

Grant Vortex Eco

**External and System Floor Standing Condensing Oil Boiler Range
Installation and Servicing Instructions**



Important Note

For use with Kerosene* only.

After installing the boiler leave these instructions with the User.

This appliance is deemed a controlled service and specific regional statutory requirements may be applicable.

*Operation on Bio-fuel

All Grant Vortex Eco condensing boilers, manufactured since May 2011, are suitable for operation on both standard kerosene (Class C2 to BS2869) and also bio-kerosene – up to a 30% blend (B30K).

All burner settings and nozzle sizes (as detailed in Section 2.3 of this manual) are correct for both standard kerosene and bio-kerosene (B30K).

In order to operate this boiler on bio-kerosene it will be necessary to take the following actions:

- Use a bio-kerosene (B30K) compatible flexible oil line in place of the oil line supplied with this boiler.
- Have your oil storage tank and oil supply line (including all pipework, sight gauges, filters, isolating valves, fire valves, ed-aeration devices, etc.) checked for their compatibility with bio-kerosene (B30K).
Where necessary some, or all, of these items may have to be replaced with a bio-kerosene compatible alternative.
- Check the suitability of the flue system with Grant UK.
- Use only bio-kerosene (B30K) that conforms to OPS24.

IMPORTANT

Under no circumstances should the boiler be used with bio-kerosene without the above actions being taken first.

Date: _____

Commissioning Engineer: _____

Tel. No: _____

Boiler model: _____

Boiler output: _____ kW

Fuel type: Kerosene / Bio-Kerosene

Nozzle size: _____

Pump pressure: _____

Air setting: _____

Flue gas % CO₂: _____

Net flue gas temp: _____

Smoke No: _____

System flushed: yes / no

Corrosion inhibitor added: yes / no

Antifreeze added: yes / no

For Sealed systems only:

Expansion vessel size: _____ litres

Expansion vessel charge pressure: _____ bar

Sealed system fill pressure (cold): _____ bar

Service Log

It is recommended that the boiler should be regularly serviced, at least once a year, and the details entered in the Boiler Handbook by the service engineer.

Declaration of Conformity

We declare that the Grant VORTEX range of Oil Boilers equipped with Riello RDB burners approved to EN 267: 1999 satisfy the requirements of the following European Directives:

1. 89/336/EEC - Electromagnetic Compatibility Directive
Referred to the generic standards EN 55014: 1993, EN 50082: 1: 1992
2. 73/23/EEC - Electrical Equipment Safety Regulations Directive
Referred to the generic standard NO: 3260: The Electrical Equipment (Safety) Regulations: 1994
3. 92/42/EEC - Hot Water Boiler Efficiency Directive
Referred to the generic standard The Boiler (Efficiency) (Amendment) Regulations 1994 (SI 1994/3083)



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This manual is accurate at the date of printing but will be superseded and should be disregarded if specifications and/or appearances are changed in the interests of continued product improvement.

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1 Introduction

This manual is intended to guide Installers who have completed the Grant Wood Pellet Boiler Installer training course on the installation, commissioning and servicing of the Grant Spira Condensing Wood Pellet Boiler.

A separate manual is available to guide users in the operation of the boiler.

The following special text formats are used in this manual for the purposes listed below:



Warning of possible human injury as a consequence of not following the instructions in the “warning”.



Caution concerning likely damage to equipment or tools as a consequence of not following the instructions in the “Caution”.



Used for emphasis or information not directly concerned with the surrounding text but of importance to the reader.

1.1 How a Condensing Boiler Works

During the combustion process, hydrogen and oxygen combine to produce heat and water vapour. The water vapour produced is in the form of superheated steam in the heat exchanger. This superheated steam contains sensible heat (available heat) and latent heat (heat locked up in the flue gas). A conventional boiler cannot recover any of the latent heat and this energy is lost to the atmosphere through the flue.

The Grant Vortex Eco condensing boiler contains an extra heat exchanger which is designed to recover the latent heat normally lost by a conventional boiler. It does this by cooling the flue gases to below 90°C, thus extracting more sensible heat and some of the latent heat. This is achieved by cooling

the flue gases to their dew point (approximately 55°C).

To ensure maximum efficiency, the boiler return temperature should be 55°C or less, this will enable the latent heat to be condensed out of the flue gases.

- The boiler will achieve net thermal efficiencies of 100%.

To achieve maximum performance from the Grant Vortex Eco boiler, it is recommended that the heating system is designed so that a temperature differential of 20°C between the flow and return is maintained. The use of modulating circulating pumps (now widely available) and effective control systems should be considered.

The Grant VORTEX Eco boiler will however still operate at extremely high efficiencies even when it is not in condensing mode and therefore is suitable for fitting to an existing heating system without alteration to the radiator sizes. The boiler is capable of a maximum flow temperature of 75°C.

1.2 Boiler Description

Grant Vortex Eco External modules have an insulated weatherproof enclosure made of galvanised steel with a powder coated finish, and are designed for external installation, either against a wall or free standing some distance away from the property, as required.

The External modules are part of the Grant range of automatic pressure jet oil boilers which have been designed for use with a fully pumped central heating system with indirect domestic hot water cylinder. They are not suitable for use with either a direct cylinder or a 'primatic' cylinder or gravity hot water.

The boilers are suitable for use on open vented or sealed central heating systems.

All models are supplied with the control panel and burner factory fitted.

The factory fitted low level discharge flue system can be adjusted on site for either rear, left hand or right hand flue outlet position as required.

An external conventional flue (Green system (Figure 9-2) is also available from Grant UK. Refer to Section 9.2 for further details.

A Hybrid flue (Green/Orange) system (Figure 9-3) is also available which allows the External module to utilise an existing chimney stack. Refer to Section 9.3 for further details.

Where an existing chimney is to be lined - Grant recommends the use of the Grant 'Orange' flue system, specifically designed for the Vortex range of condensing boilers. Refer to Section 9.3 for further details.

Where a rigid conventional flue is required, Grant recommends the use of the Grant 'Green' and 'Orange' flue system components. As no flue adaptor is supplied with the boiler it will be necessary to purchase the correct Grant Starter Elbow in order to connect this system to the boiler. Refer to Section 9 for further details.

The 'Green' and 'Orange' system components can be used to construct a flue of maximum vertical height 19 metres.



The flue system materials and construction MUST be suitable for use with oil-fired condensing boilers. Failure to fit a suitable conventional flue may invalidate the guarantee on the boiler.

A horizontal system - see Figure 9-4, is also available up to 4 metres - components available:

- Straight starter
- Extensions 150 mm, 250 mm, 450 mm and 950 mm
- Adjustable extension 195 to 270 mm
- 45° elbow
- Straight terminal

Green system

Standard external high level/vertical flue starter kit - components available:

- External starter kit, straight or elbow
- Extensions 150 mm, 250 mm, 450 mm, 950 mm
- Adjustable extension 195 to 270 mm
- 45° elbow
- High level terminal
- Vertical terminal

1.3 Boiler Components

All burners are pre-set for use with kerosene and are supplied ready to connect to a single pipe fuel supply system with a loose flexible fuel line and 3/8" to 1/4" BSP male adaptor supplied with the boiler.

If required, an additional flexible fuel line (600 mm) and 3/8" to 1/4" BSP male adaptor are available to purchase from Grant UK, for two-pipe oil supply systems (product code: RBS35 and RBS36).

The temperature of the water leaving the boiler to heat the radiators and hot water cylinder is user adjustable.

The boiler is fitted with an overheat thermostat (which allows it to be used on a sealed central heating system)

which will automatically switch off the boiler if the heat exchanger exceeds a pre-set temperature of 111°C ± 3°C.

The boiler control panel is fitted with an ON/OFF switch, boiler thermostat control knob and the manual reset button for the overheat thermostat.

An optional indoor programmer is available to purchase from Grant UK which allows the User to set the operating times for central heating and hot water (product code: EPKIT).

To access the controls remove the front panel by turning the handle at the bottom and withdrawing the cover forwards at the bottom.

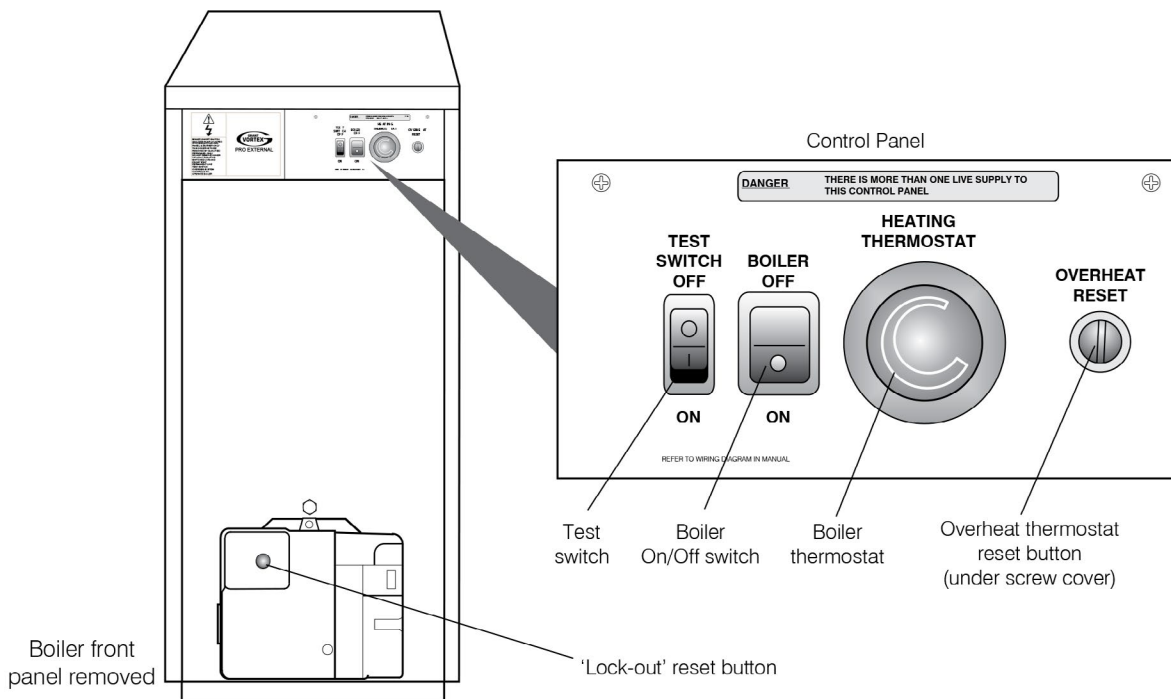


Figure 1-1: Boiler controls for external modules

2 Technical Data

2.1 Boiler Technical Data - Vortex Eco

Model	Unit	15/21	21/26	26/35
Water content	litre	13	13	19
	gal	2.9	2.9	4.2
Weight (dry) * External modules	kg	113 (external module) 136 (external system)	113 (external module) 136 (external system)	142 (external module) 152 (external system)
	lb	249 (external module) 300 (external system)	249 (external module) 300 (external system)	313 (external module) 335 (external system)
Flow connection		22 mm	22 mm	22 mm
Return connection		22 mm	22 mm	22 mm
Min. flow rate ($\Delta T=10^{\circ}\text{C}$) l/h	l/h	1 780	2 200	2 980
Min. flow rate ($\Delta T=20^{\circ}\text{C}$) l/h	l/h	890	1 100	1 490
Condensate connection		22 mm (only connect plastic)		
Flue diameter (conventional)		100 mm		
Waterside resistance $\Delta T=10^{\circ}\text{C}$	mbar	28.5		
Waterside resistance $\Delta T=20^{\circ}\text{C}$	mbar	10		
Maximum static head	m	28		
Minimum circulating head	m	1		
Boiler thermostat range	$^{\circ}\text{C}$	65 to 75		
Limit (safety) stat shut off temp.	$^{\circ}\text{C}$	111 \pm 3		
Max. hearth temperature	$^{\circ}\text{C}$	Less than 50		
Electricity supply		230/240 V ~ 50 Hz fused at 5 Amp		
Motor power	Watts	90		
Starting current	Amps	4.2		
Running current	Amps	0.85		
Oil connection		$\frac{1}{4}$ BSP Male (on end of flexible fuel hose)		
Conventional flue draught	N/m ²	Minimum 8.7 - Maximum 37		
	in wg	Minimum 0.035 - Maximum 0.15		
Maximum operating pressure - sealed system	bar	2.0		
Maximum operating pressure - open system	bar	2.0		
Maximum operating pressure - pressure relief valve	bar	2.5		

* Weight includes burner but excludes flue.

2.2 Sealed System Data - Sealed System Models

	15/21, 21/26, 26/35
Heating system pressure (cold)	Maximum 1.0 bar / Minimum 0.5 bar
Operating pressure of pressure relief valve	2.5 bar
Expansion vessel size (pre-charged at 1 bar)	12 litres
Max. heating system volume (including boiler)*	128 litres - approximately
Cold water mains connection	15 mm copper pipe
Pressure relief valve discharge connection	15 mm copper pipe
Circulating pump head	7 m

* Based on vessel charge and system cold fill pressure of 0.5 bar

2.3 Vortex Eco Boiler Using Class C2 Kerosene

Model and burner type	Heat Output		SEDBUK 2009 annual efficiency (%)	Nozzle	Oil press. (bar)	Smoke No.	Burner head type	Burner head/disc setting	Fuel flow rate (kg/h)	Flue gas temp. (°C)	CO ₂ (%)
	(kW)	(Btu/h)									
15/21 Riello RDB2.2	15.1	51 500	91.9	0.50/80°EH	7.0	0 - 1	T1	Disc setting B	1.29	70 - 75	11 - 12
	* 18.1	61 750		0.55/80°EH	7.5	0 - 1	T1	Disc setting C	1.53	75 - 80	11 - 12
	20.7	70 600		0.60/80°EH	8.5	0 - 1	T1	Disc setting C	1.78	80 - 85	11 - 12
21/26 Riello RDB2.2	20.7	70 600	91.7	0.60/80°EH	8.5	0 - 1	T1	Fixed	1.78	85 - 90	11 - 12
	* 22.7	77 500		0.65/80°EH	8.5	0 - 1	T2	Fixed	1.95	85 - 90	11 - 12
	25.6	87 350		0.75/80°EH	8.0	0 - 1	T2	Fixed	2.19	90 - 95	11 - 12
26/35 Riello RDB2.2	25.6	87 350	91.4	0.75/80°EH	8.0	0 - 1	T2	Fixed	2.19	75 - 80	11 - 12
	* 30.8	105 100		0.85/80°EH	9.1	0 - 1	T3	Fixed	2.65	85 - 90	11 - 12
	34.7	118 400		1.00/80°EH	8.0	0 - 1	T3	Fixed	2.93	90 - 95	11 - 12

Notes

- The data given above is approximate only.
- The above setting may have to be adjusted on site for the correct operation of the burner.
- Gas Oil is not suitable for use with the Grant Vortex Eco boiler range.
- The net flue gas temperatures given above are $\pm 10\%$.
- When commissioning the air damper **must be** adjusted to obtain the correct CO₂ level.
- * Factory settings: 15/21 - 18.1 kW, 21/26 - 22.7 kW, 26/35 - 30.8 kW.
- The combustion door test point may be used for CO₂ and smoke readings only. Do not use this test point for temperature or efficiency readings.
- When setting the 15/21 to 15.1 kW output the burner air adjuster disc requires repositioning. Refer to Section 10.
When setting the 21/26 to 20.7kW or the 26/35 to 25.6 kW output the combustion head must be changed. Refer to Section 11.4.
- The installer must amend the boiler data label if the output is changed.

2.4 Flue Gas Analysis

To allow the boiler to be commissioned and serviced, the boiler is supplied with a combustion test point on the front cleaning door. When this test point is used please note the following:

- The test point is for CO₂ and smoke readings only.
- The boiler efficiency and temperature must be taken from the flue test point on high level, vertical and conventional flue adaptors.
- Concentric low level flues do not contain a test point. The temperature and efficiency readings must be taken from the flue terminal.

2.5 Water Connections

Boiler model	Flow connection			Return connection		
	Size	Fitting	Supplied	Size	Fitting	Supplied
15/21	22mm pipe	Tectite elbow	in fittings kit	22mm pipe	Compression	fitted
21/26	22mm pipe	Tectite elbow	in fittings kit	22mm pipe	Compression	fitted
26/35	22mm pipe	Tectite elbow	in fittings kit	22mm pipe	Compression	fitted

2.6 Boiler Dimensions

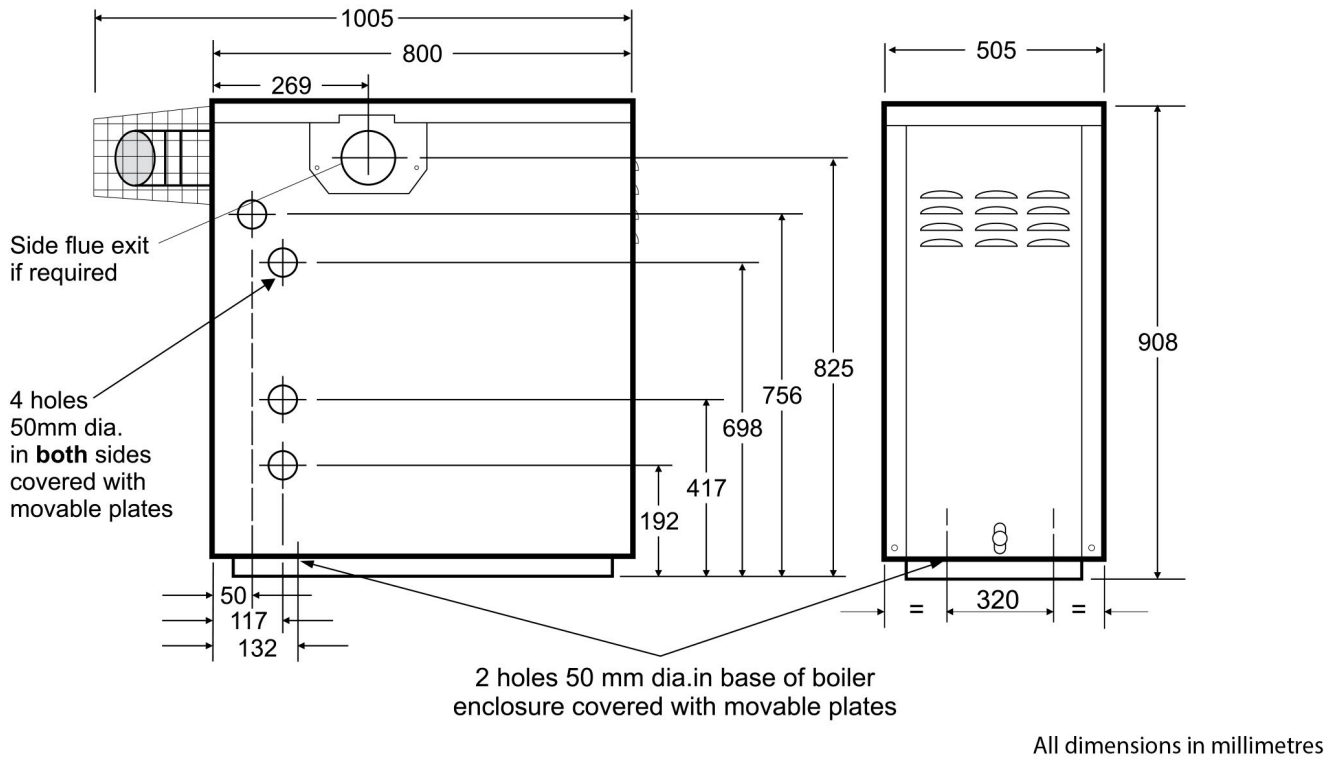


Figure 2-1: 15/21, 21/26 and 26/35 external module dimensions

3 Oil Storage and Supply System

3.1 Fuel Supply

Fuel Storage

The tank should be positioned in accordance with the recommendations given in BS 5410-1:2014, which gives details of filling, maintenance and protection from fire.

A steel tank may be used and must be constructed to BS 799-5:2010 and OFS T200.



CAUTION

A galvanised tank must not be used.

A plastic tank may be used and must comply with OFS T100.



NOTE

Plastic tanks should be adequately and uniformly supported on a smooth level surface, across their entire base area, that is, the area in contact with the ground.

Fuel Pipes

Fuel supply pipes should be of copper tubing with an external diameter of at least 10 mm.

Galvanised pipe must not be used.

All pipe connections should preferably use flared fittings. Soldered connections must not be used on oil pipes.



CAUTION

Flexible hoses must NOT be used outside the boiler case of Utility models.

Head A (m)	Maximum pipe run (m)	
	10mm OD pipe	12mm OD pipe
0.5	10	20
1.0	20	40
1.5	40	80
2.0	60	100

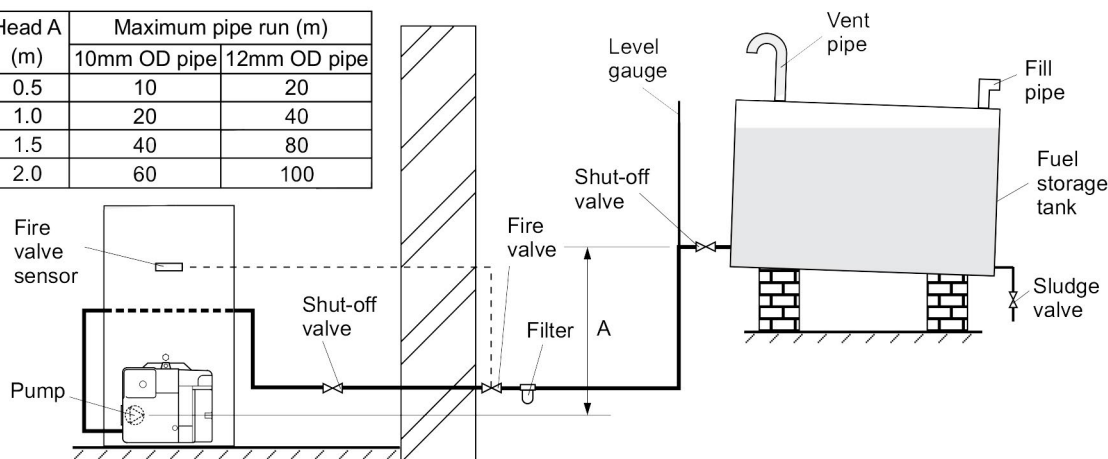


Figure 3-1: Single pipe system

A remote sensing fire valve must be installed in the fuel supply line (outside) where it enters the building, with the sensing head located above the burner. Recommendations are given in BS 5410-1:2014.

It is recommended that a good quality metal bowl type fuel filter is fitted at the tank and a secondary filter in the fuel supply line adjacent to the boiler (15 μ for Kerosene) to protect the burner pump and nozzle from contamination. If the boiler operates on bio kerosene, a compatible filter should be used.

A flexible fuel line, adaptor and 1/4" BSP isolation valve are supplied loose with the boiler for the final connection to the burner. If a two pipe system or 'Tiger Loop' type de-aerator is used, an additional flexible fuel hose (900 mm) and 3/8" to 1/4" BSP male adaptor are available to purchase from Grant UK (product codes: RBS35 and RBS36).

Metal braided flexible hoses should be replaced annually when the boiler is serviced. Long life flexible hoses should be inspected annually and replaced at least every 60 months.

Single pipe system (see Figure 3-1)

With the storage tank outlet above the burner a single pipe system should be used. The height of the tank above the burner limits the length of pipe run from the tank to the burner.

As supplied the burner is suitable for a single pipe system

Two pipe system (see Figure 3-2)

With the storage tank outlet below the burner, a two pipe system should be used. The pipe runs should be as shown in Figure 3-2. The return pipe should be the same level in the tank as the supply pipe, both being 75 to 100 mm above the base of the tank. The pipe ends should be a sufficient distance apart so as to prevent any sediment disturbed by the return entering the supply pipe.

Avoid the bottom of the tank being more than 3.5 m below the burner.

A non-return valve should be fitted in the supply pipe together with the filter and fire valve. A non-return valve should be fitted in the return pipe if the top of the tank is above the burner.

To be used with a two-pipe system, the burner **must** be fitted with an additional flexible fuel pipe - a flexible fuel hose (900 mm) and 3/8" to 1/4" BSP male adaptor are available to purchase from Grant UK (product codes: RBS35 and RBS36).

The pump vacuum should not exceed 0.4 bar. Beyond this limit gas is released from the oil.

For guidance on installation of top outlet fuel tanks and suction oil supply sizing, see OFTEC Technical Book 3. Available from OFTEC.

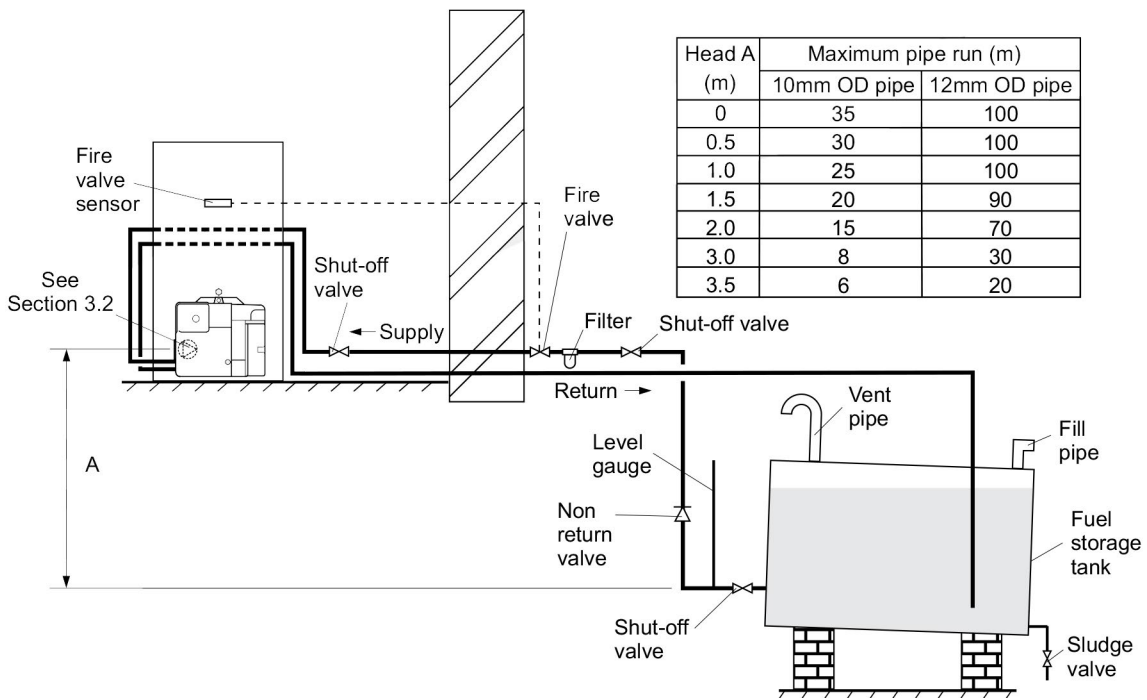


Figure 3-2: Two pipe system

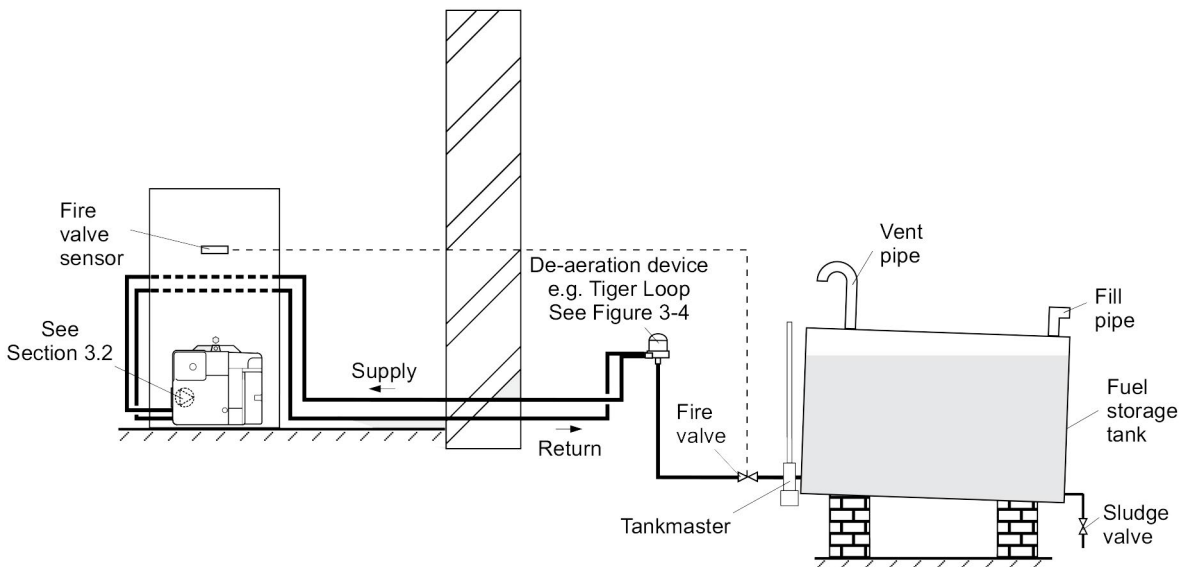


Figure 3-3: De-aeration device system

**Tiger Loop system -
(See Figures 3-3 and 3-4)**

When the storage tank outlet is below the burner, an alternative to a two pipe system can be achieved using a 'Tiger Loop' type oil de-aerator. This effectively removes the air from the oil supply on a single pipe lift.

The de-aerator is connected close to the boiler as a two pipe system (omitting the non-return valve) as shown in Figure 3-3.

Refer to the manufacturers instructions supplied with the de-aerator.

The de-aerator must be mounted vertically. See Figure 3-3 and 3-4.



WARNING

To prevent any possibility of fuel fumes entering the building, the de-aerator must be fitted outside in accordance with BS 5410-1:2014.

To be used with a de-aerator, the burner must be fitted with an additional flexible fuel hose (a flexible fuel hose (900 mm) and 3/8" to 1/4" BSP male adaptor are available to purchase from Grant UK (product codes: RBS35 and RBS36).

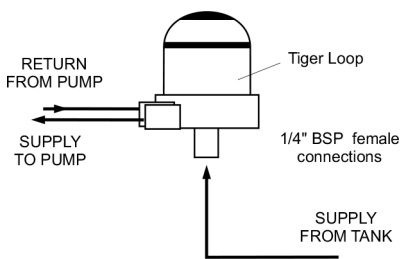


Figure 3-4: Tiger loop de-aeration device

3.2 Burner Oil Connection

The burner fuel pump is supplied for use with a single pipe fuel supply system.

For use on a two pipe system, it is necessary to fit the By-pass screw, as shown in Figure 3-5, into the tapping in the return port.

The By-pass screw is supplied in the boiler accessory pack.

Remove the plastic burner cover (secured by two screws).

For ease of access to the fuel pump, to fit the by-pass screw and connect the oil lines, the burner can be removed from the boiler. To do this, unscrew the single nut at the top of the burner (using a 13 mm spanner) and withdraw the burner from the boiler.

Remove and discard the blanking plug from the return connection of the pump and fit the By-pass screw using an hexagonal key.

Connect the return oil flexible fuel pipe to the pump.

Connect the 3/8" to 1/4" BSP adaptor to the flexible fuel pipe.

Flexible fuel pipes and adaptors are available to purchase from Grant UK.

The blanking plug supplied in the inlet (suction) port may now be plastic and will not provide an oil tight seal when the pump is running.

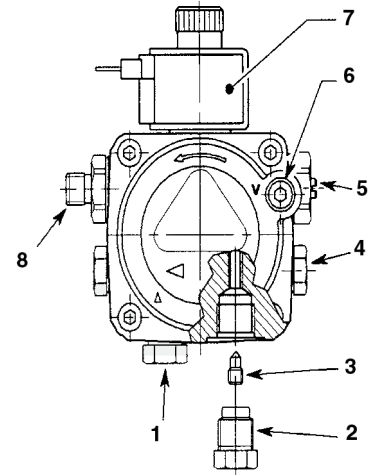


Figure 3-5: Riello RDB pump

Item	Description
1	Inlet (suction) port
2	Return port
3	By-pass screw
4	Pressure gauge port
5	Pressure adjustment
6	Vacuum gauge port
7	Solenoid
8	Nozzle outlet



WARNING

Ensure that the supply from the tank is connected to this port and that the plastic plug is discarded.

Main Burner Components

It may be necessary to remove the burner from the boiler to access connections in the fuel pump.

Disconnect the flexible air tube from the burner.

Remove the single nut at the top of the burner (using a 13 mm spanner) and withdraw the burner from the boiler.

Burner Connection

If a two pipe system is to be used refer to Section 3.2.

Remove and discard the blanking plug from the inlet (suction) port of the pump. Refer to Figure 3-5.

Connect the elbow of the flexible fuel pipe supplied with the boiler to the inlet port.

Connect the other end of the flexible fuel pipe to the rigid supply line using the adaptor supplied. The supply enters through one of the holes in the casing plinth.

! NOTE

Remove the factory fitted air inlet spigot adaptor (item 6) in Figure 3-6 from the air intake on the top right hand side of the burner and fit the grey plastic air inlet grille in its place.

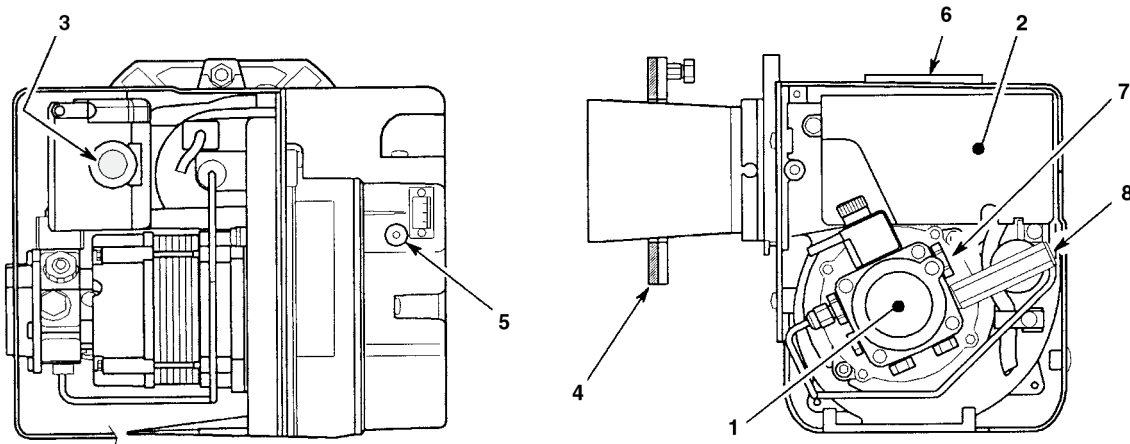


Figure 3-6: Riello RDB burner components

Item	Description
1	Oil pump
2	Control box
3	Reset button with lock-out lamp
4	Flange with gasket (do not remove from boiler)
5	Air damper adjustment screw
6	Air supply tube connection (balanced flue)
7	Pump pressure adjustment screw
8	Pressure gauge connection

4 Boiler Installation Information

4.1 Introduction

All models are supplied fully assembled with the flue terminal guard supplied loose inside the boiler.

4.2 Boiler location

1. The External module must stand on a solid, level surface capable of supporting the weight of the boiler when full of water, e.g. a prepared concrete standing, paving slabs bedded down on sand/cement, or similar.
2. The module can be installed either against the building or 'free standing' some distance away from the building.
3. The module must be positioned such that the required clearances from the low level flue outlet, as shown in Figure 9-4, are achieved.
4. Adequate clearance must be left around the module for servicing. In particular, a minimum clearance of 600 mm above the module for removal of the top panel and 600 mm at the opposite end to the flue outlet for access to the burner. Sufficient clearance is required at the rear of the boiler to allow the rear panel to be removed for access to the condensate trap.

4.3 Preparation for Installation

1. Carefully remove the packaging from the boiler and remove it from the transit pallet.
2. Remove the case top panel (four screws) and also the front and rear panels, as required.
3. The flue may exit the boiler from the left, right or rear of the casing. Carefully press out the pre-cut section on the side or rear casing panel to provide the opening in the required position for the flue to pass through the casing. Fit the cover panel (with the round flue exit hole) over the square flue opening in the casing. Fit the circular rubber sealing grommet, provided, into the circular hole in the cover panel before fitting the flue terminal section.
4. Slacken the wing nuts holding the flue elbow and rotate the elbow to the required direction for the flue to exit the casing.
5. Push the end of the flue terminal section (with the red seal) through the sealing grommet in the casing panel. The terminal section has been factory lubricated. Take care not to dislodge or damage the red flue seal.
6. Carefully insert the terminal into the flue elbow until the bend of the terminal contacts the outer casing, then, pull the terminal forward approximately 25 mm and rotate the bend so that the outlet is horizontal.
 - Rear exit** - The flue must discharge away from the building.
 - Side exit** - The flue should discharge towards the rear of the casing to prevent flue gases re-entering the boiler casing through the air inlet vents on the casing front door.
 - The flue terminal must be fitted horizontally to prevent dripping from the end of the terminal.**
7. Tighten the wing nuts holding the flue elbow and fit the stainless steel flue guard using the two screws provided.
8. The top panel of the casing has been designed so that it may be fitted to create a slight slope away from the side positioned against the wall. To tilt the top panel, loosen the four top panel casing screws, one at each corner and push down on the side furthest from the wall. Tighten the screws. See Figure 4-1.

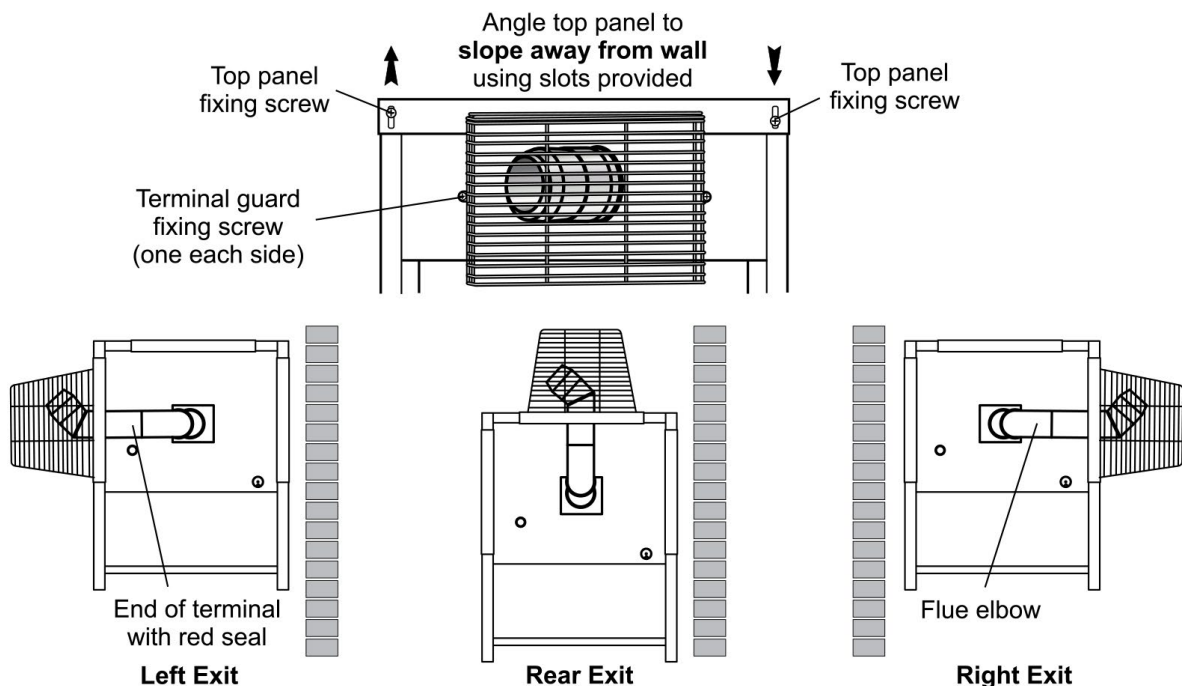


Figure 4-1: Standard low level flue

4.4 Installing the Boiler

1. If the boiler is to be fitted against the wall, prepare the wall to accept the heating system pipework. To mark the wall for drilling, refer to Section 2.6 for the positions of the pipework openings in the enclosure sides.



NOTE

Pipework should be insulated where it passes through the wall into the boiler enclosure.

If the boiler is to be installed 'free standing' (i.e. away from a wall) and the pipework run underground, push out the 'knock-outs' to open the required pipe openings in the base of the boiler enclosure. Using a sharp knife, cut through the polystyrene in the base, around the edge of the holes, to allow the flow and return pipes to enter the enclosure.

2. The electrical supply to the boiler should be routed through the wall in a suitable conduit, such that it enters the boiler enclosure via one of the unused pipework openings. The cable can be routed to the front of the boiler, for connection to the boiler control panel, either over the top or beneath the boiler heat exchanger. Heat resistant PVC cable, of at least 1.0 mm² cross section should be used within the boiler enclosure.
3. The oil supply line should be installed up to the position of the boiler. Refer to Section 3.1 for details. The final connection into the boiler enclosure can be made with 10 mm soft copper, routed along the base of the enclosure (either between the enclosure and wall or in front of the enclosure) to enter through one of the holes located in the bottom edge side panel, at the front (burner) end.

4.5 Regulations Compliance

Installation of a Grant VORTEX Eco boiler must be in accordance with the following recommendations:

- Building Regulations for England and Wales, and the Building Standards for Scotland issued by the Department of the Environment and any local Byelaws which you must check with the local authority for the area.
- Model and local Water Undertaking Byelaws.
- Applicable Control of Pollution Regulations.
- The following OFTEC requirements:
 - OFS T100 Polythene oil storage tanks for distillate fuels.
 - OFS T200 Fuel oil storage tanks and tank bunds for use with distillate fuels, lubrication oils and waste oils.

Further information may be obtained from the OFTEC Technical Book 3 (Installation requirements for oil storage tanks) and OFTEC Technical Book 4 (Installation requirements for oil fired boilers).

The installation should also be in accordance with the latest edition of the following British Standard Codes of Practice:-

- BS 715 Metal flue pipes, fittings, terminals and accessories.
- BS 799:5 Oil storage tanks.
- BS 1181 Clay flue linings and flue terminals.
- BS EN 1856-1:2009 Chimneys. Requirements for metal chimneys. System chimney products.
- BS 5449 Forced circulation hot water systems.
- BS 7593 Code of Practice for treatment of water in heating systems.
- BS 7671 Requirements for electrical installations, IET Wiring Regulations.



NOTE

Failure to install and commission appliances correctly may invalidate the boiler guarantee.



WARNING

Before starting any work on the boiler, or fuel supply please read the health and safety information given in Section 14.

4.6 Completion

Please ensure that the OFTEC CD/10 installation completion report (provided with the boiler) is completed in full.

Leave the top copy with the User.

Retain the carbon copy.

Ensure that the User Information pack (supplied with the boiler) is handed over to the Householder.

4.7 Before you Commission

To avoid the danger of dirt and foreign matter entering the boiler the complete heating system should be thoroughly flushed out - before the boiler is connected and then again after the system has been heated and is still hot. This is especially important where the boiler is used on an old system.

For optimum performance after installation, this boiler and its associated heating system must be flushed in accordance with the guidelines given in BS 7593:2006 'Treatment of water in domestic hot water central heating systems'.

This must involve the use of a proprietary cleaner, such as BetzDearborn's Sentinel X300 or X400, or Fernox Restorer. Full instructions are supplied with the products, but for more details of BetzDearborn's products, view the website www.sentinel-solutions.net and for more details of Fernox products view the website www.fernox.com.

For long term protection against corrosion and scale, after flushing, it is recommended that an inhibitor such as Betzdearborn's Sentinel X100 or Fernox MB-1 is dosed in accordance with the guidelines given in BS 7593:2006.

Failure to implement these guidelines will invalidate the guarantee.

NOTE

We recommend that both antifreeze and corrosion inhibitor be used in the primary water system.

4.8 Heating System Design Considerations

To achieve the maximum efficiency possible from the Grant VORTEX Eco boiler, the heating system should be designed to the following parameters:

Radiators:

- Flow temperature 70°C
- Return temperature 50°C
- Differential 20°C

Underfloor:

- Flow temperature 50°C
- Return temperature 40°C
- Differential 10°C

Size radiators with a mean water temperature of 60°C.

Design system controls with programmable room thermostats or use weather compensating controls to maintain return temperatures below 55°C.

NOTE

The boiler should not be allowed to operate with return temperatures of less than 40°C when the system is up to operating temperature.

The use of a pipe thermostat is recommended to control the return temperature when using weather compensating controls.

Refer to Section 2.5 for the size and type of the connections and Section 5 for the position of the connections.

4.9 Underfloor Heating Systems

In underfloor systems it is essential that the return temperature must be maintained above 40°C to prevent internal corrosion of the boiler water jacket.

4.10 Pipework Materials

Grant boilers are compatible with both copper and plastic pipe. Where plastic pipe is used it must be of the oxygen barrier type and be of the correct class (to BS 7291-1: 2010) for the application concerned.

WARNING

The first metre of pipework connected to both the heating flow and return connections of the boiler must be made in copper on all types of system - sealed or open-vented.

4.11 Sealed Systems

If plastic pipe is to be used, the installer must check with the plastic pipe manufacturer that the pipe to be used is suitable for the temperature and pressures concerned.

Plastic pipe must be Class S to BS 7291-1: 2010.

WARNING

The system must incorporate a low pressure switch to shut off power to the boiler if the system pressure drops below 0.2 bar. A suitable low pressure switch kit is available to purchase from Grant UK (product code: MPCBS63).

4.12 Underfloor Pipework

Plastic pipe may be used on Underfloor systems where the plastic pipe is fitted after the thermostatic mixing valve.

Copper tube must be used for at least the first metre of flow and return primary pipework between the boiler and the underfloor mixing/blending valves.

5 Pipe Connections

5.1 Water Connections

The flow and return pipework can exit the boiler enclosure either through the pre-cut openings provided in both sides (under the movable cover plates) and through the wall when installed against the building, or down and through the pre-cut openings provided in the base of the enclosure for 'free standing' installations. See Section 2.6.

Push out the 'knock-out' from the required holes, taking care not to distort the side panel or base.

For condensate disposal pipework refer to Section 6.

1. To gain access to the water connections, remove the two screws securing the bottom of the back panel and remove it by withdrawing it forwards at the bottom. Remove the top casing panel.
2. Carefully manoeuvre the boiler in

position to line up with pipework through the wall. Complete the water connections.

Note: Check that the baffles are in position and that the cleaning cover is correctly fitted and a good seal made.

3. If the boiler is installed against a wall, fit the wall flashing strip. Position the strip with the bottom edge of the wider flange 20 mm above the enclosure top panel, with the narrow flange (with the three fixing holes) flat against the wall. The strip should overhang the top panel by an equal amount at each end.
4. Mark the position of the three fixing holes onto the wall, drill and plug the wall and secure the strip with suitable screws (not supplied).

Flow connection: A 22 mm pipe is provided for the flow connection. This

is located on the top of the boiler. The pipe will need to be vented, as it is the highest point on the primary heat exchanger.

Return connection: A 22 mm pipe is provided for the return connection. This is located on the top of the boiler. The pipe will also need to be vented at some point, as it is the highest point on the secondary heat exchanger.



All pipes to be fitted into the push-fit connectors provided should be cut using a pipe slicer or pipe cutter - to leave the pipe ends with a slight radius and free from any burrs or sharp edges. Pipes to be used with these fittings should not be cut square using a hacksaw.

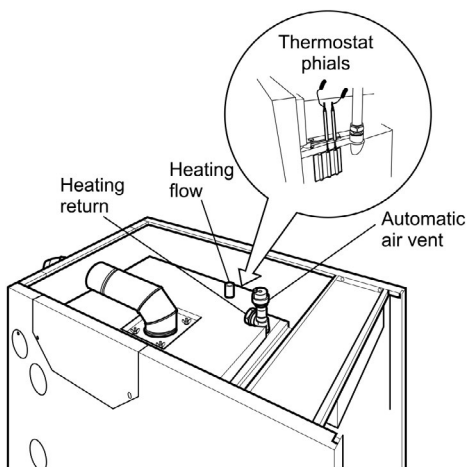


Figure 5-1: Water connections and thermostat phial positions (utility models)

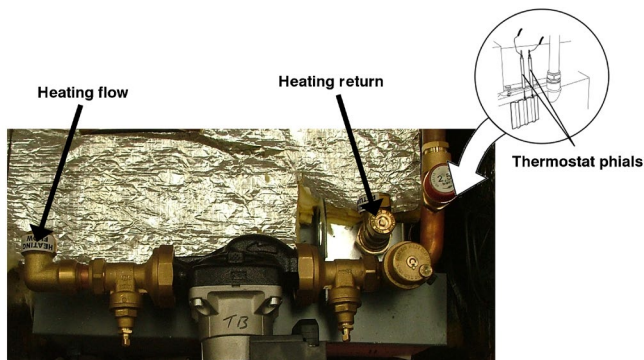


Figure 5-2: Water connections and thermostat phial positions (15/21 and 21/26 system models)

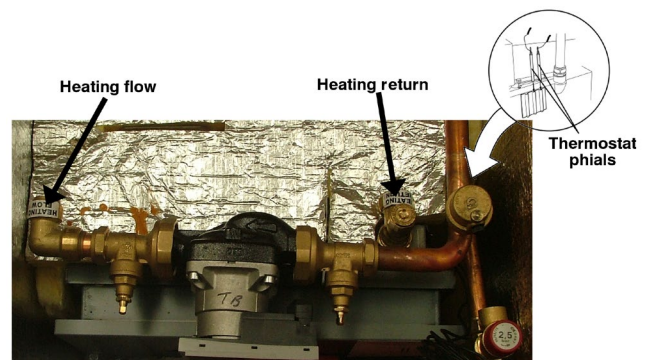


Figure 5-3: Water connections and thermostat phial positions (26/35 system models)

6 Condensate Disposal

6.1 General Requirements

When in condensing mode the Grant VORTEX Eco boilers produce condensate from the water vapour in the flue gases. This condensate is slightly acidic with a pH value of around 3 (similar to vinegar). Provision must be made for the safe and effective disposal of this condensate.

Condensate can be disposed of using one of the following methods of connection:

Internal connection (preferred option):

- into an internal domestic wastesystem (from kitchen sink, washing machine, etc.)
- directly into the soil stack

External connection:

- into an external soil stack
- into an external drain or gully
- into a rainwater hopper (that is part of a combined system where sewer carries both rainwater and foul water)
- purpose made soakaway

All condensate disposal pipes **must** be fitted with a trap - whether they are connected internally or externally to a domestic waste system/soil stack or run externally to a gully, hopper or soakaway.

6.2 Connections

Connections into a rainwater hopper, external drain or gully should be terminated inside the hopper/drain/gully below the grid level but above the water level.

Condensate disposal pipes should not be connected directly into rainwater downpipes or to waste/soil systems connected to septic tanks.

Condensate should not be discharged into 'grey water' systems that re-use water used in the home (not including water from toilets).

It should be noted that connection of a condensate pipe to the drain may be subject to local Building Control requirements.

6.3 Pipework

Condensate disposal pipework must be plastic (plastic waste or overflow pipe is suitable).

NOTE

IMPORTANT: Copper or steel pipe is **NOT** suitable and **MUST NOT** be used.

Condensate disposal pipes should have a minimum 'nominal' diameter of 22 mm (¾") - e.g. use 21.5 mm OD polypropylene overflow pipe.

Condensate disposal pipes must be fitted with a fall (away from the boiler) of at least 2.5° (~45 mm fall per metre run).

NOTE

Where it is not possible for the pipe to fall towards the point of discharge - either internally into a waste system or externally to a gully (e.g. for boilers installed in a basement), it will be necessary to use a condensate pump.

Condensate disposal pipes should be kept as short as possible and the number of bends kept to a minimum.

Pipes should be adequately fixed to prevent sagging, i.e. at no more than 0.5 metre intervals.

6.4 External Pipework

Ideally, external pipework, or pipework in unheated areas, should be avoided. If unavoidable, external pipework should be kept as short as possible (less than 3 metres) and 32 mm waste pipe used to minimise the risk of ice blocking the pipe in freezing conditions.

The number of bends, fittings and joints on external pipes should be kept to a minimum to reduce the risk of trapping condensate.

NOTE

For boiler installed in an unheated area such as an outhouse or garage, all condensate pipework should be considered as an 'external'.

6.5 Condensate Soakaway

To keep external pipework to a minimum, locate the soakaway as close as possible to the boiler but ensure it is at least 500 mm from building foundations and away from other services, e.g. gas, electricity, etc.

The condensate pipe may be run above or below ground level and can enter either the top or side of the soakaway tube. Refer to Figure 6-1.

Ensure that the drainage holes in the soakaway tube face away from the building.

Backfill both the soakaway tube, and the hole around it, with 10 mm limestone chippings.

Only use a soakaway where the soil is porous and drains easily. Do not use in clay soils or where the soil is poorly drained.

CAUTION

Any damage due to condensate backing up into the boiler due to a high water table, in the case of a soakaway, or flooded drains when the condensate disposal is via a gully or soil stack, is not covered by the Grant product guarantee.

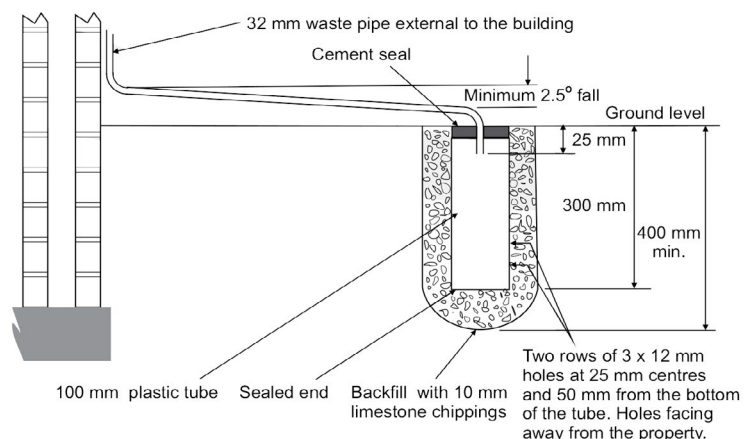


Figure 6-1: Purpose made condensate soakaway

6.6 Condensate Trap

Grant VORTEX Eco boilers are supplied with a factory-fitted condensate trap to provide the required 75 mm water seal in the condensate discharge pipe from the boiler.

This trap incorporates a float (which will create a seal when the trap is empty) and an overflow warning outlet (fitted with a plastic sealing cap), see Figure 6-2.

The trap is factory-fitted inside the boiler casing, mounted in the rear of the boiler (opposite end to the burner) on the inside of the side panel, see Figure 6-2.



Access must be available to allow for routine maintenance.

A flexible hose connects the outlet of the condensing heat exchanger to the trap inlet. Ensure the straight connector on the hose is fully pushed onto the 'top hat' inlet connector of the trap.

With the trap fitted inside the boiler casing, the sealing cap must be fitted.

If connecting the condensate discharge (either internally or externally) into a waste system or soil stack - the sealing cap must be fitted in the trap outlet.

On external discharge systems to a hopper, gully or soakaway, the sealing cap should be removed from the trap outlet.

If there is any discharge of condensate from the overflow outlet, this could indicate a blockage (possibly due to freezing). Turn off the boiler and investigate the cause. If necessary contact your service engineer for assistance.

The condensate trap outlet is at an angle of 48° below the horizontal. This is to automatically give a 3° fall on any 'horizontal' runs of condensate disposal pipe. Refer to Figure 6-2.

6.7 Condensate Disposal Pipework

The outlet of the trap will accept 21.5 mm to 23 mm OD Polypropylene overflow pipe for the condensate discharge pipe.

Possible routes for disposal pipework

The boiler enclosure has several 50 mm diameter openings in both the sides and base. These are designed to allow pipework to pass through, to suit the installation. These openings can be used to allow the condensate disposal pipe to exit the casing in one of the following ways:

Side outlet – The lower opening on either side of the enclosure can allow the condensate disposal pipe to be installed as follows:

- Connection to an internal stack – passing back through the wall of the house.
- Connection to an external soil stack adjacent to the boiler.
- Discharge into an adjacent (external) drain or gully.
- Discharge into a soakaway – with pipe either above or below ground level.

Bottom outlet – There are three openings in the base that can allow the condensate disposal pipe to be installed as follows:

- Discharge into a drain or gully beneath the boiler (e.g. drain built in to the concrete base for the boiler).
- Discharge into a soakaway – with pipe below ground level.

When connecting plastic discharge pipe, ensure that the pipe is fully pushed into the outlet end on the flexible pipe to prevent the possibility of leakage.

6.8 Inspection and Cleaning of Trap

The trap **must** be checked at regular intervals (e.g. on every annual service) and cleaned as necessary to ensure that it is clear and able to operate.

The bottom bowl is sealed to the trap body and cannot be removed.

To inspect and clean the trap:

1. Disconnect flexible condensate hose from inlet connector.
2. Unscrew the inlet connection nut.
3. Remove the inlet connector and nut from trap.
4. Remove trap from bracket.
5. Remove float from trap – clean if necessary.
6. Inspect inside of trap and clean as necessary.
7. Re-assemble trap, re-fit to boiler and re-connect flexible hose. Ensure that hose is fully pushed onto the trap inlet connector.



Failure to regularly check and clean the condensate trap may result in damage to the boiler and will not be covered by the guarantee.

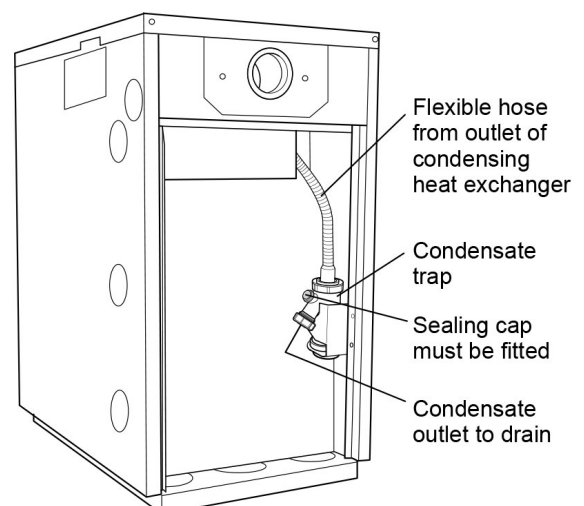


Figure 6-2: Condensate trap (rear panel removed)

7 Sealed Systems

7.1 Sealed System Installation

See Figure 7-1

All Grant VORTEX Eco boilers are suitable for use with sealed systems complying with the requirements of BS EN 12828:2003, BS EN 12831:2003, BS EN 14336:2004.

The maximum temperature of the central heating water is 75°C.

The system must be provided with the following items:

- Diaphragm expansion vessel complying with BS EN 13831:2007.
- Pressure gauge.
- Safety valve.
- Approved method for filling the system.



Ensure that the expansion vessel used is of sufficient size for the system volume. Refer to BS 7074:1:1989 or The Domestic Heating Design Guide for sizing the required vessel.

The expansion vessel can be fitted in either the return or flow pipework in any of the recommended positions as shown in Figure 7-1. To reduce the operating temperature of the expansion vessel diaphragm, position it below the pipe to which it is connected. The expansion vessel may be positioned away from the system, providing the connecting pipe is not less than 13 mm diameter.

The pressure gauge should have an operating range of 0 to 4 bar.

The safety valve, set to operate at 2.5 bar, should be fitted in the flow pipework near to the boiler.

The pipework between the safety valve and boiler must be unrestricted, i.e. no valves. The safety valve should be connected to a discharge pipe which will allow the discharge to be seen, but cannot cause injury to persons or property.

Provision should be made to replace water lost from the system. This can be done manually (where allowed by the local water undertaking) using an approved filling loop arrangement incorporating a double check valve assembly (as supplied in the Sealed System kit).

An automatic air vent should be fitted to the highest point of the system.

The expansion vessel charge pressure should always be slightly greater than the maximum static head of the system, in bar, at the level of the vessel (1 bar = 10.2 metres of water). See Figure 7-2.

The system fill pressure (cold) should be 0.2 - 0.3 bar greater than the vessel charge pressure – giving typical system fill pressures of approx 0.5 bar for a bungalow and 1.0 bar for a two storey house. Refer to the Domestic Heating Design Guide for further information if required.

If thermostatic radiator valves are fitted to all radiators, a system by-pass must be fitted.

Filling of the system must be carried out in a manner approved by the local Water Undertaking.

Where allowed, the system may be filled via the filling loop supplied (the loop arrangement includes a double check valve assembly).

All fittings used in the system must be able to withstand pressures up to 3 bar.

Radiator valves must comply with the requirements of BS 2767:1991.

One or more drain taps (to BS 2879) must be used to allow the system to be completely drained.

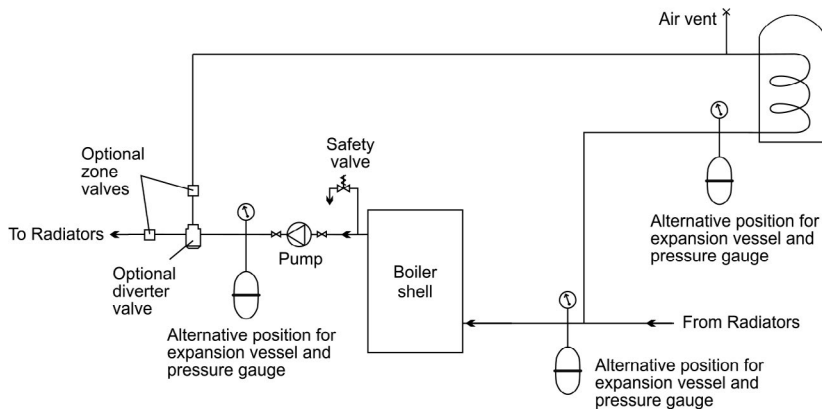


Figure 7-1: Sealed system

If thermostatic radiator valves are fitted, the system **must** incorporate an adequate by-pass.

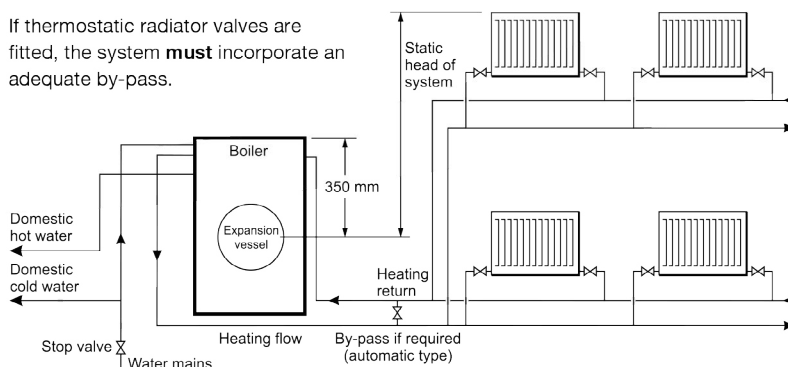


Figure 7-2: Boiler with sealed system kit

7.2 System Models

All System models have the following sealed system components factory fitted (refer to Figure 7-3):-

- A diaphragm expansion vessel complying with BS 4814, pre-charged at 1.0 bar. Refer to Section 2.2.
- System pressure gauge, with an operating range of 1 to 4 bar.
- Pressure relief safety valve complying with BS 6759 and set to operate at 2.5 bar.
- Automatic air vent, fitted to the flow pipe of the boiler, ensures the boiler is vented.
- Filling loop. This must be isolated and disconnected after filling the system.

Refer to Section 2.2 for system volumes and BS 7074: for further guidance and for further details of the expansion vessel.

The expansion vessel fitted, is supplied with a charge pressure of 1.0 bar (equivalent to a maximum static head of 10.2 metres). The charge pressure must not be less than the actual static head at the point of connection.



Do not pressurise the vessel above 1.5 bar.



The air pressure in the vessel must be checked annually.

The central heating system volume, using the expansion vessel as supplied, must not exceed the recommended value. Refer to Section 2.2. If the system volume is greater, an extra expansion vessel (complying with BS 4841) must be fitted as close as possible to the central heating return connection on the boiler.

The charge pressure of the extra vessel must be the same as the vessel fitted in the boiler.

Refer to either BS 7074:1:1989 or The Domestic Heating Design Guide for the required total expansion vessel volume for the system concerned.



The air charge pressure may be checked using a tyre pressure gauge on the expansion vessel Schraeder valve. The vessel may be re-pressurised using a suitable pump. When checking the air pressure the water in the heating system must be cold and the system pressure reduced to zero.

7.3 Fill the Sealed System

Automatic air vent(s) are fitted to the top of the boiler (see Figure 7-3). Check that the small cap on the top of each air vent is screwed on fully, then unscrew it one complete turn - the cap remains in this position from now on.

The procedure for filling the sealed system is as follows:

1. Only ever fill or add water to the system when it is cold and the boiler is off. Do not overfill.
2. Ensure that the flexible filling loop supplied with the boiler is connected and that the double check shut off valve connecting it to the water supply is closed. A valve is open when the operating lever is in line with the valve, and closed when it is at right angles to it.
3. Open the fill point valve.
4. Gradually open the double check valve from the water supply until water is heard to flow.
5. When the white needle of the pressure gauge is between 0.5 and 1.0 bar, close the valve.
6. Vent each radiator in turn, starting with the lowest one in the system, to remove air.
7. Continue to fill the system until the pressure gauge indicates between 0.5 and 1.0 bar. Close the fill point valve.
8. Repeat steps 4 and 5 as required.
9. Close the fill point and double check valves either side of the filling loop and disconnect the loop.

7.4 Pressure Relief Safety Valve

Now the pressure relief safety valve operation must be checked and set. The procedure is as follows:

1. Check the operation of the safety valve by turning the head anticlockwise until it clicks. The click is the safety valve head lifting off its seat allowing water to escape from the system
2. Check that the water is escaping from the system.
3. Continue to fill the system until the pressure gauge indicates between 0.5 and 1.0 bar.
4. Close the fill point valve and check the system for water soundness, rectifying where necessary.
5. Water may be released from the system by manually operating the safety valve until the system design pressure is obtained. The system design pressure (cold) should be between 0.5 bar and 1.0 bar.

The pressure is equivalent to the maximum static head in bar + 0.3 (1 bar = 10.2 metres of water), where the static head is the vertical height from the centre of the expansion vessel to the highest point of the system.

Now close the valves either side of the filling loop and disconnect the loop.

7.5 Circulating Pump

7.5.1 Pump Specification

Make and model	Wilo Yonos PARA RS 15/7.0 RKC FS 130 12
Construction	
Pump housing	Cast iron (with cataphorisis treatment)
Impellar	PP composite with GF 40%
Pump shaft	Stainless Steel
Bearing	Carbon, metal impregnated
Protection Class	IPx4D
Insulation Class	F
Motor Protection	Integrated
Performance	
Max. delivery head	7.2m @ Q = 0 m ³ /h
Max. volume flow	3.3 0 m ³ /h
Minimum suction head @ 50/95°C	0.5/4.5m
Power consumption @ 1 - 230V	3-45W
Nominal Motor Power	37W
Current @ 1 - 230V	0.028 - 0.44 A
Energy Efficiency Index (EEI)	≤ 0.20
Speed	800-4650 rpm
Settings	ΔP-variable (1-7m head) and Constant Speed (I, II and III)
Application	
Maximum Static Pressure	PN6
Temperature range @ maximum ambient temperatures	Maximum ambient temperature 57°C: 0 to 95°C Maximum ambient temperature 59°C: 0 to 90°C Maximum ambient temperature 67°C: 0 to 70°C
Approved Fluids	Heating Water Water/Glycol - Max 1:1 (above 20% check pumping data)

7.5.2 Pump Control Panel

Wilo Yonos PARA RKC circulating pumps have two possible setting modes:

- Constant speed with three pump speed settings (I, II and III)
- Variable pressure ($\Delta p-v$) with pump head adjustable between 1 and 7m head

Figure 7-3 shows the pump control panel with the red selector knob.

Constant Speed Mode (I, II, III)

This is the default setting of the pump and as such is recommended by Grant for heating systems. In this mode the pump speed is not automatically regulated (as with the Variable Pressure Mode), but operates at constantly at one of the three possible speeds (set using the red selector knob on the pump control panel).

Variable Pressure Mode ($\Delta p-v$)

In this mode the electronic control changes the differential pressure setpoint to be maintained by the pump in a linear fashion between H_s (the value set using the red selector knob on the pump control panel) and $\frac{1}{2} H_s$. The differential setpoint varies linearly with the volume flow Q .

7.5.3 Indicator LED

The pump is fitted with an indicator LED. This is located around the circumference of the red selector knob. See Figure 7-3 below. This indicates the operating status of the pump and will be illuminated green when the pump is operating normally. This indicator LED can assist in diagnosing and rectifying faults. Refer to Section 12.3.

7.5.3 Setting the Pump Control Mode

Set the pump to one of the two operating modes as follows:

Constant Speed Mode (I, II, III)

Grant recommends this operating mode for the pump.

To set the pump to the 'Constant Speed' mode, the pointer on the red selector knob must be set to the RIGHT of the mid position. Refer to Figure 7-3.

Set it to point at the required speed setting, I, II or III as required, ensuring that there is adequate flow to distribute the heat from the boiler whilst avoiding high water velocities causing noise in the pipework.

Variable Pressure Mode ($\Delta p-v$)

To set the pump to the 'Variable Pressure' mode the pointer on the red selector knob must be set to the LEFT of the mid position. Refer to Figure 7-3.

The further anticlockwise it is set the greater the pressure head setting of the pump – from 1m to 7m head.

If this mode is to be used, set the selector knob at a pressure that represents the maximum pressure (head) loss for the heating system in question.

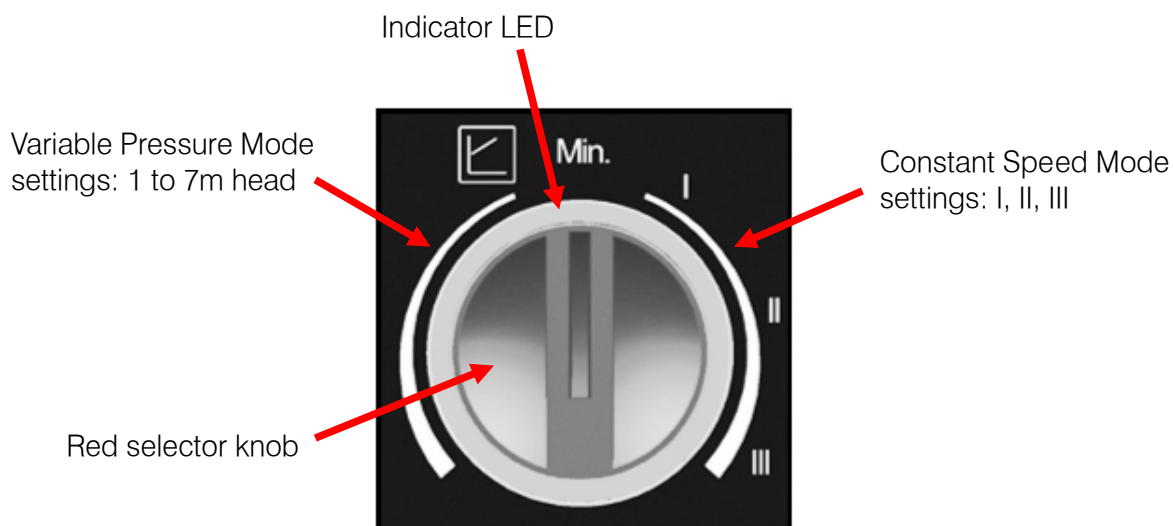


Figure 7-3: Control panel with red selector knob and LED indicator

8 Electrical

The VORTEX Eco External module requires a 230/240 V ~ 50 Hz supply. It must be protected by a 5 Amp fuse.

Refer to Figures 8-1 to 8-4 for typical control system wiring diagrams.

Refer to Figure 8-3 for boiler internal wiring diagram.



The VORTEX Eco boiler contains electrical switching equipment and must be earthed.

The supply must be fused at 5 Amp and there must only be one common isolator for the boiler and control system, providing complete electrical isolation.

A fused double pole switch or a fused three pin plug and shuttered outlet socket should be used for the connection.

The power supply cable should be at least 0.75 mm² PVC as specified in BS 6500, Table 16.

All the wiring and supplementary earth bonding external to the boiler must be in accordance with the current IET Wiring Regulations.

Any room thermostat or frost thermostat used must be suitable for use on mains voltage.

The boiler requires a permanent mains supply, do not interrupt it with any external time controls.

In the event of an electrical fault after installation of the boiler, the following electrical system checks must be carried out:

- Short circuit
- Polarity
- Earth continuity
- Resistance to earth

8.1 Connecting the Power Supply



A test switch is fitted to the control panel (see Figure 1-1) to allow the boiler to be test-fired. When On, the switch by-passes the external control system.

It is recommended that the boiler should be connected to a switched mains power supply from a programmer or control system. If a Grant remote programmer is used, a permanent 240 V mains supply (fused at 5 Amp) must be taken to the boiler. A three core cable is required to connect the boiler terminal block to the live supply. Refer to Figures 8-1 to 8-2 for typical control system wiring diagrams.

The procedure is:

1. Undo the three screws and remove the lefthand cover from the control panel to gain access to the boiler terminal block.
2. Pass the mains power supply cable through the cable grommet in the control panel, through the cable clamp and connect to the terminal block as follows:
Brown to live (terminal 2)
Blue to mains neutral (terminal 3)
Green/Yellow to mains earth (terminal 4)
3. Refer to Figures 8-1 to 8-2 for a typical control system wiring diagrams.

4. If the circulating pump is to be fitted within the boiler enclosure, the pump live must be connected to terminal 7 of the boiler terminal block.

Pass the pump power supply cable through the cable grommet in the control panel, through the cable clamp and connect to the terminal block as follows:-

Brown to live (terminal 7)

Blue to mains neutral (terminal 9)

Green/Yellow to earth (terminal 10)

Connecting the pump in this way allows it to be isolated using the isolating switch fitted in the boiler control panel, for servicing or maintenance work.

5. Ensure that the cable clamp is tightened and that all cables are secure and all external wiring is adequately supported.
6. Replace the cover on the control panel, with the yellow warning label facing outwards and secure with the three screws.

Do not switch on the electricity supply to the External module at this stage.

8.2 Frost Protection

External Modules are supplied with a factory fitted frost protection thermostat, located inside the boiler control panel

This is pre-wired to the boiler electrical system and factory set to 2°C.

For total system protection against freezing, particularly during extended periods without electrical power, Grant recommend the use of a combined heating system antifreeze and corrosion inhibitor, used in accordance with the manufacturer's instructions.

8.3 Control System Wiring Diagrams

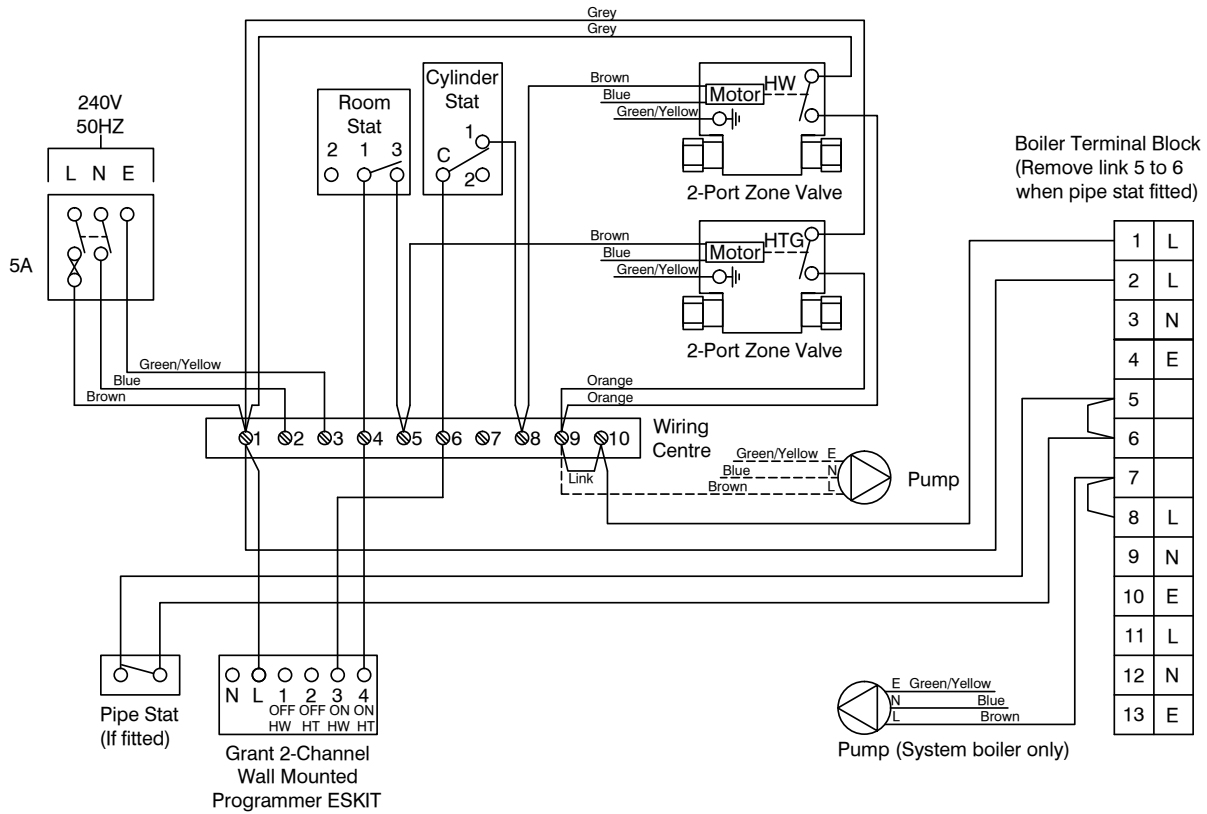


Figure 8-1: CH and HW controlled by two 2-port zone valves

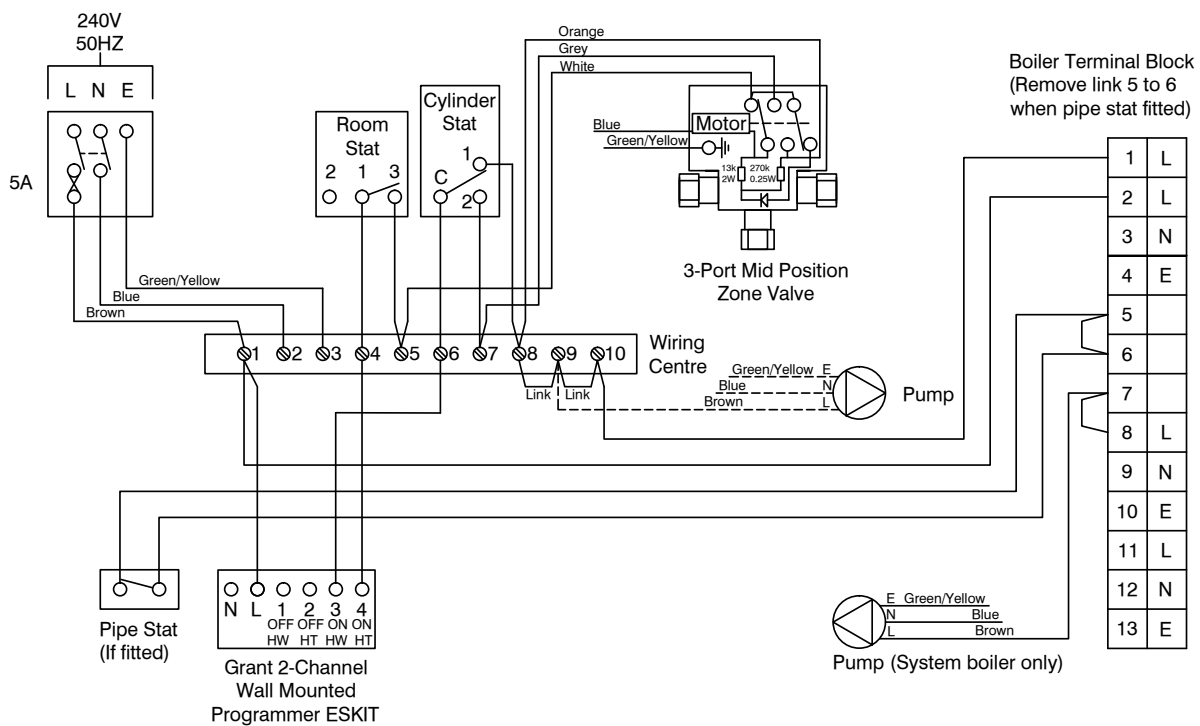


Figure 8-2: CH and HW controlled by 3-port mid position zone valve

8.4 Boiler Control Panel Wiring Diagram

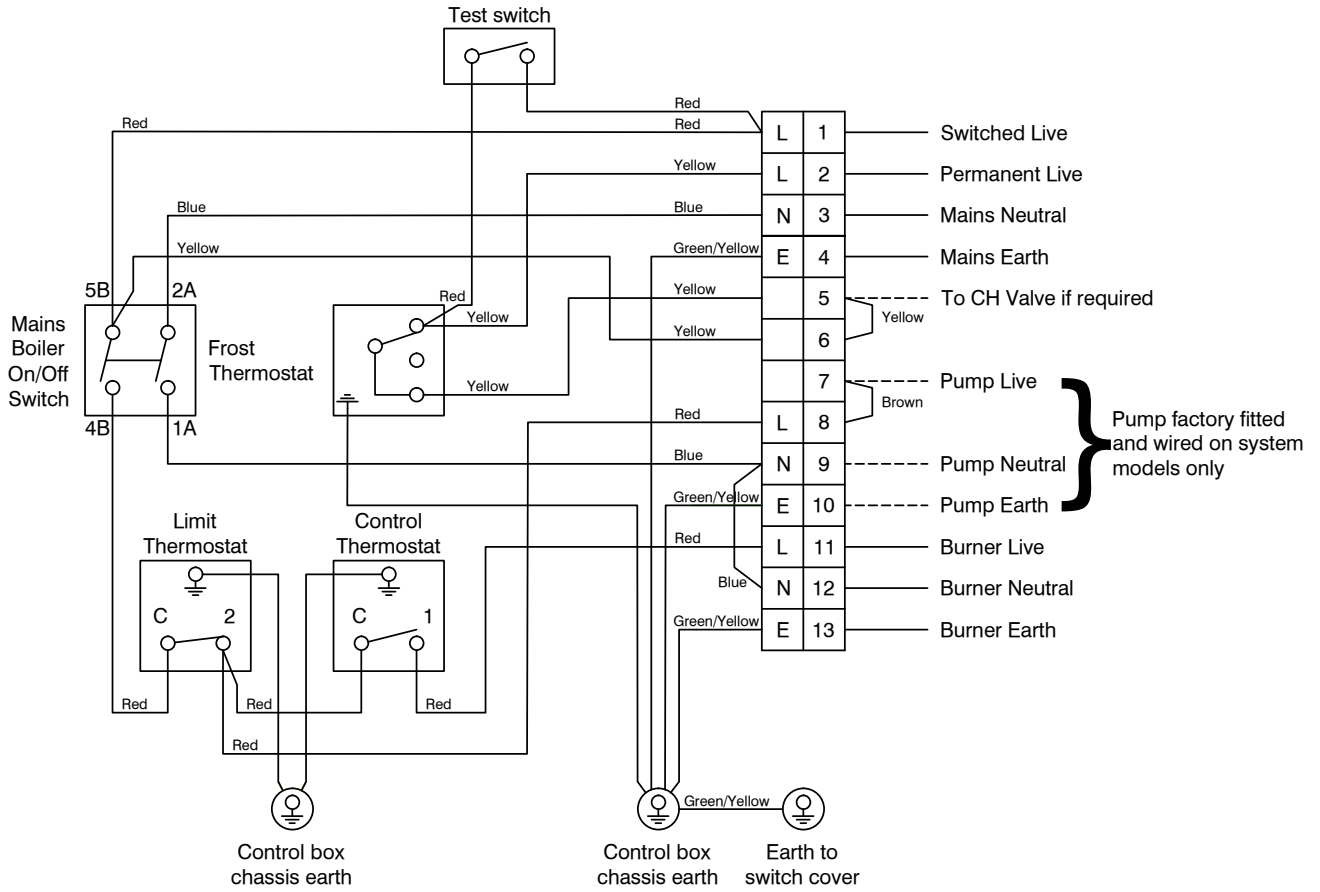


Figure 8-3: Control panel wiring

9 Flue System and Air Supply

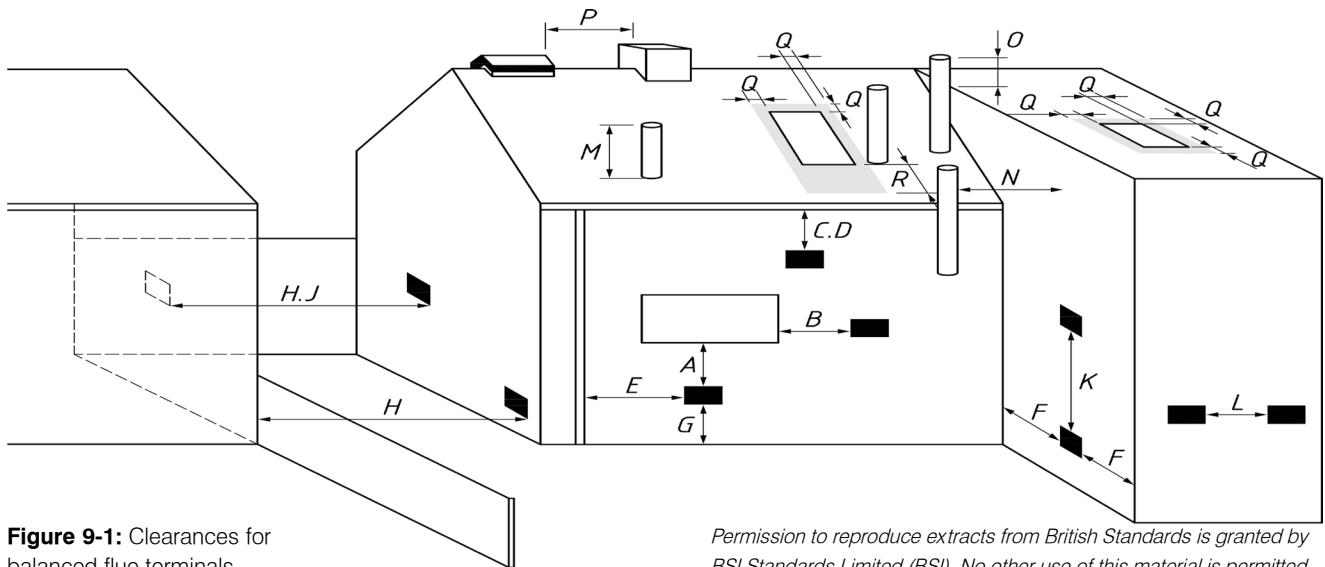


Figure 9-1: Clearances for balanced flue terminals

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Location	Appliances *	
A	Directly below an opening, air brick opening, opening window, etc.	1000
B	Horizontally to an opening, air brick opening, opening window, etc.	1000
C	Below a gutter, eaves or balcony with protection	1000
D	Below a gutter or a balcony without protection	1000
E	From vertical sanitary pipework	300
F	From an internal or external corner	300
G	Above ground or balcony level	300
H	From a surface or boundary facing the terminal	2500
J	From a terminal facing the terminal	1200
K	Vertically from a terminal on the same wall	1500
L	Horizontally from a terminal on the same wall	750
M	Above the highest point of an intersection with the roof	600
N	From a vertical structure to the side of the terminal	750
O	Above a vertical structure less than 750mm from the side of the terminal	600
P	From a ridge terminal to a vertical structure on the roof	1500
Q	Above or to the side of any opening on a flat or sloping roof	300
R	Below any opening on a sloping roof	1000

* Minimum distances to terminals in millimetres as measured from top of the chimney or the outer edge of a low level discharge opening.

NOTE: Vertical structure in N, O and P includes tank or lift rooms, parapets, dormers, etc.

NOTE: Terminating positionings A to L are only permitted for appliances that have been approved for low level flue discharge when tested in accordance with BS EN 303-1, OFS A100 or OFS A101.

Terminating positions should be at least 1.8 m from an oil storage tank unless a wall with at least 30 min fire resistance and extending 300 mm higher and wider than the tank is provided between the tank and the terminating position.

Where a flue is terminated less than 600 mm away from a projection above it and the projection consists of plastics or has a combustible or painted surface, then a heat shield of at least 750 mm wide should be fitted to protect these surfaces.

For terminals used with vaporizing burners, a horizontal distance of at least 2 300 mm should be between the terminal and the roof line.

If the lowest part of the terminal is less than 2 m above the ground, balcony, flat roof or other place to which any person has access, the terminal should be protected by a guard.

Notwithstanding the dimensions given above, a terminal should not be sited closer than 300 mm to combustible material. In the case of a thatched roof, double this separation distance should be provided. It is also advisable to treat the thatch with a fire retardant material and close wire in the immediate vicinity of the flue. A flue or chimney should not pass through the roof within the shaded area delineated by dimensions Q and R.

Where protection is provided for plastics components, such as guttering, this should be to the standard specified by the manufacturer of the plastics components.

9.1 Air Supply

A permanent air supply must be provided to the burner, sufficient to ensure proper combustion of fuel and effective discharge of combustion products to open air.

The ventilation openings provided in the upper part of the front door of the boiler casing **must not** be obstructed at any time.

9.2 Low Level Discharge Flue

The Grant VORTEX Eco External module is supplied with a low level discharge flue (see Section 4).

The minimum dimensions for locating the standard terminal from building features (windows, doors, etc.) are shown in Figure 9-1.

The terminal must be positioned so as to avoid products of combustion accumulating in stagnant pockets around the buildings or entering into buildings. Care should be taken that the plume from the condensed flue gases does not cause a nuisance.

Where it is not practical to use this flue, the external module may be fitted with an alternative flue system available from Grant UK.

! **NOTE**

Under no circumstances can the external module be installed with an existing flue system. Only Grant flue systems and components suitable for wet flues should be used. Failure to install the correct type of flue system will invalidate the guarantee.

9.3 Grant Horizontal System

This option uses the Grant Straight Starter boiler connector, replacing the low level terminal and flue guard supplied with the boiler, along with components from the Grant Green system. See Figure 9-2.

A complete list of Grant Green system flue components are given on page 28.

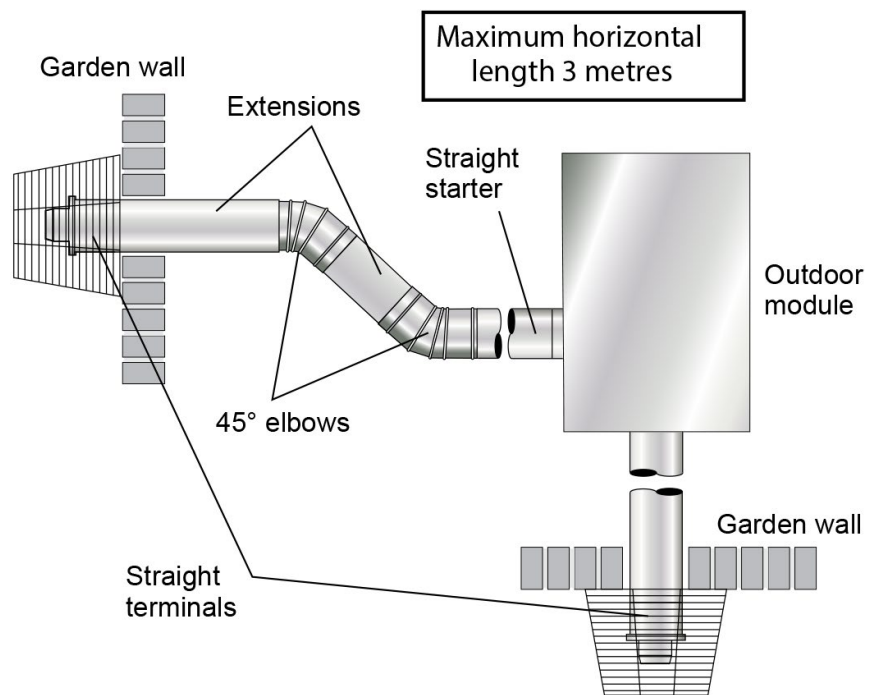
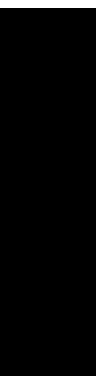


Figure 9-2: Horizontal external flue



9.4 Grant Green System

This vertical twin wall stainless steel insulated flue system - constructed using components from the Grant Green system - connects to a Grant Starter elbow and may terminate at high level or vertically as required. See Figure 9-3.

The insulated Starter elbow includes the boiler connector, complete with test point, replacing the low level terminal and flue guard supplied with the boiler.

Green System components	
Item	Part number
External starter elbow	GKM90
External starter - straight	GKM90C
150 mm extension	GX150/90
250 mm extension	GX250/90
450 mm extension	GX450/90
950 mm extension	GX950/90
195-270 mm adjustable extension	GXA250/90
45° elbow	GE45/90
High level terminal	GTH90
Vertical terminal	GTV90
Wall bracket - standard	GWB90
Wall bracket - extended	GEB90
Twin wall to single wall adaptor	GFCON80
Straight terminal - horizontal flue	GTL90

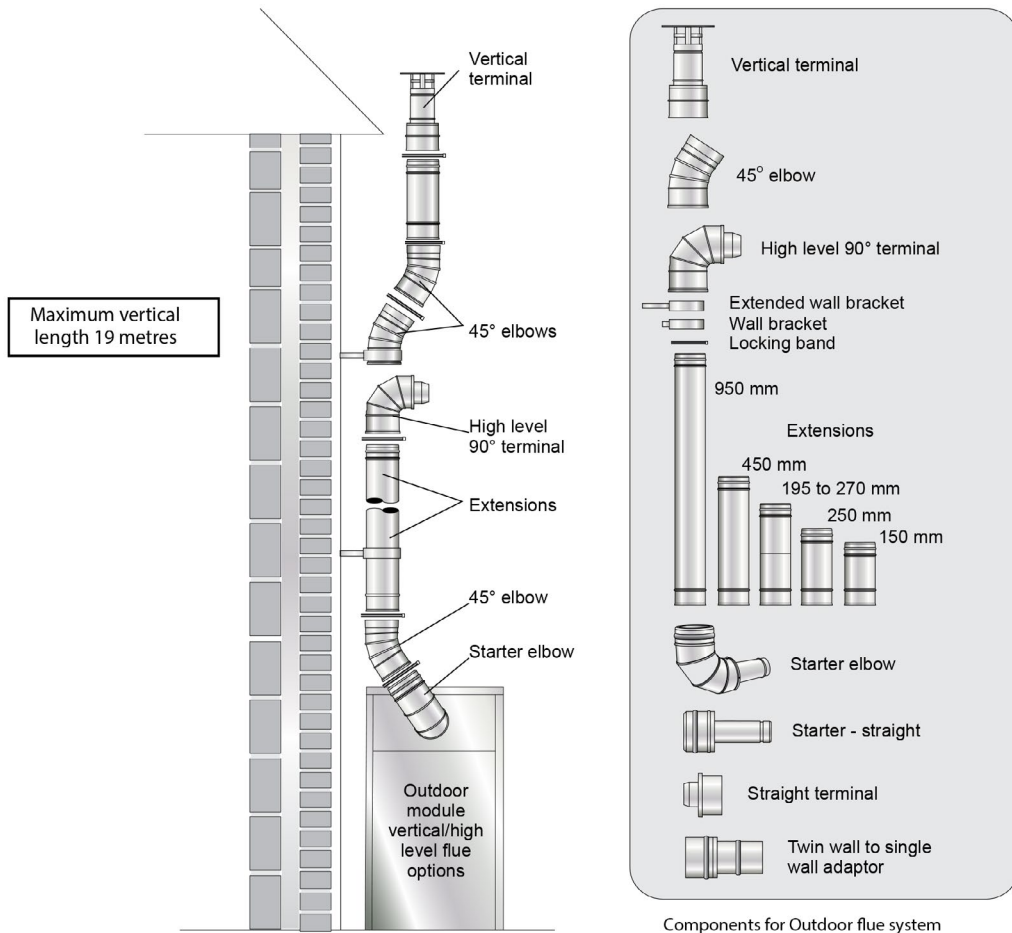


Figure 9-3: Vertical external conventional flue (Green system)

9.5 Grant Hybrid System

This vertical option allows the use of an existing chimney using part of the 'Green' system and the flexible liner and terminal of the Grant 'Orange' system. See Figure 9-4.

If an existing chimney is to be used, it must be lined with a smooth bore stainless steel liner suitable for use with oil fired condensing boilers. The top and bottom of the annular space must be sealed.

Grant recommends the use of the Grant 'Orange' flue system, specifically designed for the VORTEX range of condensing boilers.

The internal flue and liner diameter for all models up to 46 kW output must be 100 mm (4 inch).

The maximum vertical height (from the top of the boiler to the terminal) for the 'Orange' system is 19 metres.

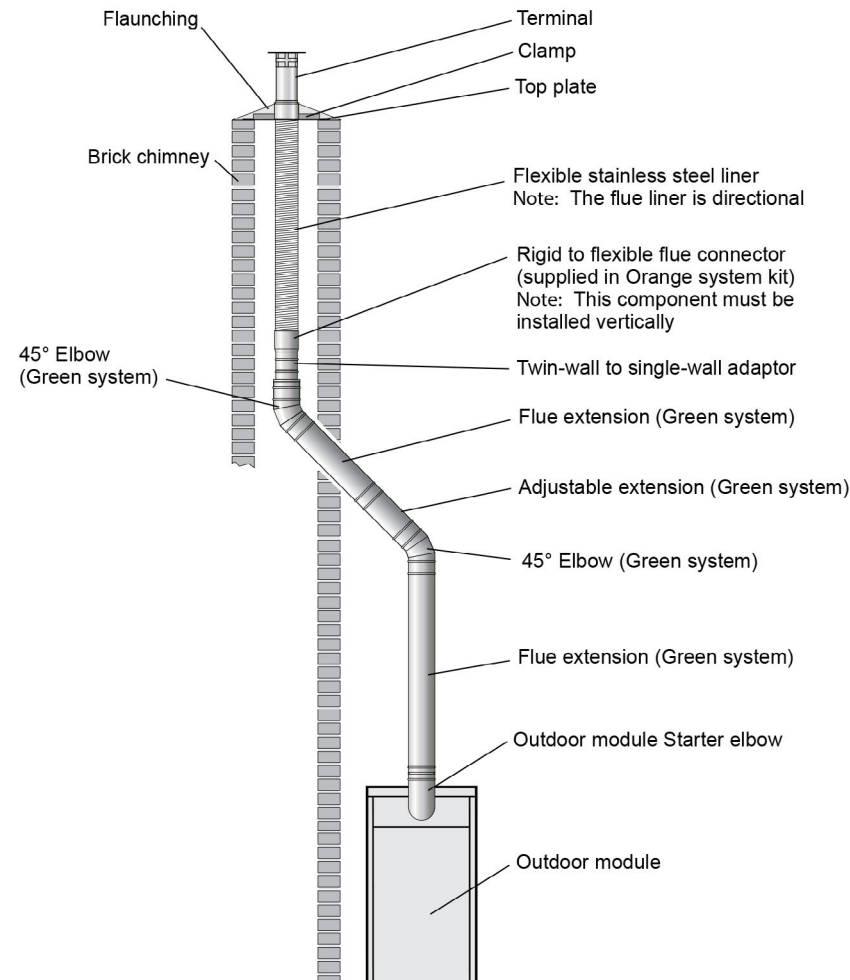


Figure 9-3: Vertical hybrid flue (Green to Orange system)

NOTE

The Grant Orange system flexible stainless steel liner is directional.

The arrows marked on the liner MUST be pointing vertically upwards, following the direction of the flue gases. Failure to comply with this instruction could lead to a leakage of condensate from the flue liner.

NOTE

In order to correctly connect the Grant hybrid system, it will be necessary to purchase the Grant Starter Elbow.

This insulated Starter elbow includes the boiler connector, complete with test point, replacing the low level terminal and flue guard supplied with the boiler.

9.6 Conventional Flue Systems

All flue components are stainless steel and fully insulated with 'O' ring seals and locking bands.

The flue must terminate in a down draught free area, i.e. at least 600 mm above the eaves or point of exit through the roof, or preferably above the ridge level.

The condensate may be allowed to run back into the boiler. A condensate drain at the base of the flue system is not required.

The flue terminal must be at least 600 mm from any opening into the building, and 600 mm above any vertical structure or wall less than a horizontal distance of 750 mm from the terminal.

No part of any flue system should be made of an asbestos material; aluminium must not be used in any part of the flue.

Only stainless steel flue components should be used.

If the draught conditions are satisfactory, the flue should terminate with a standard cowl.

Refer to the locally applicable Building Regulations, BS 5410:1 and OFTEC Installation Requirements (OFTEC Technical Books 2 and 4) for further guidance on conventional flue systems.

Do not use fire cement. The use of high temperature silicone sealants is recommended.

CAUTION

It is important to ensure that the flue system is sealed and that condensate cannot escape. Up to 1.5 l/h of condensate can be produced in a conventional flue system.

NOTE

To comply with the requirements of the Building Regulations Approved Document J - conventional flue systems must have a flue data plate. A suitable data plate is supplied with the Grant Orange flue system and should be displayed next to the boiler or flue.

10 Commissioning

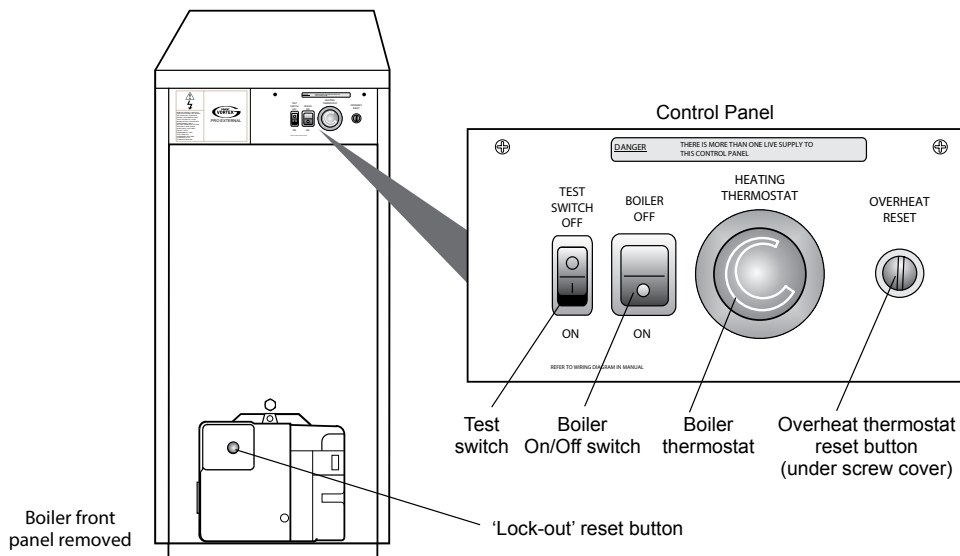


Figure 10-1: Boiler controls

It is important that the following commissioning procedure is carried out to ensure safe and efficient operation of the boiler.

To access the controls, remove the front panel (turn the handle and withdraw it forwards at the bottom).

The controls are shown in Figure 10-1.

10.1 Before Switching On

1. Ensure the boiler On/Off switch and the test switch are set to OFF.
2. Check that the high limit thermostat and boiler thermostat bulbs are correctly located in their respective pockets. Refer to Figure 5-1. Check condition of thermostat capillaries, not damaged, broken or kinked and not crushed.
3. Remove the nuts and washers securing the front cleaning door. Withdraw the door - take care it is HEAVY!
4. Check that the turbulators are in position and that the ends are vertical.
5. Check that the baffles are in position. Refer to Figures 11-1 or 11-2 as required.
6. Re-fit the cleaning door and check it is fitted correctly and that a good seal is made.
7. Remove and check the burner. Check that the burner head is correct. Refer to Section 2.3.

Check the electrodes are set correctly. Refer to Figure 11-6.

Check the nozzle is correct for the output rating required. Refer to Section 2.3.

NOTE

If a 15/21 model is down rated, the burner air adjuster disc must be adjusted to setting B as described in Section 10.6. Refer also to Section 2.3.

If a 21/26 or 26/35 model is down rated, the burner head must be changed to a T1 head. See Section 11.4. Refer also to Section 2.3.

8. Check that the water system has been vented (and pressurised if sealed system) and there are no leaks.
9. Ensure the automatic air vent on the condensing heat exchanger is open.
10. Check that all fuel line valves are open.
11. Remove the plastic burner cover if it was not previously removed.
12. Connect a combined vent manifold and pressure gauge to the pressure gauge connection port on the oil pump. See Figure 3-6. Open the vent screw on the vent manifold to vent the supply while the pump is running.
13. Check that all system controls are calling for heat and turn the boiler thermostat to maximum.

10.2 Switching On

1. Switch on the electricity supply.
2. Set the Boiler On/Off switch to ON. A neon in the switch lights when it is in the ON position. The boiler will now light automatically. Note that the neon lights when the boiler is switched on, but does not necessarily indicate the burner is firing.
3. The burner fan should start and the burner should light within about 12 seconds. If the burner does not light and the 'Lock-out' reset button lights, wait for about 45 seconds then press the reset button to restart the ignition process. This procedure may have to be repeated several times during first lighting.
4. With the burner alight, check the fuel pressure.
5. Refer to the Technical Information, Section 2.3.
6. Adjust the pressure if necessary - see Figure 3-6.

NOTE

It is important that the oil pressure is correctly set.

7. Operate the boiler until it reaches normal operating temperature. Check oil supply/return pipe for leaks, rectifying where necessary.

8. Check the operation of the boiler thermostat. Ensure that by turning it anticlockwise it switches the burner off.
9. With the burner alight, re-check the fuel pressure and re-adjust if necessary. Turn the boiler off, remove the pressure gauge and replace the plug in the pump
10. Ensure that there are no oil leaks, replace the burner cover.

10.3 Running the Boiler

1. Relight the boiler and allow it to run for at least 20 minutes.
2. Check the smoke number, if satisfactory check the CO₂. Set the CO₂ to the value given in Section 2.3 for the boiler concerned.

! NOTE

Final combustion readings can only be measured outside through the low level flue terminal (or the test point on the conventional flue starter elbow when used) with all the casing panels fitted.

3. Use the hexagonal key supplied to adjust the burner air damper (see Figure 3-6) as required. Turning the screw anti-clockwise closes the damper and increases CO₂ level, turning the screw clockwise opens the damper and reduces CO₂ level.
4. Re-check the smoke number if the damper has been moved. Under no circumstances must the smoke number be above 1.

! NOTE

It is important that the air damper is correctly set.

5. Check the flue gas temperature by placing the combustion analyser in the low level flue terminal (or into the test point on the starter elbow if either the Green system or Hybrid system is used).

10.4 Balancing the System

1. When the boiler has been adjusted and is running satisfactorily, balance the central heating system by adjusting the radiator lock shield valves. Start with the radiator nearest the boiler and adjust the

- valves to achieve the required temperature drop across each radiator. If thermostatic radiator valves have been installed, check the system by-pass.
2. Switch off the boiler.

10.5 Completion

1. With the system hot, check again for leaks, rectifying where necessary. Drain the system while it is hot to complete the flushing process. Refill and vent (and pressurise if a sealed system) the system.
2. A suitable central heating system inhibitor must be added to protect the system against the effect of corrosion.
3. A suitable antifreeze should be used to prevent damage to the boiler in areas where electrical power failure can occur in winter months.
4. Replace the top, front and rear panels as necessary.

! NOTE

After commissioning the boiler complete the Commissioning Report in the front of this manual and the OFTEC CD/11 commissioning report.

Leave the top copy with the User and retain the carbon copy.

If the boiler is to be left in service with the User, set the controls and room thermostat (if fitted) to the User's requirements.

If the boiler is not to be handed over immediately, close the boiler fuel supply valve and switch off the electricity supply.

! CAUTION

If there is any possibility of the boiler being left during frost conditions, then the boiler and system should be drained. Alternatively, a suitable antifreeze should be used.

To allow the boiler to be commissioned and serviced correctly a combustion test point is provided on the front cleaning door.

The CO₂ and smoke test may all be carried out using this test point.

! NOTE

The test point is not suitable for measuring boiler efficiency or conventional flue draught.

When using the test point on the cleaning cover note that the flue gas temperature reading will be higher than that measured in the flue thus resulting in an inaccurate efficiency reading. To obtain an accurate flue gas temperature and efficiency, the reading can only be measured outside through the low level flue terminal or the test point on the conventional flue starter elbow when fitted - with all the casing panels fitted.

10.6 Air Adjuster Disc - 15/21 only

To adjust the 15/21 air adjuster disc when downrating - See Figure 10-2.

1. Ensure the boiler is isolated from the electrical supply.
2. Remove the burner from the boiler.
3. Undo the two screws and remove the air inlet cover from the side of the burner.
4. The secondary air shutter disc is factory set in position 'C' - i.e. with the cut-out marked C located against the die-cast boss on the fan housing - suitable for outputs of 18.3 and 21 kW only. See Figure 10-2.
5. Remove the screw from the centre of the air shutter disc, and re-position the disc such that the cut-out 'B' (corresponding to 15 kW output setting - See Section 2.3) is located against the cast boss on the fan housing. Replace the screw in the centre of the air shutter disc and tighten.
6. Re-fit the air inlet cover to the side of the burner and reassemble in reverse order.

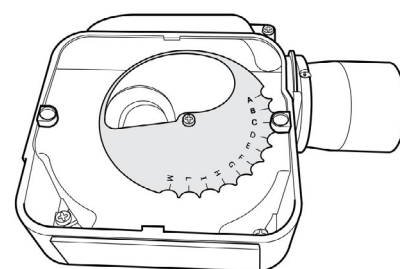


Figure 10-2: 15/21 air adjuster disc at position 'C'

11 Boiler Servicing

To ensure efficient operation of the boiler it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but in general once per year should be adequate.

Servicing and replacement of parts must only be carried out by a suitably qualified engineer.



Details of every service should be entered in the Service Log, in the Boiler Handbook.

This information may be required to validate the Grant extended guarantee.



Before starting any work on the boiler, or fuel supply please read the health and safety information given in Section 14.

External equipment operated at 230 Volts should not be serviced or repaired under adverse weather conditions.



A test switch is fitted to the control panel to allow the boiler to be testfired. When On, the switch by-passes the external control system.

11.1 Checking Before Servicing

The following sequential checks should be made before any servicing:

1. Check the flue terminal and ensure it is not blocked or damaged.
2. Run the boiler and check the operation of its controls.
3. Ensure that all water/fuel system connections and fittings are sound. Remake any joints and check the tightness of any fittings that may be leaking.
4. If the boiler is used on a sealed central heating system, check the system pressure, check the operation of the pressure relief valve and check the expansion vessel air charge. See Section 7.2.
5. Refill, vent and re-pressurise the system as necessary. See Section 7.3.
6. Check that the louvres in the front panel are clear.
7. Remove any sludge/water from the fuel tank by opening the sludge valve at the lower end of the tank.
8. With the fuel supply valve closed, clean/replace the filter element and clean the filter bowl.
9. Braided flexible fuel supply hoses (as supplied with the boiler) should be replaced annually. If long-life hoses have been installed, these should be inspected annually. In any event, these hoses must be replaced every five years.



Before servicing, set the boiler On/Off switch to Off, isolate the electricity supply and close the fuel supply valve.

Allow the boiler to cool.

The data label on the inside of the case side panel will indicate the fuel used and the nozzle fitted.

11.2 Dismantling Prior to Servicing

The procedure for dismantling the boiler is as follows:

1. Remove the front panel by turning the handle and withdrawing it forwards at the bottom.
2. Remove the four screws securing the top panel and carefully lift it off, taking care not to damage the insulation.



The top panel has been designed to provide a slight fall away from the side positioned against a wall, the side of the top panel with the fixing screws closer to the bottom edge is the highest side and goes against the wall.

2. If a sealed system kit is fitted, carefully lift up and remove the expansion vessel from the front of the boiler. Place the vessel on the floor taking care not to strain the flexible hose.
3. Remove the burner fixing nut (top of mounting flange) and withdraw the burner.
If required, disconnect the flexible oil hose(s), use a suitable container



If two flexible hoses are connected to the burner, identify (mark if necessary) which is the inlet and return if they are to be disconnected.

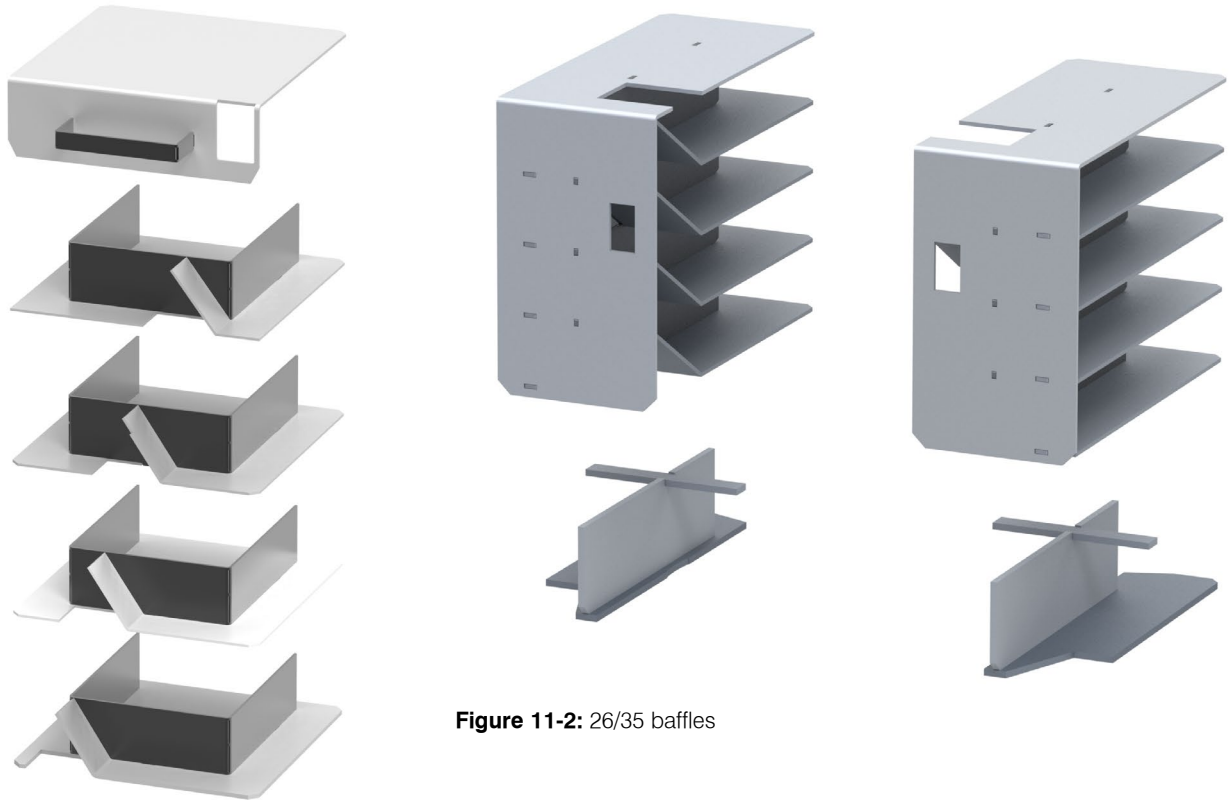


Figure 11-2: 26/35 baffles

Figure 11-1: 15/21 and 21/26 baffles

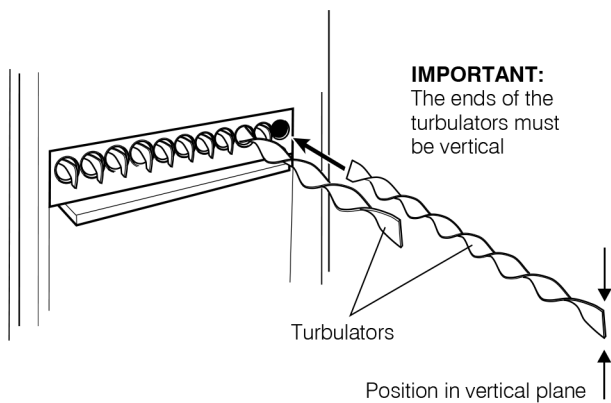


Figure 11-3: Turbulators

11.3 Cleaning the Boiler

The procedure for cleaning the boiler is as follows:

1. Remove the nuts and washers securing the front cleaning door and withdraw the door. Take care - it is heavy.
2. Remove the baffles as shown in Figures 11-1 or 11-2.
3. Remove all deposits from the baffle plates and all the boiler internal surfaces using a stiff brush and scraper if necessary.
4. Check the condition of the flue, clean as necessary.
5. Check the condition of the front cleaning door seal, replace if necessary.
6. Replace the baffles, ensuring they are correctly fitted. See Figures 11-1 or 11-2.
7. Pull out the spiral turbulators from the heat exchanger tubes. See Figure 11-3.
8. Clean the turbulators using a stiff brush.
9. Test the heat exchanger condensate drain by pouring water into one of the lower tubes and observe whether the water discharges from the 22 mm condensate outlet. Replace the turbulators.
10. Replace the front cleaning door, ensuring the seal is in good condition and secure it in position with the nuts and washers previously removed. Tighten to form a seal.
11. Remove the condensate trap and check that it is not blocked and is operating correctly, i.e. the float is free to move. Clean the trap and float as required. Refer to Section 6.8.
12. Check that the boiler condensate outlet is unobstructed. Clean if necessary.

NOTE

The condensate trap and condensate outlet must be checked on every service and cleaned as necessary.

11.4 Cleaning the Burner

The procedure is as follows:

1. Combustion head: Loosen the two screws securing the combustion head and withdraw the head.
2. Clean the combustion head.
3. Inspect the ignition electrodes: Loosen the electrode clamp screw and withdraw the electrode assembly. Wipe clean and check for any cracks in the ceramic insulation. Replace if necessary.
4. Nozzle: The nozzle should be replaced on an annual service. Check that the nozzle size and type are correct, refer to table in Section 2.3 and boiler data label.
5. With the combustion head removed, loosen the electrode assembly clamp screw and slide the electrodes away from the nozzle.
6. Do **not** attempt to clean the nozzle.
7. Remove the nozzle using a good fitting spanner (16 mm).

CAUTION

The use of an ill-fitting spanner will damage the nozzle and could lead to an incorrect flame pattern.

8. Always check the electrode settings after replacing the nozzle, see Figure 11-4.

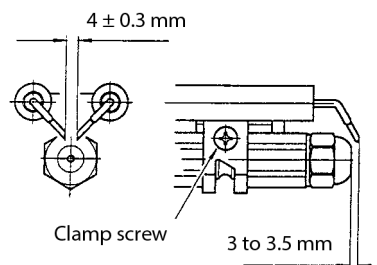


Figure 11-4: Electrode assembly

Photocell - The photocell is a push-fit in the burner body. Carefully pull it out to clean.

Burner fan - With the air intake grille or spigot removed, remove the screws securing the fan housing cover (R/H side of burner) and remove the cover.

Inspect the fan and housing and clean as necessary. Replace the cover.

Pump filter - With the burner cover removed, remove the four screws securing the pump end cover. Remove the filter and wash in kerosene. Replace the filter and end cover, ensure the 'O' ring is in position.

Re-assemble in reverse order.

WARNING

To ensure safe and efficient operation of the boiler it is important that recommissioning is carried out, especially combustion checks (CO₂ level, flue gas temperature and smoke number) after the boiler has been serviced.

Refer to the Commissioning instructions in Section 10.

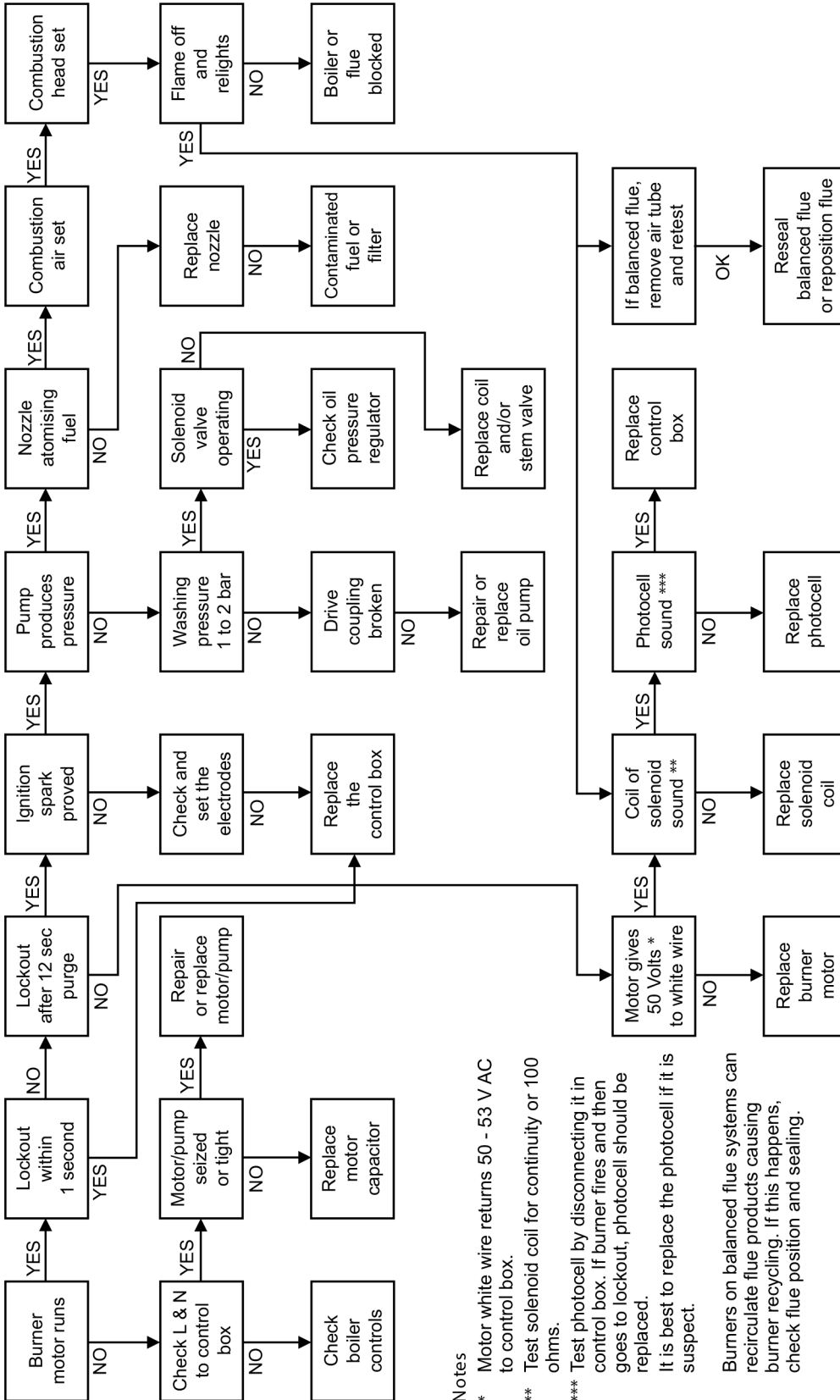
12 Fault Finding

12.1 Boiler Fault Finding

Always isolate the electricity supply to the boiler before working on the boiler.

Fault	Remedies
Boiler will not start:	
No fuel supply	Ensure that an adequate supply of fuel is available and that the fuel supply valve is open. Check the condition of the fuel filter, clean if necessary. Ensure fuel supply is reaching burner and vent pump.
No electricity supply	Ensure electricity supply to the boiler is switched on and that all controls are calling for heat. Ensure that the overheat thermostat has not tripped, reset if necessary. Check that a mains supply is present at the burner terminal block. If not, check the boiler and overheat thermostat.
Burner not starting - fuel and electricity supplies present	Press the reset button on the burner control box if it is lit. Refer to burner fault finding charts.
Burner lights but goes to lock-out	If the flame is unstable, check the combustion settings. Refer to burner fault finding charts.
Boiler works but:	
Visible smoke from flue or high smoke number	Insufficient air supply - check the air damper setting and the condition of the fan. Check room ventilation is adequate, see Section 9.1. Check the nozzle size and type. Fuel pressure may be too high - check and adjust.
Burner pulses	Insufficient air supply - check the air damper setting and the condition of the fan. Check room ventilation is adequate, see Section 9.1. Check the nozzle size and type.
Flame slow to stabilise during start up	Insufficient air supply - check the air damper setting and the condition of the fan. Check room ventilation is adequate, see Section 9.1. Check the nozzle size and type. Fuel pressure may be too low - check and adjust. Insufficient draught - clean boiler heat exchanger and check condition of flue.
Water temperature low	Undersize nozzle and/or low fuel pressure. Check condition of boiler heat exchanger and clean if necessary. Check the boiler thermostat. Check the combustion settings. Check the condition of the fuel filter.
Boiler operating on overheat thermostat	Faulty boiler thermostat. No circulation, check circulating pump. Check for air lock.
Fumes and puffing during starting (conventional flue)	Check the condition of the chimney, ensure it is not blocked and is high enough to produce the required draught. Check that there is an adequate air supply near the burner and that a kitchen fan is not drawing products out of the burner.
Oil odours	Check all fuel line connections, remake as necessary.
Combustion fumes smell	Check boiler cleaning cover and seal are correctly fitted. Check burner is correctly fitted onto flange. Check flue is correctly sealed into flue outlet of boiler. Check the condensate pipe and trap are operating correctly

12.2 Burner Fault Finding - Riello RDB burners



12.3 Circulating Pump Fault Diagnosis

The indicator LED, located around the circumference of the red control knob, can assist in diagnosing and rectifying a fault with the pump. See the table below.

LED condition	Meaning	Diagnostic	Cause	Remedy
Green	Pump operating	Pump runs according to the red knob setting	Normal operation	N/A
Flashes red and green	Pump is operating but stopped	Pump restarts itself after fault has disappeared	Undervoltage Voltage <160V OR Overvoltage Voltage >253V	Check supply voltage is 195V < V < 253V
			Overheating: temperature inside motor too high	Check water and ambient temperature
Flashes red	Pump not operating	Pump stopped (blocked)	Pump does not restart itself due to a permanent failure	Replace pump
LED off	No power supply	No voltage to pump control electronics	Pump is not connected to power supply	Check cable connection
			LED is damaged	Check if pump is running
			Electronics are damaged	Replace pump

13 Spares Parts

13.1 Boiler Parts List

Description	Part number
Cleaning door nut and washer set	EFBS14
Double pole switch	EFBS19
Test switch	EFBS21
Frost thermostat	EFBS23
Baffle set (complete) - 15/21 and 21/26	VBS96
Baffle set (complete) - 26/35	VBS97
Turbulator baffle - single	VBS98
Sealed system - Expansion vessel 12 litre	MPSS01
Sealed system - Water pressure gauge	MPSS02
Sealed system pressure relief valve	MPCBS50X
Sealed system - Expansion vessel flexible hose	MPSS04
Cleaning door - 15/21 and 21/26	VBS92
Cleaning door - 26/35	VBS69
Cleaning door seal - 15/21 and 21/26	VBS20L
Cleaning door seal - 26/35	VBS15
Overheat thermostat	TPBS33
Boiler thermostat	TPBS34
Circulating pump - 6 m head (non HE)	MPCBS23
Circulating pump - 7 m head (HE)	VBS126
White pump cable with plug (for HE pump)	VBS126A
Black pump cable with plug (for HE pump)	VBS126B
Return connection assembly - 22 mm with automatic air vent	VBS61
Automatic air vent	MPCBS29
Condensate trap	VBS02
Condensate flexible hose	VBS104
Stainless steel flue guard	FKS70

13.2 Burner Heads

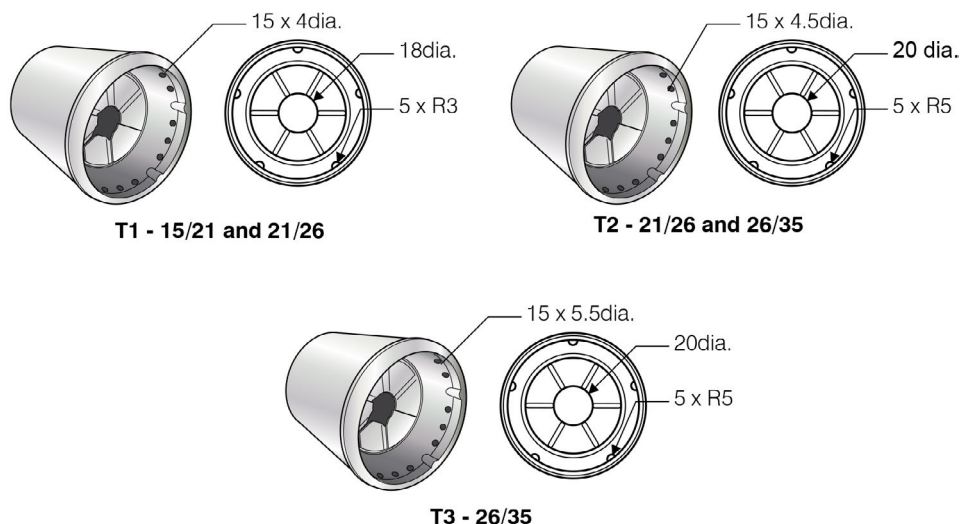


Figure 13-1: Burner heads

This section gives exploded views of the Riello burners in the Grant VORTEX Eco boilers, and parts lists associated with them.

13.3 Riello RDB2.2 burner

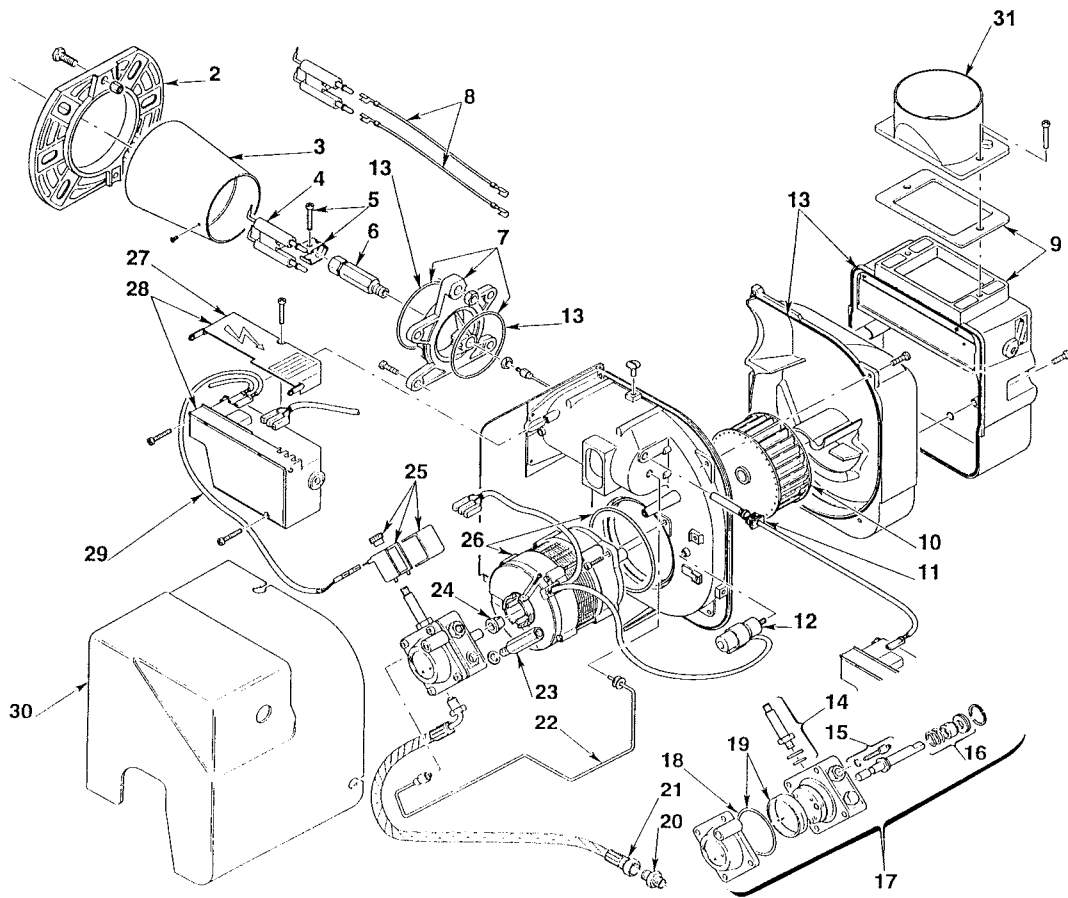


Figure 13-2: Riello RDB2.2 burner components diagram

Riello RDB2.2 burner parts list

Key number	Description	Riello part number	Grant part number
1	Not applicable	-	-
2	Flange	3005786	RBS119
3	Combustion head T1 - 15/21 (21/26 - 20.7 kW)	3002507	RBS146
3	Combustion head T2 - 21/26 (26/35 - 25.6 kW)	3002423	RBS147
3	Combustion head T3 - 26/35	3002447	RBS144
4	Electrode assembly	3007513	RBS108
5	Electrode bracket	3006552	RBS29
6	Nozzle holder	3008642	RBS111
7	Collar	3008643	RBS112
8	High voltage lead	3008794	RBS129
9	Air damper assembly	3008647	RBS116
10	Fan - 15/21	3005788	RBS151
10	Fan - 21/26	3005708	RBS39
10	Fan - 26/35	3008645	RBS142
11	Photocell	3008646	RBS115
12	Capacitor 4.5 μ F	3002837	RBS149
13	Seal kit	3008878	RBS140
14	Needle valve	3007582	RBS109
15	Regulator	3008651	RBS120
16	Pump seal	3000439	RBS14
17	Pump	3008654	RBS101
18	'O' ring	3007162	RBS08
19	Filter - 'O' ring	3008653	RBS122
20	Connector	3003602	RBS35
21	Flexible hose	3007672	RBS36
22	Tube	3008644	RBS113
23	Pressure gauge connector	3008876	RBS138
24	Drive coupling	3000443	RBS16
25	Solenoid	3008648	RBS117
26	Motor RBS102	3002836	RBS102
27	Cover	3008649	RBS118
28	Control box assembly	3008652	RBS103
29	Solenoid lead	3008851	RBS139
30	Cover	3008879	RBS141
31	Air tube spigot	3062774	RBS143

14 Health and Safety Information

Under the Consumer Protection Act 1987 and Section 6 of the Health and Safety at Work Act 1974, we are required to provide information on substances hazardous to health (COSHH Regulations 1988).

Adhesives, sealants and paints used in the manufacture of the product are cured and present no known hazards when used in the manner for which they are intended.

The following other materials are present in the product:

14.1 Insulation Materials

Material Types: Ceramic fibre board, mineral wool.

Description: Rigid board, slabs, sleeves, gaskets, ropes.

Known Hazards: May cause temporary irritation or rash to skin. High dust levels may irritate eyes and upper respiratory system.

Precautions: Avoid unnecessary or rough handling, or harsh abrasion of boards. Normal handling and use of material should not produce high dust levels.

Avoid inhalation, and contact with skin and eyes.

After handling always follow normal good hygiene practices.

Protection: Use disposable gloves, face mask and eye protection.

First Aid: Eyes - If irritation occurs, wash eyes with copious amounts of water.

If symptoms persist, seek immediate medical advice.

Skin - If irritation occurs, wash under running water before washing with soap and water.

Inhalation - Remove to fresh air, drink water to clear throat and blow nose to remove dust/fibres.

Ingestion - Drink plenty of water.

14.2 Sealant Materials

Material Types: Silicone elastomer.

Description: Sealant and adhesive.

Known Hazards: Irritation to eyes.

Precautions: Avoid inhalation of vapour, contact with eyes and prolonged or repeated contact with skin.

After handling always follow normal good hygiene practices.

Protection: Use eye protection. Rubber or plastic gloves should be worn where repeated contact occurs and a face mask worn when working in confined spaces.

First Aid: Eyes - Flush eyes with water for 15 minutes. Seek immediate medical attention.

Skin - Wipe off and wash with soap and water.

Inhalation - Remove to fresh air.

14.3 Kerosene and Gas Oil Fuels (mineral oils)

Known Hazards: The effect of mineral oils on the skin vary according to the duration of exposure and the type of oil.

The lighter fractions remove the protective grease naturally present on the skin, leaving it dry, liable to crack and more prone to damage by cuts, abrasions and irritant chemicals.

Skin rashes (Oil acne) most often on arms, but also on any part of the body in contact with oil or oily clothing.

Contact with fuel oils can cause dermatitis.

Precautions: Avoid as far as possible any skin contact with mineral oil or with clothing contaminated with mineral oil.

The use of a lanolin-based barrier cream is recommended, in conjunction with regular washing with soap and rinsing with water to ensure all oil is removed from the skin.

Take care to prevent clothing, especially underwear, from becoming contaminated with oil.

Do not put oily rags or tools in pockets, especially trouser pockets.

Have first-aid treatment at once for an injury, however slight.

Do not inhale any vapours from mineral oils.

15 Recycling and Disposal

In EU Countries

The following information is provided to enable regulatory compliance with the European Union (EU) directives identified and any amendments made to these directives when using electrical or electronic equipment in EU countries.

Disposal of Electrical and Electronic Equipment

European Union (EU) Directive 2002/96/EC Waste Electrical and Electronic Equipment (WEEE)

Do not dispose of electrical or electronic equipment in landfill sites. In the EU, it is the individual recipient's responsibility to ensure that discarded electrical or electronic materials are collected and recycled according to the requirements of EU environmental law.

Disposal of Surplus Packaging

European Parliament and Council Directive 94/62/EC Packaging and Packaging Waste

Do not dispose of surplus packaging in landfill sites. In the EU, it is the individual recipient's responsibility to ensure that packaging materials are collected and recycled according to the requirements of EU environmental law.

In non-EU Countries

In non-EU countries, dispose of electrical and electronic equipment and all surplus packaging in accordance with national and regional regulations.

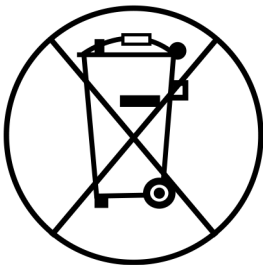
Complies with EC Low voltage Electromagnetic compatibility and Boiler efficiency Directives.



Circulating Pump

The circulating pump must not be disposed of in normal domestic waste as most of the materials used in its construction can be recycled.

For details on how to responsibly dispose of this pump, please visit: www.wilo.com/recycling



16 Guarantee

16.1 The Vortex Oil Boiler Guarantee

You are now the proud owner of a Grant Vortex condensing boiler from Grant Engineering (UK) Limited which has been designed to give years of reliable, trouble free, operation.

Grant Engineering (UK) Limited guarantees the manufacture of the boiler including all electrical and mechanical components for a period of **twelve months from the date of installation⁴**, provided that the boiler has been installed in full accordance with the installation and servicing instructions issued.

This will be extended to a total period of **two years** if the boiler is registered with Grant Engineering (UK) Limited **within thirty days of installation⁴** and serviced at twelve monthly intervals³. See main Terms and Conditions below.

Registering the product with Grant Engineering (UK) Limited

Please register your Grant Vortex condensing boiler with Grant Engineering UK Limited **within thirty days of installation**. To do so visit www.grantuk.com and follow the links to the 'Homeowners Zone', where you can register your boiler for a further **twelve months** guarantee (giving **two years** from the date of installation⁴). This does not affect your statutory rights¹.

If a fault or defect occurs within the manufacturer's guarantee period

If your boiler should fail within the guarantee period, you must contact Grant Engineering (UK) Limited who will arrange for the repair under the terms of the guarantee, providing that the boiler has been correctly installed, commissioned and serviced (if the appliance has been installed for more than twelve months) by a competent person and the fault is not due to tampering, running out of oil, oil contamination, debris, system water contamination, misuse, trapped air or the failure of any external components not supplied by Grant Engineering (UK) Limited, e.g. fire valve, motorised valve, etc.

This two year guarantee only applies if the boiler is registered with Grant Engineering (UK) Limited within thirty days of installation⁴ and is serviced after twelve months³.

In the first instance

Contact your installer or commissioning engineer to ensure that the fault does not lie with the system components or any incorrect setting of the system controls that falls outside of the manufacturer's guarantee otherwise a service charge could result. Grant Engineering (UK) Limited will not be liable for any charges arising from this process.

If a fault covered by the manufacturer's guarantee is found

Ask your installer to contact Grant Engineering (UK) Limited Service Department on +44 (0)1380 736920 who will arrange for a competent service engineer to rectify the fault.

Remember - before you contact Grant Engineering (UK) Limited:

- Ensure the boiler has been installed, commissioned and serviced by a competent person in accordance with the installation and servicing instructions.
- Ensure there is oil to supply the burner.
- Ensure the problem is not being caused by the heating system or its controls. Consult the boiler handbook for guidance.

Free of charge repairs

During the **two year** guarantee period no charge for parts or labour will be made, provided that the boiler has been installed and commissioned correctly in accordance with the manufacturer's installation and servicing instructions, it was registered with Grant Engineering (UK) Limited within thirty days of installation⁴ and, for boilers over twelve months old, details of annual service is available³.

The following documents must be made available to Grant Engineering (UK) Limited on request:

- Proof of purchase
- CD10 Installation Completion Form (or equivalent document)
- CD11 Commissioning Report Form (or equivalent document)
- Service documents (CD11 or equivalent document)

Chargeable repairs

A charge may be made (if necessary following testing of parts) if the breakdown is due to any fault(s) caused by the plumbing or heating system, e.g. contamination of parts due to system contamination, sludge, scale, debris or trapped air. See 'Extent of

manufacturer's guarantee'.

Extent of manufacturer's guarantee:

The manufacturer's guarantee does not cover the following:

- If the boiler has been installed for over **two years**.
- If the boiler has not been installed, commissioned, or serviced by a competent person in accordance with the installation and servicing instructions.
- The serial number has been removed or made illegible.
- Fault(s) due to accidental damage, tampering, unauthorised adjustment, neglect, misuse or operating the boiler contrary to the manufacturer's installation and servicing instructions.
- Damage due to external causes such as bad weather conditions (flood, storms, lightning, frost, snow, or ice), fire, explosion, accident or theft.
- Fault(s) due to incorrectly sized expansion vessel(s), incorrect vessel charge pressure or inadequate expansion on the system.
- Fault(s) caused by external electrics and external components not supplied by Grant Engineering (UK) Limited.
- Problems caused by lack of oil or faults with the oil storage and supply system.
- Fault(s) due to contamination of the oil storage and supply system, e.g. water or debris.
- Bleeding or removing oil storage tank contamination or blockages from oil lines.
- Problems due to the flue system being incorrectly fitted or not installed to meet installation requirements.
- Boiler servicing, de-scaling or flushing.
- Cleaning out condensate traps/ discharge pipes or thawing out frozen condensate pipework.
- Checking and replenishing system pressure.
- Oil supply pipelines, electrical cables and plugs, external controls not supplied by Grant Engineering (UK) Limited.
- Heating system components, such as radiators, pipes, fittings, pumps and valves not supplied by Grant Engineering (UK) Limited.
- Instances where the oil boiler has been un-installed and re-installed in another location.
- Use of spare parts not authorised

- by Grant Engineering (UK) Limited.
- Consumable items including, but not limited to, oil nozzles, oil hoses, gaskets.

IMPORTANT

The nozzle and braided oil hose supplied with the boiler are only covered for the period up to the time of the first service (twelve months). Both **must** be changed on the first service and on every annual service thereafter.

IMPORTANT

Do not wait until the fuel supply runs out before you re-order. Sludge in the bottom of the tank may be drawn into the fuel lines. It is recommended that the boiler is switched off when the new oil supply is delivered and that the fuel is allowed to settle for an hour before restarting the boiler.

Terms of manufacturer's guarantee:

- The Company shall mean Grant Engineering (UK) Limited.
 - The boiler must be installed by a competent installer and in full accordance with the relevant Codes of Practice, Regulations and Legislation in force at the time of installation.
 - The boiler is guaranteed for **two years** from the date of installation⁴, providing that after twelve months the annual service has been completed³ and the boiler registered with the Company within thirty days of installation. Any work undertaken must be authorised by the Company and carried out by a competent service engineer.
 - The shell (heat exchanger) of the oil boiler is also covered by a **five year parts only** guarantee from the date of installation⁴. This is subject to the following:
 - The boiler is operated correctly, in accordance with the installation and servicing instructions.
 - Proof is provided that the system has been flushed or chemically cleaned where appropriate (refer to BS 7593) and that the required quantity of a suitable corrosion inhibitor added.
 - Proof of annual servicing (including the checking of any expansion vessels and pressure relief valves) must be provided if and when requested by the Company.
- IMPORTANT**

*Grant Engineering (UK) Limited **strongly recommends** that a Grant Mag-One in-line magnetic filter/s (or equivalent⁵) is fitted in the heating system pipework. This should be installed and regularly serviced in accordance with the filter manufacturer's instructions.*

- This guarantee does not cover breakdowns caused by incorrect installation, neglect, misuse, accident or failure to operate the boiler in accordance with the manufacturer's installation and servicing instructions.
- The boiler is registered with the Company within thirty days of installation. Failure to do so does not affect your statutory rights¹.
- The balance of the guarantee is transferable providing the installation is serviced prior to the dwelling's new owners taking up residence. Grant Engineering (UK) Limited must be informed of the new owner's details.
- The Company will endeavour to provide prompt service in the unlikely event of a problem occurring, but cannot be held responsible for any consequences of delay however caused.
- This guarantee applies to Grant Engineering (UK) Limited boilers purchased and installed on the UK mainland, Isle of Wight, Channel Islands and Scottish Isles only². Provision of in-guarantee cover elsewhere in the UK is subject to agreement with the Company.
- All claims under this guarantee must be made to the Company prior to any work being undertaken. Invoices for call out/repair work by any third party will not be accepted unless previously authorised by the Company.
- Proof of purchase and date of installation, commissioning and service documents must be provided on request.
- If a replacement boiler is supplied under the guarantee (due to a manufacturing fault) the product guarantee continues from the installation date of the original boiler, and **not** from the installation date of the replacement⁴.
- The oil boiler must be connected to a mains water supply (installations utilising a private water supply are not covered by this guarantee).
- Breakdown/failure due to lime

scale will not be covered by this guarantee.

- The replacement of a boiler under this guarantee does not include any consequential costs, such as the removal or replacement of worktops, kitchen units, etc.
- The boiler (excluding external modules) must not be sited in a location where it may be subjected to frost.

Hard water advice (for Combi boilers only)

If you live in a hard water area, protection against scaling must be given to the domestic hot water heat exchanger of your combination boiler.

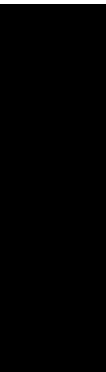
You should fit an appropriate scale inhibitor or water softener as any breakdown caused by water scaling is not covered by the manufacturer's guarantee. Ask your installer for advice.

Foot notes:

- Your statutory rights entitle you to a one year guarantee period only.
- The UK mainland consists of England, Scotland and Wales only. Please note that for the purposes of this definition, Northern Ireland, Isle of Man and Scilly Isles are **not** considered part of the UK mainland.
- Your boiler must be regularly serviced as per the installation and servicing instructions, (even when the guarantee has expired) to prolong the lifespan and ensure it is operating safely and efficiently.
- The guarantee period will commence from the date of installation, unless the installation date is more than six months from the date of purchase, in which case the guarantee period will commence six months from the date of purchase.
- As measured by gauss. The Mag-One magnetic filter has a gauss measurement of 12000.

Version 1.0

18 Notes







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