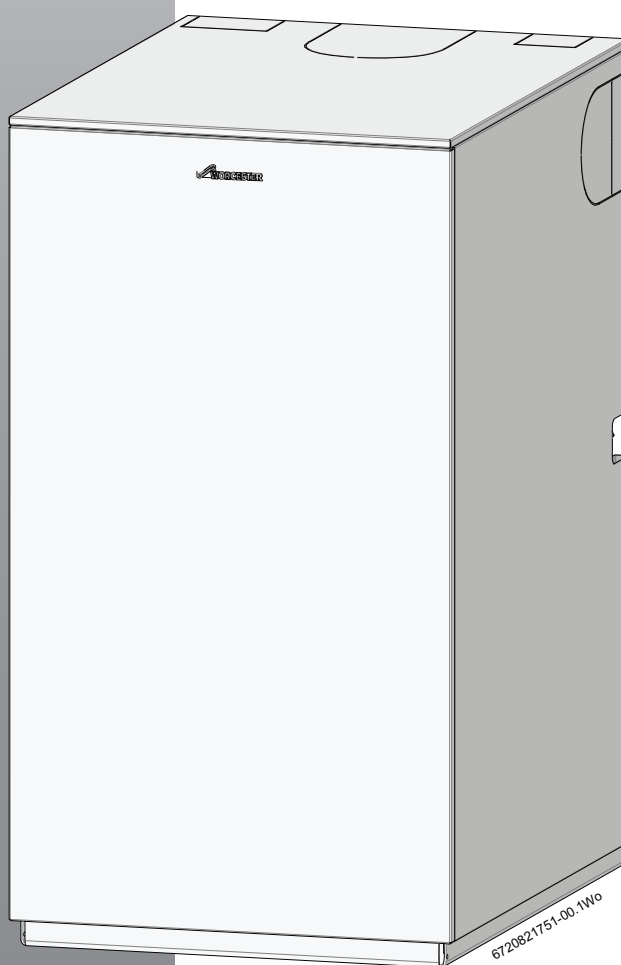


Installation, Commissioning and Servicing instruction manual

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

Greenstar Utility ErP+ 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

 **WORCESTER**
Bosch Group


Contents

1	Key to symbols and safety instructions	3	6	Commissioning	28
1.1	Key to symbols	3	6.1	Pre-commissioning checks	28
1.2	General safety instructions	3	6.2	Filling the system	28
2	Installation regulations	5	6.3	Water treatment	28
2.1	Complying with the building regulations	5	6.4	Starting the appliance	28
3	Appliance information	6	6.4.1	Priming a single pipe gravity feed systems:	28
3.1	General information	6	6.4.2	Priming a double pipe sub-gravity feed systems and single pipe suction lift with de-aerator	29
3.2	Technical data	6	6.4.3	Riello RDB burners	29
3.3	Energy efficiency	7	6.4.4	Appliance lockout indicator on:	29
3.4	Layout & components	8	6.4.5	Burner commissioning check	29
4	Pre-Installation	9	6.4.6	Central heating	30
4.1	Cleaning primary systems	9	6.5	Combustion and burner settings	30
4.1.1	Before cleaning the system:	9	6.5.1	Burner settings	30
4.1.2	Flushing the system	9	6.5.2	Electrode Settings	31
4.1.3	Inhibitor	9	6.6	Burner adjustment	31
4.1.4	Artificially softened water	9	6.6.1	Combustion head adjustment	31
4.2	Mains supply	10	6.6.2	Air damper adjustment	32
4.2.1	Electrical supply	10	6.7	Burner commissioning/adjustment completed	32
4.3	Oil supply	10	6.8	Operational checks, system controls	32
4.3.1	Single pipe gravity feed system:	10	6.9	Finishing commissioning	32
4.3.2	Double pipe sub-gravity feed system:	10	6.9.1	Appliance hand over	33
4.3.3	Single pipe suction lift with de-aerator:	11	6.9.2	Appliance guarantee	33
4.3.4	Pipework	11	7	Inspection and maintenance	34
4.3.5	Appliance oil isolation valve	11	7.1	Inspection and maintenance considerations	34
4.4	Water systems and pipework	11	7.2	Preparing for inspection and maintenance	34
4.5	Condensate discharge	13	7.3	Appliance maintenance	35
4.5.1	Condensate pipe work	13	7.3.1	Secondary heat exchanger	35
4.5.2	Internal connections	13	7.3.2	Replacing the flue manifold	35
4.5.3	External connections	14	7.3.3	Combustion chamber	36
4.6	Pressure relief pipework	15	7.3.4	Condensate trap	37
4.7	Appliance locations and clearances	16	7.4	Burner maintenance	37
4.7.1	Appliance clearances	16	7.4.1	Maintenance frequency	37
4.7.2	Compartments	16	7.4.2	Maintenance considerations	37
4.7.3	Rooms containing a bath or shower	17	7.4.3	Fan and housing cleaning	38
4.8	Flue terminal positions	18	7.4.4	Photocell cleaning	38
4.9	Conventional flue	19	7.4.5	Combustion head maintenance and nozzle replacement	38
4.9.1	Flue adapters	19	7.4.6	Oil pump	39
4.9.2	CF sizing	19	7.4.7	External oil filter	39
4.9.3	Room sealed flue options	20	7.5	Re-commission the burner	39
5	Installation	22	7.6	Spare parts	40
5.1	Unpacking the appliance	22	8	Fault finding and diagrams	41
5.2	Pipework positions and flue opening	22	8.1	Fault finding	41
5.3	Flue installation	23	8.2	Burner fault indicator diagnostics	42
5.4	Combustion chamber	24	8.3	Riello control box	42
5.5	Pipework connections	24	8.3.1	Control box LED codes	42
5.6	Oil burner and pump - Riello RDB burners	25	8.3.2	Fault finding	43
5.7	Refitting components	26	8.3.3	Flame sensing photocell	44
5.8	Electrical	26	8.4	Oil supply vacuum testing	45
			8.5	Air pressure switch connections	45
			8.6	Appliance reset	45
			8.6.1	Appliance reset buttons	45
			8.6.2	Burner reset button	45
			8.7	Oil appliance commissioning checklist	46
			8.8	Service interval record	47

1 Key to symbols and safety instructions

1.1 Key to symbols

Warnings




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

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

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

Important information



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

Additional symbols

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

Table 1 Symbols

Abbreviations used in this manual

Ø	Diameter
CH	Central Heating
DHW	Domestic Hot Water
DCW	Domestic Cold water
TRV	Thermostatic Radiator Valve
IP	Ingress Protection
CF	Conventional Flue
RS	Room Sealed 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 (appliance, heating controls, etc.) carefully before starting the installation.
- ▶ Follow the safety instructions and warnings.
- ▶ Follow 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, follow the following rules.

- ▶ Extinguish any naked flames
- ▶ Isolate the electrical supply
- ▶ Isolate the fuel supply to the appliance
- ▶ 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 followed.

- ▶ Lift only a manageable weight, or ask for help.
- ▶ When lifting, bend your knees, and keep your 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 appliance must only be used as a heat appliance in a heating system for domestic purposes.

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

Appliance operation

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

Children shall not play with the appliance.

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

Installation, commissioning and servicing

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

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

Fitting and Modification

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

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

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

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 follow connection diagrams of other system components.

Handover to the user

When handing over, instruct the user in how to operate the heating system and inform them 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 person 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 appliance. 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 to 45kW.
BS 5410: part 2:	Code of practice for Oil Fired Boilers over 45kW.
EN-BS 15034	Condensing heating boiler for fuel oil
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.

For further guidance see:

OFTEC Technical book three - Regional requirements: Republic of Ireland

3 Appliance information

3.1 General information

Standard package

1 - Floor standing oil fired condensing appliance

2 - Literature pack:

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

3 - ErP label

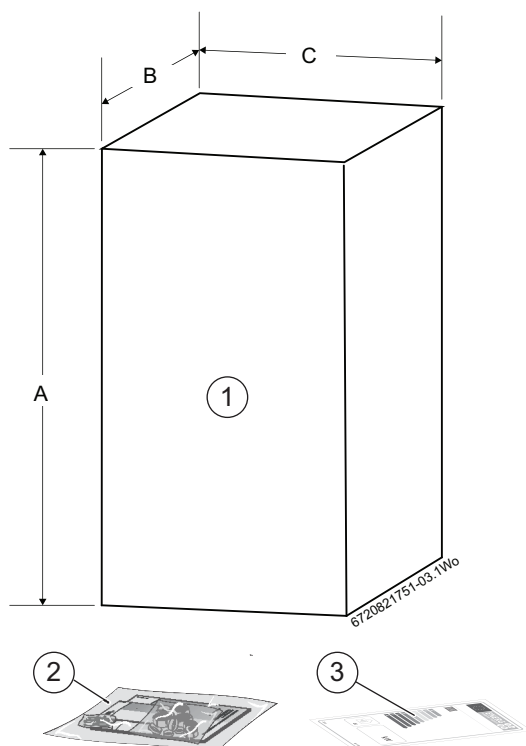


Fig. 1

- [A] 1098mm
[B] 795mm
[C] 598mm

3.2 Technical data

Description	Units	32/50	50/70
Central heating			
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	24	45
Flue			
Exit flue gas mass flow	kg/hr	76	106
Conventional flue (min. diameter required)	mm	130	130
Room sealed flue (diameter)	mm	100/ 150	100/ 150
Pipework connections			
Fuel line (compression)	mm	10	10
CH flow	inch BSP	1¼	1¼
CH return	mm	28	28
CH vent	inch BSP	1¼	1¼
Condensate (polypropylene)	mm	21.5	21.5
Electrical			
Electrical power supply voltage	AC . . V	230	230
Frequency	Hz	50	50
Thermostats			
Appliance flow temperature range (cut out)	°C	50/80	50/80
CH control thermostat differential	°C	5	5
Appliance high limit thermostat set point (+ 0 / - 6°C)	°C	95	95
Appliance manual reset overheat thermostat (cut out)	°C	105	105
Flue manual reset overheat thermostat (+ 0 / - 6°C)	°C	110	110
General data			
Maximum hearth temperature	°C	< 85	< 85
SEDBUK 2005 (Band A)	%	93.0	92.5
SEDBUK (2009)	%	90.7	90.5
Appliance protection rating	IP	20	20
Weight (excluding packaging)	kg	215	220

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	7 731 600 171	7 731 600 172
Product type	–	–	Greenstar Utility ErP+ 32/50	Greenstar Utility ErP+ 50/70
Condensing boiler	–	–	Yes	Yes
Low temperature boiler	–	–	No	No
B1 boiler	–	–	No	No
Cogeneration space heater (CHP)	–	–	No	No
Combination heater	–	–	No	No
Rated heat output	P_{rated}	kW	50	70
Seasonal space heating energy efficiency	η_s	%	90	91
Energy efficiency class	–	–	A	A
Useful heat output				
At rated heat output and high temperature regime ¹⁾	P_4	kW	50.1	71.8
At 30% of rated heat output and low temperature regime ²⁾	P_1	kW	15.99	22.90
Useful efficiency				
At rated heat output and high temperature regime 1)	η_4	%	97.3	97.5
At 30% of rated heat output and low temperature regime 2)	η_1	%	101.7	101.7
Auxiliary electricity consumption				
At full load	e_{max}	kW	0.192	0.182
At part load	e_{min}	kW	0.065	0.061
In standby mode	P_{SB}	kW	0	0
Other items				
Standby heat loss	P_{stby}	kW	0.272	0.278
Ignition burner power consumption	P_{ign}	kW	0	0
Emissions of nitrogen oxides	NO _x	mg/kWh	94	94
Annual energy consumption	Q_{HE}	kWh	44,444	61,539
Sound power level, indoors	L_{WA}	dB(A)	61	60

Table 2 Product data for energy consumption

1) High-temperature regime means 60 °C return temperature at heater inlet and 80 °C feed temperature at heater outlet.

2) Low temperature means for condensing boilers 30 °C, for low-temperature boilers 37 °C and for other heaters 50 °C return temperature (at heater inlet).

3.4 Layout & components

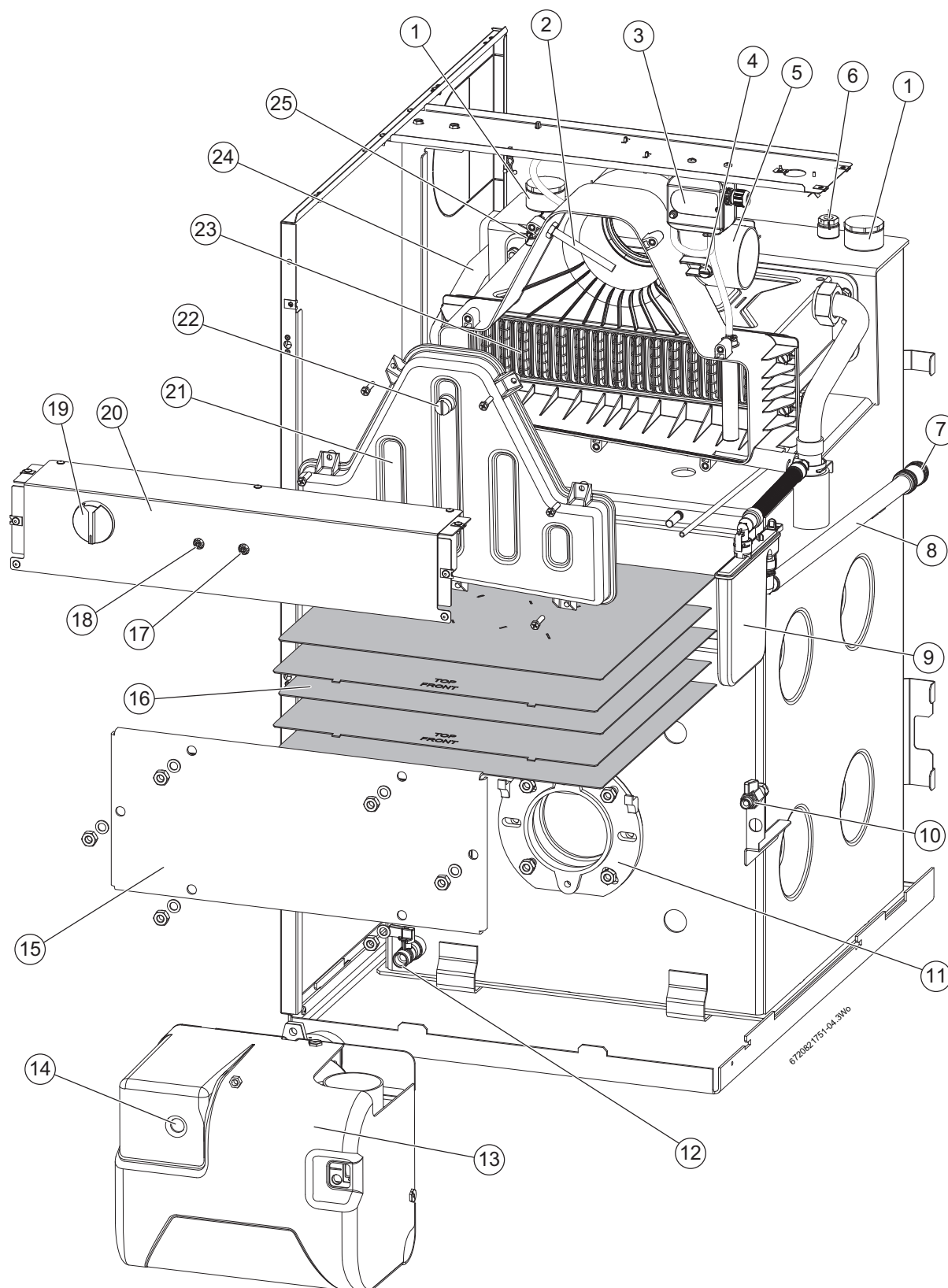


Fig. 2 Appliance components (The diagram excludes the top, front and RH side casing panels.)

1 CH flow connector (left and right)	2 Flue over heat thermostat	3 Air pressure switch	4 Air sample point
5 Air supply duct to burner	6 Appliance overheat thermostat	7 Condensate pipe connector	8 Condensate drain pipe
9 Condensate trap	10 Oil supply isolation valve	11 Burner mounting flange	12 Primary HE drain point
13 Burner	14 Burner fault indicator/reset	15 Combustion chamber access door	16 Primary HE baffle
17 Flue overheat manual reset	18 Overheat manual reset	19 Control knob	20 Control panel
21 Flue manifold access cover	22 Flue gas sample point	23 Secondary HE baffles	24 CH return pipe
25 Secondary air vent			

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 VAC) (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.



Worcester, Bosch does not recommend flushing the existing central heating system with the new appliance fitted. Always employ an after-market power flushing system or similar to remove magnetite and other debris from the central heating system.

4.1.2 Flushing the system



Best practice is to follow the guidance given in BS7593: "Code of practice for treatment of water in domestic hot water central heating systems".

BS7593 recommends flushing the system before the new appliance is fitted to a new or an existing central heating system and adding chemicals to clean and inhibit contamination by following the manufacturer's instructions. Even new central heating systems contain contaminants that need to be removed before treating the system with inhibitor/anti-freeze.

Flushing the system once the appliance has been fitted

The system may require flushing at some later date

- ▶ Fill the system with cold water and check for leaks.
- ▶ 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.
- ▶ Mark the position of the lock shield valves and then open them fully.

- ▶ Fully open all TRVs
- ▶ Circulate the flushing agent before the appliance is fired up.
- ▶ Run the appliance/system at normal operating temperature as directed by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system with clean water to remove the flushing agent and debris.
- ▶ A power flushing machine may be required under some circumstances to aid the cleansing process.
- ▶ Close the drain cocks and manual air vents.
- ▶ Close all lock shield valves to their original positions and close down all TRVs to the required settings
- ▶ Add a suitable inhibitor to the system in accordance with the manufacturer's instructions and fill the system.

4.1.3 Inhibitor

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



The inhibitor or combined inhibitor/anti-freeze must not cause damage to the materials within the appliance (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:

ADEY	01242546717 - www.adey.com
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 appliance requires an untreated cold water connection taken from the mains supply, before the water softener, to the primary water filling point of the heating system.

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



NOTICE:

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

4.2 Mains supply

4.2.1 Electrical supply

- Supply: 230 V - 50 Hz
- Cable: PVC insulated 0.75 mm² (24 x 0.2mm) temperature rated to 90°C.
- External 5A fuse to BS1362.
- The appliance must be earthed.
- This appliance must not be connected to a three phase supply.
- IPX4D.
- 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 additional components that are connected to the appliance with mains electrical supply must not have a separate supply.

4.3 Oil supply



NOTICE: Contaminated oil 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 wall
7	Oil filter (70µm max filtration size)
8	Fire valve sensor
9	Oil pump
10	Oil burner
11	Non-return valve
12	De-aerator
13	Appliance isolation valve

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].

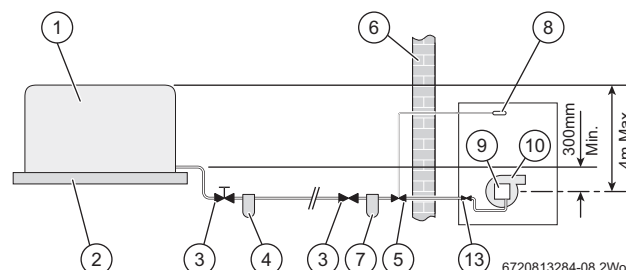


Fig. 3 Single pipe feed



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 feed 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].

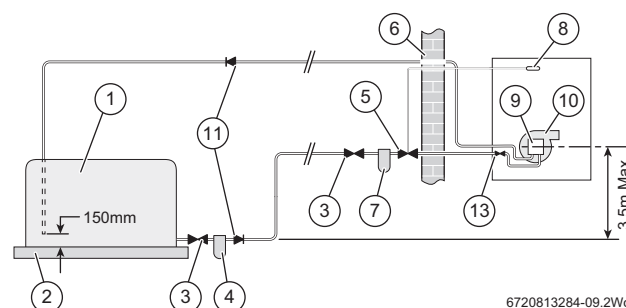


Fig. 4 Double pipe feed

Maximum pipe run for double pipe sub-gravity feed 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.

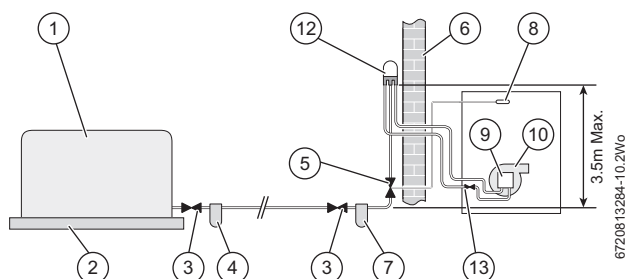


Fig. 5 De-aerator feed

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

FUEL FLOW RATE Head (m)	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

Table 4



Table 4 & figure 5 are guides only and do 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 appliance 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 appliance, but not inside the appliance 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 Appliance oil 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].

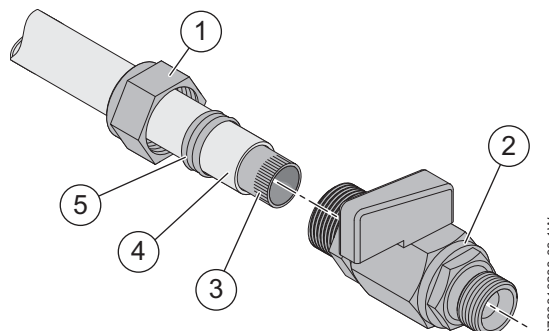


Fig. 6 Isolation valve bracket removed for clarity

- Use flexible hoses to connect from the appliance oil isolation valve to the oil pump.

4.4 Water systems and pipework



NOTICE:

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

Primary system plastic pipework:

- Any plastic pipework used for the CH system must have a polymeric barrier, complying with BS 7921 and installed to BS 5955 with 1000mm (minimum) length of copper or steel pipe connected to the appliance.
- 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 appliance, 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 [F] and feed and expansion pipe [H] must rise continuously from the appliance.
- The feed and expansion cistern [E] must be positioned to provide a static head [S] of at least 1 metre above the highest point in the heating system to the water level in the feed and expansion cistern [E].
- Ensure adequate space is left in the expansion cistern for expansion of the system water.
- No valve shall be fitted in the open vent pipe [F] or the feed and expansion pipe [H].
- The open vent pipe [F] must be at least 22mmØ.

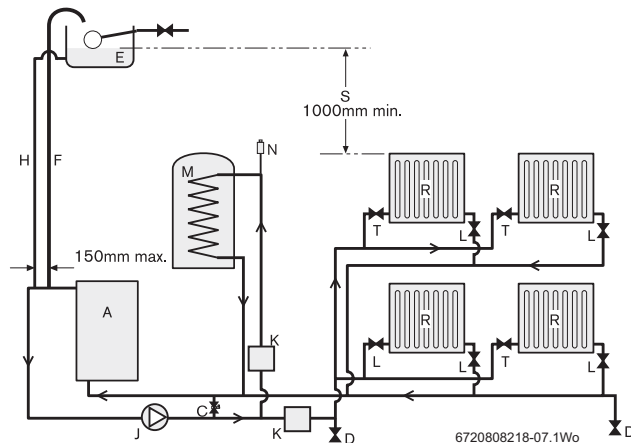


Fig. 7 Typical open vent system

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 appliance or onto one of the appliance top 1½" BSP outlets.
- An expansion vessel [B] must be fitted to the heating return pipe as close as possible to the appliance 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 appliance 1½" BSP outlets.
- An automatic air vent [N] must be fitted.

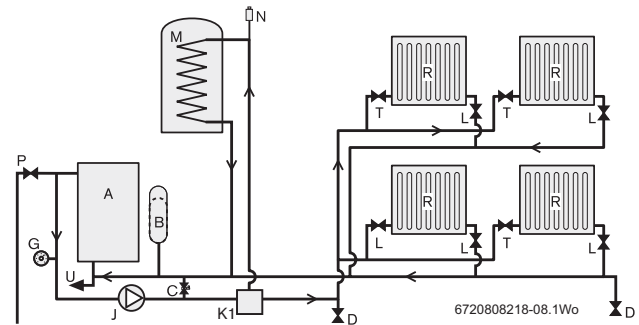


Fig. 8 Typical sealed system

- [A] Appliance
- [B] Expansion vessel
- [C] Automatic bypass valve
- [D] Drain cock
- [E] Feed and expansion cistern
- [F] Open vent 22mmØ min.
- [G] Pressure gauge
- [H] Feed and expansion 15mmØ min.
- [J] Circulating pump
- [K] Zone valves
- [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

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.

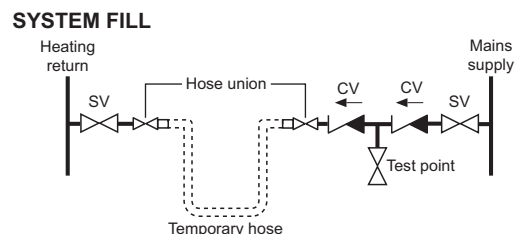


Fig. 9

- [SV] Stop valve
[CV] Check valve

4.5 Condensate discharge

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

1. **To minimize the risk of freezing, wherever possible: the condensate drain should be installed internally.**
2. All condensate pipework must 'fall' from the appliance by a minimum of 3 degrees (52mm per metre) to ensure adequate condensate flow.
3. The pipework route must allow air to be supplied back to the appliance for correct operation of the trap.
4. Connection to a rainwater down pipe must include an air break.

Also:

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

4.5.1 Condensate pipe work

!

NOTICE:

- ▶ Where a new or replacement appliance is being installed, access to an internal "gravity discharge" point should be one of the factors considered in determining appliance 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.

!

NOTICE: Unheated internal areas.

Condensate discharge may freeze in areas of the pipework during prolonged cold temperatures.

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

Key to condensate illustrations, figures 12, 13, 14, 15, 16 & 17	
1	Condensate discharge from appliance
2	Soil and vent stack
3	Minimum 450mm and up to three storeys
5	Sink or basin with integrated overflow
6	75mm sink waste trap
7	Condensate pump

Table 5 Key to Internal condensate disposal methods

4.5.2 Internal connections

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

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

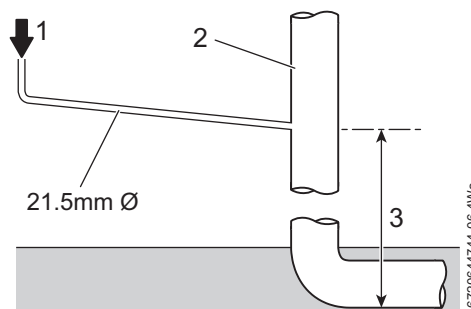


Fig. 10 Disposal to soil vent stack

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

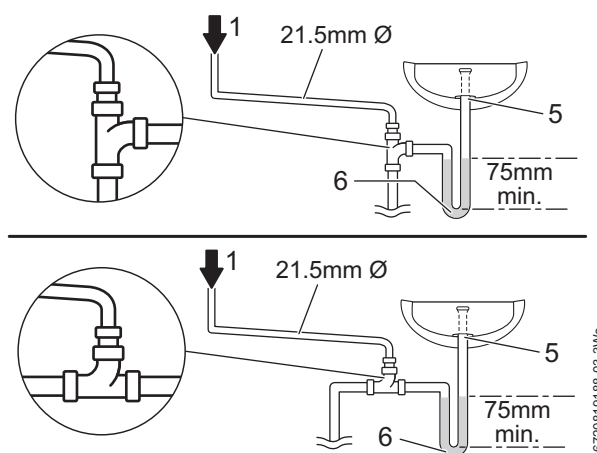


Fig. 11 Disposal to a waste pipe

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 appliance or condensate pump manufacturer.

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

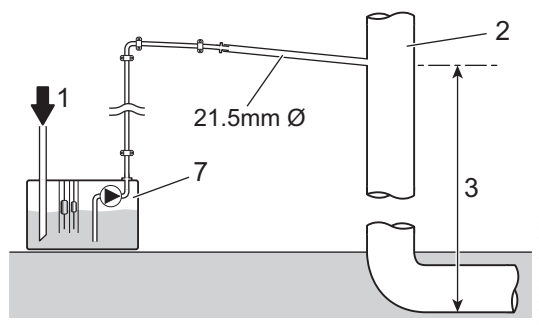






Fig. 12 Condensate pump disposal


4.5.3 External connections

	NOTICE: Rainwater or external drain disposal Untreated condensate must not be allowed to flow into streams or rivers ▶ A rainwater down pipe or an external drain shall only be used for condensate disposal if the down pipe or external drain is connected to a combined foul and rainwater system ▶ Refer to BS 5410 for more information
	NOTICE: Grey water systems Contamination of recovered water ▶ Condensate disposal shall not be allowed into a grey water recovery system that is intended for re-use
	NOTICE: Freezing conditions ▶ Pipe work length should be kept to a minimum and the route as vertical as possible. ▶ When required, use only weather proof insulation.
	NOTICE: Condensate waste ▶ Care should be taken when siting a soak-away to avoid obstructing existing services.

Continued - Key to illustrations, figures 13, 14, 15, 16 & 17

8	Pipe work transition
9	Insulate and increase pipe size
10	External rain water pipe into foul water
11	External air break
12	Air gap
13	PVCu strap-on fitting
14	43mm 90 male/female bend
15	100mm Ø minimum plastic pipe
16	Drainage holes
17	Limestone chippings (25kg minimum)
18	Bottom of sealed tube
19	Increase soak away size and the area with limestone chippings if in clay soil area. Not recommended for high clay soil areas.
20	Increase pipe size to next size up from discharge pipe

Table 6 Key to external condensate disposal methods

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

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

- ▶ The external run be kept as short as possible and not exceed 3 metres.
- ▶ The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to 32mm before it passes through the wall to the exterior. The pipe should be insulated using suitable waterproof and weather resistant insulation, if not using a CondenseSure siphon.
- ▶ The external pipe should take the shortest and least exposed route to the discharge point, and should "fall" as steeply as possible away from the appliance, 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 appliance condensate outlet and the drainpipe, outside the property, to avoid flooding during adverse weather conditions.

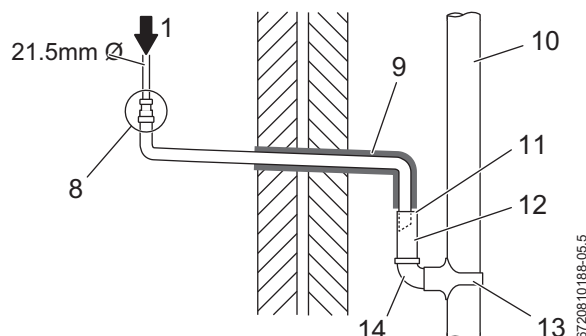


Fig. 13 Disposal into a rainwater down pipe

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

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

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

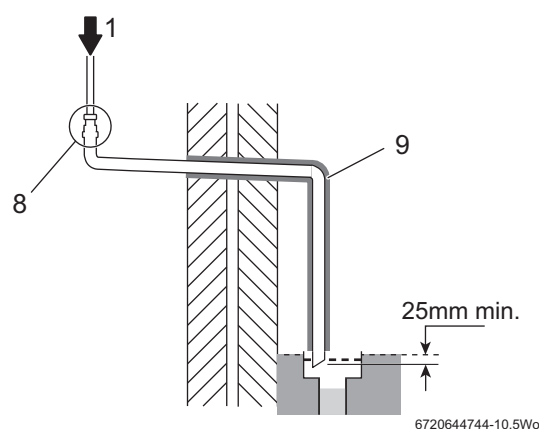


Fig. 14 External disposal

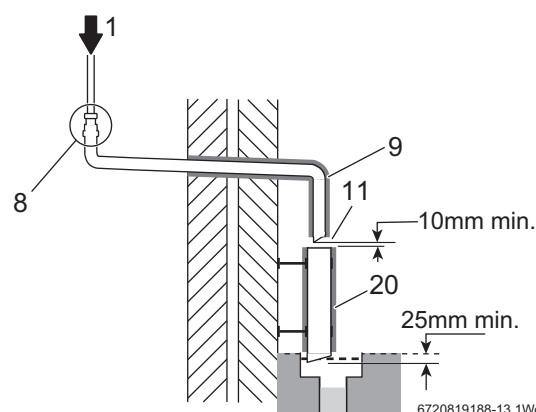


Fig. 15 External disposal with an air break

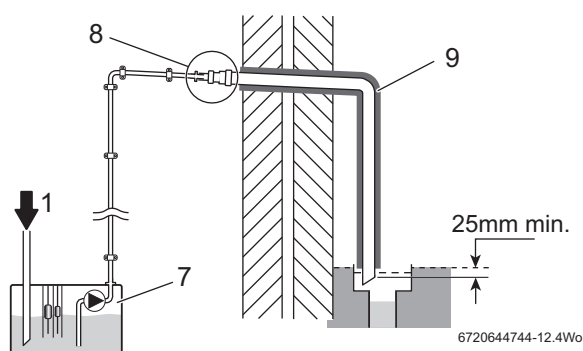


Fig. 16 Condensate pump to external disposal

CONDENSATE SOAK-AWAY

Condensate soak-away considerations

Before deciding to use a soak-away, the ability of the surrounding area should be accessed for the ability to disperse the condensate.

Areas prone to flooding and ground with a high clay content can result in a blocked condensate pipe in freezing conditions.

Although it is possible to increase the size of the soak-away and amount of limestone chippings in clay soil areas, if the clay content is high, preventing effective dispersal of the condensate, then a soak-away would be ineffective and an alternative method of disposal must be sought.

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



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

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



NOTICE: Unheated internal areas.

- Internal pipe runs in unheated areas such as lofts, basements and garages should be treated as external runs and consideration should be given to using a CondenseSure siphon.



Not recommended for heavy clay soil types

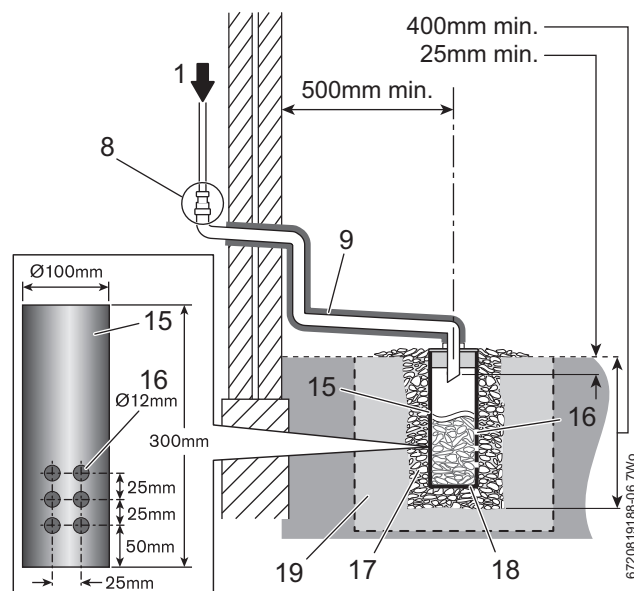


Fig. 17 Discharge to a soakaway

4.6 Pressure relief pipework



CAUTION: Scalding injury

The pressure relief valve is a safety device for the appliance 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.

- The pressure relief drain pipe [K] should be at least 15mm diameter copper pipe and run downwards away from the appliance and discharge away from any electrical 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.

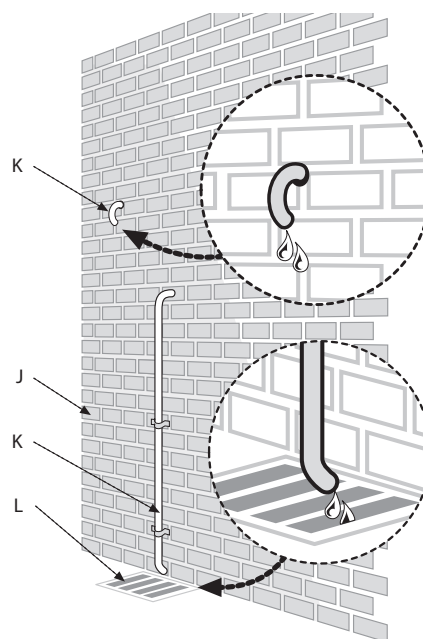


Fig. 18 Pressure relief pipe work

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

4.7 Appliance locations and clearances

- ▶ This appliance is only suitable for installing internally within a property at a suitable location onto a fixed rigid, non-combustible surface of the same size as the appliance and capable of supporting the appliance weight.
- ▶ The appliance must be installed on a flat level surface to ensure condensate does not enter the primary heat exchanger.
- ▶ The appliance is not suitable for external installation unless a suitable enclosure is provided.
- ▶ The appliance 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 appliance is situated.

CF minimum air inlet sizes

Output	32/50kW	50/70kW
Size cm ²	275	385

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

- ▶ If the appliance is to be installed in a confined space or compartment two air vents are required, one at high level and one at low level. The minimum free area of each vent is shown in figure 20 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 9.

4.7.1 Appliance clearances

There are several clearances to be considered when either installing or servicing a appliance in an unventilated or ventilated compartment.

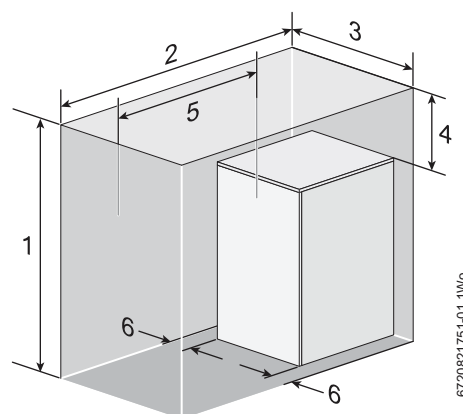


Fig. 19 Appliance clearances

	Clearance	Dimension (mm)	
		Installation	Service/Maintenance
1	Overall height	1,398	1,398
2	Overall depth	1,395	1,395
3	Overall width	798	618
4	Above	300	300
5	Front	600	600
6	Side	100	10

Table 7 Clearances - Installation and Service/Maintenance

4.7.2 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 appliance and any ancillary equipment.
- If fitting the appliance into an airing cupboard use a non-combustible material (if perforated, maximum hole sizes of 13mm) to separate the appliance 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 appliances 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."

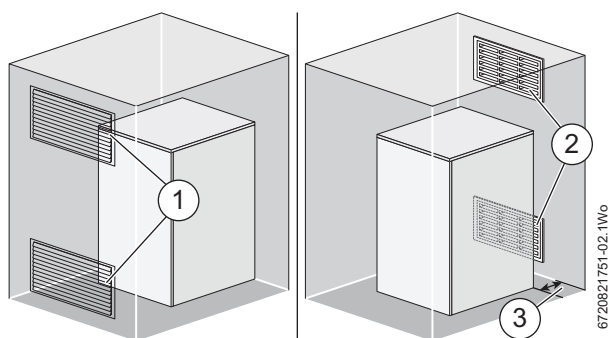


Fig. 20 Venting compartments

- [1] Internal ventilation
[2] External ventilation
[3] 100mm space between the appliance and vent

Minimum air vent area (cm²) for appliances fitted in compartments

Conventional flue models	Internal ¹⁾ ventilation		External ²⁾ ventilation	
	High level	Low level	High level	Low level
32/50	550	825	275	550
50/70	770	1155	385	770

Table 8 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 ¹⁾		External ventilation ²⁾	
	High level	Low level	High level	Low level
32/50	550	550	275	275
50/70	770	770	385	385

Table 9 Room Sealed flue

4.7.3 Rooms containing a bath or shower



WARNING: Conventional flues

- Conventional flue appliances must not be installed in a bathroom



WARNING: Electric shock

- Any switch or appliance using mains electricity must not be within reach of a person using the bath or shower.



The installation must be in accordance with the latest amendments in the latest edition of the IET wiring regulations (BS7671), in all cases.

Refer to figure 21, the appliance must not be installed in zones 1 or 2.

The appliance can be installed outside the shaded areas.

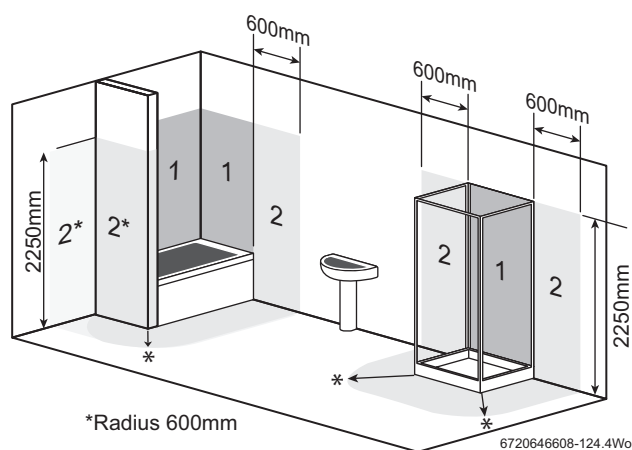


Fig. 21 Bathroom zones

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

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

4.8 FLUE TERMINAL POSITIONS

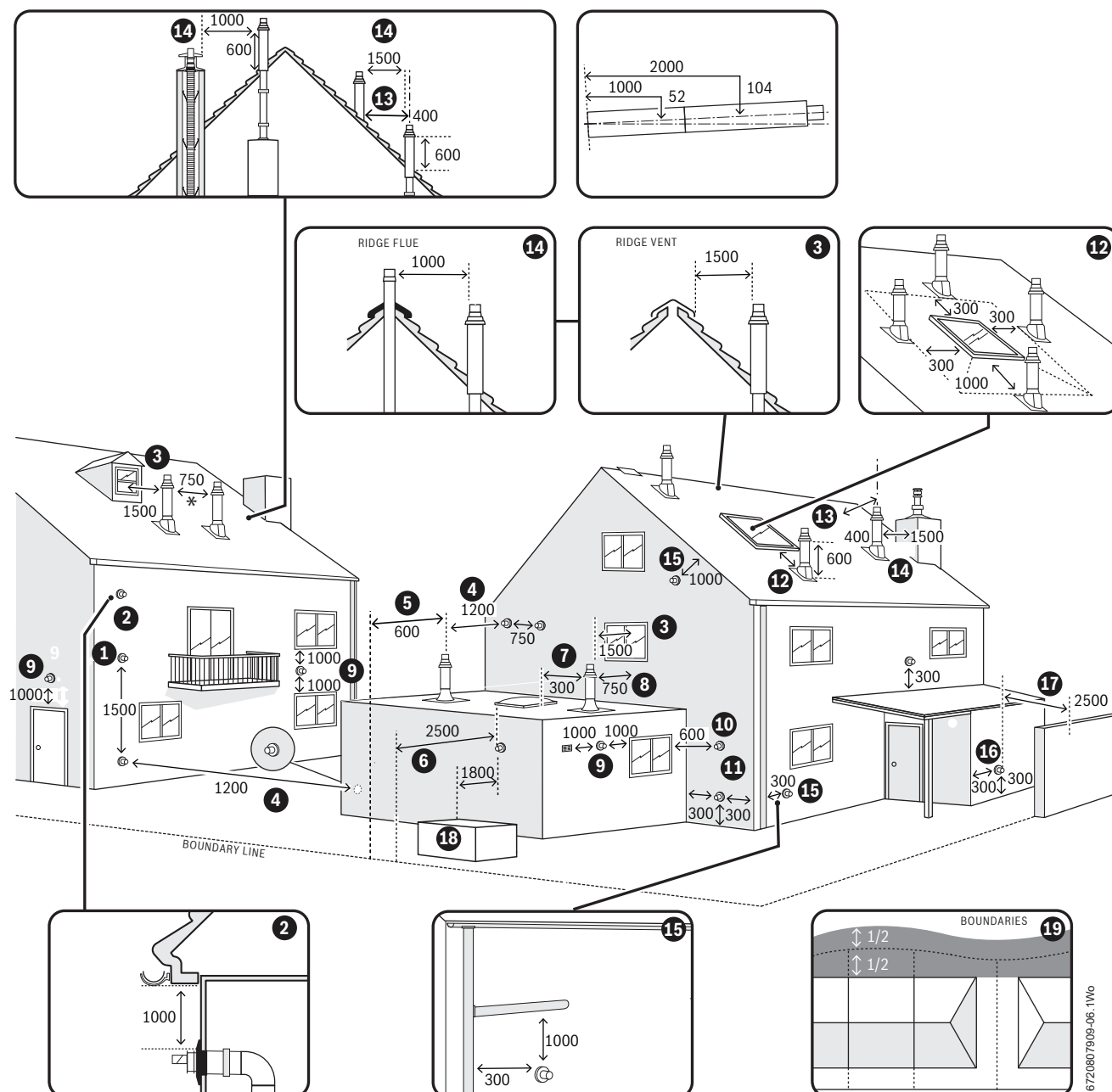


Fig. 22 Flue terminal positions



NOTICE:

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

KEY TO ILLUSTRATION

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



NOTICE:

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

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 2 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 appliance take off point providing the joint is correctly sealed. Never reduce the flue diameter from the appliance take off point.

4.9.1 Flue adapters

All measurements in millimetres

130mm Conventional Flue Adaptor Part No. 7-713-600-211

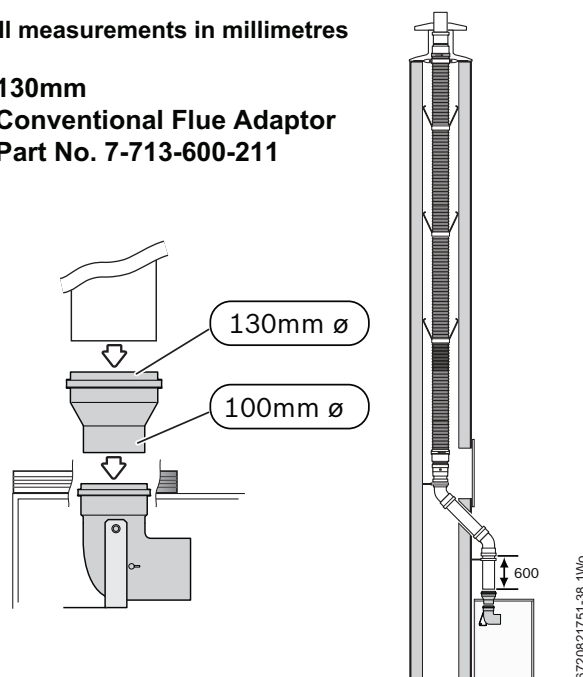


Fig. 23 Conventional Flue adapter information

4.9.2 CF sizing

32/50 & 50/70 = 130mm Ø

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

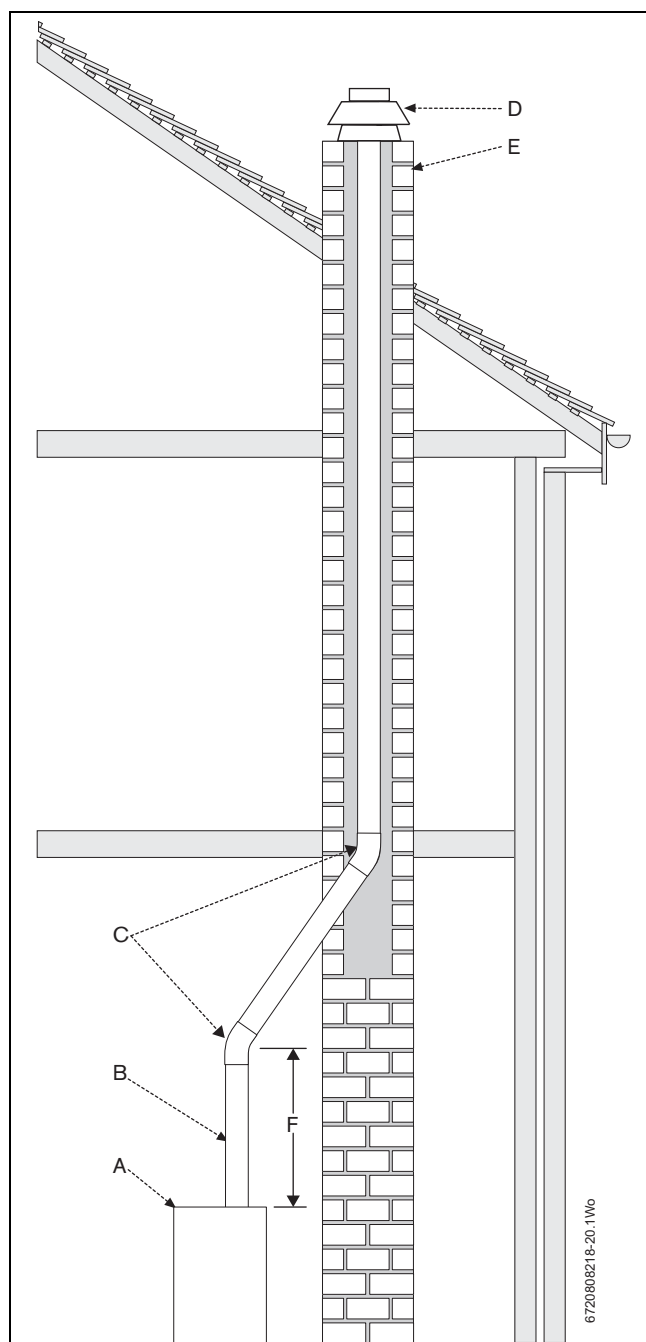


Fig. 24 Conventional flue

- [A] Appliance
- [B] Flue
- [C] Max. two bends at 135°
- [D] Anti down-draught terminal
- [E] Chimney
- [F] Height to first bend from top of appliance (minimum 600mm of stainless steel flue attached to the appliance)

Appliance	Flue diameter [Ø]	Maximum flue length
32/50	130mm	15000mm
50/70	130mm	15000mm

Table 10 Conventional Flue (CF) maximum flue length

4.9.3 Room sealed flue options

Figure 25 shows the components used and table 11 gives maximum flue length [L] from the appliance outlet to the outside wall/roof of the building for each flue configuration.

In all cases L is measured from the outside of the appliance 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.



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

Calculating the flue length

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

Horizontal 100/150mmØ: 6400mm (excluding 270mm of terminal extending outside the building)

Vertical 100/150mmØ: 10000mm (measured from the appliance 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

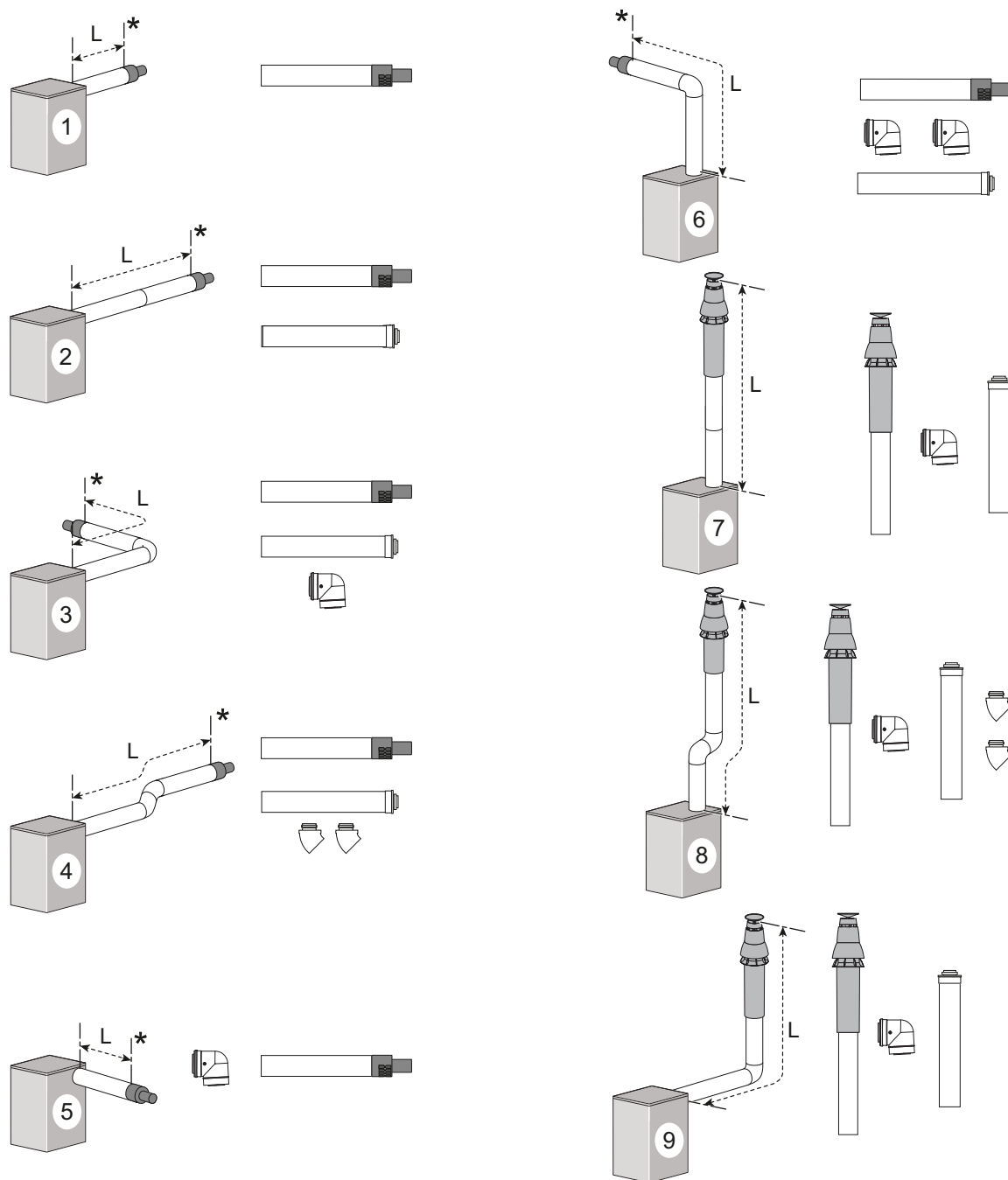
Horizontal & Vertical 100/150mmØ: 1000mm overall length.

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

Flue terminal lengths

Horizontal 100/150mmØ: 1090mm effective length 820mm)

Vertical 100/150mmØ: 1740mm



6720822156-04.1Wo

Fig. 25 Room sealed flue options

32/50 and 50/70 models		Total flue length L (mm)	
Flue configurations		32/50	50/70
1	Horizontal flue assembly	630	630
2	Horizontal flue extension	6400	6400
3	Horizontal flue with 1 x 90° bend	6400	6400
4	Horizontal flue with 2 x 45° bends	6400	6400
5	Horizontal side exit flue	4400	5400
6	High level horizontal flue	6400	6400
7	Vertical flue	10000	10000
8	Vertical flue with 2 x 45° bends	10000	10000
9	Rear exit with vertical flue	12000	12000

Table 11 Maximum flue lengths - Room sealed (RS)

* to outside wall.

5 Installation

5.1 Unpacking the appliance



LIFTING AND CARRYING PRECAUTIONS:

- ▶ Lift only a manageable weight, or ask for help.
- ▶ When lifting or putting things down, bend your knees, and keep your 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 appliance from the van to the point of delivery.

1. Once the packaged appliance has been delivered, remove the outer carton. 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 the carton up and away from the appliance. Remove the plastic bag and any protection cover from the appliance and place safely aside.
3. Lift the front of the top panel up to disengage ball stud connectors and pull towards you to remove.
4. Remove the ancillary items [a] & [b].
5. Pull the upper front panel towards you to disengage the ball studs.
6. Lift the front panel up and away from the supporting ledge on the appliance and store away from the working area, remove the screws securing the appliance to the transport pallet.



NOTICE: The correct method for handling heavy objects should be strictly followed, at all times.

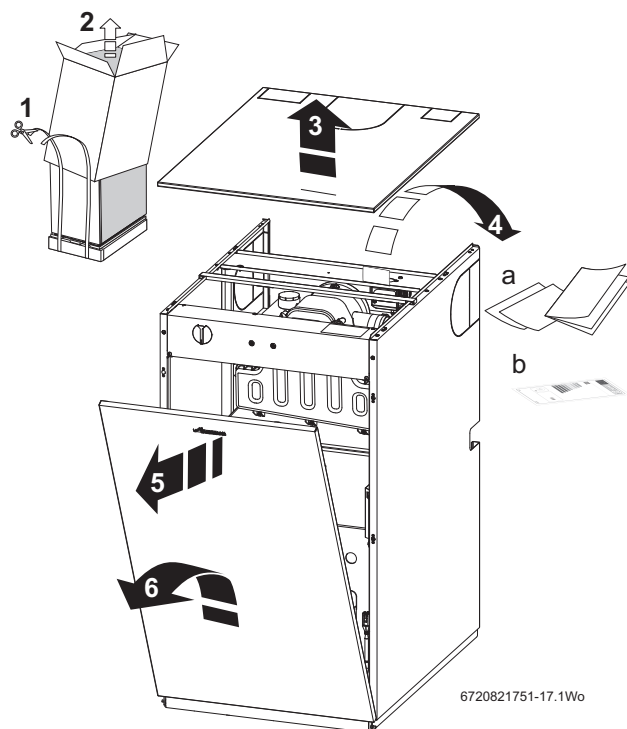


Fig. 26

5.2 Pipework positions and flue opening



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

Safety:

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

Pipework positions

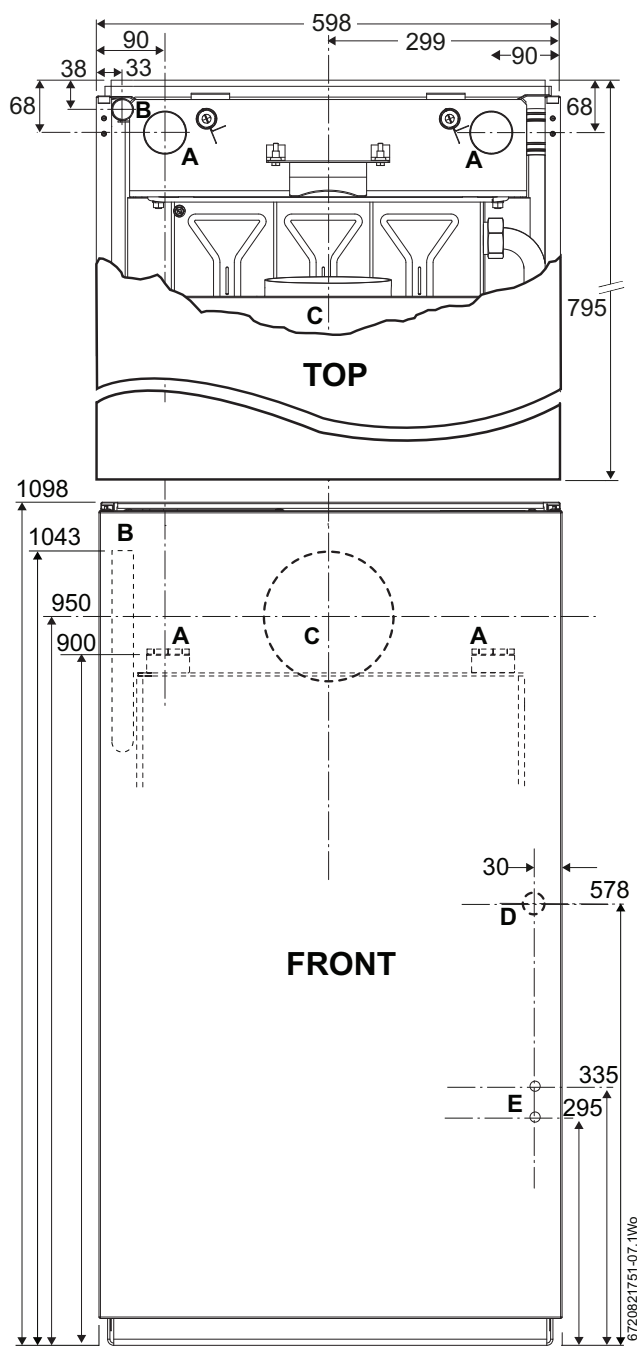


Fig. 27 Pipework position

Key to figure 27:

- [A] Flow pipe connections:
- [B] Return pipe connection
- [C] Flue outlet
- [D] Condensate outlet pipe 21.5mm Ø
- [E] Oil pipe positions



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

Flue opening

- Refer to figure 28 and mark the centre of the flue [1 & 2] for rear opening, [2 & 3] for side opening or [1 & 4] for top opening.



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

- Make an opening [A, B or C] through the wall using a core drill or similar at a size relative to the wall thickness as shown below:

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

Table 12

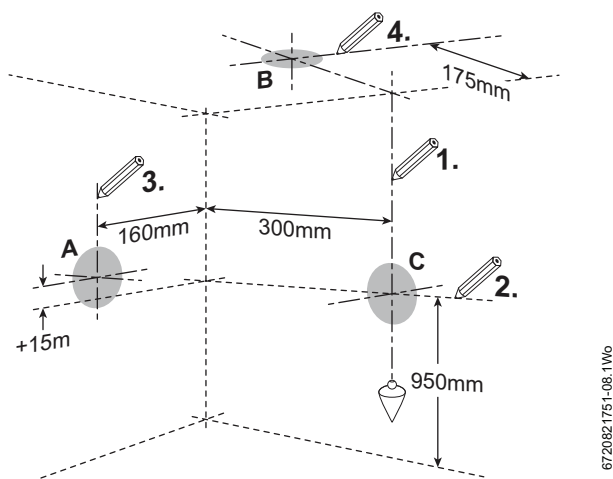


Fig. 28

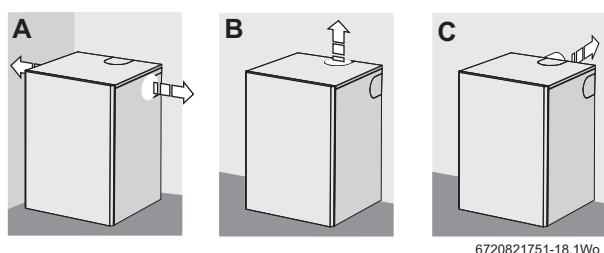


Fig. 29

5.3 Flue installation

Refer to figure 29

The flue can exit the appliance 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).

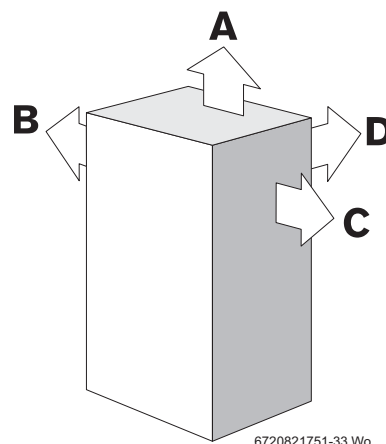


Fig. 30

Refer to the separate flue installation instructions supplied with the flue kits available for this appliance:

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

- All horizontal flue sections must rise by at least 52mm for each metre away from the appliance to ensure that condensate flows back into the appliance 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 appliance 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.

5.4 Combustion chamber

Secondary heat exchanger:

Refer to figure 31

1. Remove the seven screws [1] securing the flue manifold access cover [2].
- Check that all the baffles and retainer [3] are correctly fitted to the secondary heat exchanger:
- Check there is a gap between bottom of the dip tube [4] and the flue manifold.

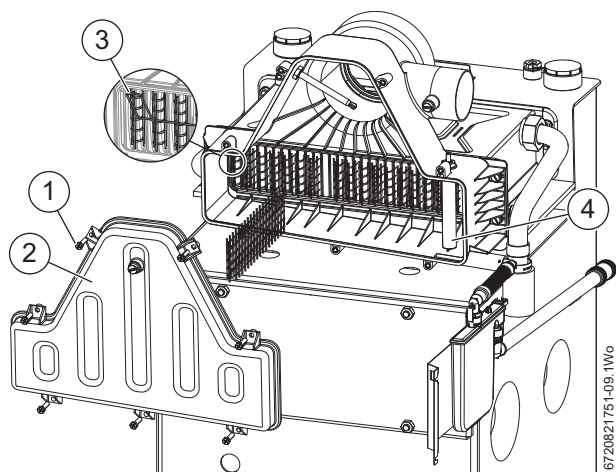


Fig. 31

Combustion chamber

Refer to figure 32

2. Remove the six retaining nuts and washers [1].
 - Remove combustion chamber access door [2]
 - Check that the combustion chamber seal [3] is in good condition and seated properly
 3. Remove any transit packaging and ensure that the baffle [4] is correctly fitted.
 4. Refit combustion chamber door [2].
- IMPORTANT:** Secure with nuts and washers [1] and tighten gradually in a rotating sequence, as shown in figure 32. Do not over tighten the nuts.

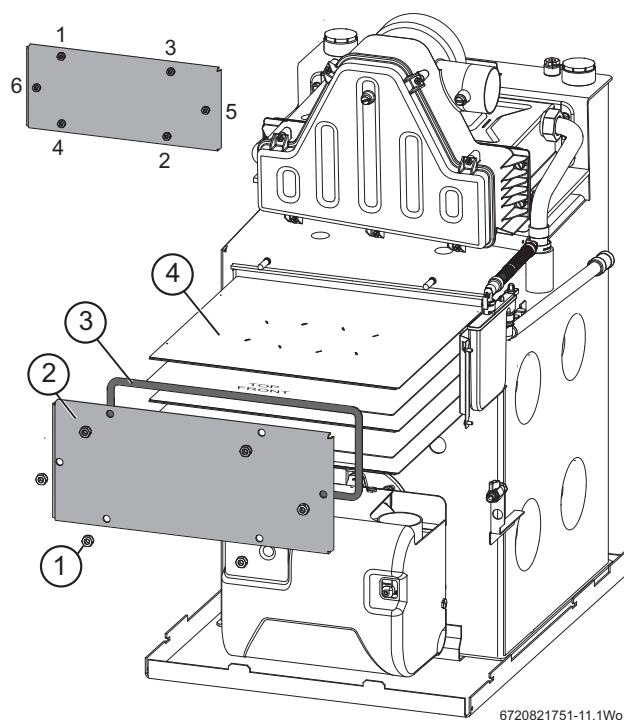


Fig. 32

5.5 Pipework connections



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

Refer to figure 33

Water connections

- Remove any transit bungs from the pipework connections on the appliance.



Surplus water may be present, in the appliance, due to factory testing.

- Ensure all pipework is clean.
- Align water pipework and connect to [1] and [2].
- Check that the unused socket have been capped.

Oil supply connections

- Route oil supply pipe [8] along the side of the appliance as required, finishing close to the burner. Avoid hot surfaces.
- Connect the oil supply pipe [8] to the isolating valve [7], ensure the valve is closed.



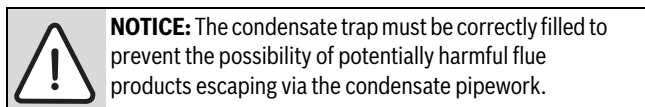
Replace flexible hose at annual service to prevent possible oil leakage.

- Connect the flexible oil hose to the isolating valve [7].

Condensate connection

- Connect 21.5mm polypropylene pipe [4] (not supplied) to the condensate waste pipe [5] 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 appliance at a constant fall of 50mm (min.) for every metre.
- Seal all condensate pipe joints.

- ▶ **Fill the condensate trap [6] with 500ml of water via the condensate collection sump [9].**
- ▶ Check the water is running away and the condensate pipework joints are water tight.
- ▶ Check the flue manifold cover seal is undamaged and seated correctly.
- ▶ Refit flue manifold access cover [10] and secure with screws [11].



Fire valve

Check that the oil supply pipe has a fire valve fitted externally to the building with the fire valve sensor located within the appliance case. A fire valve sensor clip is provided for this purpose on the support bar between the side panels.

The fire valve label, on the support bar, states that the fire valve should be rated at 85°C or above to avoid nuisance cut outs.

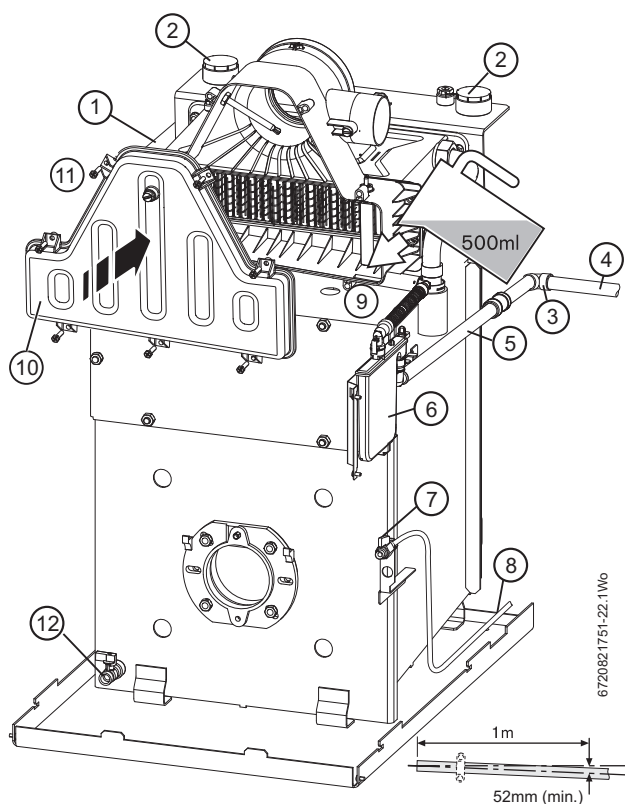


Fig. 33

- [1] CH Return 28mmØ copper - male
- [2] CH flow /heating vent 1¼" Ø BSP female
- [3] 90° elbow (not supplied)
- [4] Condensate pipe - not supplied
- [5] Condensate outlet (21.5mmØ) - supplied
- [6] Internal condensate trap
- [7] Oil isolating valve
- [8] Oil supply pipe - not supplied
- [9] Condensate collection sump
- [10] Flue manifold access cover
- [11] Flue manifold access cover screws
- [12] Primary drain

5.6 Oil burner and pump - Riello RDB burners



CAUTION:

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

Oil burner

- RIELLO RDB 3.2 BX (32/50)
- RIELLO RDB 3.2 BT (50/70)

Oil pump - Single pipe connection

Connecting the oil pump for a single pipe system:

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

Oil pump - two pipe connection

Converting the oil pump for a double pipe system:

1. Check the inlet pipe connection.
 - ▶ Unscrew the return plug [1].
 - ▶ Screw in the by-pass screw [2] that is supplied in a plastic bag attached to the oil pump.
2. Connect the flexible oil pipe return hose [3] (not supplied) to the oil pump and return pipe fixing and tighten to secure (for routing see figure 33).

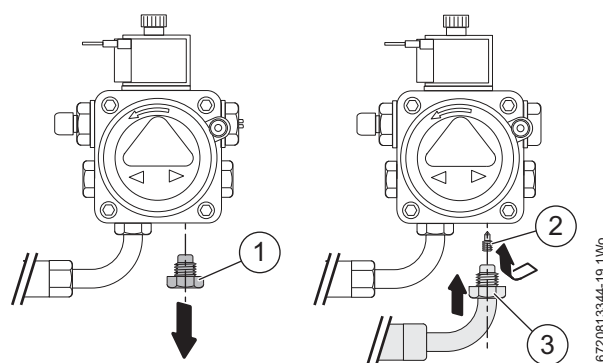


Fig. 34 Converting to double pipe system

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

5.7 Refitting components



WARNING: Flue gas leakage

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

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

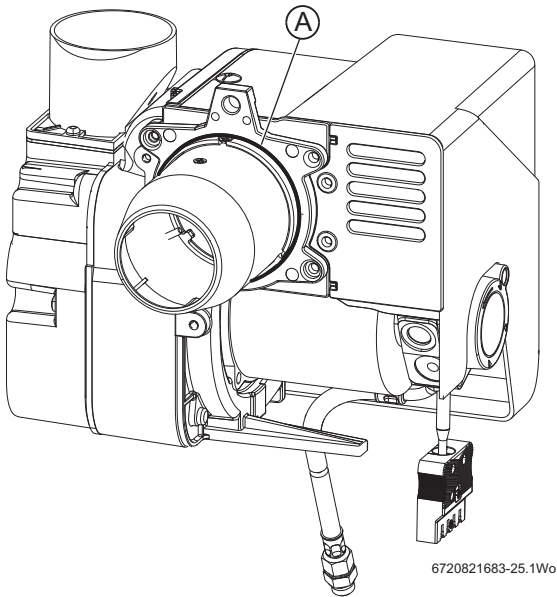
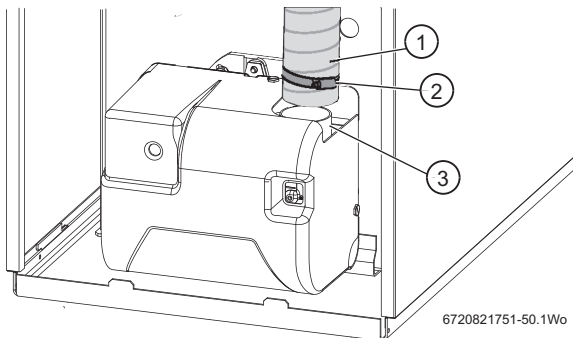


Fig. 35

- ▶ Align burner combustion head into appliance housing tube flange, ensure that the burner is level.
- ▶ Push the burner forward into the flange ensuring that the seal is properly seated.
- ▶ Secure with retaining nut.
- ▶ Tighten retaining nut sufficiently to ensure a good seal.
- ▶ Connect the burner lead into the control box socket.
- ▶ Attach air duct [1] and tighten hose clip [2] to secure to the burner air intake box and the burner air intake [3].



5.8 Electrical



DANGER: ISOLATE THE 230V ELECTRICITY SUPPLY

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



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

Access to 230V connections:

1. Pull the control knob [D] forwards to remove from control panel [C].
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 [J].

Route the power cable to the external connection point avoiding any potentially hot surfaces.



NOTICE: Any external device connected to the appliance must take its power supply from the appliance 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:

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

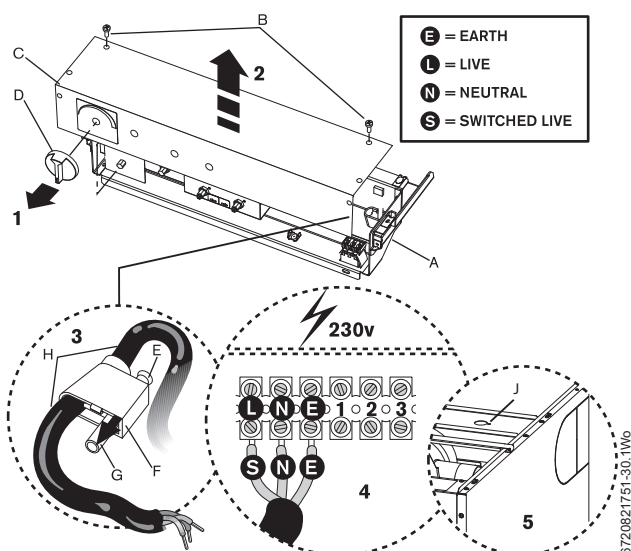


Fig. 36

230V STANDARD WIRING DIAGRAM

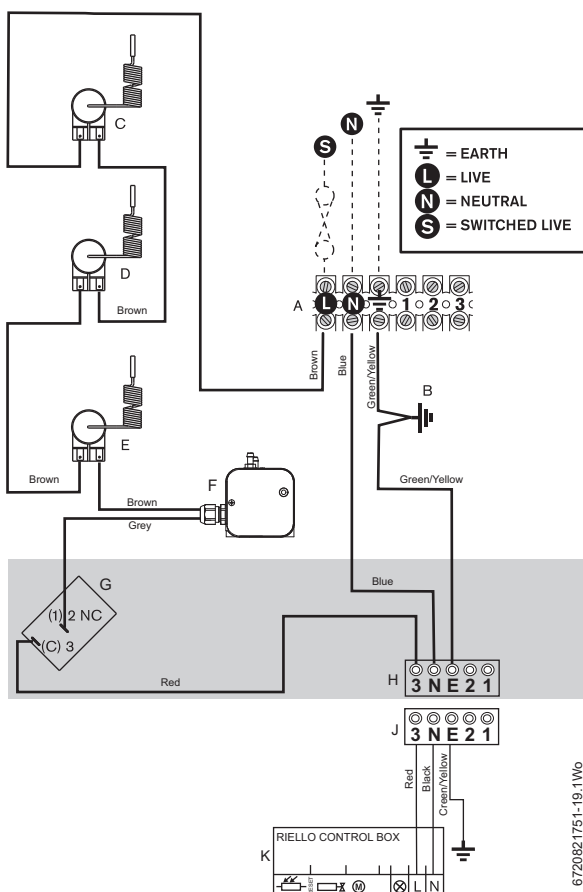


Fig. 37

Key to components:

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

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

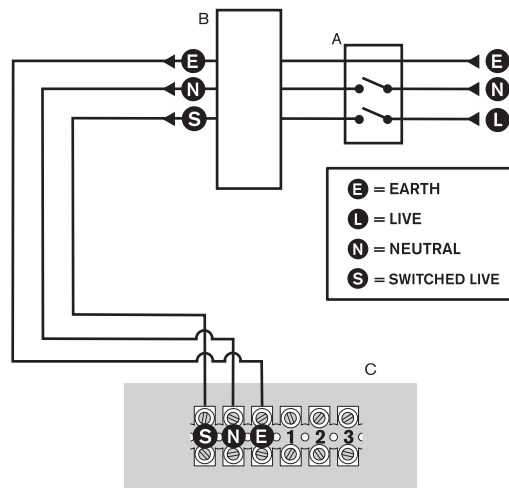


Fig. 38

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] Appliance 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 appliance.

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

6 Commissioning

6.1 Pre-commissioning checks



CAUTION: Isolate the mains supplies before starting any work and follow 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 appliance 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 appliance.
Complete the installation part of the Guarantee Registration Card, and complete a CD10 or equivalent to inform the LABC of the installation.

6.2 Filling the system

- ▶ 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 Schrader 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 the secondary heat exchanger via the air vent (a radiator key is ideal for this).

6.3 Water treatment



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

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

Flushing (Central Heating)

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

Inhibitor (Central Heating)

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



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

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



NOTICE:

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

Water treatment products

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

ADEY	01242 546717 or www.adey.com
FERNOX	0870 601 5000 or www.fernox.com
SENTINEL	0800 389 4670 or www.sentinel-solutions.net

6.4 Starting the appliance



NOTICE:

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

1. Check the oil supply is correctly fitted and in good working order before turning on the oil supply valves to the appliance.
 - ▶ 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 appliance should be primed before the burner is operated to avoid unnecessary pump wear.
 - The use of an oil suction pump will prime and flush through any oil supply set up simply and easily, alternatively the following procedures can be used.

6.4.1 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 and reconnect the flexible oil hose.

When the oil reaches the pump, bleed the air from the pump as follows, refer to figure 39:

- ▶ Open the isolating valve and the oil pump bleed port [1] to discharge into a suitable container once the appliance is started up.
- ▶ Switch on the electricity supply to the appliance.
- ▶ Set the programmer to ON for CH and DHW.
- ▶ Turn on the appliance control thermostat.

- ▶ Allow the burner to run through to lockout indicated by the illumination of the lockout indicator/reset button [4].

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 [4].
- ▶ Repeat the procedure until a steady stream of oil without air, runs from the bleed port, then lock the bleed port [1].
- ▶ Safely dispose of the container/discharge.

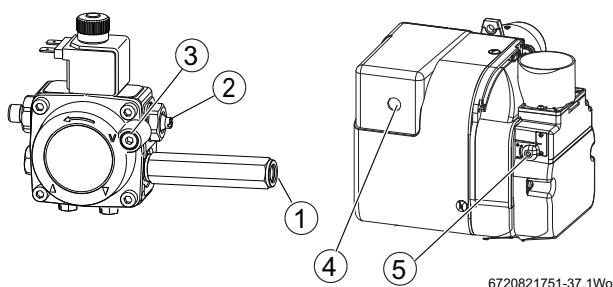


Fig. 39

- [1] Bleed & pressure gauge port
- [2] Pressure adjustment
- [3] Vacuum gauge port
- [4] Lock out indicator / Reset button
- [5] Air shutter setting

6.4.2 Priming a double pipe sub-gravity feed systems and single pipe suction lift with de-aerator

Refer to figure 40:

NOTICE: Oil pump damage

- ▶ Prime the oil supply pipework to ensure that the oil pump does not run dry.

- ▶ To prime a de-aerator [2], disconnect the flexible oil inlet hose [7] from the isolation valve and place in a container of kerosene [6]. Connect a spare flexible oil hose [5], to discharge into container [6]. Open the isolating valve, turn on the power to the appliance and set the programmer to ON. Prime the de-aerator until there is a steady flow of oil into container [6]. Turn off the appliance then reconnect the flexible oil inlet hose [7].
- ▶ Turn on the appliance, 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.

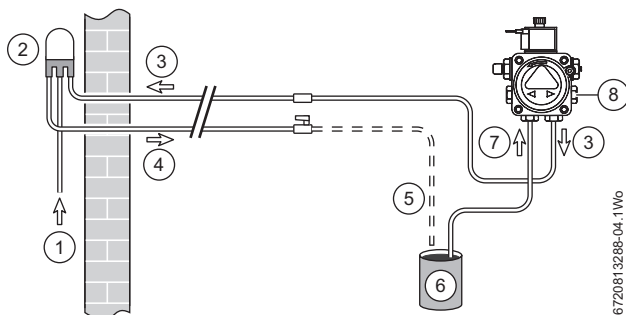


Fig. 40 Priming the pump

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

6.4.3 Riello RDB burners

2. Fit a suitable pressure gauge to the port [1] on the oil pump.

Refer to tables 13 & 14 for the settings

- ▶ Adjust the air shutter [5], turn the appliance on and then adjust the pump pressure [2]. The burner should ignite following a pre-ignition period of approximately 15 seconds.

6.4.4 Appliance lockout indicator on:

Refer to figure 39

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 [4].

- ▶ Wait 2 minutes then press the lockout indicator reset button [4] to initiate another start sequence.
 - ▶ Repeat procedure until a flame is established.
3. Start and run for three minutes then switch off.
 - ▶ Release the burner retainer.
 - ▶ Remove the burner from the appliance.
 - ▶ Check for after-spurting from the nozzle, indicated by oil saturation on the combustion head.

If after-spurting occurs:

- i** Removing the combustion head and nozzle

 - ▶ Refer to section 7.4.5 "Combustion head maintenance and nozzle replacement" to access the nozzle.
- ▶ Remove the combustion head from the burner to expose the nozzle. Hold the burner vertical to unscrew the nozzle and fill the nozzle holder with kerosene.
 - ▶ Refit the nozzle, combustion head and burner.
 - ▶ Restart and run for three minute intervals until after-spurting stops.

6.4.5 Burner commissioning check

4. Start and run for 20 minutes.
- ▶ Remove sampling point plug [1] to check the smoke reading is between 0-1. If the smoke level is above 1, check the combustion settings are correct and the oil nozzle is in good condition.

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

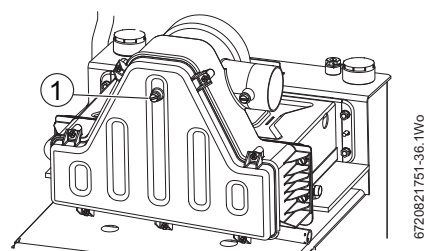


Fig. 41

- ▶ Check the CO₂ levels and adjust the air shutter (refer to figure 39 item [5]) setting according to tables 13 & 14 on page 30.
- ▶ Check the flue gas temperature is close to the values shown in tables 13 & 14 on page 30.

If the flue gas temperature is too high and the baffles are correctly fitted, then reduce the oil pump pressure (refer to figure 39 item [2]) 5-10 p.s.i. (0.35 - 0.67 bar) to compensate for nozzle variations.

- ▶ Turn off the electrical supply.
- ▶ Isolate the oil supply to the burner.
- ▶ Remove the oil pressure gauge.

- ▶ Replace the bleed/oil pressure port blanking plug (refer to figure 39 item [1]).
- ▶ Check and rectify any oil leaks.
- 5. Switch on the oil supply.
- ▶ Switch on the electrical supply.
- ▶ Restart the appliance and run for 5 minutes.
- ▶ Recheck the CO₂ levels and if required, adjust the air damper setting to obtain the correct CO₂ level.
- ▶ Repeat the fine tuning procedure if required.
- ▶ Refit the sample point cap, hand tighten only do not over tighten (refer to figure 41 item [1]).

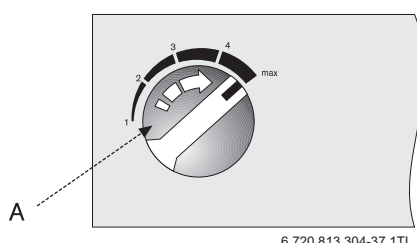
6.4.6 Central heating

1. Open all radiator valves.

- ▶ Set room thermostat to maximum.
- ▶ Set programmer to ON for CH & DHW (if applicable).
- ▶ Turn the appliance 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.



6 720 813 304-37.1TL

Fig. 42

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.

6.5 Combustion and burner settings



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

6.5.1 Burner settings

32/50 appliances burner settings information

Description	Unit	Values		
Output (appliance)	kW	32	41	50
Nozzle (gph)		0.85	1.10	1.25
Nozzle (spray angle)		60°	60°	60°
Nozzle (type)		ES	ES	S
Oil pump Pressure	p.s.i.	150	145	150
	bar	10.5	10.0	10.5
Fuel flow rate	Kg/h	2.76	3.53	4.33
	l/h	3.52	4.33	5.48
Approx. flue gas temperature	°C	70	82	89
CO ₂ content	%	12.0	12.5	12.5
Approximate air setting		4.75	4.50	5.75
Air damper disc setting		B	D	N/A
Combustion head setting	mm	14.0	17.0	21.0
Burner head		BX + Recirculation tube		

Table 13 32/50 appliances burner information

50/70 appliances burner settings information

Description	Unit	Values		
Output (appliance)	kW	50	60	70
Nozzle (gph)		1.25	1.50	2.00
Nozzle (spray angle)		45°	45°	45°
Nozzle (type)		H	H	S
Oil pump Pressure	p.s.i.	145	136	133
	bar	10.0	9.4	9.2
Fuel flow rate	Kg/h	4.33	5.17	6.03
	l/h	5.48	6.58	7.66
Approx. flue gas temperature	°C	76	85	91
CO ₂ content	%	12.5	12.5	12.5
Approximate air setting		2.25	3.75	6.50
Air damper disc setting		N/A	N/A	N/A
Combustion head setting	notch	0	3	4
Burner head		BT		

Table 14 50/70 appliances burner information

6.5.2 Electrode Settings

Riello RDB 3.2 BX (32/50)



The burner head is shown without the recirculation tube for clarity.

- Adjust the electrodes settings to the values below.

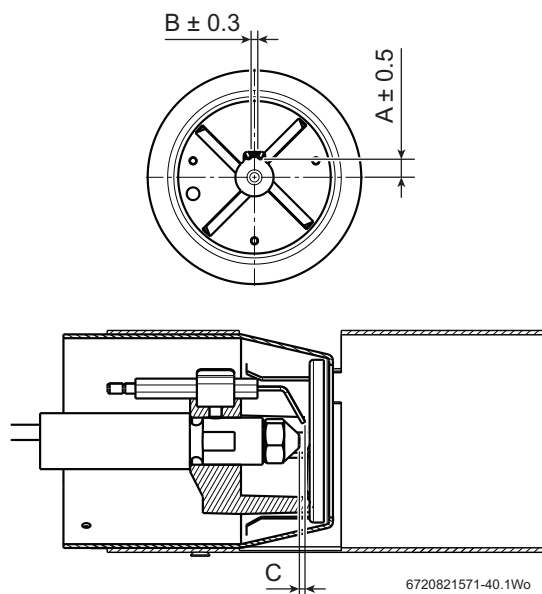


Fig. 43 RDB 3.2 BX electrode settings

A	B	C
4.6mm	3mm	2 - 2.5mm

Table 15 RDB 3.2 BX electrode settings

Riello RDB 3.2 BT (50/70)

To adjust the diffuser disc unit:

- Loosen the securing screw [1].
- Move the diffuser disc unit to setting dimension A.
- Tighten screw [1] to secure in place.

To adjust the electrodes unit:

- Loosen the securing screw [2].
- Move the electrodes unit to setting dimension B.
- Tighten screw [2] to secure in place.

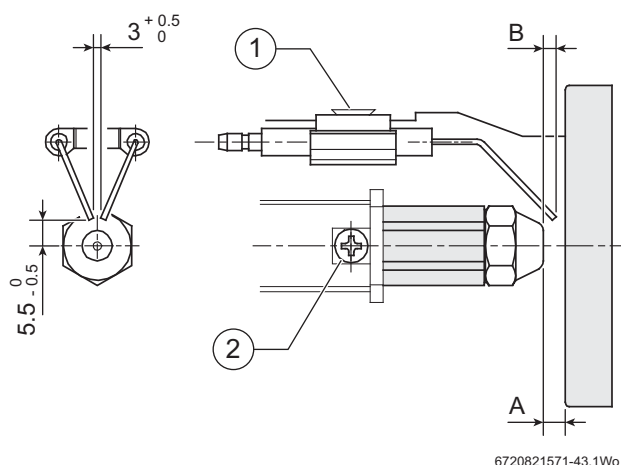


Fig. 44 RDB 3.2 BT electrode settings

A	6.5	+ 0.7/-0.5
B	3.5	± 0.5

Table 16 RDB 3.2 BT electrode settings

6.6 Burner adjustment

6.6.1 Combustion head adjustment

Riello RDB 3.2 BX (32/50)

- Turn the adjustment screw [A] and set the combustion head to the correct output required, refer to table 13.
 - Distance between two notches equals three millimetres
 - e.g. to set 21mm at the combustion head turn the adjustment screw [A] until seven notches are visible from the zero notch
 - e.g. to set 17mm at the combustion head turn the adjustment screw until six notches are visible from the zero [0] notch and then back the adjustment screw off one turn (1mm) to achieve 17mm.
 - One complete rotation of the adjustment screw [A] equals one millimetre of movement at the combustion head
 - All distances are measured from the zero [0] notch to the adjustment assembly face [X]

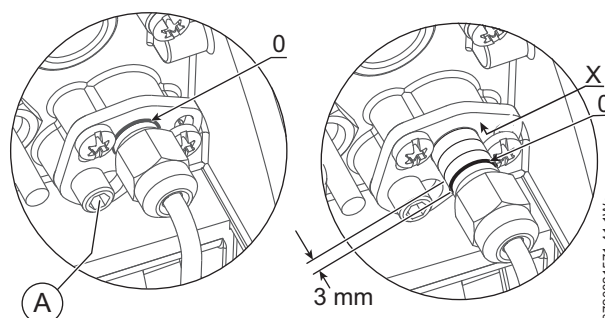


Fig. 45 RDB 3.2 BX combustion head adjustment

Riello RDB 3.2 BT (50/70)

- Loosen the two screws [1] in the ring slots.
- Turn the blast tube until the end of the slotted ring [2] lines up with the notch value [3] for the required output, refer to table 14.
- Tighten the two screws [1], once adjustments have been made.

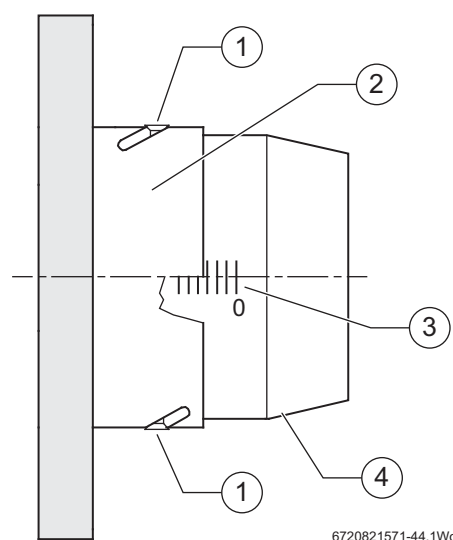


Fig. 46 RDB 3.2 BT combustion head adjustment

- [1] Screws
- [2] Slotted ring
- [3] Combustion head setting notch
- [4] Blast tube

6.6.2 Air damper adjustment

The air damper is factory set according to the values indicated in the burner settings table for the relevant burner (tables 13 and 14). The adjustments are for guidance only.

Each installation, has its own unpredictable working conditions: actual nozzle output; positive or negative pressure in the combustion chamber, the need for excess air, etc.

All these various conditions may require a different air-damper setting.

The damper is used to precisely adjust the input air flow rate.

- Adjust the air damper [2], the setting is displayed in the window [1].

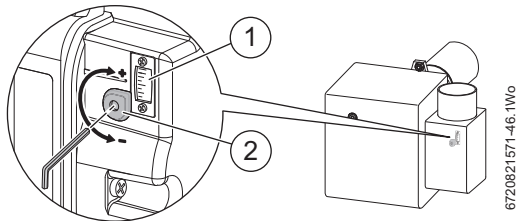


Fig. 47 Air damper adjustment

6.7 Burner commissioning/adjustment completed

- When the burner commissioning/adjustment is completed and the combustion settings are correct:
 - Remove the pressure gauge and refit the blanking plug.
 - Refit the plastic cover.
 - Ensure the oil flexible line/s are routed correctly so to avoid being damaged or trapped.
 - Ensure that the rigid 90° connection at the pump points to the entry point of the oil supply into the appliance when the appliance is viewed from the front.

6.8 Operational checks, system controls

- Turn the appliance thermostat control to maximum.

Check central heating operation

- Open all radiator valves.
- Set the programmer to ON for central heating.
- Set the room thermostat to maximum.
- The burner should be ON along with the circulating pump.
- Ensure all radiators are heating up evenly.
 - Balance the system to the temperature difference required for the heating flow and return according to the heating load.
- Set the room thermostat to minimum.

The burner and circulating pump should be OFF.

Check hot water operation (if applicable)

- Set the programmer to ON for domestic hot water.
- Set the domestic hot water thermostat on the cylinder to maximum.
- The burner should be ON along with the circulating pump.
- Set the domestic hot water thermostat to required temperature.
- Set the programmer to OFF for domestic hot water.

-or-

- Wait for the domestic hot water to reach required temperature or lower the domestic hot water thermostat temperature setting to minimum.

The burner and circulating pump should be OFF.

6.9 Finishing commissioning

Completion of commissioning

When the commissioning has been completed:

1. Locate the bottom edge of front panel onto the supporting ledge on the baseplate.
2. Locate the ball studs into the ball catches [1] and press the top edge of the front in to secure.
3. Locate the rear corners of the top panel onto the tabs and press down firmly on both sides to engage the ball stud catches [2].

Apply pressure at the edges of the appliance panels when securing to avoid accidental damage.

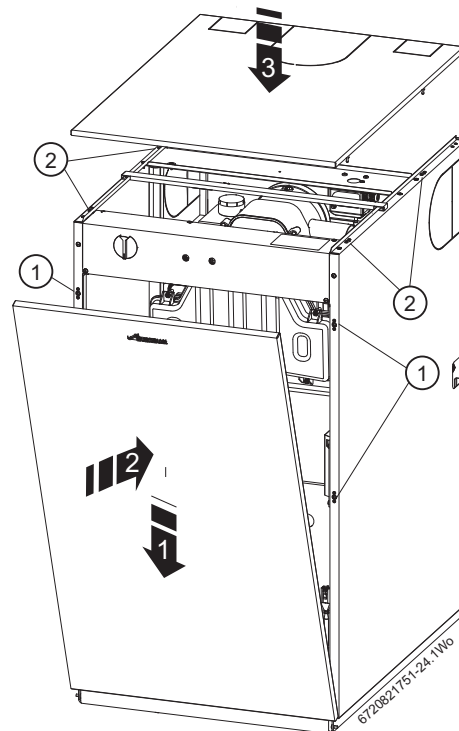


Fig. 48

6.9.1 Appliance hand over

- ▶ Complete the Guarantee Registration Card, Commissioning Checklist and CD11 or an equivalent commissioning form.
- ▶ Set up the appliance controls and show the customer how to operate all the control unit/s for central heating operation.
 - Also show where in the appliance/controls documentation where this information can be found.
- ▶ Where applicable, instruct the customer on:
 - the need to occasionally re-pressurise the appliance and the pressure expected at the pressure gauge.
 - location of the filling loop and system pressure gauge.
 - the use of the filling loop and how to re-pressurise the system.
 - how to employ and set 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 if they call in with a problem.
- ▶ Give the customer details of how to contact the installer/emergency numbers.
- ▶ Show the customer how to safely isolate the appliance.
- ▶ Advise the customer where they can find information on the Worcester, Bosch Group website www.worcester-bosch.co.uk.
- ▶ Advise the customer that outside temperatures will affect the output of the appliance, especially the DHW.
- ▶ Ensure that all documentation, is left with the appliance or homeowner.
 - Appliance documentation.
 - Controls documentation.
 - Any other equipment documentation that is connected to the appliance or system.
- ▶ Appliance not in use
 - If the appliance is not going to be used immediately and may be exposed to freezing conditions, advise the customer of the precautions necessary to prevent damage to the appliance, system and building.
 - 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 in unheated or external areas that may be at risk of freezing during prolonged cold spells.

6.9.2 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.

- The guarantee period for your product/component will vary depending on its type and the accreditation of your installer. To confirm the guarantee period applicable to your product, please visit our website www.worcester-bosch.co.uk.
- The guarantee must be registered within 30 days of installation.
- The householder may be asked to prove the date of installation and that the appliance was correctly commissioned. This should be documented as a part of the Commissioning Checklist.
- The product must be correctly installed and commissioned in accordance with the Installation instruction for your product and meet the requirements of the Benchmark initiative if applicable.
- The product must be maintained, inspected/serviced in accordance with the manufacturer's product instructions by a Bosch Thermotechnology Ltd or other competent Engineer. Proof of inspection/servicing may be required to validate a guarantee.
- During the period of this guarantee any components of the appliance that are proven to be faulty or defective in manufacture will be exchanged or repaired free of charge if repaired directly by Bosch Thermotechnology Ltd.
- Invoices for attendance and repair of this appliance by third parties will not be accepted for payment by Bosch Thermotechnology Ltd.
- That any product or part thereof returned for servicing under the guarantee must be accompanied by a claim stating the Model, Serial Number, Date of Installation.
- That Bosch Thermotechnology Ltd will not accept responsibility for damage caused by faulty installation, neglect, misuse or accidental damage or the nonobservance of the instructions contained in the Installation and Users Instructions leaflets.
- The appliance has been used only for the normal domestic purposes for which it was designed.
- That this guarantee applies only to equipment purchased and used in the United Kingdom of Great Britain and Northern Ireland, the Isle of Man or the Channel Islands.

For full terms and conditions, please visit:

www.worcester-bosch.co.uk/guarantee-terms-and-conditions

Guarantee registration

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

Guarantee Registration can be completed:

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

To read the full Terms & Conditions please visit us on-line at www.worcester-bosch.co.uk/guarantee.

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

7 Inspection and maintenance



DANGER: Risk of 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.
- ▶ Check for zero potential before proceeding with work.



WARNING: Hot surfaces!

If the appliance has been operating components may be hot.

- ▶ Ensure precautions are taken when working on the appliance.



NOTICE: Damage to property!

Water/oil discharge during servicing or maintenance.

- ▶ Isolate the water and the oil supply to the appliance before carrying out work.



NOTICE: Personnel and equipment!

- ▶ Any service work must be carried out by competent registered engineers.
- ▶ Service work must not be attempted if a calibrated CO/CO₂ analyser, manometer, vacuum gauge, pressure gauge and means of reading combustion gas temperature are not available.

7.1 Inspection and maintenance considerations

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

- ▶ Check that the safety and regulation devices (3 bar pressure release valve, air bleed, etc.) are operating properly.
- ▶ Check that neither the installation nor the appliance present with any water or fuel leaks, (leaks may result in a safety risk and shorten the life of the appliance).
- ▶ When it is frequently necessary to add water, in a sealed system, to maintain pressure in the installation, even though no leaks have been discovered, perform an expansion vessel check.
- ▶ Clean or replace all oil filters.
- ▶ Check that the condensate system is not obstructed, clean and refill the condensate trap.
- ▶ Check the condition of the various seals (burner flange, burner door, flue outlet, etc.).
- ▶ Check the flexible oil pipe/s and replace if necessary.
- ▶ Check and clean the burner.
- ▶ Replace the burner oil nozzle.
- ▶ Check the secondary heat exchanger baffle retainer.
- ▶ Check and clean the baffles.
- ▶ Check and clean the heat exchanger and secondary heat exchanger surfaces.
- ▶ Check the combustion chamber access door insulation board.
- ▶ Check that the flue system is unobstructed and undamaged, clean/replace as necessary.

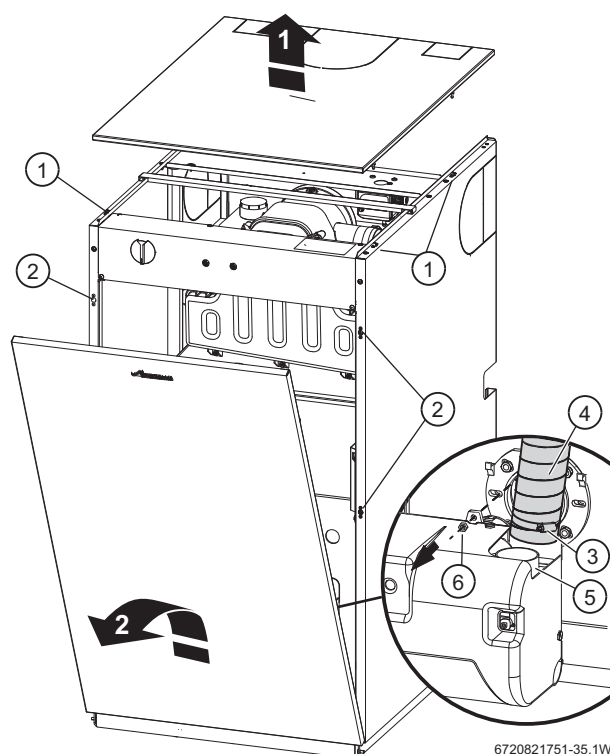
7.2 Preparing for inspection and maintenance

Pre-service checks

1. Lift the front of the top panel up to disengage the ball stud connections [1] and pull the panel towards you to remove.
2. Pull the upper front panel squarely forwards to disengage ball stud connections [2], lift from the bottom edge of the appliance and remove.

Operate the appliance and system and note any faults which may need to be corrected during the service.

- ▶ Switch off and electrically isolate the appliance.
- ▶ Loosen the hose clip [3] to detach the air duct [4] from the burner air intake [5].
- ▶ Unplug the burner lead from control box.
- ▶ Disconnect the oil line(s) to the pump.
- ▶ Remove the burner retainer nut [6].
- ▶ Pull the burner towards you to release the blast tube from the heat exchange and store safely away from the appliance.



6720821751-35.1Wb

Fig. 49

7.3 Appliance maintenance

7.3.1 Secondary heat exchanger

Refer to figure 50.

- Remove the seven screws [1] securing the flue manifold access cover [2].

Checking and cleaning of manifold flue outlet.

- Check:
 - the inside of the outlet with an electric torch.
 - the connection to the flue manifold assembly.
 - the end of the flue through the horizontal or vertical fabric of the property.
 - clean the burner air inlet tube.

Flue system

- Ensure that the flue system is not blocked or restricted.
 - Excessive flue gas system restriction or blockage will cause the air pressure switch to lockout. This will need to be reset once the restriction or blockage has been removed.

Cleaning the secondary heat exchanger.



NOTICE:

- Do not dismantle or move the dip tube [4].

- Remove the baffle retainer and baffles from the secondary heat exchanger.
- Check and if required clean the secondary heat exchanger surfaces with a plastic brush.
 - Ensure the condensate drain point is clear.
 - Ensure the dip tube [4] is clean and there is a gap between the bottom of the dip tube [4] and the flue manifold.



CAUTION: Damage to components!

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

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

- Refit the baffles and retainer [3], making sure the retainer is hooked over the end baffle of both sides.
- Refit the manifold access cover once the cleaning (if required) and baffles and retainer checks are complete.

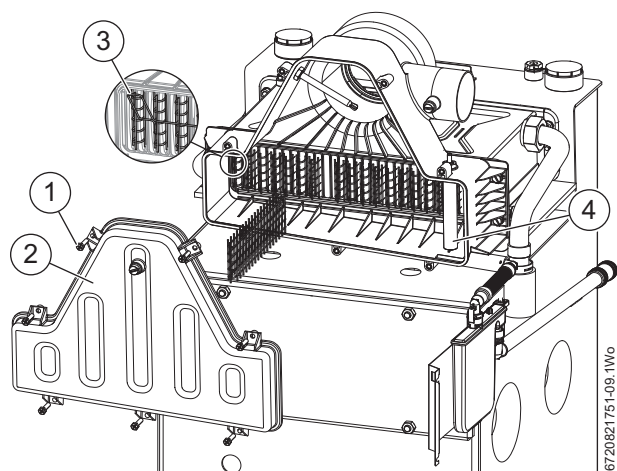


Fig. 50

	SLOTS	DOUBLE BAFFLES	SINGLE BAFFLES
32/50kW	25	12	1
50/70kW	31	15	1

Table 17 Secondary baffles

7.3.2 Replacing the flue manifold



DANGER: Risk to life

Escaping flue gas from an improperly fitted manifold

- Ensure the replacement manifold is correctly fitted, Read all the instructions before commencing work



Only remove and replace the flue manifold if damaged or distorted

To gain access to the flue manifold:

- Remove the manifold access cover
- Loosen the hose clip and detach the air duct
- Disconnect the electrical lead to the dip tube
- Remove the four bolts securing the manifold to the heat exchanger
- Discard the old seal fit the one supplied with the new manifold

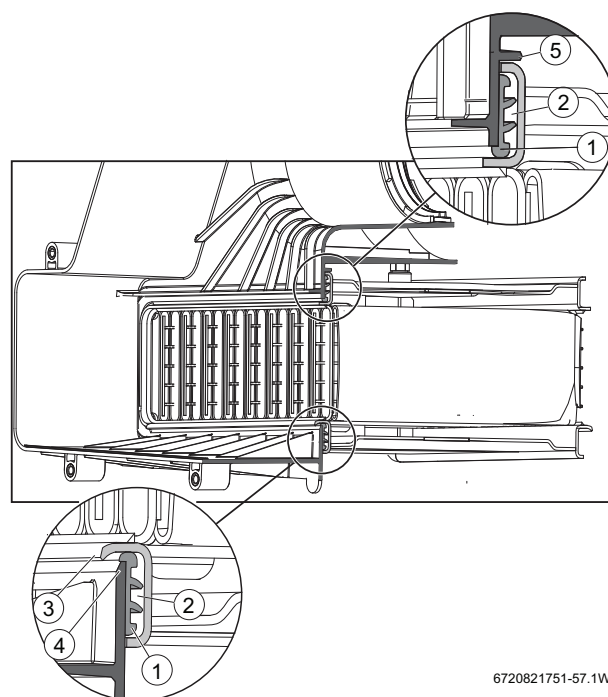


Fig. 51 Cross section of flue manifold and heat exchanger

- [1] Manifold seal
- [2] Mating face of heat exchanger
- [3] Lower protruding edge of heat exchanger
- [4] Lower edge of flue manifold
- [5] Lip on upper edge of manifold

Fitting procedure

- Apply a thin film of grease to the seal [1] and the heat exchanger face [2] to hold the seal in place during the fitting of the manifold

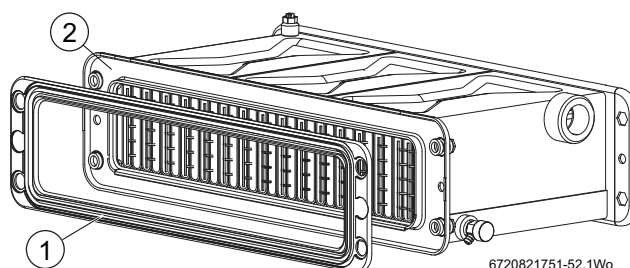


Fig. 52 Seal

- Identify the protruding lower edge [3] of the heat exchanger

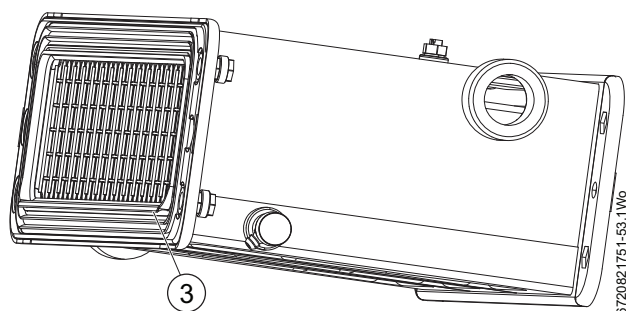


Fig. 53 Protruding edge

- Present the lower edge of the flue manifold [4] to the lower edge of the heat exchanger and ensure that the flue manifold edge [4] is located under the protruding edge [3] of the heat exchanger

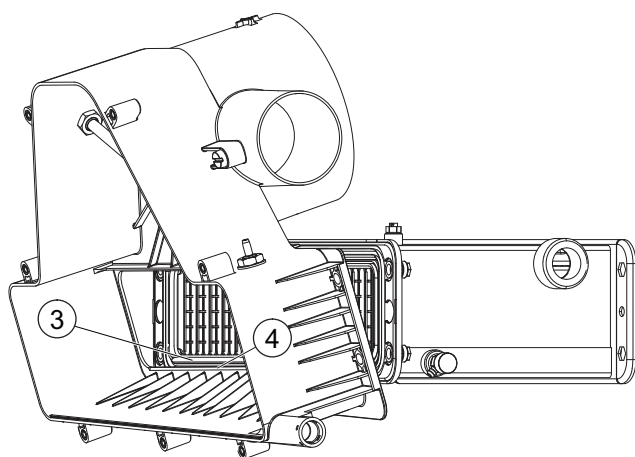


Fig. 54 Locate on bottom edge

- With lower edge of the flue manifold in place, rotate the manifold up to the heat exchanger ensuring that the lip [5] on the flue manifold is on top of the heat exchanger as shown in figure 55.

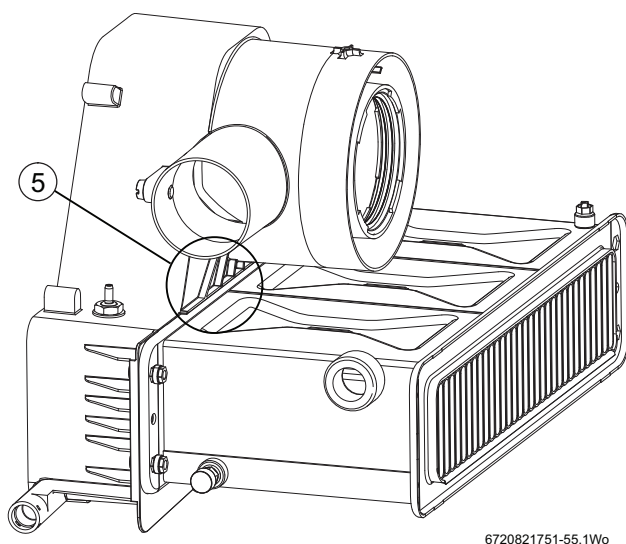


Fig. 55 Locate lip of flue manifold

- Tighten the four bolts [6] gradually in a rotating sequence until the flue manifold is securely seated on the Heat exchanger.

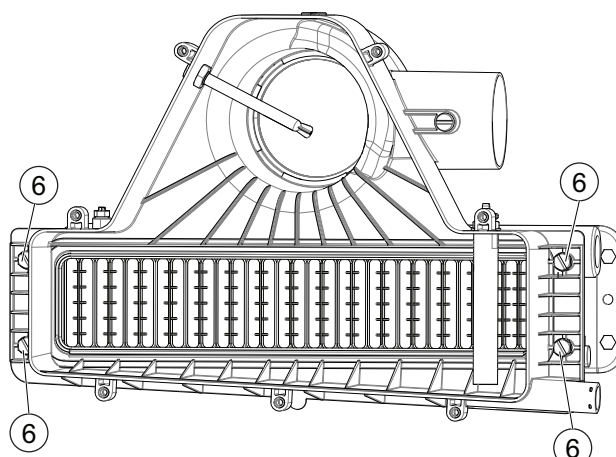


Fig. 56 Tighten bolts

7.3.3 Combustion chamber

- Remove the six retaining nuts and washers [1].
- Remove combustion chamber access door [2]
- Check that the combustion chamber seal [3] is in good condition replace if necessary.
- Remove the baffle [4], check the condition of the baffle, clean or replace as necessary.
- Thoroughly clean all of the heat exchanger surfaces using a suitable brush and clear all loose debris from the combustion chamber.
- Refit the baffle, ensuring it is fitted correctly.
- Check the condition of the combustion chamber access door insulation. If the insulation is damaged the door assembly must be replaced.
- Refit combustion chamber door [2].

IMPORTANT: Secure with nuts and washers [1] and tighten gradually in the sequence shown in figure 57, do not over tighten the nuts.

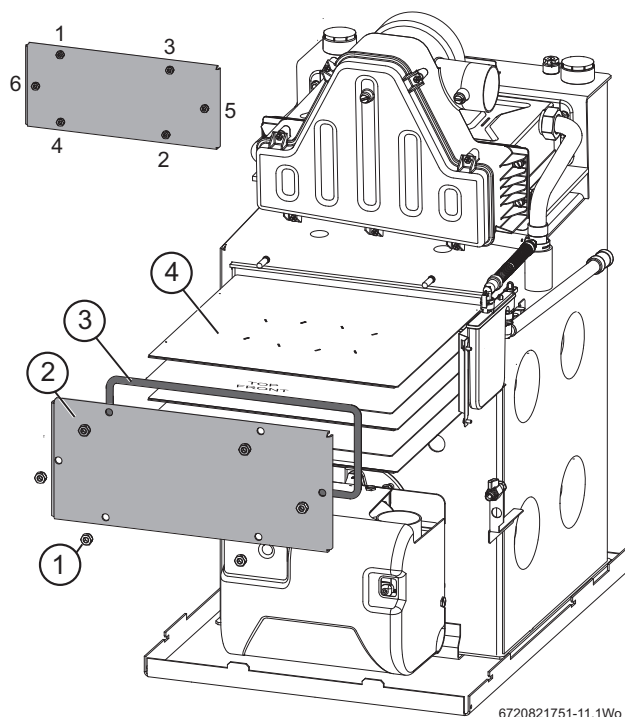


Fig. 57

7.3.4 Condensate trap

- Check the discharge pipe for leaks or damage.

Condensate trap removal:

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

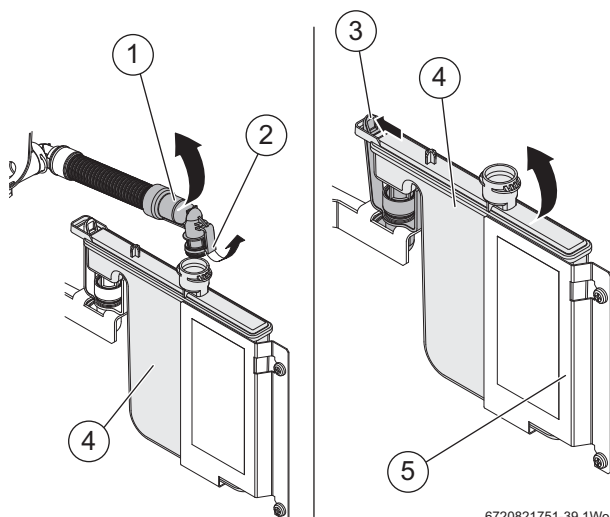


Fig. 58

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.

7.4 Burner maintenance

7.4.1 Maintenance frequency



Notes on safety for maintenance.

- The periodic maintenance is important for safety, good operation and long life cycle of the burner, reducing also consumption and polluting emissions.

The burner must be serviced at least once a year. Only qualified and authorised personnel shall carry out maintenance and the calibration of the burner, in accordance with this manual and in compliance with the local standards and regulations.

Before carrying out any maintenance operation:

- Disconnect the electrical supply.
- Close the fuel isolation valve.
- Pay attention to hot burner components.

7.4.2 Maintenance considerations

- Clean fan and housing and check for damage.
- Check and clean the combustion head.
- Replace the oil nozzle.
- Check the ignition electrodes, readjust or replace as necessary.
- Refit the combustion head.
- Ensure that the electrode settings are correct.
- Check the pump filter and clean if necessary.
- Check and clean the oil filters, replace if necessary.
- Check the condition of the flexible oil hoses and replace if necessary.
- Check oil supply components (pipes, pumps, oil feed pipe) and their connections for leaks or signs of wear, replace if necessary.
- Check electrical connections and connection cables for damage, replace if necessary.
- Remove water or contaminants, if present, in the fuel tank.
- Refit the burner.
- Start the burner, check the flue gas data, correct burner settings if necessary.



NOTICE: Risk of oil leak!

Possibility of leakage due to ageing of oil supply pipe/s.

- Check the standard flexible oil supply pipe/s at every annual service and replace if necessary.

- Check the O-ring seal located around the combustion head and replace if necessary.



DANGER: Risk of escaping combustion gasses!

Leakage of combustions gasses from damaged or missing combustion head seal.

- Always check the seal around the combustion head before refitting the burner combustion head through the flange of the appliance.

7.4.3 Fan and housing cleaning


CAUTION:

- ▶ Ensure that no dust has accumulated inside the fan or on its blades, as this condition can cause a reduction in the air flow rate, resulting in incomplete combustion.

- ▶ Loosen the two Allen screws and remove the air intake cover and clear any debris from the air intake and air damper.
- ▶ Note the position of the air damper adjustment and check the air damper moves freely.
- ▶ Note the position of the air damper disc and clean if necessary.
- ▶ Loosen the four Allen screws to disassemble the burner to allow access to the impeller.
- ▶ Check the condition of the gaskets between these parts and replace is necessary.
- ▶ Clean both sides of the impeller and remove any debris from the burner housing.
- ▶ Check the impeller rotates freely.
- ▶ Reassemble the components.

7.4.4 Photocell cleaning

- ▶ Withdraw the photocell from its housing and wipe clean and replace into the housing.

7.4.5 Combustion head maintenance and nozzle replacement

- ▶ Disassemble the combustion head from the burner and verify that all components are in good condition, dirt and soot free and correctly positioned.
- ▶ Clean the combustion head.
- ▶ Verify the position of the electrodes.
- ▶ Replace nozzle.



NOTICE: Do not dismantle the oil nozzle or clean the oil nozzle tip.

- ▶ It is recommended that the oil nozzle is replaced at every annual service.



NOTICE: For safe and efficient operation.

- ▶ Only use the specified/recommended oil nozzles.



NOTICE: Always check the position of electrodes after having replaced the oil nozzle.

An incorrect position could cause ignition troubles.

- ▶ After refitting the blast tube, check that the electrode gaps are correct.

Riello RDB 3.2 BX (32/50)

- ▶ To remove the blast tube [1], loosen the three screws [2] from the collar and remove the blast tube.
- ▶ To disconnect the electrode cables [6], loosen the screw [8] and disconnect the electrode cables.
- ▶ Remove the electrode-stabiliser unit [3].
- ▶ Secure the nozzle-holder [7] in position with a spanner and with another spanner remove the nozzle [4].
- ▶ Still securing the nozzle holder [7] with the spanner, fit a new nozzle and tighten with the other spanner.
- ▶ Reconnect the electrode cables [6] and tighten screw [8] to secure.
- ▶ Reassemble the electrode-stabiliser unit [3].
- ▶ Replace the blast tube [1] and tighten the three screws [2] to secure.
- ▶ Check that the combustion head setting is correct for the output of your appliance, refer to table 13 for the correct setting.
- ▶ Check the alignment of the electrodes, refer to section 6.5.2 for the correct settings.

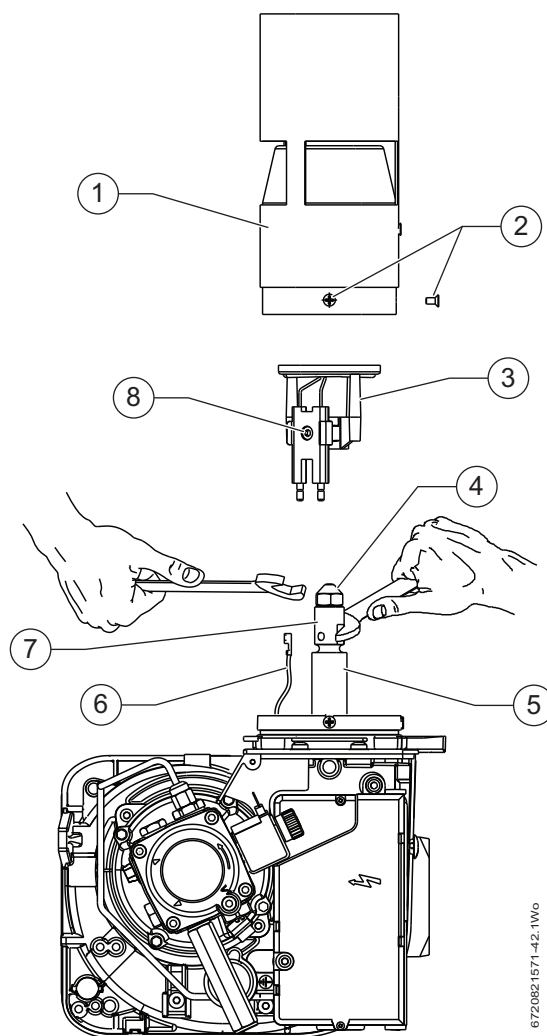


Fig. 59 Riello RDB 3.2 BX maintenance position

Riello RDB 3.2 BT (50/70)

- ▶ To remove the blast tube [1] loosen the fixing screws [2] and remove the blast tube.
- ▶ Disconnect the cables [5] from the electrodes [6].
- ▶ To remove the diffuser disc-holder assembly from the nozzle-holder [4], loosen the retaining screw [3].
- ▶ Secure the nozzle-holder [7] in position with a spanner and with another spanner remove the nozzle.
- ▶ Still securing the nozzle holder with the spanner, fit a new nozzle and tighten with the other spanner.
- ▶ Reconnect the cables [5] to the electrodes [6]
- ▶ Reassemble the diffuser disc-holder assembly onto the nozzle holder and secure with the retaining screw [3].
- ▶ Refit the blast tube [1] and secure with the screws [2]
- ▶ Check that the combustion head setting is correct for the output of your appliance, refer to table 14 for the correct setting.
- ▶ Check the alignment of the electrodes, refer to section 6.5.2 for the correct settings.

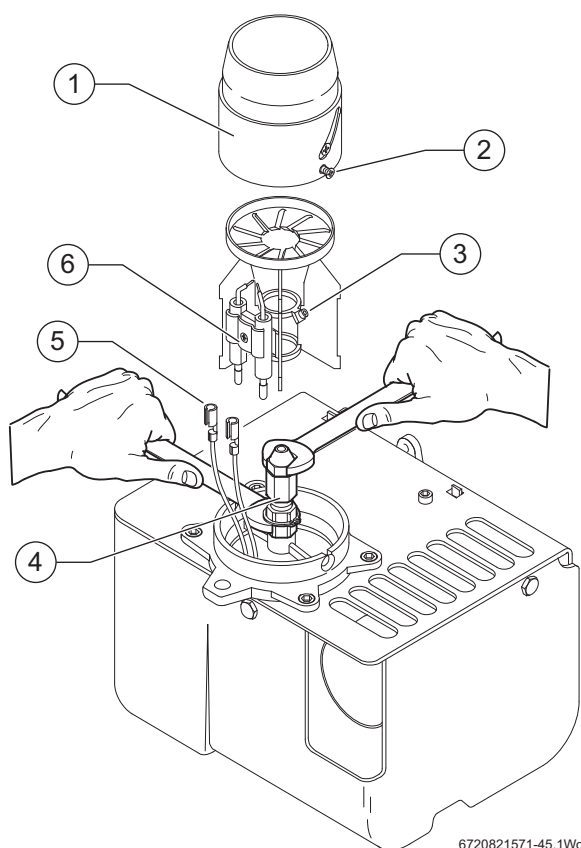


Fig. 60 Riello RDB 3.2 BT maintenance position

7.4.6 Oil pump

- ▶ Verify the pump pressure.
 - In case of anomalies check the oil filter and the oil supply line.
- ▶ Check the internal pump filter and clean if clean if necessary.

7.4.7 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.

7.5 Re-commission the burner



WARNING: Flue gas leakage

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

- ▶ Unless the burner is level when pushing the burner into the flange the O ring may not seat properly allowing flue gas to escape! The retaining nut may not pull the burner into the flange. The burner must be fully engaged in the flange before the retaining nut is fitted and tightened
- ▶ Always check that the O-ring seal is in good condition before fitting the burner. Replace the O-ring seal if defective.



Combustion and burner settings

- ▶ Combustion and burner settings refer to section 6.5, they contain the settings and adjustment details for the burner.
- ▶ For the operation check of the burner refer to section 6.4.6.
- ▶ For full details on burner commissioning check refer to section 6.4.5.

- ▶ Fit a suitable pressure gauge and a vacuum gauge on the oil pump.
- ▶ Slide the burner into position in the heat exchanger and secure with the retaining nut on top of the burner.
- ▶ Reposition the flexible air supply tube over the burner air supply connection.
 - Secure the flexible air supply tube in place with the hose clamp.
- ▶ Plug the burner lead into the control box.
- ▶ Create a demand:
- ▶ Run the appliance for approximately 10 minutes uninterrupted before re-commissioning the burner.
- ▶ Check:
 - Oil pressure is correct for the required appliance output.
 - Bacharach (smoke) reading is between 0 -1.
- ▶ If the Bacharach (smoke) reading is above 1:
 - Check the air settings
- ▶ If the air setting is correct:
 - Check that the burner has been reassembled correctly

Allow the appliance to warm up then:

- ▶ Ensure that the CO₂ levels are correct as indicated in the burner settings data table.
 - Adjust the CO₂ if necessary using the air damper.
- ▶ Check the flue gas temperature are close to the values in the burner settings data table.
 - If the flue gas temperature is too high and the baffles are correctly fitted, then reduce the oil pump pressure 5-10 p.s.i. (0.35-0.67 bar) to compensate for oil nozzle variations.

When the combustion settings are correct:

- ▶ Remove the pressure gauge and refit the blanking plug.
- ▶ Refit the plastic cover.

Before hand over

- ▶ Ensure the oil flexible line/s are routed correctly so to avoid being damaged or trapped.
- ▶ Ensure that the rigid 90° connection at the pump points to the entry point of the oil supply into the appliance when the appliance is viewed from the front.

Refit panels

1. Locate the bottom edge of front panel onto the supporting ledge on the baseplate.
2. Locate the ball studs into the ball catches [1] and press the top edge of the front in to secure.
3. Locate the rear of the top panel onto the tabs and press down firmly to secure the ball stud catches [2].

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

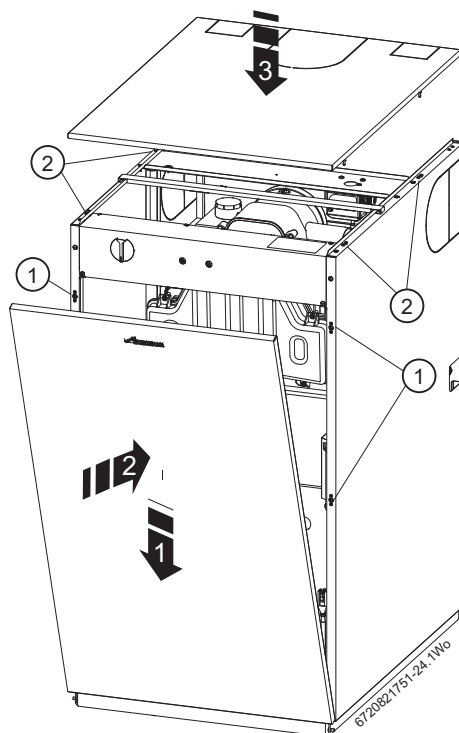


Fig. 61

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 appliance and drain the system and appliance, including the secondary heat exchanger.

7.6 Spare parts



WARNING: Mains supplies - Isolate the appliance

- ▶ Turn off the oil supply and isolate the mains electrical supply before starting any work and observe all relevant safety precautions.
- ▶ Drain the appliance/system where necessary and protect any electrical equipment from water ingress during component replacement.



Only use Worcester, Bosch Group original spare parts with this appliance. Non Worcester, Bosch Group spare parts will invalidate the guarantee (if applicable) and any warranty.

- ▶ A comprehensive list of appliance spares can be found in the Spares Booklet.
- ▶ Alternatively refer to the website at www.worcesterbosch.co.uk/spares

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
LOCKOUT		
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
	Combustion settings incorrect	Set up as in installation instructions
	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 appliance
	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
BURNER FAILS TO START:	No power to appliance	Check electrical / control circuit
	Programmer open circuit	Check programmer
	Faulty appliance thermostat	Check by temporarily linking out high limit and control thermostats
	Faulty control box	Replace
HIGH SMOKE NUMBER:	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
FAULTY APPLIANCE OPERATION		
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	No primary water circulation	Check system / circulating pump
	Short circuit appliance thermostat	Temporarily take out of circuit to check
	Thermostat bulb not fully home in pocket	Ensure bulb is pushed fully home
	Faulty appliance thermostat	Replace if necessary
Short Cycling	External controls not operating correctly	Check and correct external controls
	Appliance thermostat differential incorrect	Replace appliance thermostat
	Burner rating incorrect	Correct burner rating
OIL SMELLS:	Blocked flue, fumes on startup	CF - Check flue with gauge and check seals/gaskets RS - Check seals/gaskets
	Oil soaked appliance, faulty burner operation, numerous lockouts	Rectify burner operation and lockouts
	Odour in appliance room, oil leaks from pipework, flexible hoses connections	Rectify oil leaks, replace components if necessary

8.2 Burner fault indicator diagnostics

When the lockout LED illuminates, the burner will attempt to restart only after pressing the reset button. After that, if the burner is working properly, the trip can be attributed to a temporary fault that is not dangerous.

Otherwise, if the trip persists, the cause of the fault must be sought and the solutions indicated in Table must be implemented.

Problem	Possible cause	Fault indicator	Possible solution/check
The burner does not start when there is heat demand.	Lack of electrical supply,	OFF	► Check presence of voltage on the L - N pin plug
			► Check the conditions of the fuses
			► Check the safety thermostats are not in lockout
	The flame detector sees extraneous light.	■▲■▲	► Eliminate the extraneous light
	The connections in the control box are wrongly inserted.	OFF	► Check and correct all the plugs and sockets properly
The pre-heater link is missing or incorrectly fitted.	■□■□	► Check and connect link correctly/replace link	
The burner goes into lockout mode before or during the pre-purging.	The flame detector or sees extraneous light.	▲△▲△	► Check for and eliminate any extraneous light
Burner runs normally in the pre-purge and ignition cycle and looks out after about 5 seconds.	The photocell is dirty.	Red Steady ON	► Clean it
	The photocell is faulty.		► Replace it
	Flame moves away or fails.		► Check pressure and output of the fuel
			► Check air output
			► Check oil nozzle
Burner starts with an ignition delay	The ignition electrodes are damaged or incorrectly positioned.	OFF	► Check the coil of solenoid valve
			► Replace the blast tube and electrode assembly
			► Set the air output according to the instructions of this manual
	Oil nozzle dirty or worn		► Replace it

Table 18 Burner fault indicator diagnostics

Key to symbols

ON	OFF	Colour code
▲	△	Red
■	□	Green

Table 19

8.3 Riello control box

8.3.1 Control box LED codes

Lockout types (burner in lockout)	
Refer to Fault finding chart, section 8.3.2, go to line number on chart	
RED steady ON Lockout for no flame after safety time	[3]
RED 0.5 seconds ON/ RED 0.5 seconds OFF Lock out for false flame signal	[5a]
RED 0.2 seconds ON /RED 0.2 seconds OFF Lock out for maximum number of flame loss re-lights	[9]

Table 20

Lockout types (burner in lockout)	
RED 2.5 seconds ON / ORANGE 0.5 seconds ON Lock out for fan motor failure	[3d]
RED 2.5 seconds ON / GREEN 0.5 seconds ON Lock out for oil valve circuit driver failure	[8c]
ORANGE 0.5 seconds ON / GREEN 0.5 seconds ON Lock out for EEPROM failure	Replace control box
Red 0.5s ON / Red 2.5s OFF Max pre-heat time exceeded (10 minutes)	[2]

Table 20

Anomaly types (Burner in stand-by)	
Green 0.5 s ON / Green 2.5 s OFF Pre-heating time	Fit pre-heat link
Green 0.5s ON / RED 0.5s ON Extraneous light	Lock out after 25s
Orange steady ON Abnormal frequency supply	When an anomaly appears during: ► pre-purge. the burner remains in pre-purge. ► after ignition, burner remains in operation. When anomalies disappear the burner re-starts
Orange 0.2s ON / Green 0.2s ON Control box internal error	

Table 21

Anomaly types (Burner in stand-by)	
Green 0.2s ON / Red 0.2s ON Reset pushbutton or remote reset failure	Remote reset / pushbutton is activated for more than 60 seconds. When anomaly appears the burner does not stop

Table 21

Last lockout memory feature

The control box allows the last lockout that happened to be displayed. Access to this function is possible in both STANDBY and OPERATING status.

- Keep the button pressed for 25 seconds = $t < 30$ seconds
- Release the button.

LED displaying the type of lockout memorised for 10 seconds

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

8.3.2 Fault finding

Line	Check	Action
1	Control box is supplied with heat demand?	Yes
		No
2	Is the pre-heater fitted or if no pre-heater is fitted, is the link fitted?	Yes
		No
3	Motor starts after initialization check time 3.5 seconds?	Yes
		No
	3a Green 0.5 seconds ON/Red 0.5 seconds ON before lockout?	Yes
		No
	3b Fan motor or oil pump seized?	Yes
		No
	3c 230 Volts to motor across blue and black motor wires?	Yes
		No
	3d Approximately 35 Ω across blue and black motor wires?	Yes
		No
4	Motor runs for less than 12 seconds?	Yes
		No
	4a Motor gives 50 Volts a.c. across black and white wires?	Yes
		No
5	Burner does not fire, burner locks out after 25 seconds from motor start?	Yes
		No
	5a Burner fires when the photo cell is covered?	Yes
		No
	5b Photo cell voltage $\geq 3.8V$ in the dark and approximately 0V in the light?	Yes
		No

Table 22

Line	Check		Action	
6	Pump washing pressure 1 to 2 bar?		Yes	Go to line 7
			No	Go to line 6a
	6a	Pump pressure more than 6 bar?	Yes	Replace oil pump
			No	Go to line 6b
	6b	Check oil supply to the pump, if oil supply is OK	Go to line 6c	
	6c	Drive coupling broken?	Yes	Replace drive coupling
No			Replace oil pump	
7	Ignition spark present?		Yes	Go to line 8
			No	Go to line 7a
	7a	Are ignition leads and electrodes OK and set correctly?	Yes	Replace control box
			No	Replace/reset electrodes/ignition leads
8	Solenoid coil releases working pressure?		Yes	Go to line 9
			No	Go to line 8a
	8a	Does burner light or green 0.5 seconds ON/red 0.5 seconds ON before lockout?	Yes	Go to line 5a
			No	Go to line 8b
	8b	Contaminated fuel filters?	Yes	Clean/Replace filters
			No	Go to line 8c
	8c	Coil lead OK	Yes	Go to line 8d
			No	Replace solenoid coil lead
	8d	Solenoid coil resistance 90 to 110 Ω	Yes	Go to line 8e
			No	Replace solenoid coil
8e	After 15 seconds from motor start, 25 to 30 Volts d.c. to solenoid coil? (coil connected)	Yes	Replace oil pump	
		No	Replace control box	
9	Air set correctly?		Yes	Go to line 10
			No	Adjust combustion air settings
10	Does the burner light? Flue damper fitted? (if required)		Yes	Go to line 11
			No	Go to line 10a
	10a	Is the nozzle atomising the fuel?	Yes	Go to line 11
			No	Go to line 10b
	10b	Nozzle new?	Yes	Go to line 10c
			No	Replace nozzle
10c	Check oil pipe from pump to nozzle holder	Clean/ replace pump and fuel line filters		
11	Combustion head set correctly?		Yes	Go to line 11a
			No	Reset combustion head
	11a	Flame goes out then re-lights	Yes	Go to line 11c
			No	Go to line 11b
	11b	Boiler or flue blocked	Yes	Clear blockage
			No	Go to line 11c
	11c	If balanced flue, remove the snorkel and test - now OK?	Yes	Go to line 11d
			No	Go to line 11e
	11d	Balanced flues can recirculate gases causing recycling	Check the air intake with an analyser for the presence of re-circulating flue gases (CO ₂ and CO), if any re-circulation is present, check the flue position and seals	
	11e	Photo cell voltage ≥ 3.8V in the dark and approximately 0V in the light?	Yes	Replace the control box
No			Replace photocell	

Table 22

8.3.3 Flame sensing photocell

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

- ▶ Electrically isolate the burner
- ▶ Remove the photocell
- ▶ Connect a voltmeter across the blue and brown wires to the photocell
- ▶ Reconnect the power to the burner and wait until the burner locks out due to the false flame fault (red and green LEDs blinking)

- ▶ Cover the photocell to exclude any light and the voltmeter should read 3.8 Volts or higher
- ▶ Expose the photocell to light and the voltmeter should read approximately 0 Volts
- ▶ If these two conditions are not met, change the photocell
- ▶ Disconnect the voltmeter
- ▶ Disconnect the burner and replace the photocell

8.4 Oil supply vacuum testing

A vacuum gauge can be attached to the oil pump vacuum test port [1] and the appliance 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.

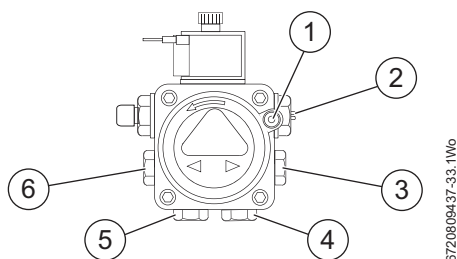


Fig. 62 Oil pump ports/connections

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

8.5 Air pressure switch connections



NOTICE: APS pressure sensing tubes

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



Air pressure switch sensing tube connections:

- ▶ Ensure that the sensing tubes are connected correctly, refer to figure 63.

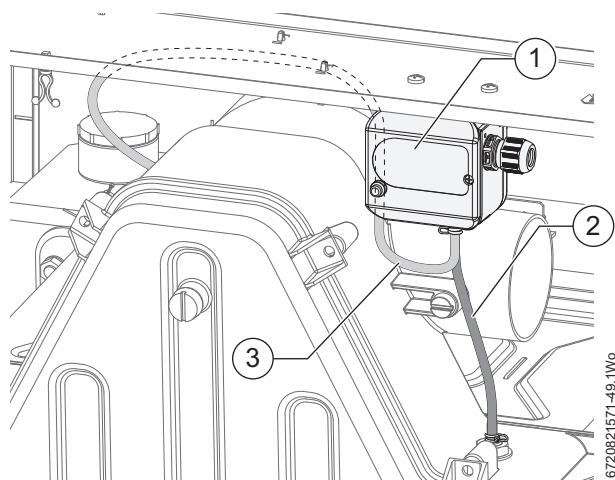


Fig. 63

- [1] Air Pressure Switch
- [2] Air intake connection (front APS connection)
- [3] Flue exhaust connection (rear APS connection, marked with a +)

8.6 Appliance reset

8.6.1 Appliance reset buttons

Air pressure switch reset [1]

Flue system restriction or blockage will cause the air pressure switch to trip bringing the appliance into a lockout state.

- ▶ Clear the restriction or blockage.
- ▶ Reset by pressing the protruding button [4] on the air pressure switch [1].

Flue overheat reset button [2]

If the flue-gas temperature exceeds the cut-off set point the appliance will lockout,

- ▶ When the flue has cooled down, reset by pressing the protruding cross button, the button will click when a reset is possible.

Appliance overheat reset button [3]

If the appliance temperature exceeds the cut-off set point the appliance will lockout,

- ▶ When the appliance has cooled down, reset by pressing the protruding cross button, the button will click when a reset is possible.

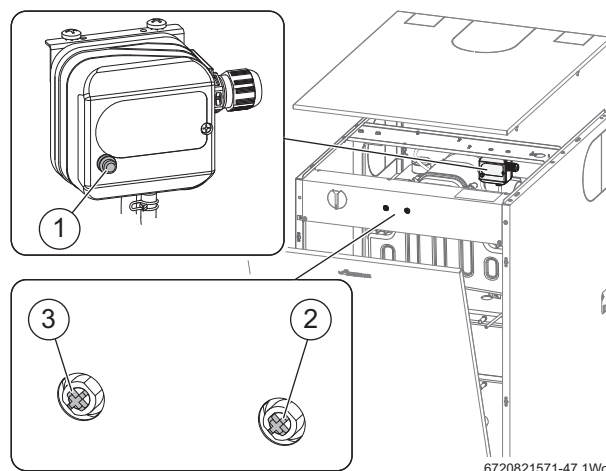


Fig. 64 Appliance reset button locations

8.6.2 Burner reset button

The burner is located in the lower third of the appliance, the burner reset button will illuminate if the burner is in a lockout state.

- ▶ Reset the burner by pressing the illuminated button.

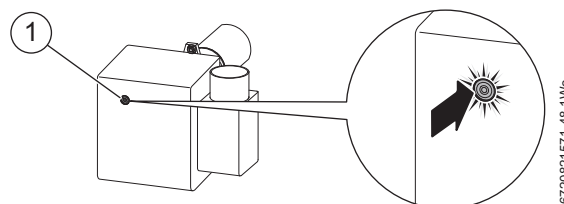


Fig. 65 Burner lockout indicator and reset button

8.7 Oil appliance commissioning checklist

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



IMPORTANT

- ▶ Leave this manual with the Homeowner or at the appliance.

Appliance details

Appliance make and model:

Appliance serial number:

Commissioning Engineer

Company name:

Company address:

Telephone number:

Commissioned by (signature)

(print name)

Commissioning date:

Commissioning checks

Oil type used is Kerosene

Yes ☐

Pump pressure

Bar/psi

CO₂

%

CO

ppm

CO/CO₂ ratio

Smoke reading

Flue gas temperature

°C

Flue pressure

Burner model:

Controls: Tick the appropriate boxes

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

All Systems

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

What system cleaner was used?

What inhibitor was used? Quantity litres

Has a system filter been fitted? Yes ☐ No ☐

The condensate drain has been installed in accordance with the manufacturer's instructions and/or BS5410? Yes ☐

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

Central Heating mode: Measure and record

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

Combination boilers only

Domestic Hot Water mode: Measure and record

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

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

What type of scale reducer has been fitted?

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

Water flow rate l/min

All installations

Fire valve fitted rated to 85 °C. Yes ☐

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

If required, is the flue damper correctly fitted? Yes ☐ No ☐

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

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

Does the installation comply with current OFTEC Regulation? Yes ☐ No ☐

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

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

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

8.8 Service interval record

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

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

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

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

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

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

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

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

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

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

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

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

General checks

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

Boiler runs straight to lockout

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

No domestic hot water

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

No central heating

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

WORCESTER, BOSCH GROUP:

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

Worcester, Bosch Group
Cotswold Way, Warndon, Worcester WR4 9SW.
Tel. 0330 123 9559

Worcester, Bosch Group is a brand name of Bosch Thermotechnology Ltd.
worcester-bosch.co.uk

6 720 821 751 (2020/09)



WORCESTER
Bosch Group