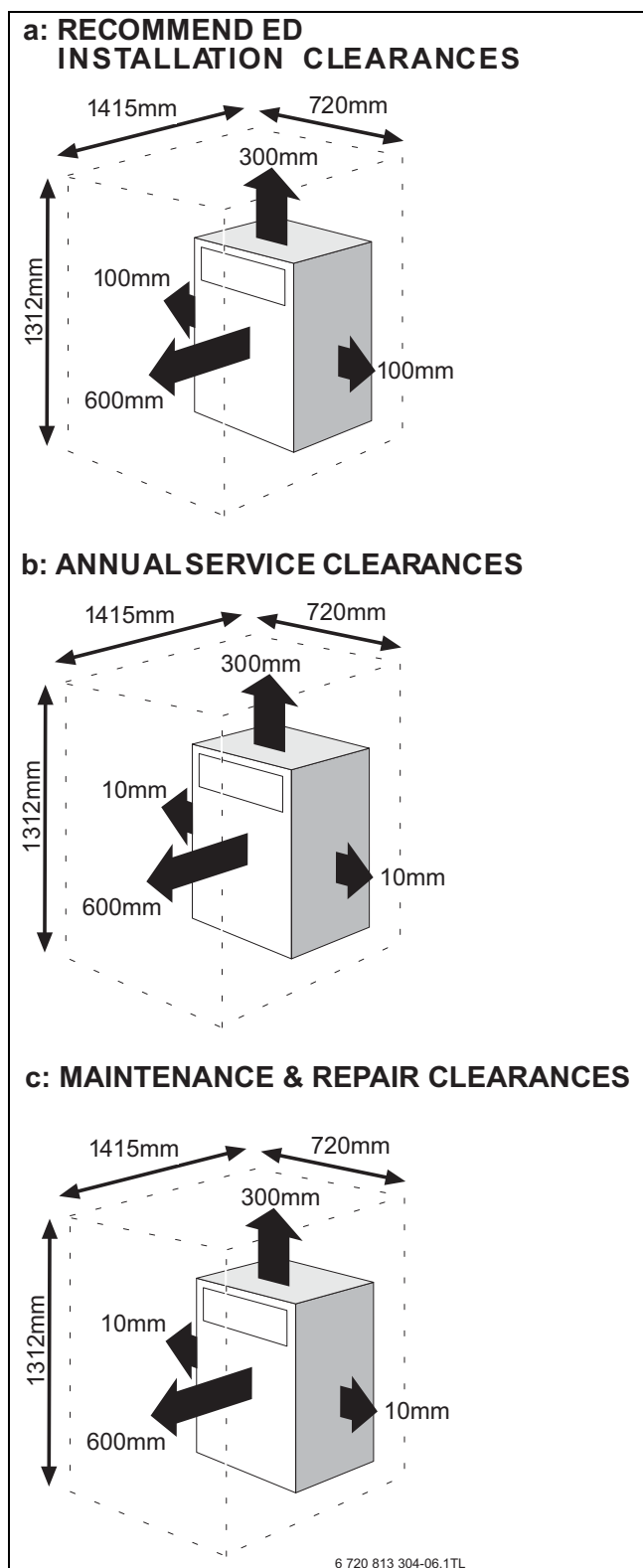


Fig. 18 Installation clearances

**Minimum air vent area (cm<sup>2</sup>) for appliances fitted in compartments**

Conventional flue models	Internal <sup>1)</sup> ventilation		External <sup>2)</sup> ventilation	
	High level	Low level	High level	Low level
32/50	495	743	248	495
50/70	715	1073	358	715

Table 4 Conventional flue

- 1) Internal air to and from a space/room inside the building.
- 2) External air to and from directly outside the building.

Room sealed flue models	Internal ventilation <sup>1)</sup>		External ventilation <sup>2)</sup>	
	High level	Low level	High level	Low level
32/50	495	495	248	248
50/70	715	715	358	358

Table 5 Room Sealed flue

**Compartments**

Follow the requirements of BS 5410 and note:

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

**Venting compartments**

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

- Ventilation must be provided for boilers fitted into compartments as described in BS 5410.
- Combustion air must not be taken from a room or internal space containing a bath or shower and must not communicate with a protected area such as a hall, stairway, landing, corridor, lobby, shaft etc.
- Air vents must allow access for clean free air and must be sited to comply with the flue terminal position requirements.
- Air duct runs must not exceed 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 boiler 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.

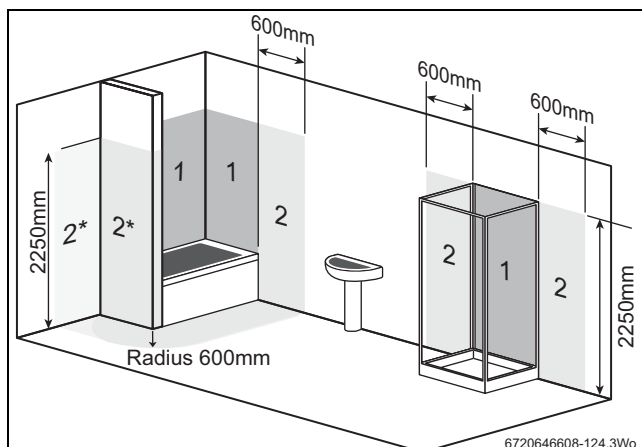


Fig. 19 Bathroom zones

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



### 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.

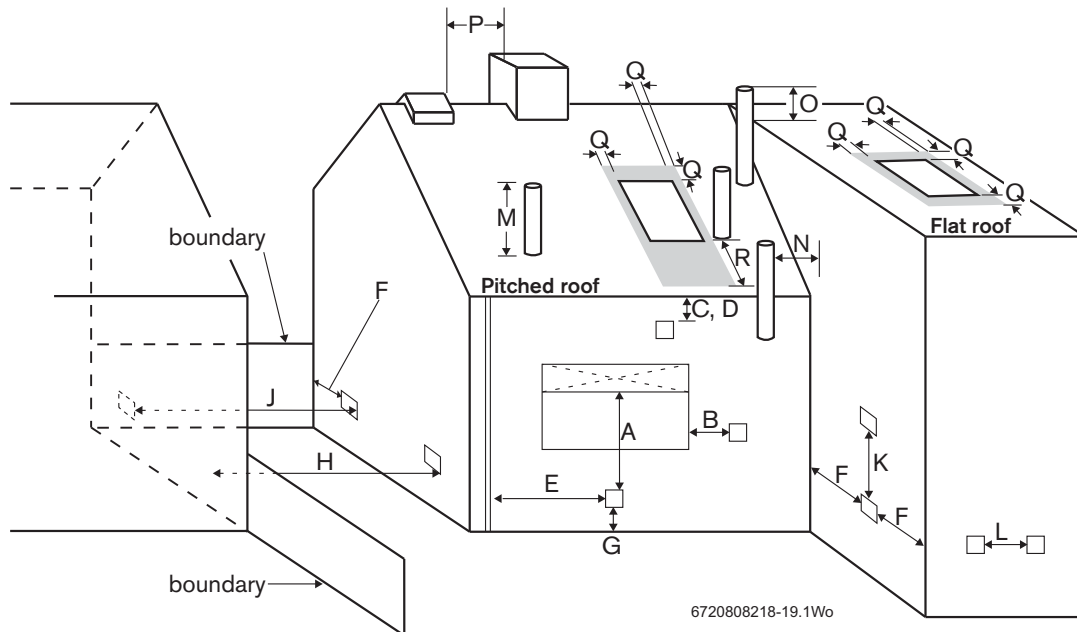
The air inlet/outlet duct and the terminal of the boiler must not be closer than 25mm to any combustible material. Detailed recommendations on protection of combustible materials are given in BS 5410:1

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.

1. Terminals should be positioned so as to avoid products of combustion accumulating in stagnant pockets around the building or entering into buildings.
  2. Vertical structure in N, O and P includes tank or lift rooms, parapets, dormers etc.
  3. 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 Conventional flue

- 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:

– 32/50 & 50/70 = 130mm Ø

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

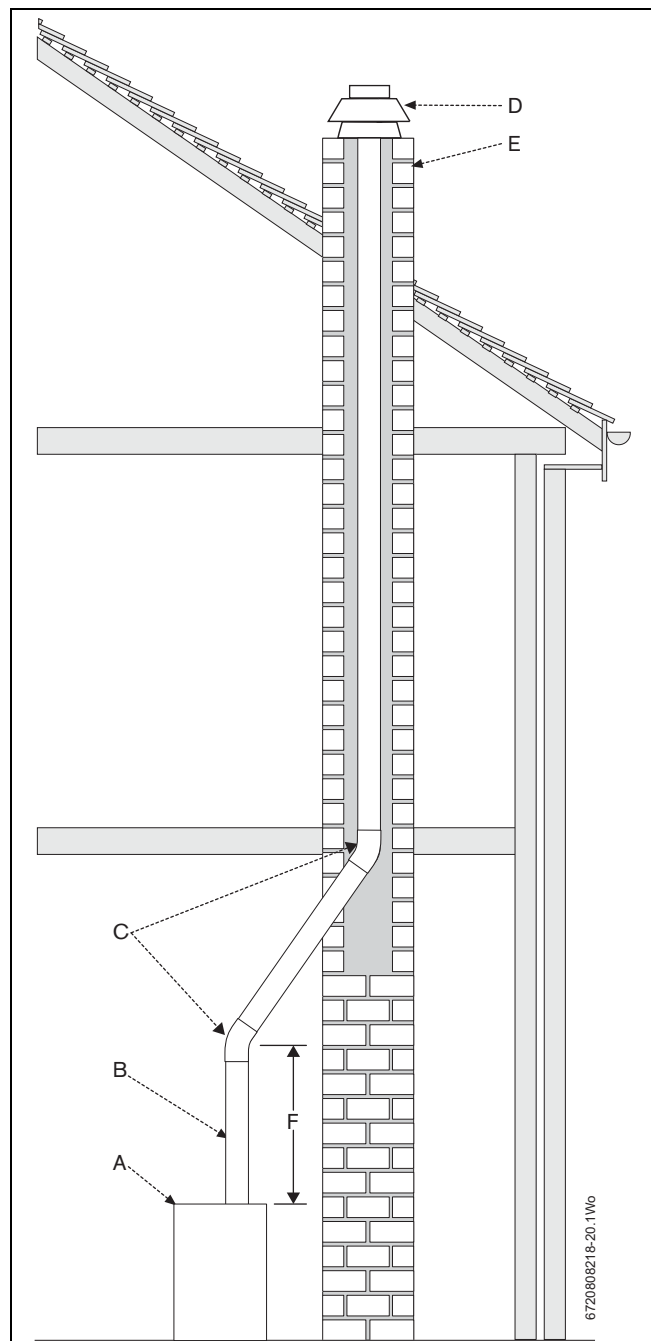


Fig. 20 Conventional flue

- [A] Boiler
- [B] 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)

**4.9.1 Room sealed flue options**

The diagrams (opposite) show the components used and the maximum flue length [L] from the boiler outlet to the outside wall<sup>1)</sup>/roof of the building 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.

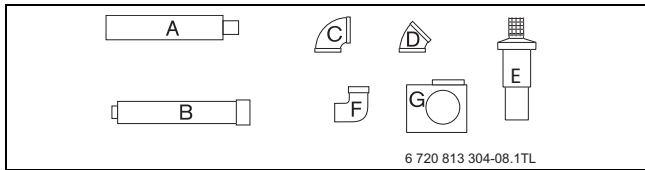


Fig. 21

- [A] Horizontal terminal
- [B] Straight flue extension
- [C] Flue bend 90°
- [D] Flue bend 45°
- [E] Vertical Terminal
- [F] 90° inner elbow - inner flue to boiler
- [G] Air intake box

**Calculating the flue length**

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

Horizontal 100/150mmØ: 3000mm (excluding 220mm of terminal extending outside the building)

Vertical 100/150mmØ: 6000mm (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:

- 1000 mm for 90°
- 500 mm for 45°

**Flue extension lengths**

Horizontal & Vertical 100/150mmØ: 1000mm overall length.

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

**Flue terminal lengths**

Horizontal 100/150mmØ: 1000mm

Vertical 100/150mmØ: 1290mm + cage

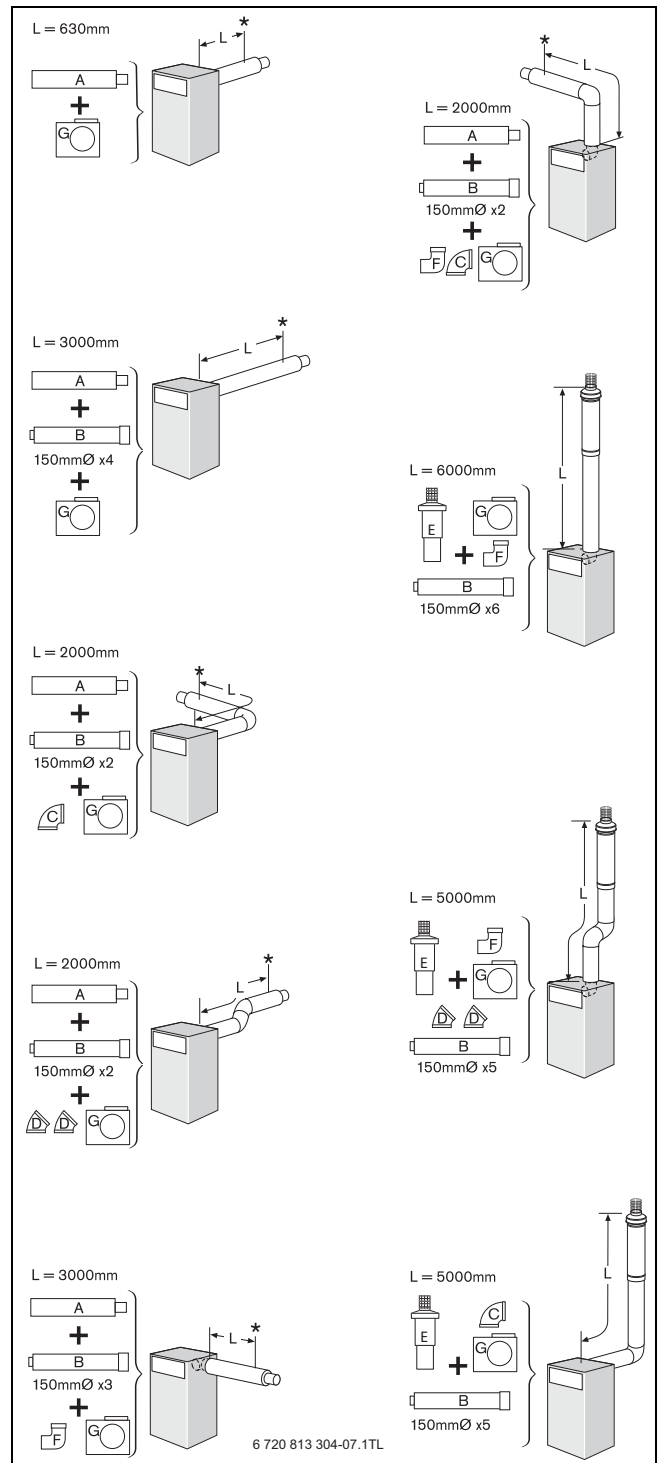


Fig. 22 Room sealed flue options

1) to outside wall.

## 5 Installation

### 5.1 Unpacking the boiler



#### LIFTING AND CARRYING PRECAUTIONS:

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

#### Unpacking

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

1. Once the packaged boiler has been delivered, the outer carton is removed first. Care should be taken when releasing the straps. If a sharp implement is used make sure the outer carton is not pierced and that the implement is used in such a way so that it may not cause personal injury. All sharp objects must be covered or the blade retracted after use and put away in a safe place.
2. Lift carton up and away from the boiler.
3. Remove the plastic bag and upper front protection cover from the boiler and place safely aside.
4. Lift top panel [A] upwards to disengage ball stud connectors [B] and remove.
5. Extract the ancillary items [I] [II] & [III].
6. Pull the upper front panel [C] forwards to disengage the ball stud connectors.
7. Remove securing screws [D] from front panel [E].
8. Pull front panel [E] up and away from the supporting ledge on the boiler and store away from the working area.
9. Remove the bolts securing the boiler to the transport pallet.



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

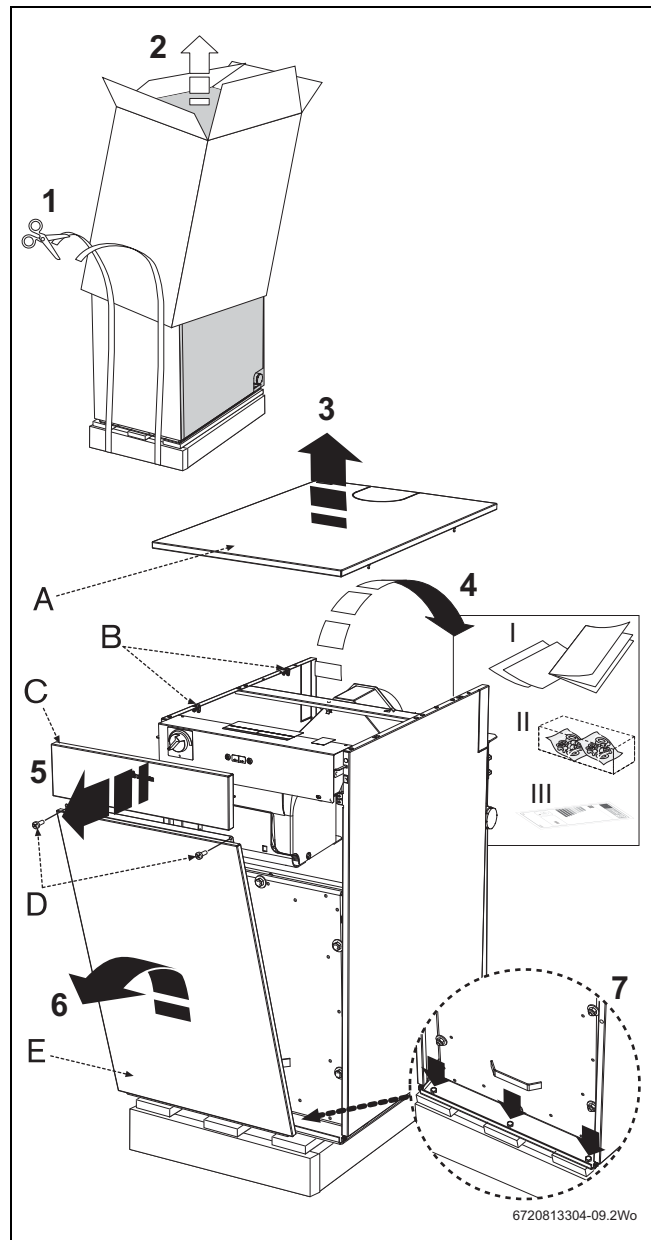


Fig. 23

## 5.2 Pipework positions and flue opening

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

### Safety:

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

### Pipework positions

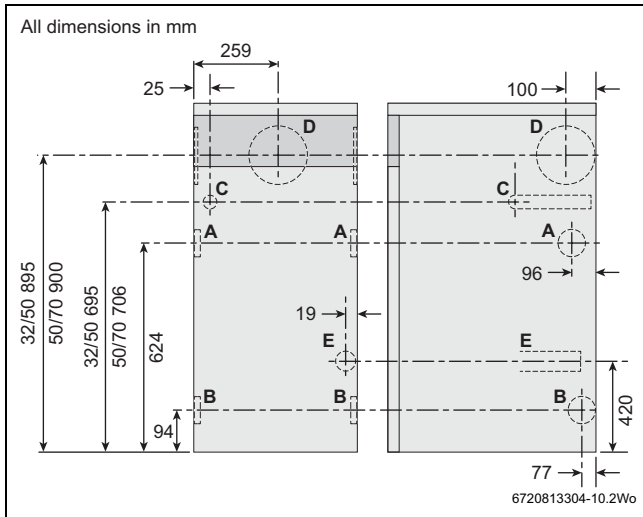


Fig. 24 Pipework position

### Key to figure 24:

- [A to D] show the flue and pipe positions:
- [A - CH]flow /heating vent 1 1/2" Ø BSP
- [B] Primary drain/cold feed 1 1/2" Ø BSP
- [C] CH return 28mm Ø copper
- [D] Flue outlet
- [E] Condensate outlet 21.5mm Ø

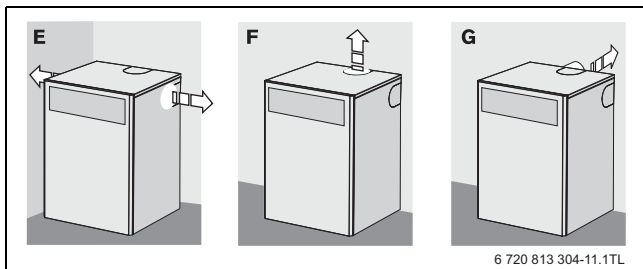


Fig. 25

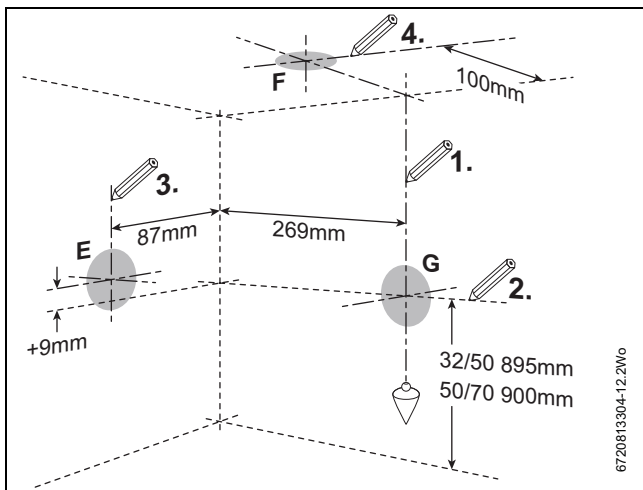


Fig. 26



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

### Flue opening

- Follow the diagram opposite to mark the centre of the flue [1 & 2] for rear opening, [2 & 3] for side opening or [1 & 4] for top opening.



**WARNING:** for horizontal flues, increase this height by 52mm for every 1000mm of horizontal length that the flue opening is away from the boiler.



**NOTICE:** All horizontal flue sections must rise away from the boiler by 52 mm 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] through the wall using a core drill or similar at a size relative to the wall thickness as shown below:

125 mm Ø flue:	
Wall thickness mm	Flue hole size Ø mm
150 - 240	175
240 - 330	185
330 - 420	195
420 - 500	205

Table 6

## 5.3 Boiler installation

1. Lift the top panel [A] upwards to disengage the ball stud connections [B] and remove.
2. Pull the upper front panel squarely forwards to disengage the ball stud connectors and remove from the control box [G]. Remove securing screws [C] from each side. Slide control box [G] outwards to its full extent.
3. Depress locking ears to unplug burner lead [F] from control box [G].
4. Remove burner retainer nut [O]. Lift burner up to release blast tube [N] from heat exchanger and store safely away from the boiler.
5. Release split pin [P] to remove the flue thermostat [M] from the flue hood.
6. Release split pin [P]. Carefully remove the CH Control thermostat [Q], Automatic High Limit [T] and Manual Reset thermostat [U] phials from the heat exchanger thermostat pocket.
7. Unscrew side panel [R] retaining screws [S] from both sides. Slide both side panels together with the top support bracket [L] and control box [G] forwards to release the side panel retaining lugs. Remove and store safely away from the boiler.



To enable the panels to stand upright, reposition and secure control box [G] to the side panels.

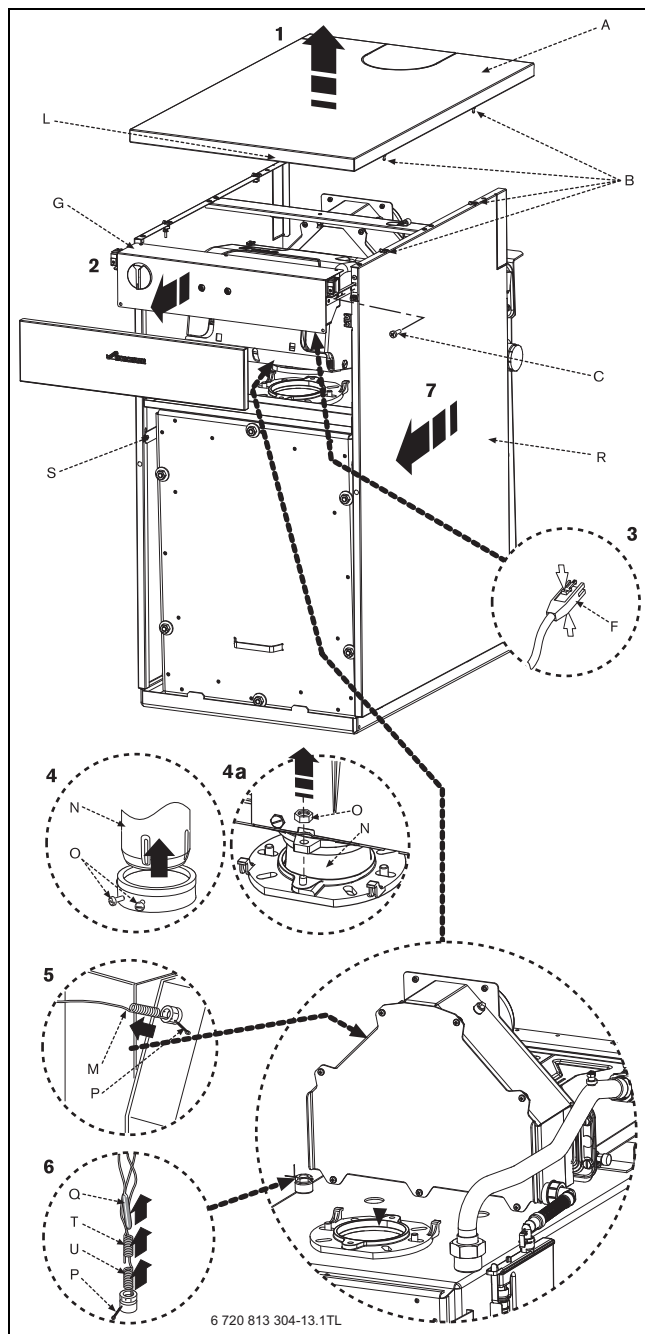


Fig. 27

### 5.4 Flue installation

The flue can exit the boiler from outlets A, B, C or D allowing vertical (RS & CF) 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:

#### INSTALLATION NOTES

- ▶ 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.
- ▶ Use flue clamps, where supplied, to support the flue system.



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

- ▶ 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.
- ▶ A flue terminal guard must be fitted if the flue outlet is below 2 metres from the ground level.

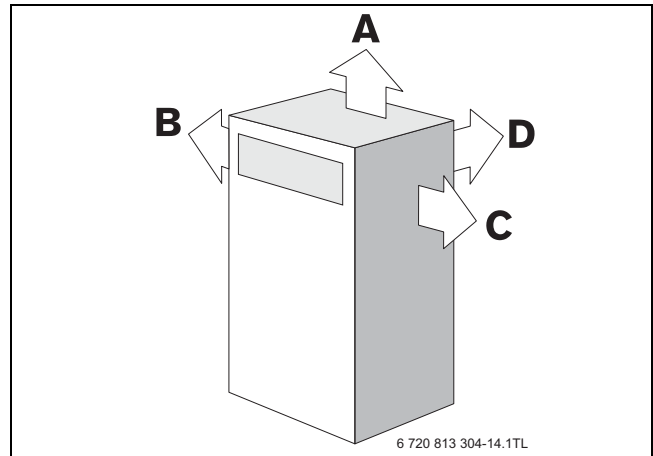


Fig. 28

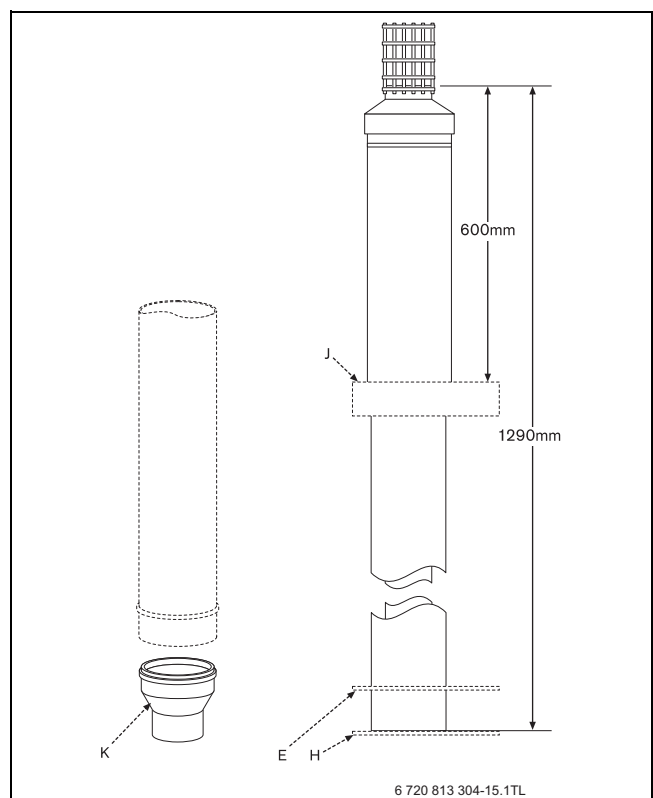


Fig. 29

- [E] Boiler outer casing
- [F] Outer flue tube
- [G] Inner flue tube
- [H] Air box outer casing
- [J] Outside wall/roof
- [K] CF adaptor

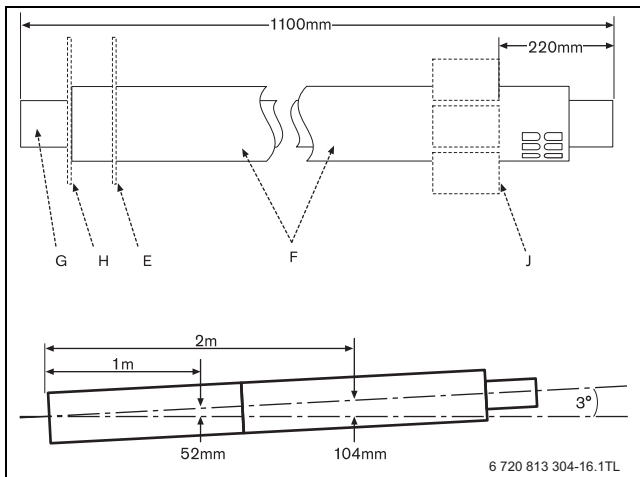


Fig. 30

### 5.5 Combustion chamber

#### Secondary heat exchanger:

1. Unscrew screws [B] and remove flue manifold access cover [A].
- ▶ Check that all the baffles and retainers are correctly fitted to the secondary heat exchanger:

	SLOTS	DOUBLE BAFFLES	SINGLE BAFFLES
32/50kW*	25	10	N/A
50/70kW	31	15	1

Table 7

#### Combustion chamber

2. Remove the retaining nuts and washers [D].
  - ▶ Remove combustion chamber access door [C].
  3. Remove the transit packaging and ensure the baffles [E] and baffle retainer [F] are correctly fitted for the boiler output as shown in the plan views below.
  4. Refit combustion chamber door [C].
- IMPORTANT:** Secure with nuts and washers [D] and tighten gradually in the sequence [1-6] shown until the chamber door is firmly secured, do not over tighten the nuts.

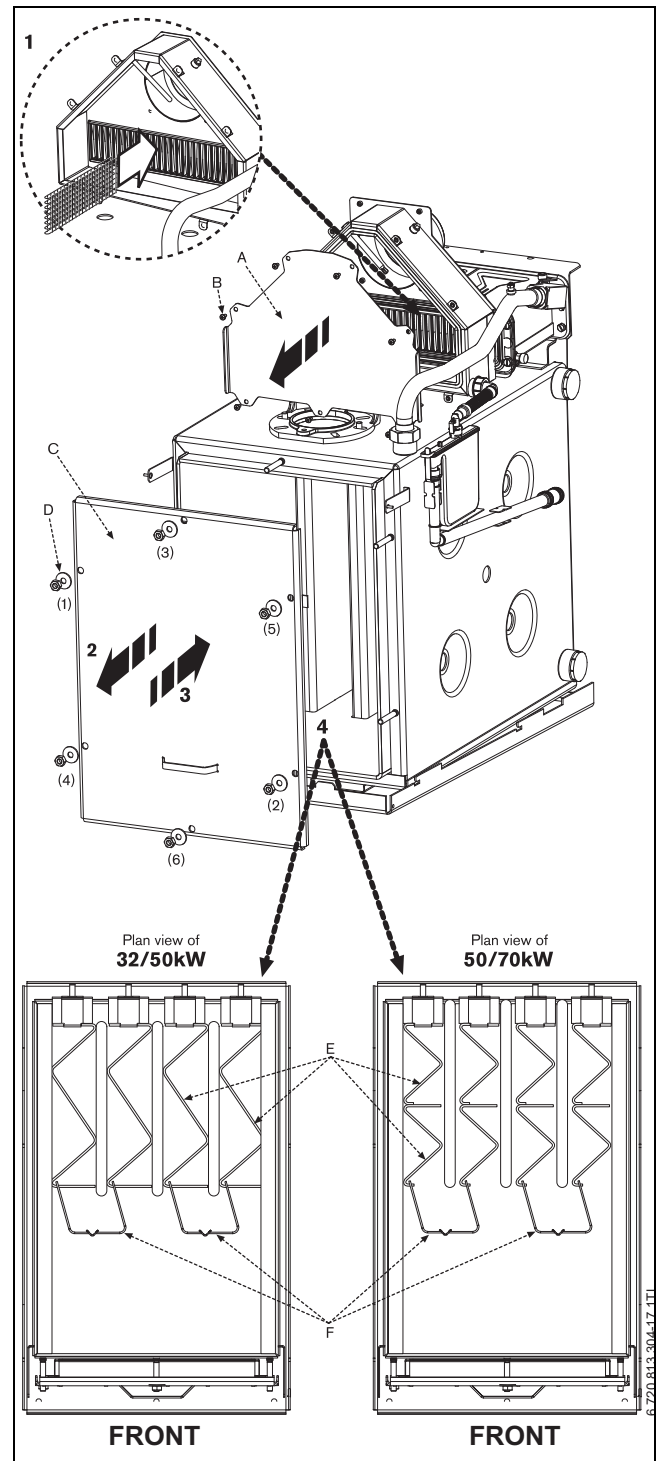


Fig. 31

## 5.6 Pipework connections



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

### Water connections

- ▶ Remove the transit bungs from the pipework connections on the boiler.



That surplus water may be present due to factory testing.

- ▶ Ensure all pipework is clean.
- ▶ Align water pipework and connect.
- ▶ Fit a drain cock to either of the primary cold feed/drain points [B].
- ▶ Check that all unused sockets have been capped.

### Oil supply connections

- ▶ Route oil supply pipe [D] along either side of the boiler as required, finishing close to the burner. Avoid hot surfaces.
- ▶ Connect the oil supply pipe [D] to the isolating valve [E], ensure the valve is closed.



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

- ▶ Connect the flexible oil hose [F] to the isolating valve [E].

### Condensate connection

- ▶ Connect 21.5mm polypropylene pipe [J] (not supplied) to the condensate waste pipe [G] flexible push fit connector and terminate to waste.
- ▶ Do not use any solvents, adhesives or lubricants when pushing the pipe into the rubber connector.
- ▶ Ensure that the condensate pipe runs away from the boiler at a constant fall of 50mm (min.) for every metre.
- ▶ Seal all condensate pipe joints.
- ▶ **Carefully pour 500ml of water into the condensate collection [O] to fill condensate trap [K].**
- ▶ 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 [M] and secure with screws [L].



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

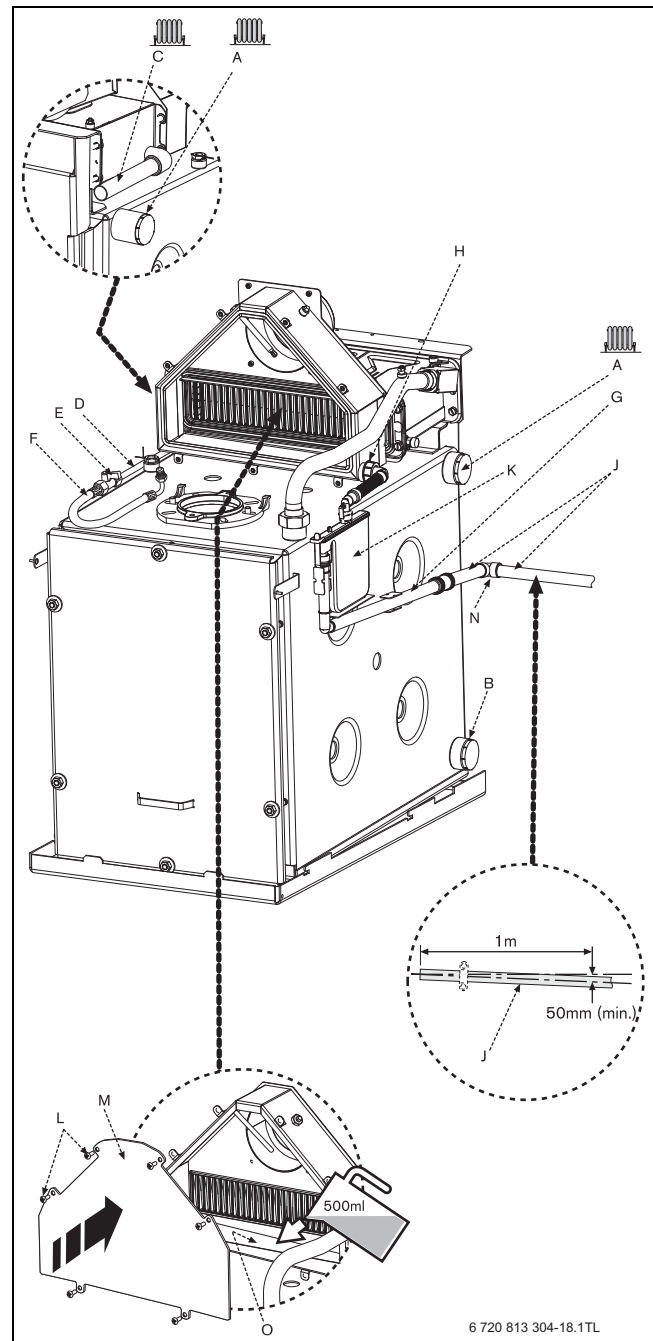


Fig. 32

- [A] CH flow /heating vent 1 1/2" Ø
- [B] Primary drain/cold feed/drain 1 1/2" Ø
- [C] CH Return 22mmØ copper - male
- [D] Oil supply pipe - not supplied
- [E] Oil isolating valve - not supplied
- [F] Flexible oil hose<sup>1)</sup>
- [G] Condensate outlet (21.5mmØ) - supplied
- [H] Flue manifold condensate outlet
- [J] Condensate pipe - not supplied
- [K] Internal condensate trap
- [N] 90° elbows

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



## 5.7 Oil burner and pump Riello RDB burners



**CAUTION:**

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

### Oil burner

1. RIELLO RDB 3.2
2. RIELLO RDB 4.2

- ▶ Remove the combustion head from the burner by removing the two opposing screws at the top of the combustion head.
- ▶ Adjust the combustion head setting [B] so that it is correct for the relevant output as shown in the table opposite
- ▶ To adjust the combustion head setting [B], turn the adjustment bar [A] clockwise or anti-clockwise to move the inner sleeve [C] up and down the blast tube [D].  
The correct setting is shown when the relevant number on the scale [B] is in line with the top of the blast tube [E].
- ▶ The electrodes and nozzle are factory set and there is no need to adjust them.
- ▶ With the adjustment bar [A] in line with the top of the burner [F] return the combustion head and secure in place with the two screws at the top of the blast tube.

### Oil pump

#### Connecting the oil pump for a single pipe system:

The pump is factory set for single pipe operation with the flexible oil hose fitted.

#### Converting the oil pump for a double pipe system:

1. Check the inlet hose connection.

#### RIELLO RDB:

- ▶ Unscrew return plug [2].
  - ▶ Screw in by-pass screw [3].
1. Connect the flexible oil return hose (not supplied) between the oil pump and the **return** line connection, and tighten to secure.

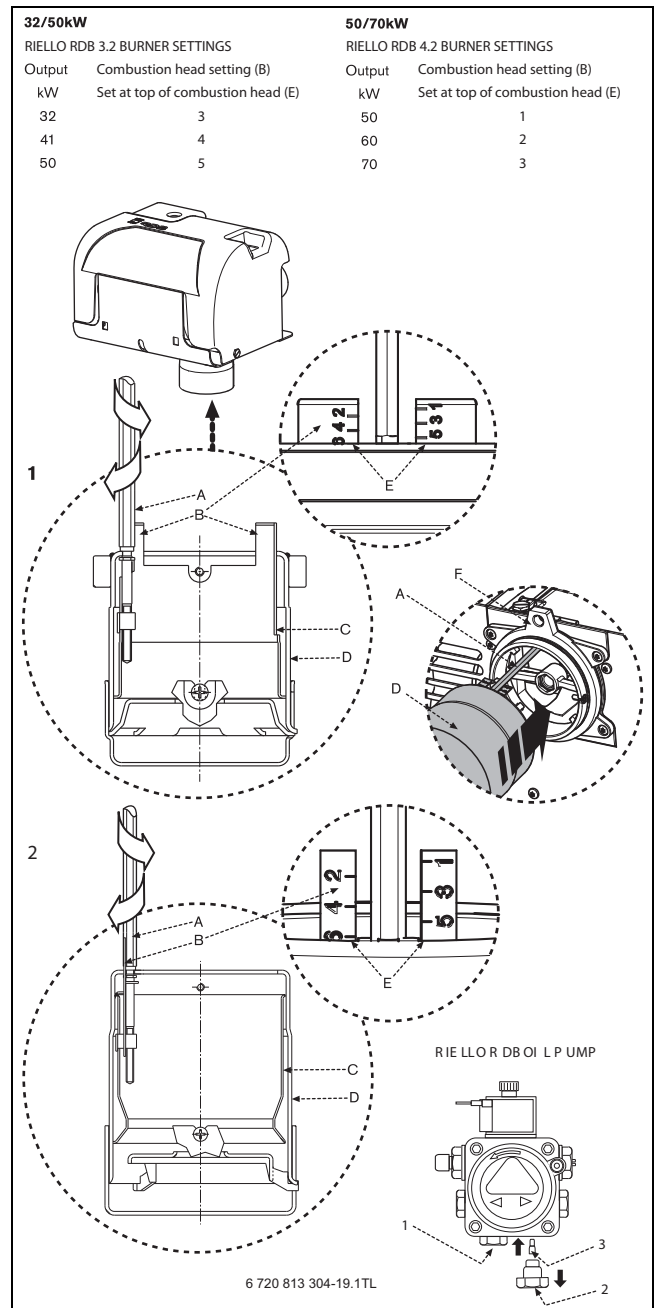



Fig. 33

## 5.8 Refitting components

1. Slide side panels [R] and top support bracket [L] together with control box [G] along base rails and push to secure into the retaining lugs.
  - ▶ Secure side panel [R] with retaining screws [S] on both sides.
2. Carefully replace the Manual Reset thermostat [U], Automatic High Limit [T] and CH Control thermostat [Q] phials into the heat exchanger thermostat pocket.
  - ▶ Refit split pins [P] to secure.
3. Carefully replace the flue thermostat [M] into the flue hood and refit split pin.
4. Align burner combustion head [N] into boiler housing tube flange [O].
  - ▶ Secure with retaining nut [H].
  - ▶ Tighten retaining nut sufficiently to ensure a good seal.

 **NOTICE:** Ensure the gasket is a good seal between the burner combustion head and the boiler housing to prevent flue gases escaping from the combustion chamber into the room.

5. **RS flue only:**  
attach air duct and tighten clip [J] to secure to the burner air intake box and the burner air intake.
6. Plug burner lead [F] into control box [G].

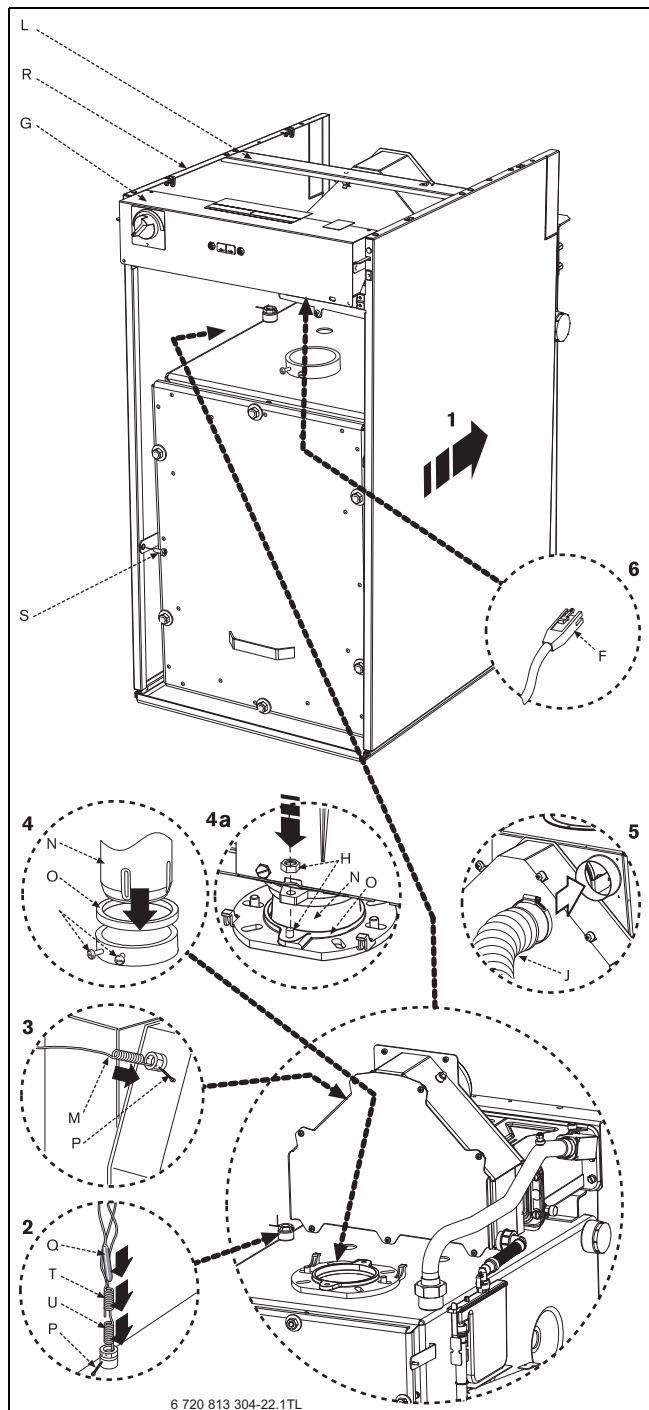




Fig. 34

### 5.9 Electrical

 **DANGER:** 230 Volts  
Isolate the mains electricity supply before starting any work and observe all relevant safety precautions.

 **NOTICE:** Observe electrostatic discharge precautions  
▶ Do not touch the PCB circuits.


#### Access to 230V connections:

1. Pull control knob [D] forwards to remove from control panel [A].
  2. Release screws [B] and remove cover panel [C] from control box [A].
  3. Release screw [E] from cable clamp [F].
- ▶ Pull inner clamp part [G] outwards.
  - ▶ Feed sufficient power cable [H] through the cable clamp [F] and secure grip with screw [E].
  - ▶ Separate wires from cable end and strip to 6mm.

#### 230V connections:

4. Connect SWITCHED LIVE wire (Brown or RED) to terminal L.
- ▶ Connect NEUTRAL wire (Blue or Black) to terminal N.
  - ▶ Connect EARTH wire (Green/Yellow) to the terminal  $\perp$ .
5. Secure the cable to the cable clamp [I].

*Route the power cable to the external connection point avoiding any potentially hot surfaces allowing sufficient cable to pivot the control box into the service position. Open the control box into the service position to check the cable length and routing.*

 **NOTICE:** Any external device connected to the boiler must take its power supply from the boiler only and must NOT have a separate supply.  
See the following pages of electrical diagrams for details of different systems.

#### Refit electric control panel cover:

Removing the blanking plate

- ▶ Refit cover panel [C] to control box [A] and secure with screws [B].
- ▶ Refit control knob [D].

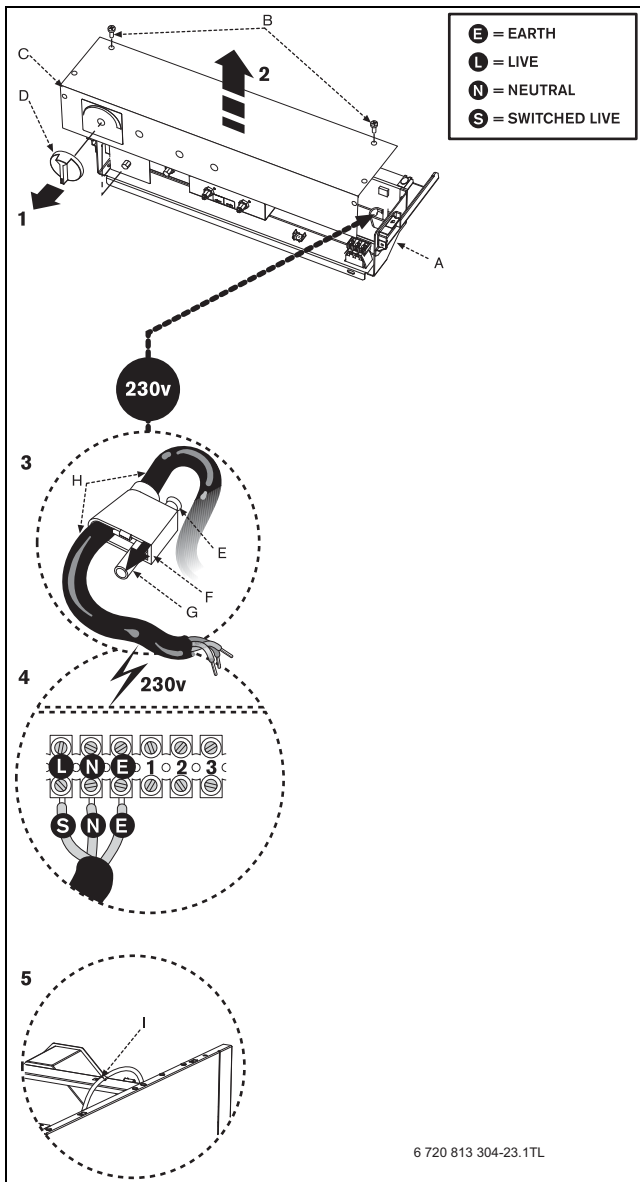


Fig. 35

**230V STANDARD WIRING DIAGRAM**

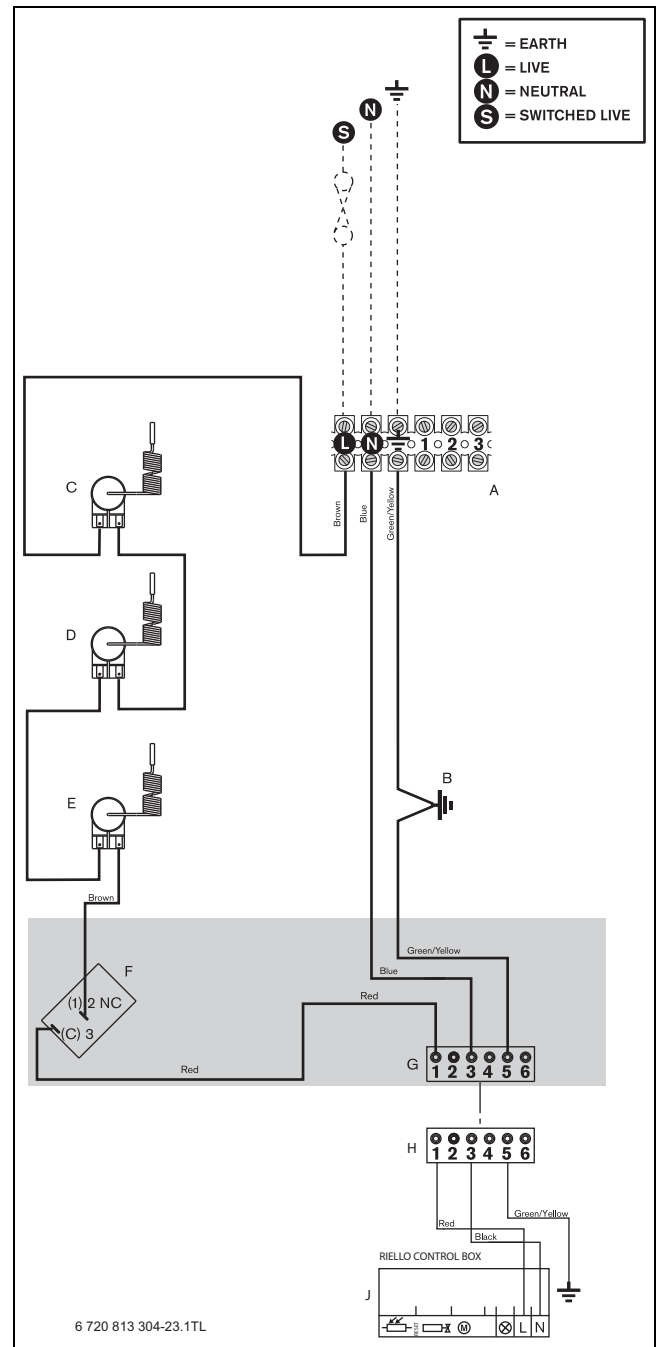


Fig. 36

**Key to components:**

- [A] Terminal connector block
- [B] Earth connector
- [C] Flue thermostat (manual reset)
- [D] Heating thermostat (automatic reset)
- [E] Heating thermostat (manual reset)
- [F] Control thermostat
- [G] Burner socket
- [H] Burner plug
- [J] Burner control box

**PRE-WIRED REMOTE 2 OR 3 PORT VALVE CONTROL SETS:**

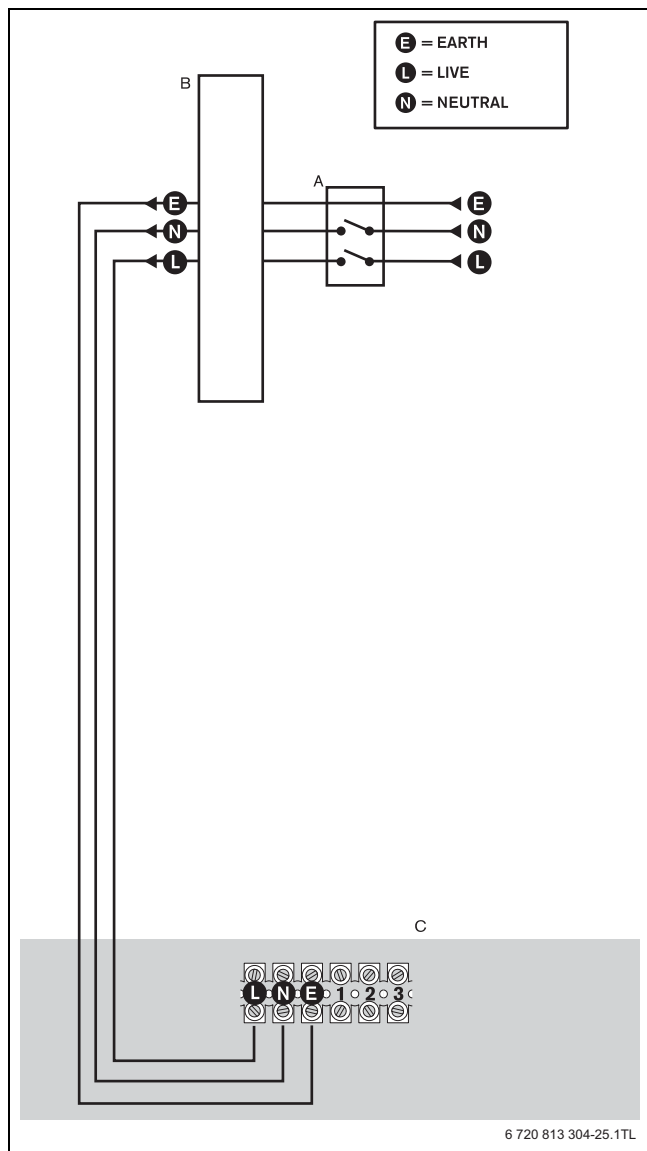


Fig. 37

**Key to components:**

- [A] Double pole switched fused spur, positioned in the boiler room next to the appliance.
- [B] Remote junction box (10 way) to connect the following:
  - Mains wiring 230V 50Hz.
  - Hot water tank thermostat
  - Room thermostat
  - System water valves
  - Circulating pump
  - External programmer
- [C] Boiler control box terminal connector block

**Remote junction box [A] requirements**

- ▶ This 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 [A] must be fitted externally to the boiler.

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

**6 Commissioning**

**6.1 Pre-commissioning checks-appliance**

**CAUTION:** Isolate the mains supplies 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 Class C2, 28 second kerosene and that the pipework is connected correctly to the oil pump via the supplied flexible 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 immediately then:  
After successfully completing all of the checks and any rectification work, close the water valves, shut off the oil supply and electrically isolate the boiler. Complete the installation part of the Guarantee Registration Card, and complete a CD10 or equivalent to inform the LABC of the installation.

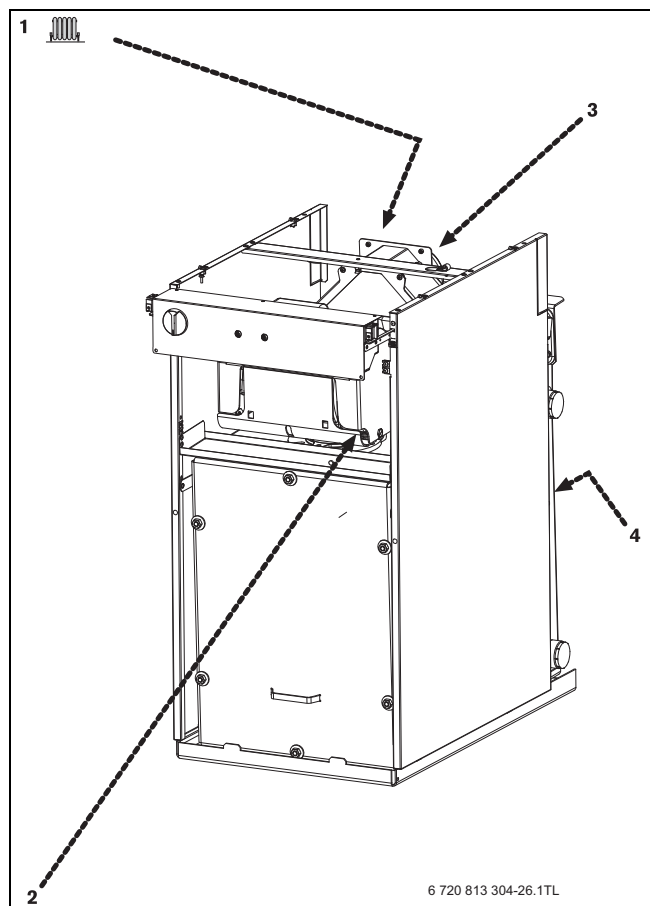



Fig. 38

## 6.2 Filling the system

- ▶ Open all system and radiator valves.
- ▶ Turn on the water main stop cock.
- ▶ Open vented systems only:
  - Turn on the water to the system feed and expansion cistern and allow the system to fill.
- ▶ Sealed systems only:
  - Check and if required, adjust the expansion vessel pressure using the Schraeder type valve.
- ▶ Fill the system to between 1 and 2 bar pressure via a WRAS approved filling link.
- ▶ Monitor the pressure gauge during venting and repressurise if required.
- ▶ Vent all radiators, retighten when completed.
- ▶ Check the system and correct any leaks.
- ▶ Bleed air from at least one of the secondary heat exchanger air vents (a radiator key is ideal for this). There are two venting bosses [1] on the top of the secondary heat exchanger. Only one can be used if fluing to the side.

## 6.3 Starting the appliance




**NOTICE:**  
Never run the appliance when the appliance/system is unpressurised (sealed systems) or empty.

1. Check the oil supply is correctly fitted and in good working order before turning on the oil supply valves to the boiler.
- ▶ Turn on the main oil supply valve at the tank and draw off at least 2.5 litres of oil until a steady flow of clear uncontaminated oil can be seen as follows:
  - The oil supply to the boiler should be primed before the burner is operated to avoid unnecessary pump wear.
  - The use of an oil suction pump will prime and flush through any oil supply set up simply and easily, alternatively the following procedures can be used.

### Priming a single pipe gravity feed systems:

- ▶ Disconnect the flexible oil hose and open the isolating valve to discharge the oil into a suitable container.



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

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

### Priming a double pipe sub-gravity feed systems and single pipe suction lift with de-aerator, refer to figure 39:

- ▶ 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.
- ▶ 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.

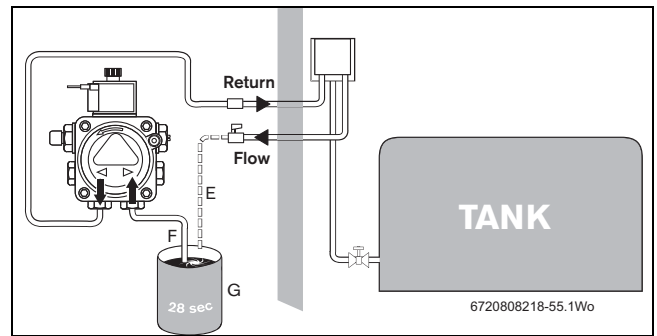


Fig. 39

### When the oil reaches the pump, bleed the air from the pump as follows, refer to figure 40:

- ▶ Open the isolating valve and the oil pump bleed port [A] to discharge into a suitable container once the boiler is started up.
- ▶ Switch on the electricity supply to the boiler.
- ▶ Set the programmer to ON for CH and DHW.
- ▶ Turn on the boiler control thermostat.
- ▶ Allow the burner to run through to lockout indicated by the illumination of the lockout indicator/reset button [E].

### If no oil comes out of the port valve A, then re-prime the oil line.

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

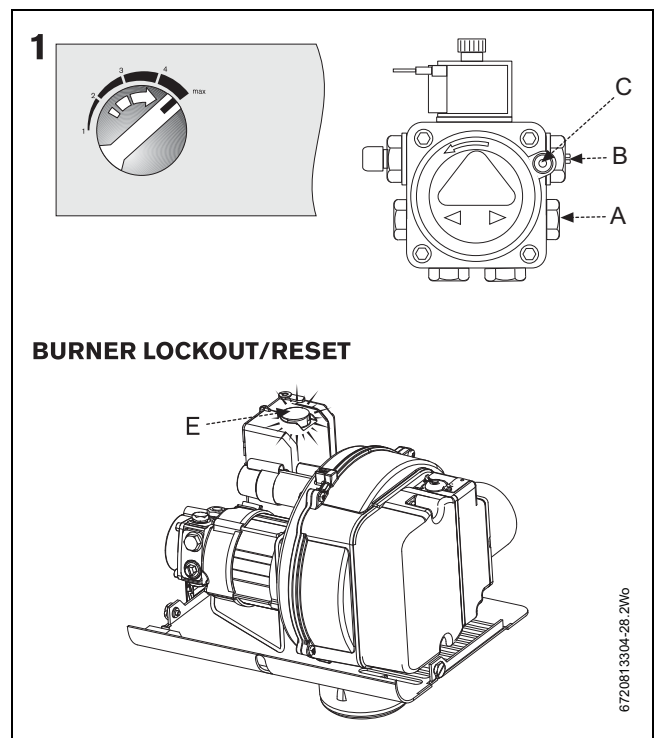


Fig. 40

- [A] Bleed & pressure gauge port
- [B] Pressure adjustment
- [C] Vacuum gauge port
- [D] Second stage pressure adjustment (50/70kW only)
- [E] Oil filter

**6.3.1 Riello RDB burners**

2. Fit a suitable pressure gauge to port [A] on the oil pump.

- ▶ Adjust the air shutter [F] and pump pressure [B] as shown in the table below. The burner should ignite following a pre-ignition period of approximately 15 seconds.

**Boiler lockout 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/reset button [E].*

- ▶ Wait 2 minutes then press the lockout indicator reset button [E] to initiate another start sequence.
- ▶ Repeat procedure until a flame is established.

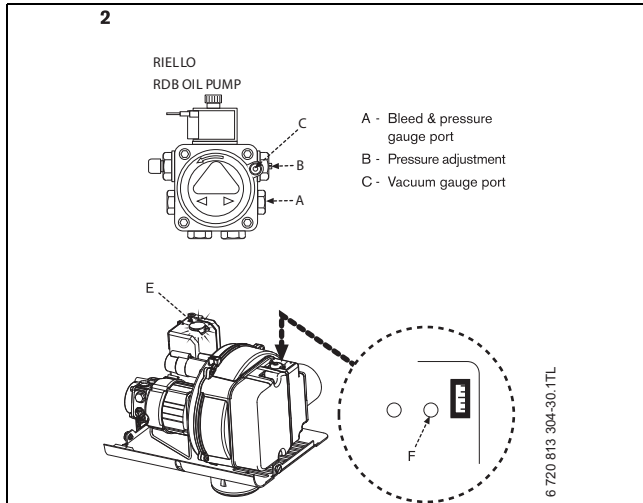


Fig. 41

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].

*If after-spurting occurs:*

- ▶ Release the burner retainer [H].
- ▶ Remove the burner from the boiler and the blast tube [J] from the burner to expose the nozzle. Hold the burner vertical to unscrew the nozzle [I] and fill the nozzle holder [K] with kerosene.
- ▶ Refit nozzle [I], blast tube [J] and the burner.
- ▶ Restart and run for 3 minute intervals until after-spurting stops.

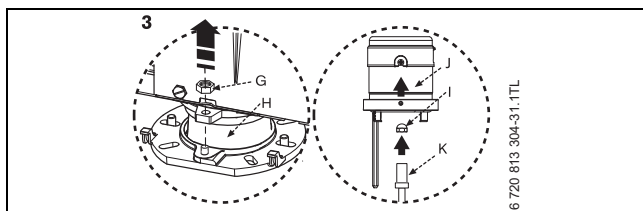


Fig. 42

1. Start and run for 20 minutes.

- ▶ Remove sampling point plug [L] 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.

**i** 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 [F] setting according to table 8 on page 31.
- ▶ Check the flue gas temperature is close to the values shown in table 8 on page 31.

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

- ▶ Turn off the electrical supply.
- ▶ Isolate the oil supply to the burner.
- ▶ Remove the oil pressure gauge.
- ▶ Refit the blanking plug [A].
- ▶ Check and rectify any oil leaks.

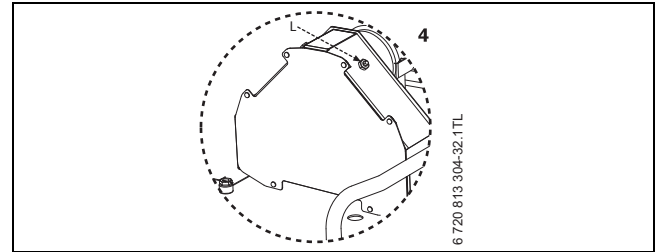


Fig. 43

2. 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 [F] to obtain the correct CO<sub>2</sub> level.
- ▶ Repeat the fine tuning procedure [5] if required.
- ▶ Refit the sample point cap [L] (hand tighten only, do not over tighten).

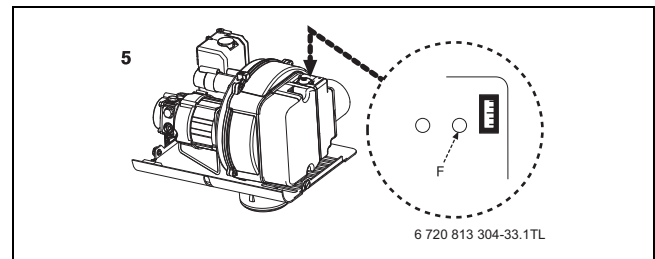


Fig. 44

**Nominal boiler rating at normal operating temperature using 28 second Kerosene:**

NOZZLE	OIL PUMP PRESSURE (p.s.i)	FUEL FLOW RATE		APPROX. FLUE GAS TEMP (°C)	% CO <sub>2</sub>	APPROX. AIR SETTING	COMBUSTION HEAD SETTING	APPLIANCE				
		Kg/h	l/h					INPUT kW	INPUT Btu/hr	OUTPUT kW	OUTPUT Btu/hr	
<b>Riello RDB 3.2 (32/50)</b>												
1.0 60°ES	100	2.78	3.52	75	11.5	3.0	3	33.4	114000	32	110000	
1.10 60°S	130	3.55	4.49	77	12.0	4.5	4	42.7	146000	41	140000	
1.35 60°S	135	4.33	5.48	85	12.5	5.5	5	52.1	178000	50	170000	
<b>Riello RDB 4.2 (50/70)</b>												
1.25 60°S	145	4.33	5.48	80	12.0	2.5	1	52.1	178000	50	170000	
1.50 45°S	145	5.2	6.58	80	12.0	5	2	62.5	213000	60	205000	
2.00 45°S	125	6.05	7.66	86	12.0	4.5	3	72.9	249000	70	240000	

Table 8

**6.3.2 Central heating**

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

*The burner should be ON with the circulating pump.*

- ▶ Ensure all radiators are heating up evenly and balance the system to the temperature difference required for the heating flow and return according to the heating load.

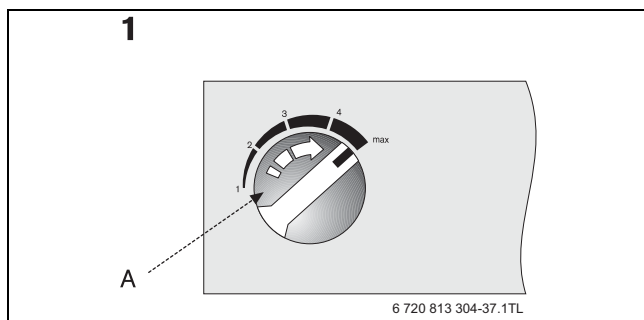


Fig. 45

2. Set the room thermostat to minimum. *The burner and circulating pump should be off.*
3. Check that any other controls that are fitted to the system are operating properly.

**6.4 Finishing commissioning - Appliance**

1. Locate edge of front panel [A] onto the supporting ledge [B] on the baseplate.
  - ▶ Refit securing screws [C] to secure.
2. Slide control box [D] into boiler.
  - ▶ Secure with screws [E].
  - ▶ Locate the ball stud connectors [F] and push-fit upper front panel [G] towards the boiler to secure.
3. Locate the top panel [H] onto the ball stud connections [J] and press down to secure.

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

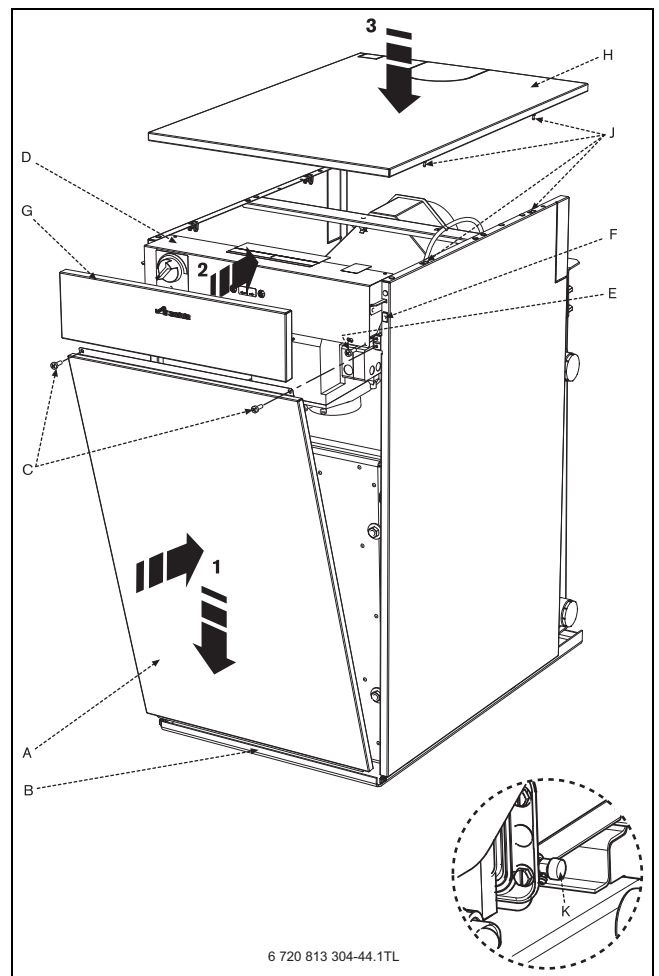


Fig. 46

#### 6.4.1 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 this 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.

#### 6.4.2 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



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

#### Routine servicing

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

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

#### Pre-service checks

1. Lift the top panel [A] upwards to disengage the ball stud connections [B] and pull forward to remove.
2. Pull upper front panel squarely forwards to disengage ball stud connections and remove from control box [G].

- ▶ Remove securing screws [C] from each side.
- ▶ Slide control box [G] outwards to its full extent.

1. Remove securing screws [F] from front panel [E].

- ▶ Lift panel [E] up and away from the supporting ledge [D] on the boiler.

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.

1. Depress locking ears and unplug burner lead [H] from control box [G].

2. RS flue only: loosen clip [J] to detach air duct [K] from the air intake box.

#### 3. Riello burner

- ▶ Remove burner retainer nut [M].
- ▶ Lift burner up to release blast tube [L] from heat exchanger, taking care not to over strain the flexible oil hose/s or connections, and store safely away from the boiler.

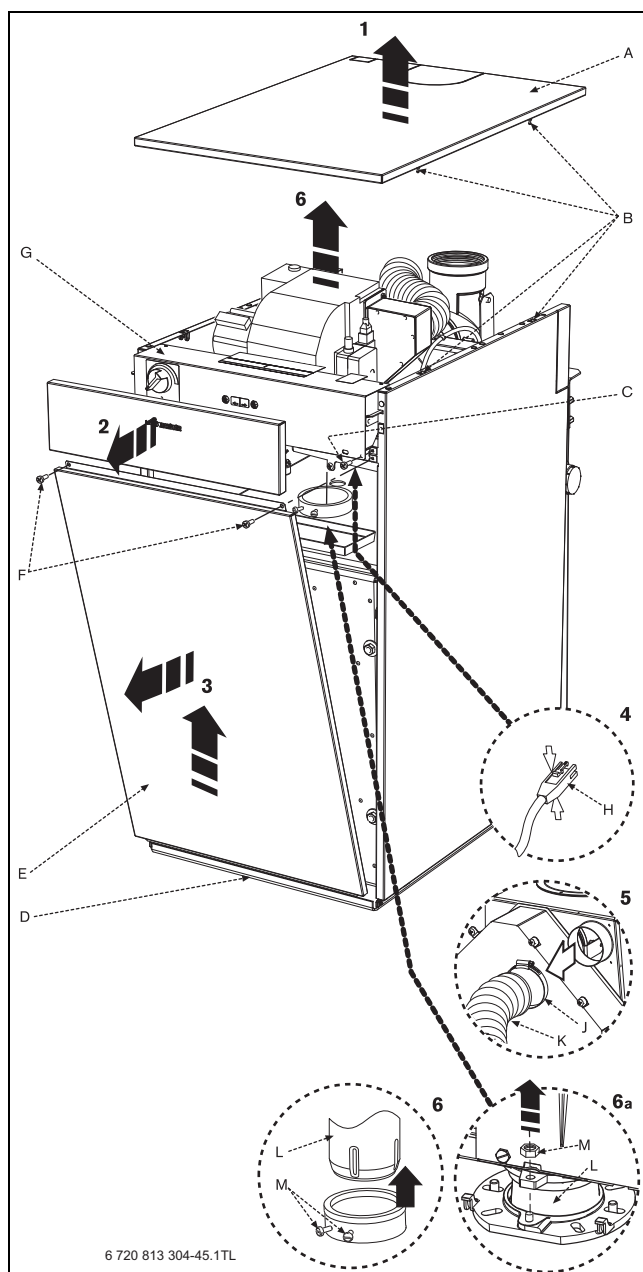


Fig. 47

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

- ▶ Check and clean the burner.
- ▶ Replace burner nozzle and flexible oil hose/s.
- ▶ Check and clean the baffle retainers.
- ▶ Check and clean the baffles.
- ▶ Check 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 as necessary.

#### Clean the burner


- ▶ Undo the three screws [A] and remove cover [B] from the burner.
- ▶ Loosen clip to remove the flexible air inlet hose [C] from the burner (RS flue systems only).
- ▶ Remove the air intake cover [D] by releasing the M4 screws.
- ▶ Check the condition of the gasket between these two parts and replace if necessary.

- ▶ Note the position of the air damper adjustment and check the air damper moves freely.
- ▶ Clean both sides of the fan impeller and remove any debris from the burner housing.
- ▶ Check the impeller rotates freely.
- ▶ Reassemble components.
- ▶ Remove the combustion head from the burner by removing the two opposing screws at the top of the combustion head.
- ▶ Check that the combustion head setting [F] is correct for the relevant output as shown in the table opposite.
- ▶ To adjust the combustion head setting [F], turn the adjustment bar [E] clockwise or anti-clockwise to move the inner sleeve [G] up and down the blast tube [H].  
The correct setting is shown when the relevant number on the scale [F] is in line with the top of the blast tube [I].
- ▶ The electrodes and nozzle are factory set and there is no need to adjust them.

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

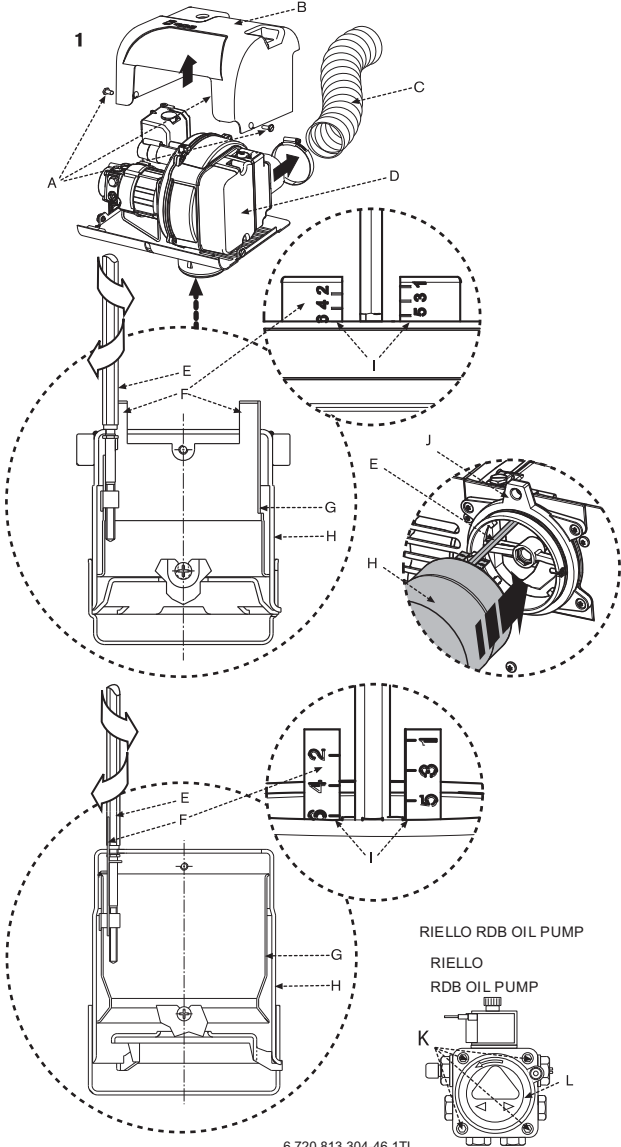
- ▶ With the adjustment bar [E] in line with the top of the burner [J] return the combustion head and secure in place with the two screws at the top of the blast tube.
- ▶ Withdraw the photocell from its housing and wipe clean.
- ▶ Remove the oil pump internal filter, clean in kerosene and reassemble.

The internal filter is accessed by removing screws [K] and the oil pump cover [L]



**NOTICE:** Replace the standard flexible oil hose/s at every annual service to prevent the possibility of oil leakage.

32/50kW RIELLO RDB 3.2 BURNER SETTINGS		50/70kW RIELLO RDB 4.2 BURNER SETTINGS	
Output kW	Combustion head setting [F] Set at top of Combustion head [I]	Output kW	Combustion head setting [F] Set at top of Combustion head [I]
32	3	50	1
41	4	60	2
50	5	70	3

RIELLO RDB OIL PUMP  
RIELLO RDB OIL PUMP  
K L

6 720 813 304-46.1TL

Fig. 48

**External oil filter**

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

**Clean the boiler**

**Manifold access**

- ▶ Release screws [E] to remove the flue manifold access cover [F] and clear any debris.
- ▶ Check the flue system and clean if necessary.
- ▶ Remove the baffle retainer and baffles [H] from the secondary heat exchanger.

	SLOTS	DOUBLE BAFFLES	SINGLE BAFFLES
32/50kW <sup>1)</sup>	25	10	N/A
50/70kW	31	15	1

1) Five of the slots do not have baffles.

- ▶ Check and clean the secondary heat exchanger surfaces.



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

- ▶ Check the condensate route [G] is clear.
- ▶ The condensate trap [K] should be removed and checked for debris.
- ▶ Release the pipe locking tab [I] and disconnect the flexible pipe [J][K] from the top of the trap and move the flexible pipe up away from the trap
- ▶ Release the trap locking tab [L] and move the trap up and back to remove from its mountings.
- ▶ Clean the trap by flushing with water.
- ▶ Check the O ring seals and replace if necessary, grease the seals with a solvent free grease.
- ▶ Refit the trap making sure that the locking tabs are locked in place
- ▶ Pour 500ml of water into drain [G] to refill the condensate trap.
- ▶ Clean the secondary heat exchanger baffles [H] if necessary and refit correctly
- ▶ Refit the baffle retainer
- ▶ Check the seal on the manifold access cover [F] and replace if necessary.
- ▶ Refit the flue manifold access cover [F] and secure with screws [E].

**Combustion chamber**

- ▶ Release the M10 retaining nuts and washers [B] and remove combustion chamber access door [A].
- ▶ Check the fibreglass rope seal on the combustion chamber access door [A] and replace if necessary.
- ▶ Remove and check the baffle retainers [D].
- ▶ Remove the baffles [C], clean and check the condition of the baffles and the acoustic insulation. Replace any baffles or insulation pads considered to be badly corroded/degraded.
- ▶ Thoroughly clean all of the heat exchanger surfaces using a suitable brush and clear all loose debris from the combustion chamber.
- ▶ Check the condition of the combustion chamber access door insulation. If the insulation is damaged the door assembly must be replaced.
- ▶ Refit the items in reverse order ensure the baffles [M] and baffle retainers [L] are correctly fitted for the boiler output as shown in the plan view opposite.
- ▶ Refit combustion chamber door [K].



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

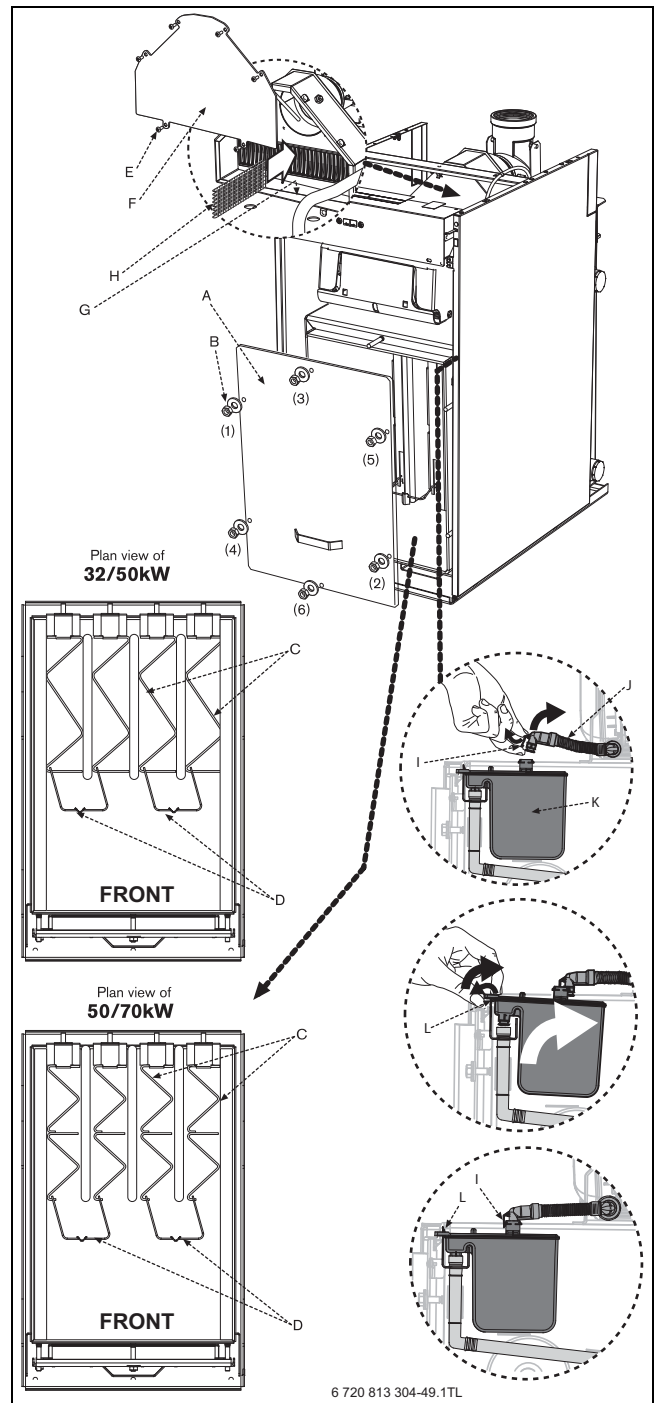


Fig. 49

**Fire valve**


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

**Re-commission the burner**

**1. Riello burner**

Align burner combustion head [N] into boiler housing tube flange [O].

- ▶ Secure with retaining nut [H].
- ▶ Tighten retaining nut sufficiently to ensure a good seal.

 **NOTICE:** Ensure the gasket is a good seal between the burner combustion head and the boiler housing to prevent flue gases escaping from the combustion chamber into the room.

2. Plug burner lead [K] into control box [D].
- ▶ Connect an oil pressure gauge to the oil pump, run the burner and check the oil pressure is correct for the required boiler output. Check that the smoke reading is between 0 and 1, if the smoke reading is above 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 the table below, adjust the CO2 if necessary using the air shutter.  
When the combustion is correct turn off the boiler, remove the pressure gauge and refit the blanking plug.

**Refit panels**

3. Locate edge of front panel [A] onto supporting ledge [B] on the baseplate.
  - ▶ Secure with screws [C].
4. Slide control box [D] into the boiler.
  - ▶ Secure with screws [E].
  - ▶ Locate ball stud connector [F] and push-fit upper front panel [G] towards the boiler to secure.
  - ▶ If the data label plate has been removed ensure it is refitted to the appliance.
5. Locate the top panel [H] onto the ball stud connections [J] and press down to secure.

**After service handover**

- ▶ Make a note of the date of any water treatment.
- ▶ Set the controls back to the users requirements.

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

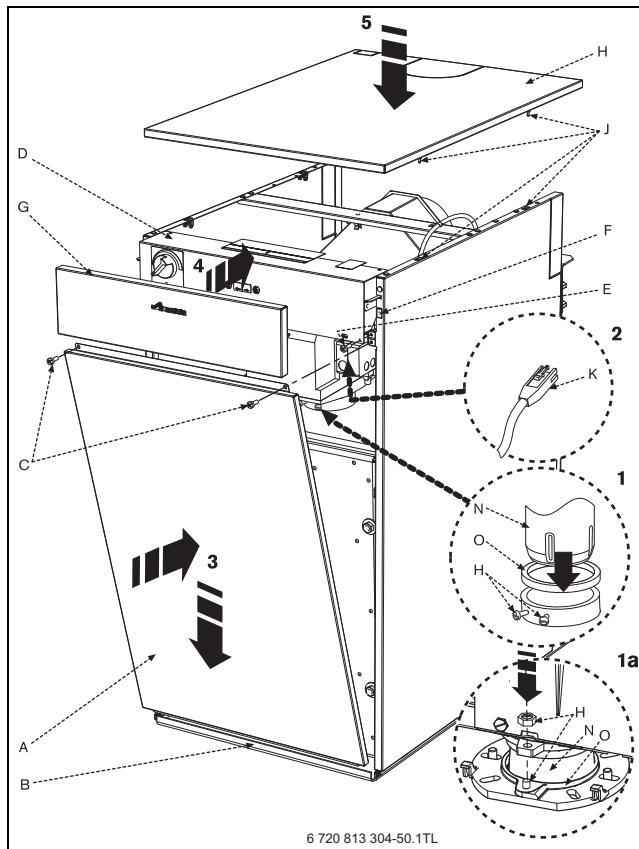


Fig. 50

**Nominal boiler rating at normal operating temperature using 28sec kerosene**

NOZZLE	OIL PUMP PRESSURE (p.s.i)	FUEL FLOW RATE kg/h	FUEL FLOW RATE l/h	APPROX. FLUE GAS TEMP (°C)	% CO2	APPROX. AIR SETTING	COMBUSTION HEAD SETTING	INPUT kW	APPLIANCE OUTPUT		
									Btu/hr	kW	Btu/hr
<b>Riello RDB 3.2 (32/50)</b>											
1.0 60°ES	100	2.78	3.52	75	11.5	3.0	3	33.4	114000	32	110000
1.10 60°S	130	3.55	4.49	77	12.0	4.5	4	42.7	146000	41	140000
1.35 60°S	135	4.33	5.48	85	12.5	5.5	5	52.1	178000	50	170000
<b>Riello RDB 4.2 (50/70)</b>											
1.25 60°S	145	4.33	5.48	80	12.0	2.5	1	52.1	178000	50	170000
1.50 45°S	145	5.2	6.58	80	12.0	5	2	62.5	213000	60	205000
2.00 45°S	125	6.05	7.66	86	12.0	4.5	3	72.9	249000	70	240000

Table 9

**7.2 Spare parts**

**7.2.1 Short parts lists Riello RDB burners**

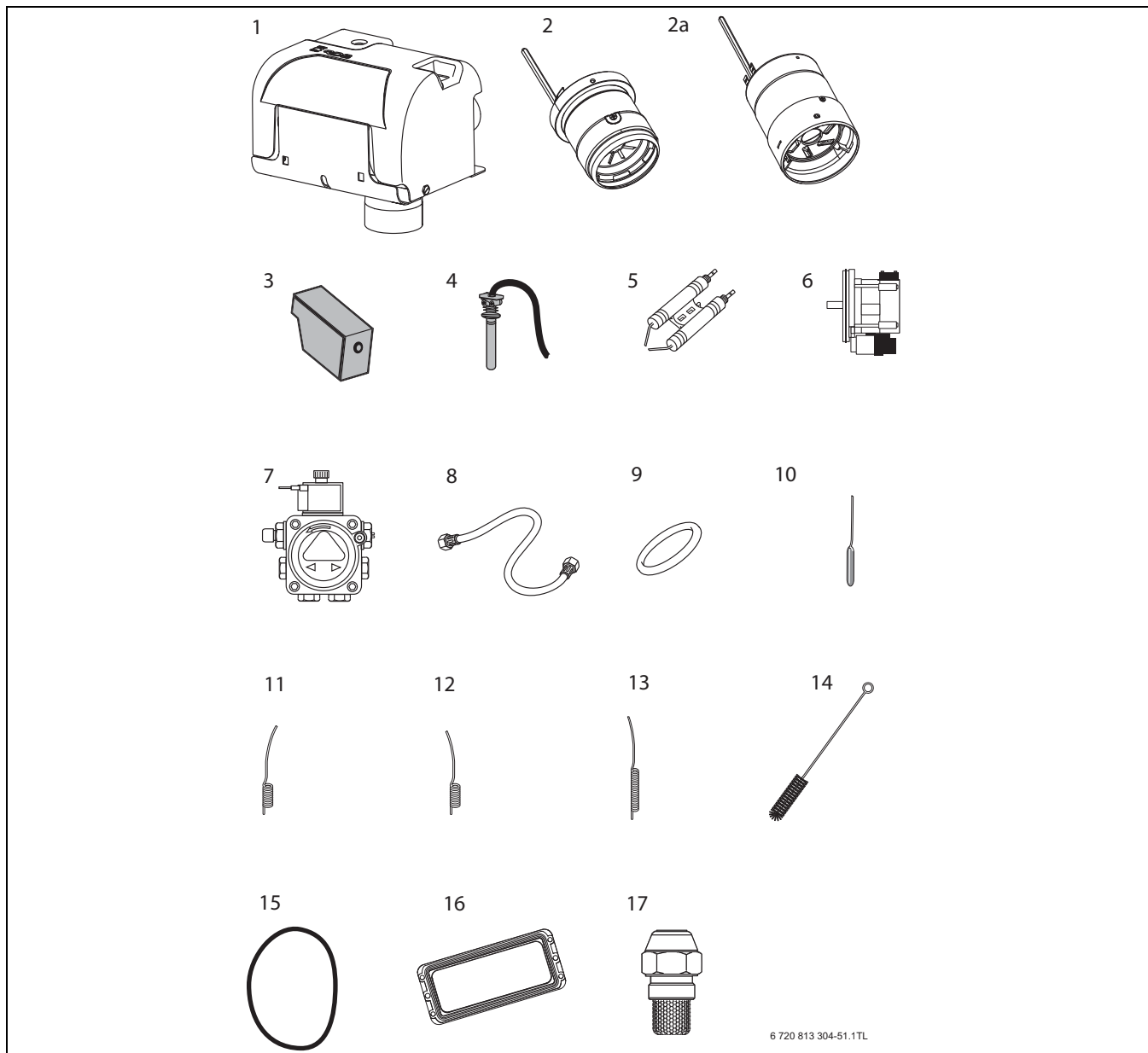


Fig. 51 Short parts list Riello RDB burners

	Part No.
1 Burner - Riello RDB 3.2 32/50	8 718 686 583 0
Burner - Riello RDB 4.2 50/70	8 718 686 726 0
2 Combustion head - ELICA G3 32/50	8 716 116 102 0
2a Combustion head - ELICA G10 50/70	8 716 116 105 0
3 Control box 535 RSE/LD	8 716 109 230 0
4 Photocell	8 716 109 193 0
5 Ignition electrode	8 716 109 183 0
6 Motor	8 718 687 343 0
7 Oil pump - Riello RDB	8 716 109 182 0
8 Flexible oil hose kit	8 716 116 103 0
9 Burner 'O' ring gasket	8 718 687 347 0
10 Heating control thermostat	8 716 107 621 0
11 Auto reset High Limit thermostat	8 716 107 798 0
12 Manual reset High Limit thermostat	8 716 107 621 0

	Part No.
13 Manual reset flue thermostat	8 716 107 624 0
14 Cleaning brush	8 716 109 428 0
15 Gasket manifold 32/50	8 718 680 315 0
Gasket manifold 50/70	8 718 680 344 0
16 Secondary Heat Exchanger gasket 32/50	7 747 009 829 0
Secondary Heat Exchanger gasket 50/70	8 718 680 093 0
17 Oil nozzle 32/50	8 716 156 675 0
1.0 60° ES (32kW output)	
1.10 60° S (41kW output)	8 716 142 795 0
1.35 45° S (50kW output)	8 716 142 796 0
Oil nozzle 50/70	
1.25 60° S (50kW output)	8 716 156 511 0
1.50 45° S (60kW output)	8 716 108 098 0
2.00 45° S (70kW output)	8 716 110 047 0

Table 10 Key to short parts list Riello RDB burners

## 8 Fault finding and diagrams

### 8.1 Fault finding



**WARNING:** Under no circumstances must an appliance be left to operate with any control linked out or overridden.

PROBLEM	CAUSE	REMEDY
<b>LOCKOUT</b>		
Pulsation on start	CF - Flue draught incorrect	CF - Check flue draught
	Combustion settings incorrect	Set up as in installation instructions
	Faulty nozzle	Replace nozzle
Intermittent lockout	Bad electrical connection	Check control box/electrical connections
	Intermittent flame detection fault	See flame detection fault
	Down draught	Extend flue or fit an anti-down draught cowl (CF only)
Burner motor fails to operate	Faulty motor or electrical supply to motor	Check for 230V to motor during startup period
	Control box fault	Replace control box
Flame detection fault	Photocell filmed over (dirty)	Wipe clean
	Photocell faulty	Replace
	Control box faulty	Replace
Incorrect CO2	Air adjustment fault	Set up as in installation instructions
	Oil pressure incorrect	Set up as in installation instructions
No oil from nozzle	No oil at pump	Check and refill oil tank/bleed oil line Check and clean filters & valves from oil tank to boiler
	Air in pump	Bleed pump
	Nozzle blocked	Replace nozzle
	Faulty pump or drive	Replace
Ignition failure	Electrode settings incorrect	Set up as in installation instructions
	Faulty ignition transformer	Replace
	Open circuit ignition	Check and replace electrodes or high tension leads if necessary
	Faulty control box or electrical connections not properly made	Correct electrical control box connections or replace control box
<b>BURNER FAILS TO START:</b>	No power to boiler	Check electrical / control circuit
	Faulty boiler thermostat	Check by temporarily linking out high limit and control thermostats
	Programmer open circuit	Check programmer
	Faulty control box	Replace
<b>HIGH SMOKE NUMBER:</b>	Air intake/flue blocked	Check & clear air intake/flue
	Incorrect combustion settings	Set up as in installation instructions
	Oil pressure incorrect	Adjust to correct pressure
	Incorrect components used on combustion head	Check with installation instructions
	Faulty nozzle	Replace nozzle
<b>FAULTY BOILER OPERATION</b>		
Noisy operation	Pump noise from air in pump or worn pump	Bleed air from pump or replace pump
	Worn motor bearings	Replace motor
	Fan out of balance	Replace fan
Boiling	Faulty boiler thermostat	Replace if necessary
	Short circuit boiler thermostat	Temporarily take out of circuit to check
	Thermostat bulb not fully home in pocket	Ensure bulb is pushed fully home
	No primary water circulation	Check system / circulating pump
Short Cycling	Burner rating incorrect	Correct burner rating
	Boiler thermostat differential incorrect	Replace boiler thermostat
	External controls not operating correctly	Check and correct external controls
<b>OIL SMELLS:</b>	Blocked flue, fumes on startup	CF - Check flue with gauge and check seals/gaskets RS - Check seals/gaskets
	Oil soaked boiler, faulty burner operation, numerous lockouts	Rectify burner operation and lockouts
	Odour in boiler room, oil leaks from pipework, flexible hoses connections	Rectify oil leaks, replace components if necessary

### 8.2 Fault finding logic for 535 SE/LD RDB control box

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.

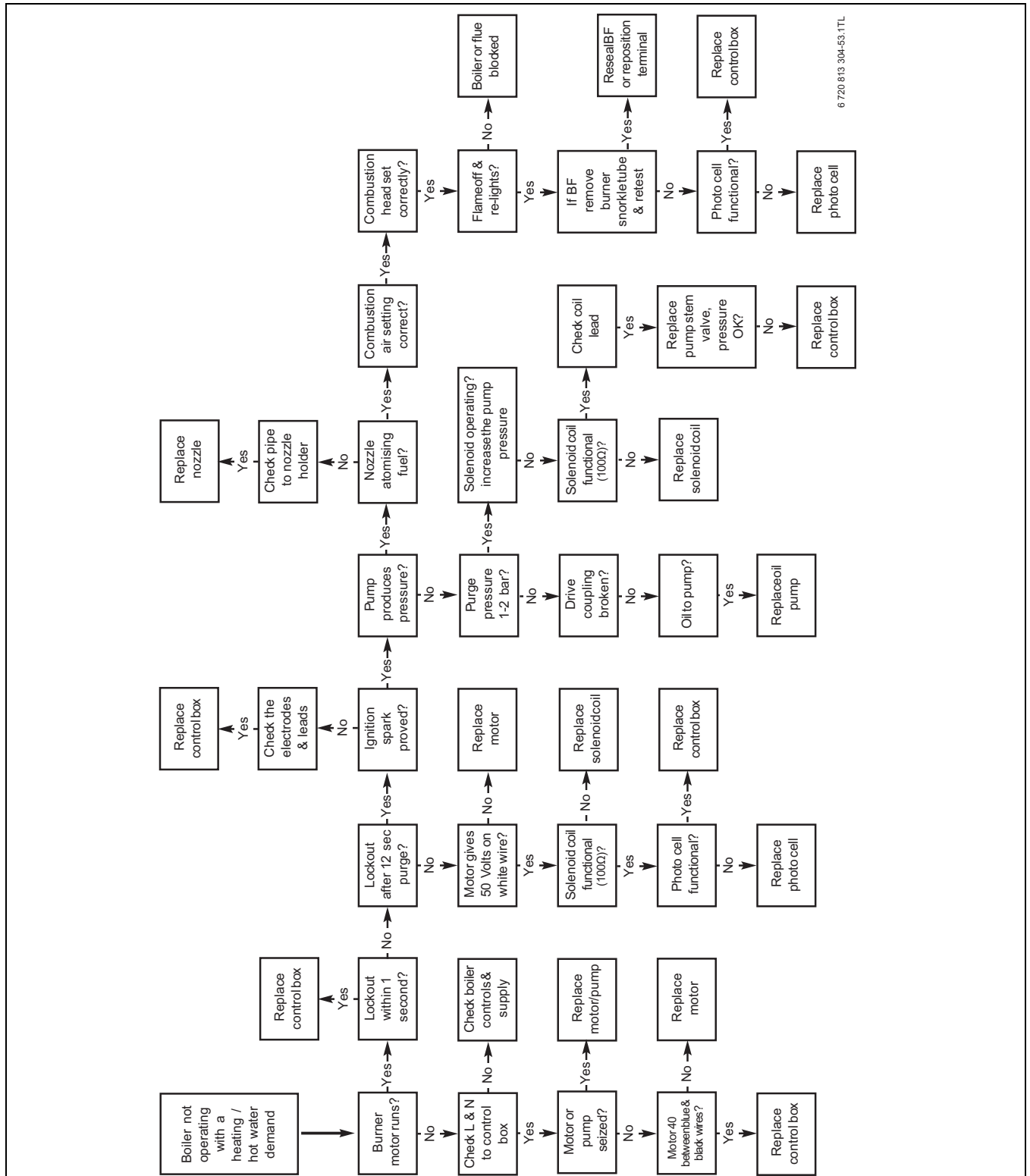


Fig. 52

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

### 8.3 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.

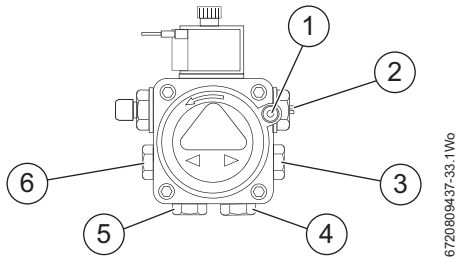


Fig. 53 Oil pump ports/connections

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







# 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: \_\_\_\_\_

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