

Grant Vortex Pro

External Module Condensing Oil Boiler Range

Installation & Servicing Instructions



Commissioning Report

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 Pro 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, de-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.



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1 Introduction

This manual is intended to guide engineers in the installation and maintenance of Grant VORTEX Pro External modules. A User guide for the operation of this boiler is attached to the reverse of this manual.

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

WARNING

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

CAUTION

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

NOTE

Note text. 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 Pro 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 Pro 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 Pro 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 Pro 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 9-3) is also available from Grant UK. Refer to Section 9.2 for further details.

A Hybrid flue (Green/Orange) system (Figure 9-1) is also available which allows the External module to utilise an existing chimney stack. Refer to Section 9.2 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 9.2 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 for further details.

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

NOTE

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 warranty on the boiler.

A horizontal system - see Figure 9-4, is also available up to 3 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 hose and $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP male adaptor supplied with the boiler.

If required, an additional flexible fuel line (900 mm) and $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP male adaptor are available to purchase from Grant UK, for two-pipe oil supply systems, Part No. 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 $111^{\circ}\text{C} \pm 3^{\circ}\text{C}$.

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, Part No. EPKIT.

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

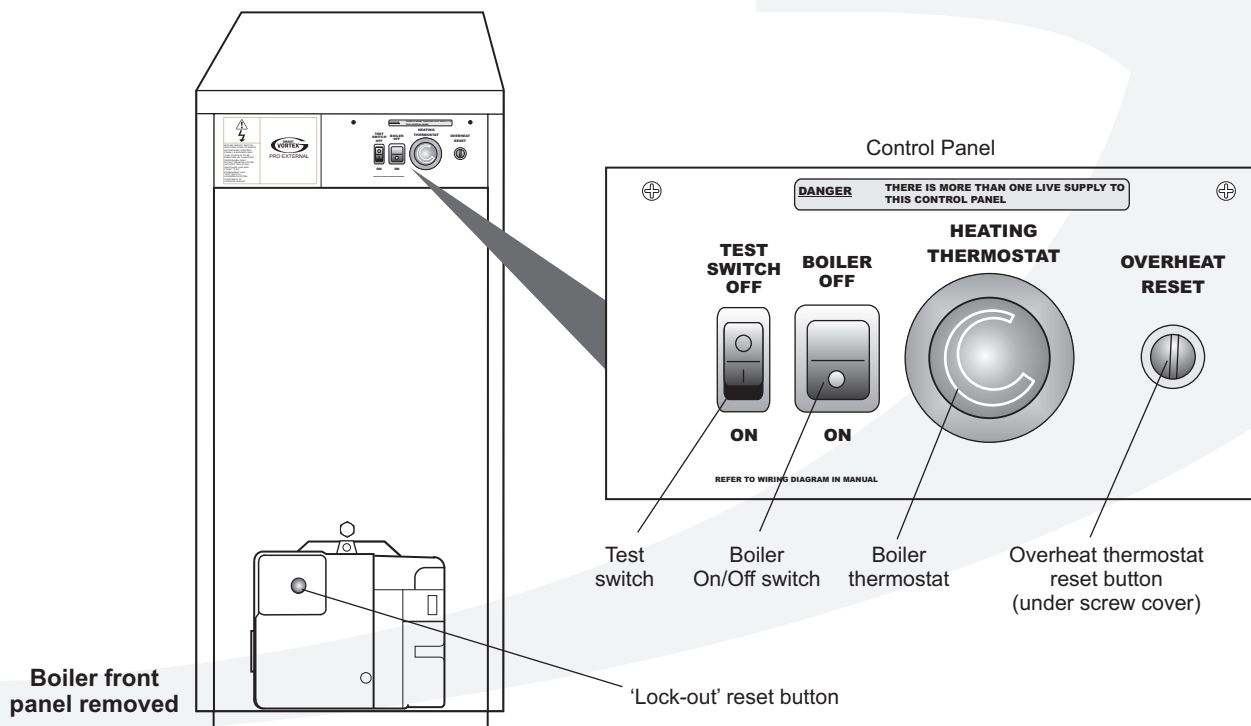


Figure 1-1: Boiler controls for External modules

2 Technical Data

2.1 Boiler Technical Data - Vortex Pro

Model		External module					
		15/21	15/26	26/36	36/46	46/58	58/70
Water content	litre	16.5	19	21	21	50	50
	gal	3.6	4.2	4.7	4.7	11	11
* Weight (dry)	kg	99	157	174	174	335	339
	lb	218	345	383	383	738	747
Max. heat output (kerosene)	kW	21	26	36	46	58	70
	Btu/h	71 650	88 700	122 840	157 000	197 896	238 840
Flow connection		22 mm	22 mm	28 mm	28 mm	1¼"BSP	1¼"BSP
Return connection		22 mm	22 mm	28 mm	28 mm	1¼"BSP	1¼"BSP
Min. flow rate ($\Delta T=10^{\circ}\text{C}$) l/h	l/h	1 800	2 200	3 000	4 000	5 200	6 000
Min. flow rate ($\Delta T=20^{\circ}\text{C}$) l/h	l/h	900	1 100	1 500	2 000	2 600	3 000
Condensate connection		22 mm (only connect plastic pipe)					
Flue diameter (conventional)		100 mm (4 in)			125 mm (5 in)**		
Waterside resistance $\Delta T=10^{\circ}\text{C}$	mbar	28.5		26.0			
Waterside resistance $\Delta T=20^{\circ}\text{C}$	mbar	10.0		9.5			
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				150	
Starting current	Amps	4.2	2.6	2.6	4.2	6.4	
Running current	Amps	0.85					
Oil connection		¼" 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					
Max operating press - sealed sys	bar	2.5					
Max operating press - open sys	bar	2.5					

* Weight includes burner but excludes flue.

** 125 mm diameter required for flexible flue liner (Orange system). For rigid flue system (e.g. Green system) 100 mm diameter flue required. Refer to Section 9 Flue System and Air Supply for further details.

2.2 Sealed System Data - External modules

	15/21, 15/26, 26/36, 36/46
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)	10 litres (15/21), 12 litres (15/26), 16 litres (26/36, 36/46)
Max heating system volume (including boiler)*	106 litres (15/21), 128 litres (15/26), 170 litres (26/36, 36/46) - approx.
Cold water mains connection	15 mm copper pipe
Pressure relief valve discharge connection	15 mm copper pipe
Circulating pump head	6 m (15/21, 15/26), 7 m (26/36, 36/46)

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

2.3 Vortex Pro Boilers using Class C2 Kerosene

Model and burner type	Heat Output		SEDBUK 2009 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	15.0	51 200	91.2	0.50/80°EH	7.0	0 - 1	T1	Disc setting B	1.29	66	12.0
	18.3	62 400		0.55/80°EH	7.5	0 - 1	T1	Disc setting C	1.56	73	12.0
	* 21.0	71 650		0.60/80°EH	9.0	0 - 1	T1	Disc setting C	1.83	80	12.0
15/26 Riello RDB1	15.0	51 180	91.9	0.50/80°EH	7.0	0 - 1	T1	Fixed	1.25	60 - 65	12.0
	20.0	68 240		0.60/80°EH	8.0	0 - 1	T1	Fixed	1.67	65 - 70	12.0
	* 23.0	78 475		0.65/80°EH	8.5	0 - 1	T2	Fixed	1.94	70 - 75	12.0
	26.0	88 700		0.75/80°EH	8.0	0 - 1	T2	Fixed	2.16	68	12.0
26/36 Riello RDB2	26.0	88 700	93.3	0.75/80°EH	8.0	0 - 1	T3	Fixed	2.18	68	12.0
	* 31.5	107 500		0.85/80°EH	9.0	0 - 1	T3	Fixed	2.57	70	12.0
	36.0	123 000		1.00/80°EH	9.1	0 - 1	T3	Fixed	3.01	78	12.0
36/46 Riello RDB2.2	36.0	123 000	90.7	1.00/80°EH	9.0	0 - 1	T5	Fixed	3.01	78	12.0
	* 41.5	142 000		1.20/80°S	8.0	0 - 1	T5	Fixed	3.56	80	12.0
	46.0	157 000		1.25/80°S	8.0	0 - 1	T5	Fixed	3.90	88	12.0
46/58 Riello RDB3.2	46.0	156 952	91.7	1.25/80°S	8.0	0 - 1	GIB	Head setting 0	4.01	75 - 80	12.0
	* 52.0	177 424		1.35/80°S	9.5	0 - 1	GIB	Head setting 0	4.47	75 - 80	12.0
	58.0	197 896		1.65/80°S	8.0	0 - 1	GIB	Head setting 0	5.05	75 - 80	12.0
58/70 Riello RDB3.2	58.0	197 896	91.4	1.65/80°S	8.0	0 - 1	GIB	Head setting 0	5.05	75 - 80	12.0
	* 64.0	218 368		1.65/80°S	9.5	0 - 1	GIB	Head setting 0	5.58	75 - 80	12.0
	70.0	238 840		1.75/80°S	9.5	0 - 1	GIB	Head setting 4	6.01	75 - 80	12.0

Notes:

- The data given above is approximate only.
- The above settings 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 Pro boiler range.
- The net flue gas temperatures given above are ± 10%.
- When commissioning the air damper **must be** adjusted to obtain the correct CO₂ level.
- * Factory settings: 15/21 - 21 kW, 15/26 - 23 kW, 26/36 - 31.5 kW, 36/46 - 41.5 kW, 46/58 - 52.0 kW, 58/70 - 64.0 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 kW output the burner air adjuster disc requires repositioning. Refer to Section 10 Commissioning.
When setting the 15/26 to 15 or 20 kW output the combustion head must be changed. Refer to Section 11.4 Cleaning the burner.
When setting the 58/70 to 70 kW output the combustion head setting must be changed. Refer to Section 11.4 Cleaning the burner.
- 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 External module	22mm pipe	Compression straight	in fittings kit	22mm pipe	Compression	fitted
15/26 External module	22mm pipe	Compression elbow	in fittings kit	22mm pipe	Compression	fitted
26/36 External module	28mm pipe	Compression straight	in fittings kit	28mm pipe	Compression	fitted
36/46 External module	28mm pipe	Tectite straight	in fittings kit	28mm pipe	Compression	fitted
46/58 External module	1¼" BSP	Female socket	fitted	1¼" BSP	Female socket	fitted
58/70 External module	1¼" BSP	Female socket	fitted	1¼" BSP	Female socket	fitted

2.6 Boiler Dimensions

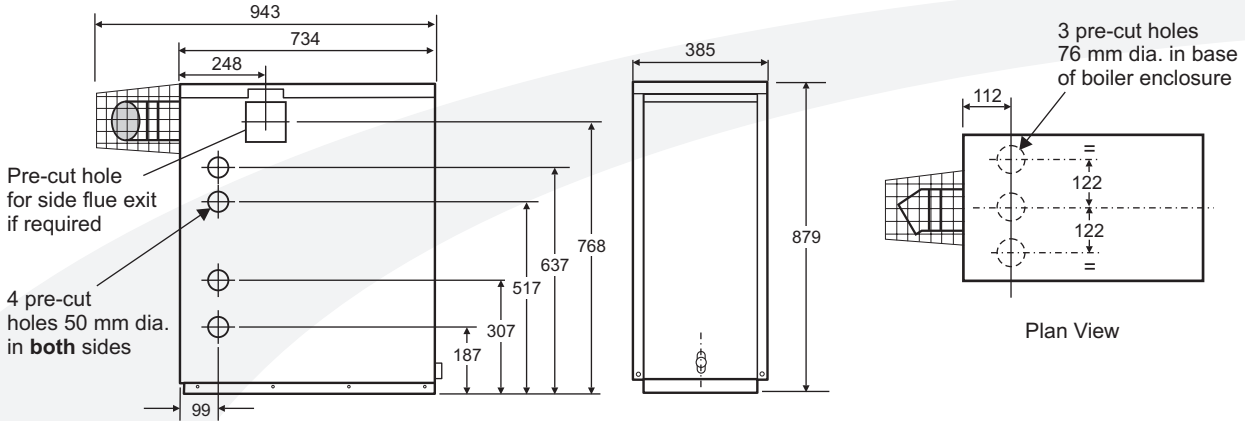


Figure 2-1: 15/21 External module dimensions

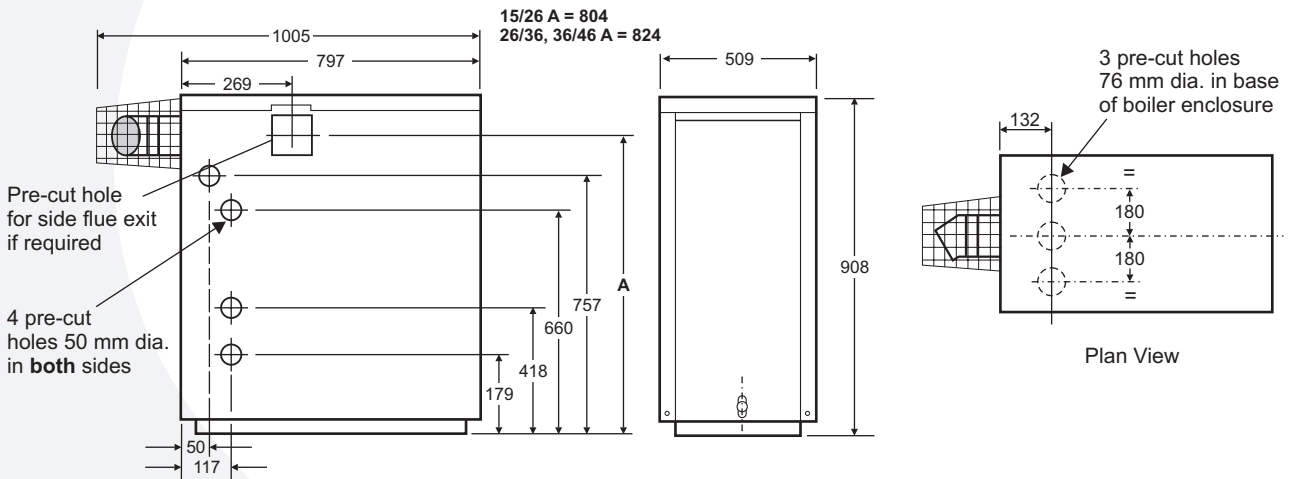


Figure 2-2: 15/26, 26/36, 36/46 External module dimensions

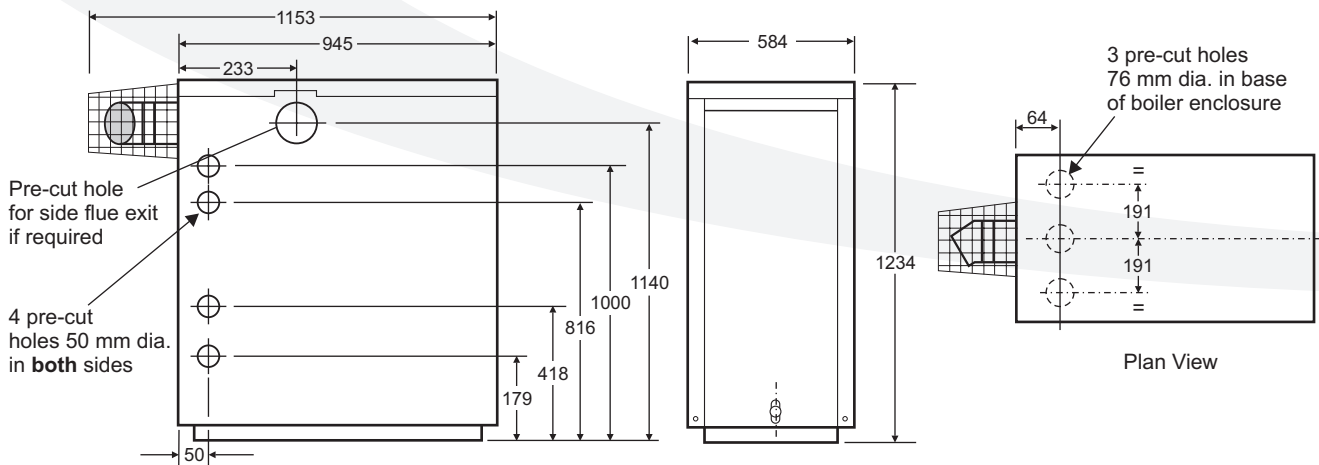


Figure 2-3: 46/58, 58/70 External module dimensions

All dimensions in the diagrams above are in millimetres

3 Oil Storage & Supply System

3.1 Fuel Supply

Fuel Storage

The tank should be positioned in accordance with the recommendations given in BS 5410:1:1997, which gives details of filling, maintenance and protection from fire.

A steel tank may be used and must be constructed to BS 799:5:1987 and OFST200.

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.

A remote sensing fire valve must be installed in the fuel supply line, with the sensing head located above the burner. Recommendations are given in BS 5410:1:1997.

A metal bowl type filter with a replaceable micron filter must be fitted in the fuel supply line adjacent to the boiler. A shut-off valve should be fitted before the filter, to allow the filter to be serviced.

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, Part No. 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 hose - a flexible fuel hose (900 mm) and 3/8" to 1/4" BSP male adaptor are available to purchase from Grant UK, Part No. 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.

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

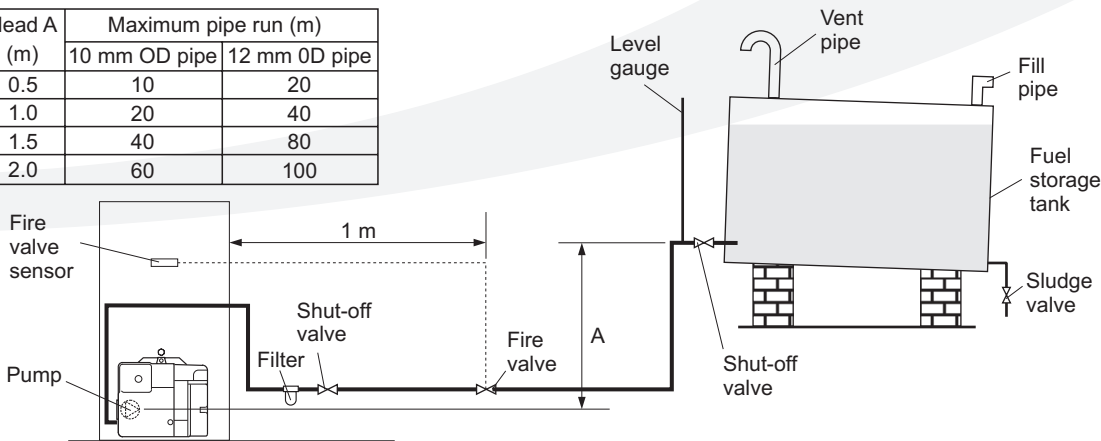


Figure 3-1: Single pipe system

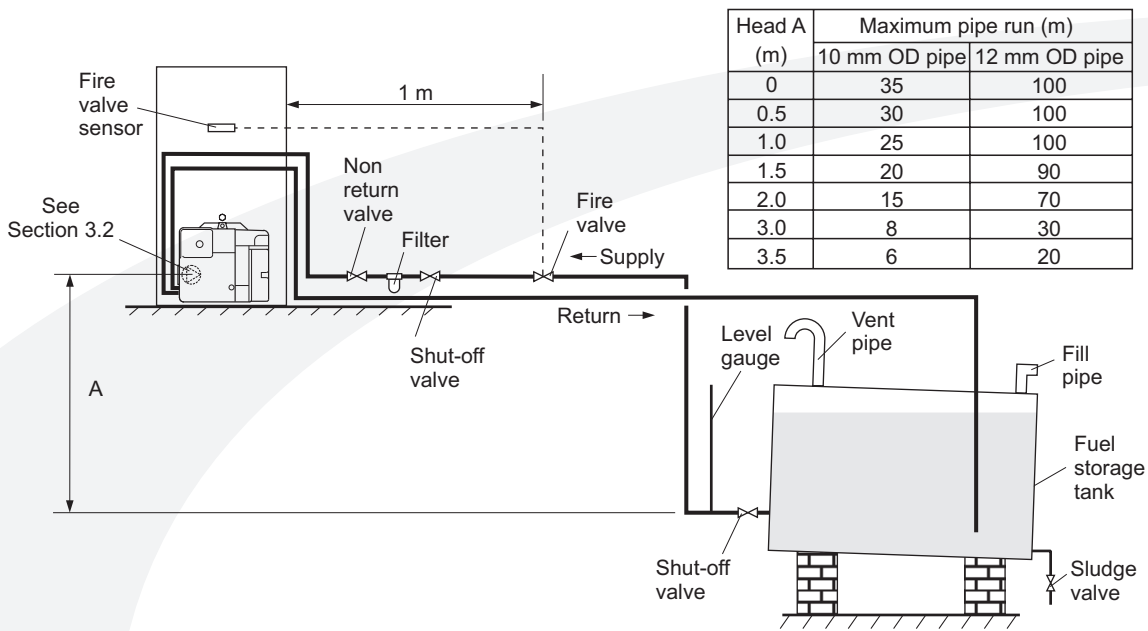


Figure 3-2: Two pipe system

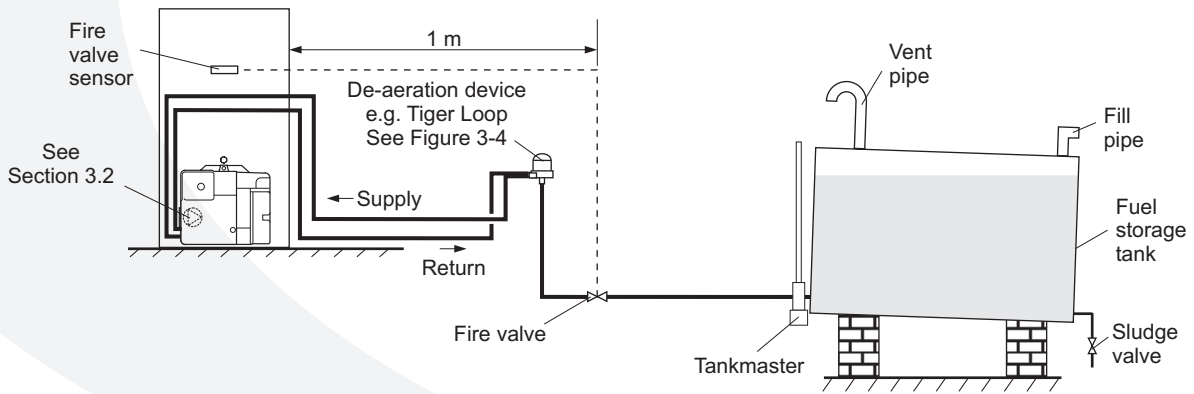


Figure 3-3: De-aeration device system

**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.

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 $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP male adaptor are available to purchase from Grant UK, Part No. RBS36.

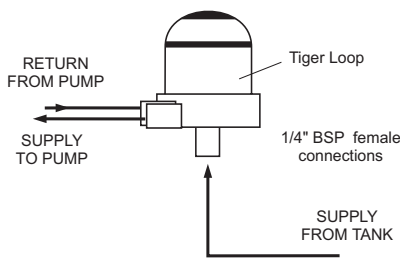


Figure 3-4: Tiger loop de-aeration device

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.

On all models except 46/58 and 58/78:
Remove the plastic burner cover (secured by two screws).

On 46/58 and 58/70 models only:
Remove the plastic burner cover (secured by three 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 hose to the pump.

Connect the $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP adaptor to the flexible fuel hose.

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

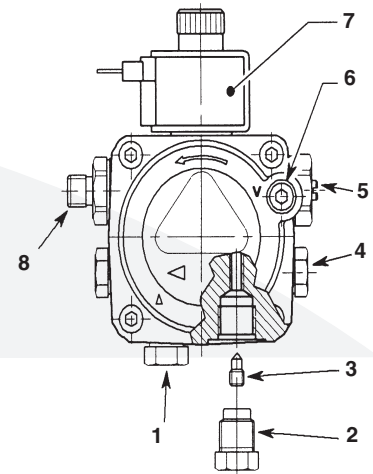


Figure 3-5: Riello RDB pump

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

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.

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.

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

! 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.

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 hose supplied with the boiler to the inlet port.

Connect the other end of the flexible fuel hose to the rigid supply line using the adaptor supplied. The supply enters the enclosure through one of the holes in the bottom of the side panels.

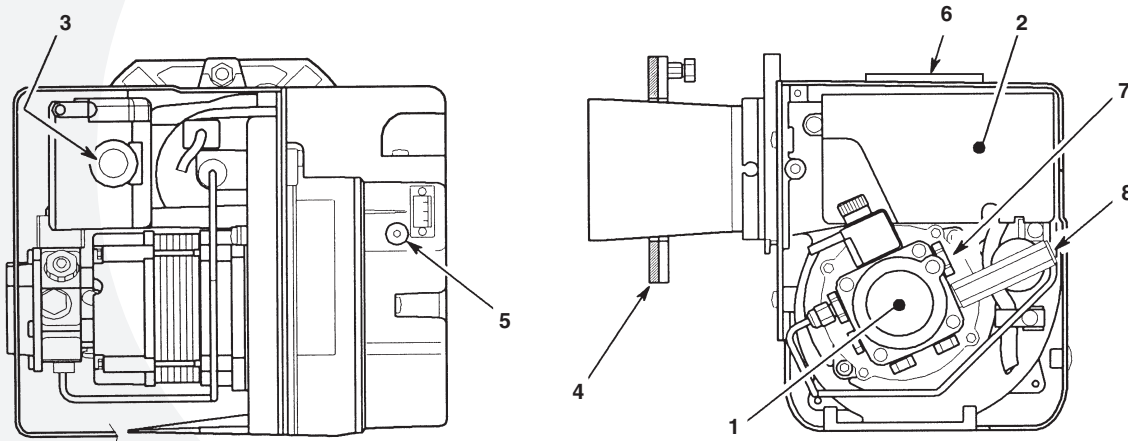


Figure 3-6: Riello RDB burner components

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.
 - 15/21, 15/26, 26/36 and 36/46 models** - 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.
 - 46/58 and 58/70 models** - Fit the circular rubber sealing grommet, provided, into the circular hole in the side/rear casing 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.

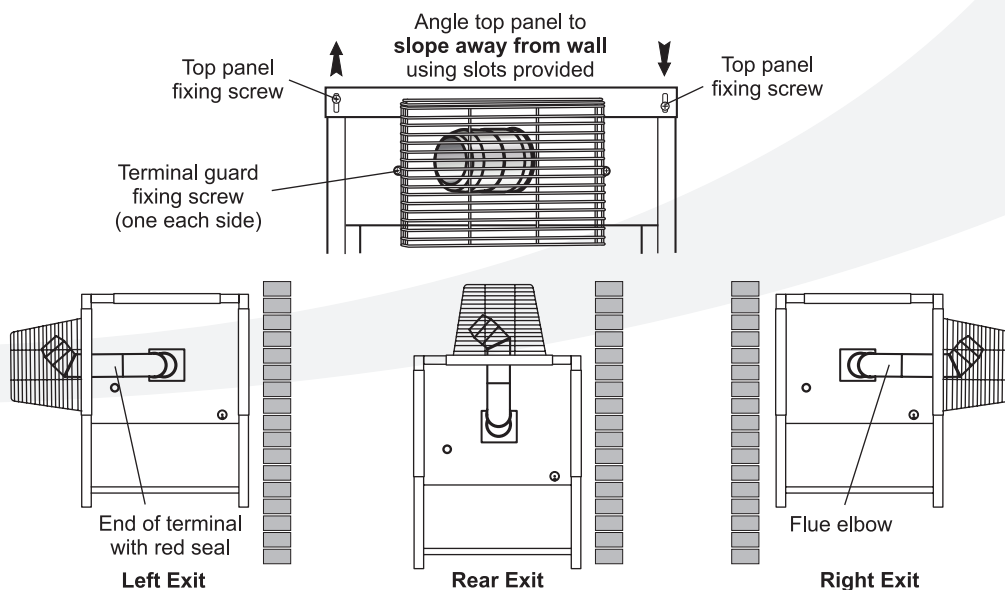


Figure 4-1: Standard low level flue

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 Pro 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 4543:3 Factory made insulated chimneys for oil fired appliances.
- BS 4876 Performance requirements for oil burning appliances.
- BS 5410:1 Code of Practice for oil firing appliances.
- 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, IEE Wiring Regulations.

NOTE

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

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 7593:1992 '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 7593:1992.

Failure to implement these guidelines will invalidate the warranty.

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 Pro 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:Part 1:2001) 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: Part 1:2001.

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, Part No. MPCBS 63.

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. If required, fit the Grant sealed system kit. Refer to Section 7.
3. 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.

4. 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.
5. 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).

15/21, 15/26, 26/36, 36/46 Flow connection: A pipe (22 mm for 15/21, 15/26 or 28 mm for 26/36, 36/46) 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.

15/21, 15/26, 26/36, 36/46 Return connection: A pipe (22 mm for 15/21, 15/26 or 28 mm for 26/36, 36/46) 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.

46/58, 58/70 Flow connection: A 1¼" BSP socket is provided for the flow connection. This is located on the top of the boiler. This flow pipe will need to be vented, as it is the highest point on the primary heat exchanger.

46/58, 58/70 Return connection: A 1¼" BSP socket is located on top of the boiler. This return pipe will also need to be vented at some point, as it is the highest point on the secondary heat exchanger.

! NOTE

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.

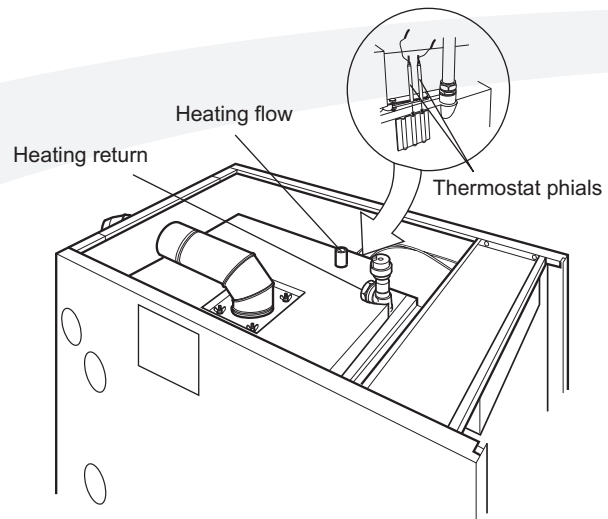


Figure 5-1: 15/26 water connections

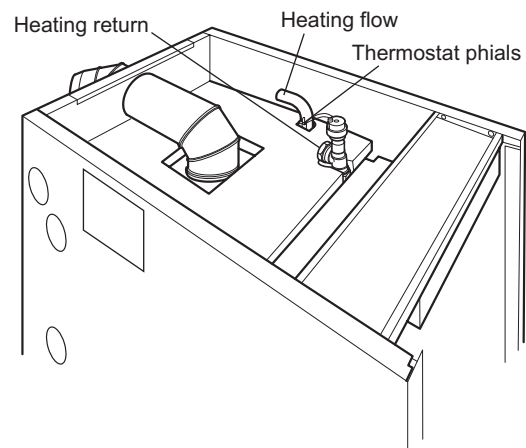


Figure 5-2: 15/21, 26/36, 36/46 water connections

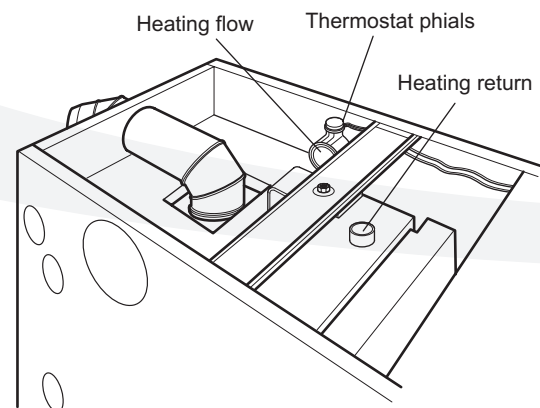


Figure 5-3: 46/58, 58/70 water connections

6 Condensate Disposal

6.1 General Requirements

When in condensing mode the Grant VORTEX Pro 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 waste system (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 warranty.

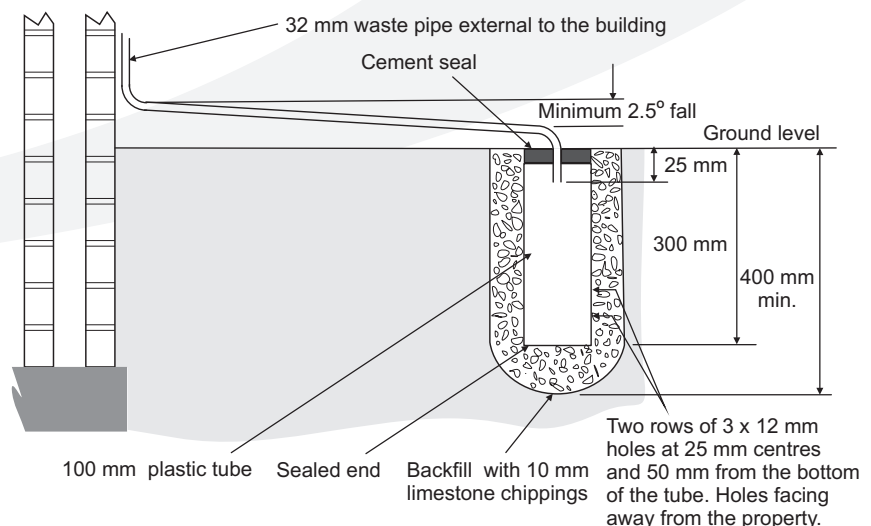


Figure 6-1: Purpose made condensate soakaway

6.6 Condensate Trap

Grant VORTEX Pro 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.

! NOTE

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.

! NOTE

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.

! CAUTION

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

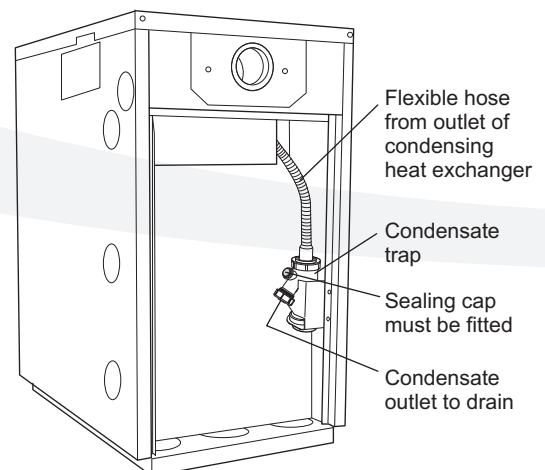


Figure 6-2: Condensate trap (rear panel removed)

7 Sealed Systems

7.1 Sealed System Installation

See Figure 7-1

All Grant VORTEX Pro boilers are suitable for use with sealed systems complying with the requirements of BS 5449.

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 4814.
- Pressure gauge.
- Safety valve.
- Approved method for filling the system.

! NOTE

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 fitted on System models).

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. The by-pass must be an automatic type.

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(10):1972.

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

7.2 15/21 Sealed System Kit

See Figures 7-3 and 7-4

1. The kit includes the following items:
 - Pressure relief valve and automatic air vent.
 - 22 mm manifold pipe.
 - 10 litre expansion vessel with flexible hose and sealing washer.
 - Expansion vessel mounting bracket.
 - Filling loop kit.
 - Pressure gauge (mounted on compression tee).
 - 6 m head circulating pump with 22 mm gate valves.
 - 15 mm copper pressure relief valve discharge pipe (in two pieces with push-fit connector).
 - Pump support bracket (with fixing screws).

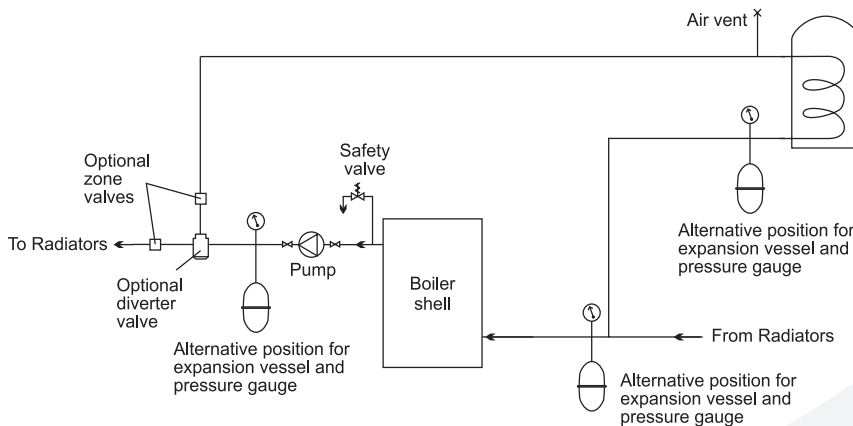


Figure 7-1: Scaled system

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

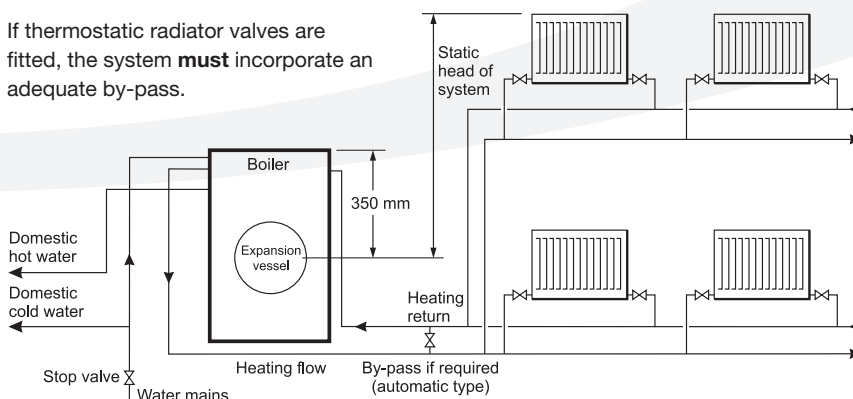


Figure 7-2: Boilers with sealed system kit

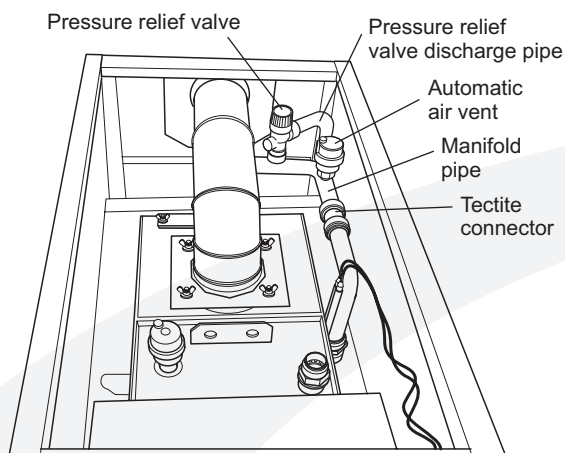


Figure 7-3: 15/21 top view

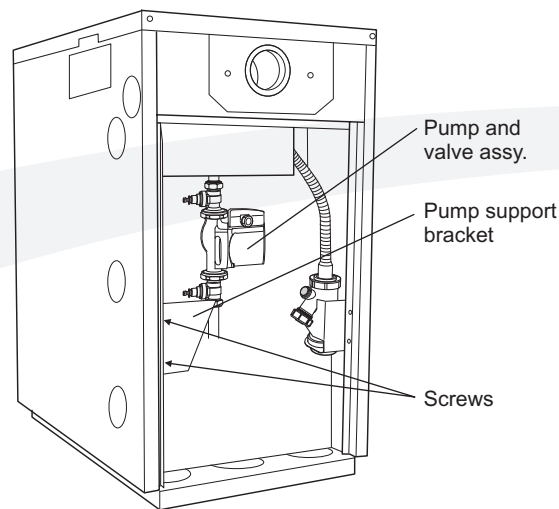


Figure 7-4: 15/21 rear view

2. Unscrew and remove the two nuts and washers from the two cleaning door studs. Remove cleaning door from boiler.
3. Remove the 1/2" BSP black iron plug from the front of the boiler waterway, using a 3/8" drive socket wrench.
4. Fit the 1/2" BSP straight connector end of the flexible expansion vessel hose into the tapping on the front of the waterway using a suitable thread sealant.
5. Fit the 3/4" BSP connection on the flexible expansion vessel hose to the vessel using the black rubber sealing washer supplied and tighten the union nut.
6. Replace the cleaning door on the two door studs. Fit the expansion vessel mounting bracket onto the studs. Replace the nuts and washers and re-tighten to secure door and bracket.
7. Push the 22 mm push-fit connector (supplied with the boiler) onto the end of the boiler flow pipe.
8. Fit the pressure relief valve and automatic air vent onto the manifold pipe. Then push fit the manifold pipe end into the 22 mm push-fit connector on the boiler flow pipe. Refer to Figure 7-3.
9. Fit both 22 mm pump valves to the circulating pump using the sealing washers provided.
10. Fit the pump support bracket, with the screws provided, using the two holes in the left hand side panel flange (viewed from rear of boiler as shown in Figure 7-4).

11. Fit the pump/pump valve assembly to the end of the pressure relief valve/auto air vent manifold pipe. Ensure that the pump shaft is horizontal and the pump motor is facing towards the right side of the boiler (viewed from the rear as shown in Figure 7-4). The flow arrow on the body of the pump must face in the required direction of flow – away from the boiler flow connection – downwards in this case.
12. Ensure that the pump/valve assembly is supported by the bracket. The upper part of the lower valve should rest on the support bracket, with the body of the valve passing through the cut-out. Connect the flow pipework to the lower pump valve.
13. Assemble the two sections of the pressure relief valve discharge pipe using the 15 mm straight push-fit connector provided. Adjust the pressure relief valve so that the outlet points to the rear left corner of the boiler (viewed from the rear of the boiler).
14. Fit the pressure relief valve discharge pipe to the pressure relief valve outlet using the nut and olive provided. Route the pipe down the left hand rear side of the boiler and locate the lower end through the slot in the bottom flange of the left hand side panel.
15. The circulating pump may be wired into the boiler control panel if required. Refer to Section 8.
16. The pressure gauge and filling loop should be installed in a convenient position inside the building.

7.3 15/26 Sealed System Kit

See Figure 7-5

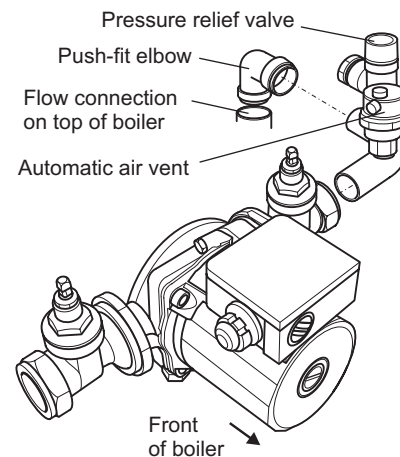


Figure 7-5: 15/26 pump assembly

1. The kit includes the following items:
 - Pressure relief valve and automatic air vent.
 - 22 mm manifold pipe.
 - 12 litre expansion vessel with flexible hose and sealing washer.
 - Filling loop kit.
 - Pressure gauge.
 - 6 m head circulating pump with 22 mm gate valves.
 - 15 mm copper pressure relief valve discharge pipe (in two pieces with push-fit connector).
2. Remove the 1/2" BSP black iron plug from the front of the boiler waterway, using a 3/8" drive socket wrench.

3. Fit the ½" BSP straight end of the flexible expansion vessel hose to the tapping on the front of the waterway using a suitable thread sealant.
4. Position the 12 litre expansion vessel on the front of the boiler combustion door locating the hook (on the back of the vessel) onto the uppermost handle of the combustion door.
5. Fit the ¾" BSP connection of the flexible expansion vessel hose to the vessel using the black rubber washer supplied and tighten the nut.
6. Push the 22 mm push-fit elbow (supplied with the boiler) onto the boiler flow pipe.
7. Fit the pressure relief valve and automatic air vent onto the manifold pipe, then push the manifold pipe end into the 22 mm push-fit elbow on the flow pipe. Refer to Figure 7-5.
8. Fit both 22 mm pump valves to the circulating pump using the sealing washers supplied.
9. Fit the pump assembly to the automatic air vent/pressure relief valve assembly ensuring that the pump shaft is horizontal and the pump motor is facing towards the front of the boiler. The flow arrow on the body of the pump must face in the direction of flow away from the boiler connection.
10. Fit the pressure relief valve discharge pipe to the pressure relief valve using the nut and olive supplied. Route the discharge pipe through the slot in the base of the right hand side panel. Push the panel insulation back to expose the slot.
11. The circulating pump may be wired into the boiler control panel if required. Refer to Section 8.
12. The pressure gauge and filling loop should be installed in a convenient position inside the building.

7.4 26/36, 36/46 Sealed System Kit

See Figure 7-6

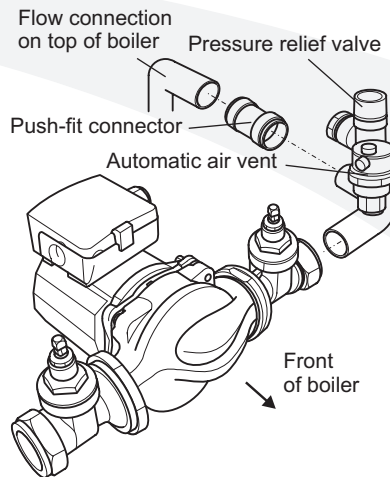


Figure 7-6: 26/36, 36/46 pump assembly

1. The kit includes the following items:
 - Pressure relief valve and automatic air vent.
 - 28 mm manifold pipe.
 - 16 litre expansion vessel with flexible hose and sealing washer.
 - Expansion vessel mounting bracket with vessel locking screw.
 - Filling loop kit.
 - Pressure gauge.
 - 7 m head circulating pump with 28 mm gate valves.
 - 15 mm copper pressure relief valve discharge pipe (in two pieces with push-fit conne).
2. Remove the ½" BSP black iron plug from the front of the boiler waterway, using a 3/8" drive socket wrench.
3. Fit the ½" BSP straight end of the flexible expansion vessel hose to the tapping on the front of the waterway using a suitable thread sealant.
4. Remove the nuts and washers from the boiler combustion door.
5. Fit the vessel support bracket to the studs of the combustion door and refit the nuts and washers. Tighten to ensure an adequate seal is made.
6. Position the 16 litre expansion vessel onto the support bracket in front of the boiler combustion door locating the top of the vessel behind the control panel first.

7. Screw in the locking screw on the base of the bracket to secure the vessel in place.
8. Fit the ¾" BSP connection of the flexible expansion vessel hose to the vessel using the black rubber washer supplied and tighten the nut.
9. Remove the right hand boiler casing panel (viewed from the burner end). This panel is fixed in place by:
 - Two screws in the right end of the upper rear panel.
 - Four screws along the lower outer edge of the side panel.
 - Two screws at the right end of the control panel.

Note: It will be necessary to support the control panel when the side panel is removed.

10. Slacken the compression nut at the base of the flow connection pipe (on the right hand side of the boiler). Carefully rotate the flow pipe through 180° until it faces to the front of the boiler, then re-tighten the compression nut.
11. Push the 28 mm push-fit connector (supplied with the boiler) onto the end of the boiler flow pipe.
12. Fit the pressure relief valve and automatic air vent onto the manifold pipe, then push the manifold pipe end into the 28 mm push-fit elbow on the flow pipe. Refer to Figure 7-6.
13. Remove the two screws securing the motor to the pump body. Rotate the motor through 180°, then replace and secure with the two screws. Fit both 28 mm pump valves to the pump using the sealing washers supplied.
14. Fit the pump assembly to the automatic air vent/pressure relief valve assembly ensuring that the pump shaft is horizontal and the pump motor is facing towards the rear of the boiler. The flow arrow on the body of the pump must face in the direction of flow away from the boiler connection.
15. Fit the pressure relief valve discharge pipe to the pressure relief valve using the nut and olive supplied. Route the discharge pipe through the slot in the base of the right hand side panel. Push the panel insulation back to expose the slot.

16. The circulating pump may be wired into the boiler control panel if required. Refer to Section 8.
17. Refit the casing side panel only after filling and checking the system for leaks

Ensure there is no leak from the connection at the base of the flow pipe BEFORE re-fitting the casing side panel.

7.5 Fit the Expansion Vessel

The expansion vessel fitted is supplied with a charge pressure of 1.0 bar (equivalent to a max. 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 expansion vessel is connected via a flexible hose to allow it to be moved to gain access to the baffle cleaning cover. When replacing the vessel, care should be taken to ensure that the flexible connecting hose is not twisted.



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 volumes. 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.

NOTE

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.

7.6 Fill the Sealed System

Automatic air vent(s) are fitted to the top of the boiler (see Figures 7-3, 7-5 and 7-6). 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 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.

7.7 Vent the Pump

It is important that the pump is properly vented to avoid it running dry and damaging its bearings. The procedure is as follows:

1. Remove the cap, then unscrew and remove the plug from the centre of the pump.
2. Using a suitable screwdriver rotate the exposed spindle about one turn.
3. Replace the plug and cap.

7.8 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 (see Figure 7-2) 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.

8 Electrical

The VORTEX Pro 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 8-5 for boiler internal wiring diagram.

WARNING

The VORTEX Pro External module 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 I.E.E. 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 control.

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

NOTE

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 recommend 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 8-4 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 8-4 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

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

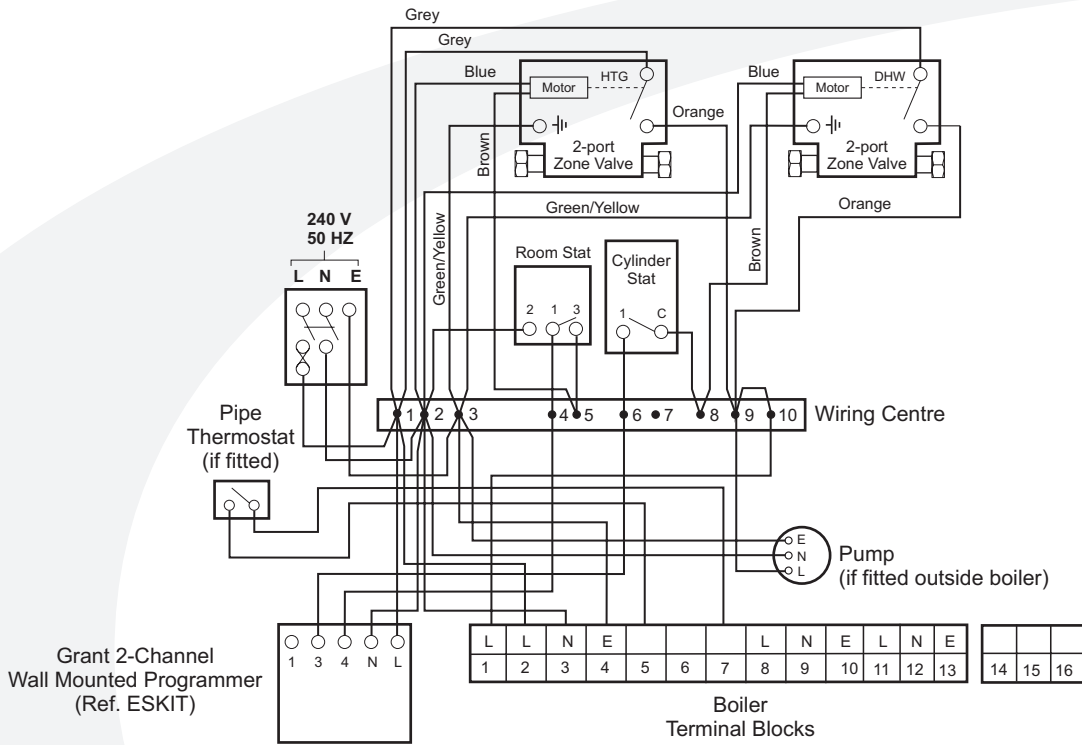


Figure 8-1: Grant 2 channel wall mounted programmer (Ref. ESKIT) - CH and HW controlled by two 2-port zone valves

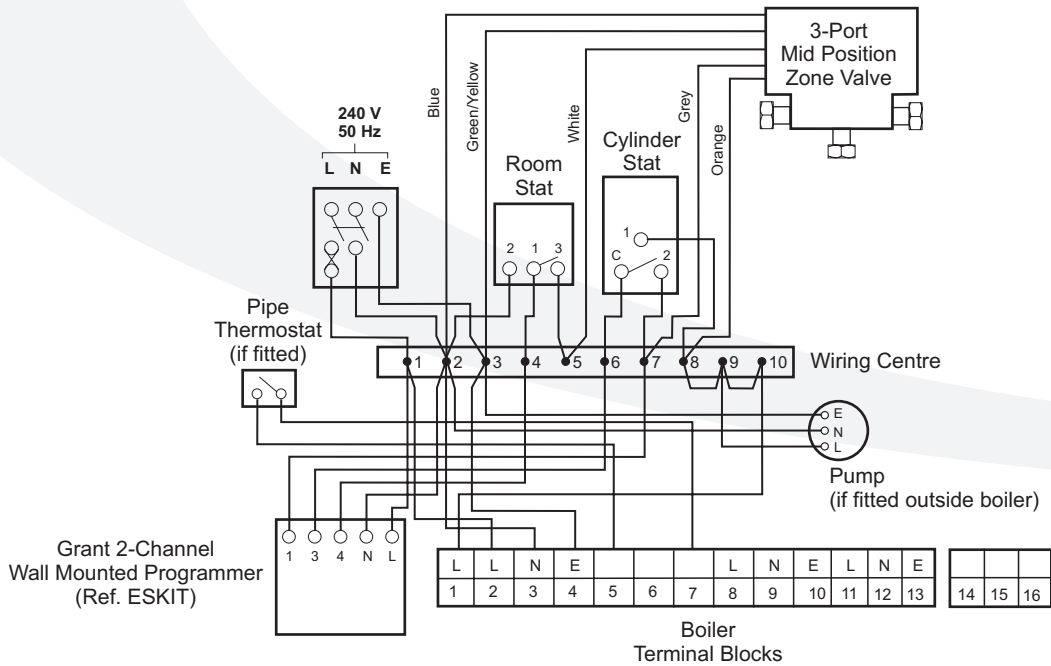


Figure 8-2: Grant 2 channel wall mounted programmer (Ref. ESKIT) - CH and HW controlled by 3-port mid position valve

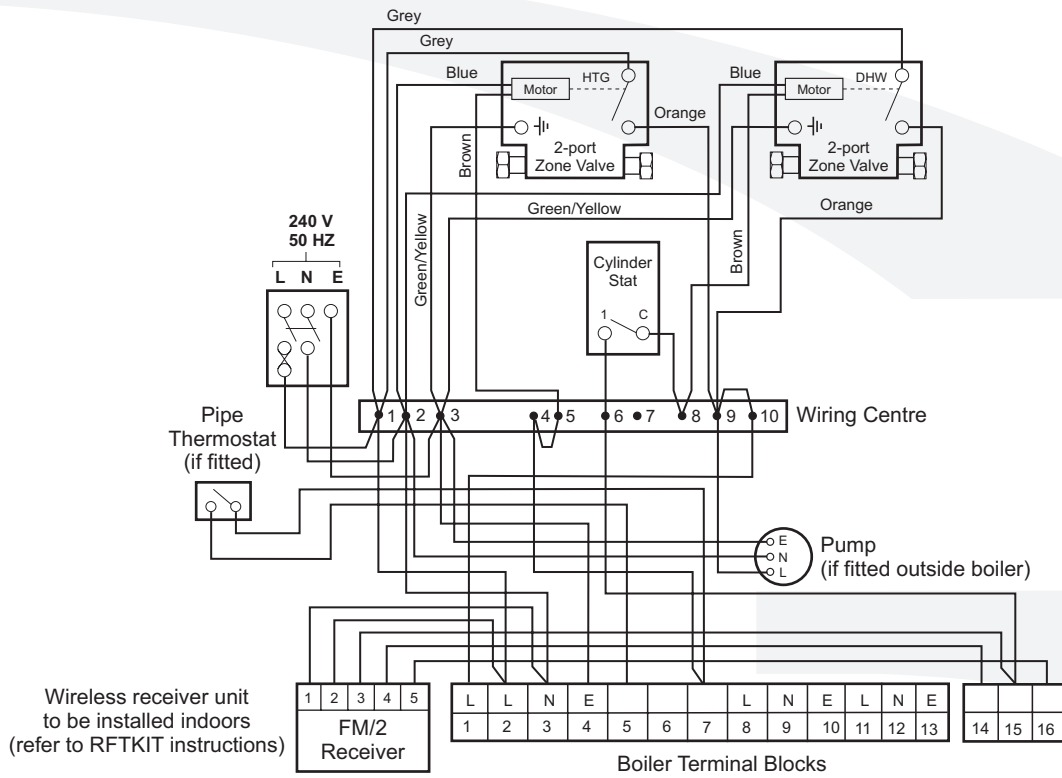


Figure 8-3: Grant wireless twin channel control (RFTKIT) - CH and HW controlled by two 2-port zone valves

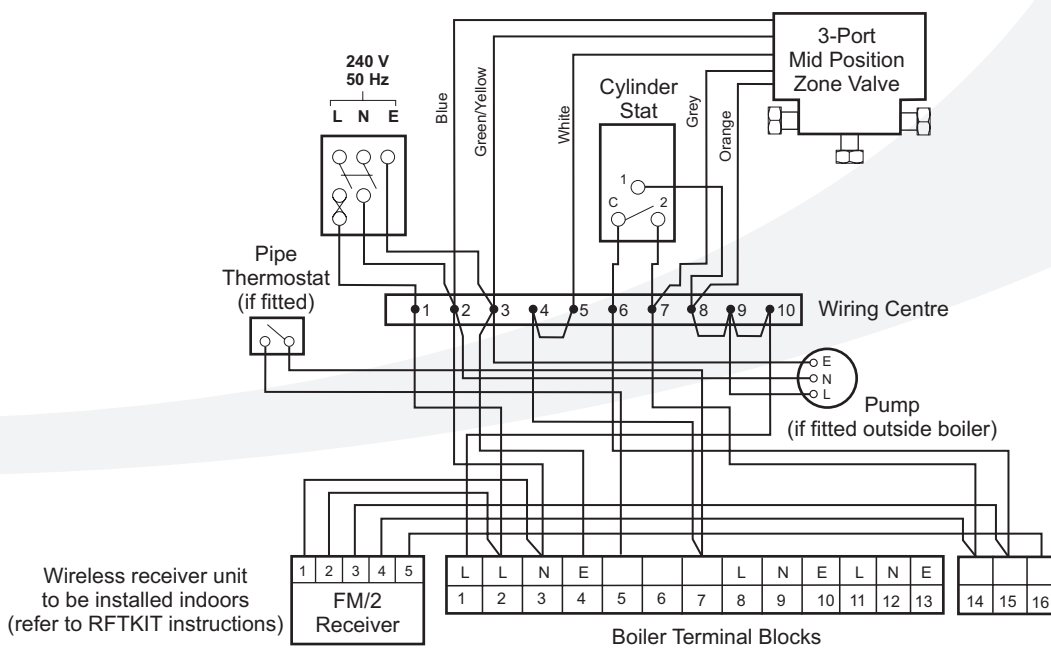


Figure 8-4: Grant wireless twin channel control (RFTKIT) - CH and HW controlled by 3-port mid position valve

8.4 Boiler Control Panel Wiring

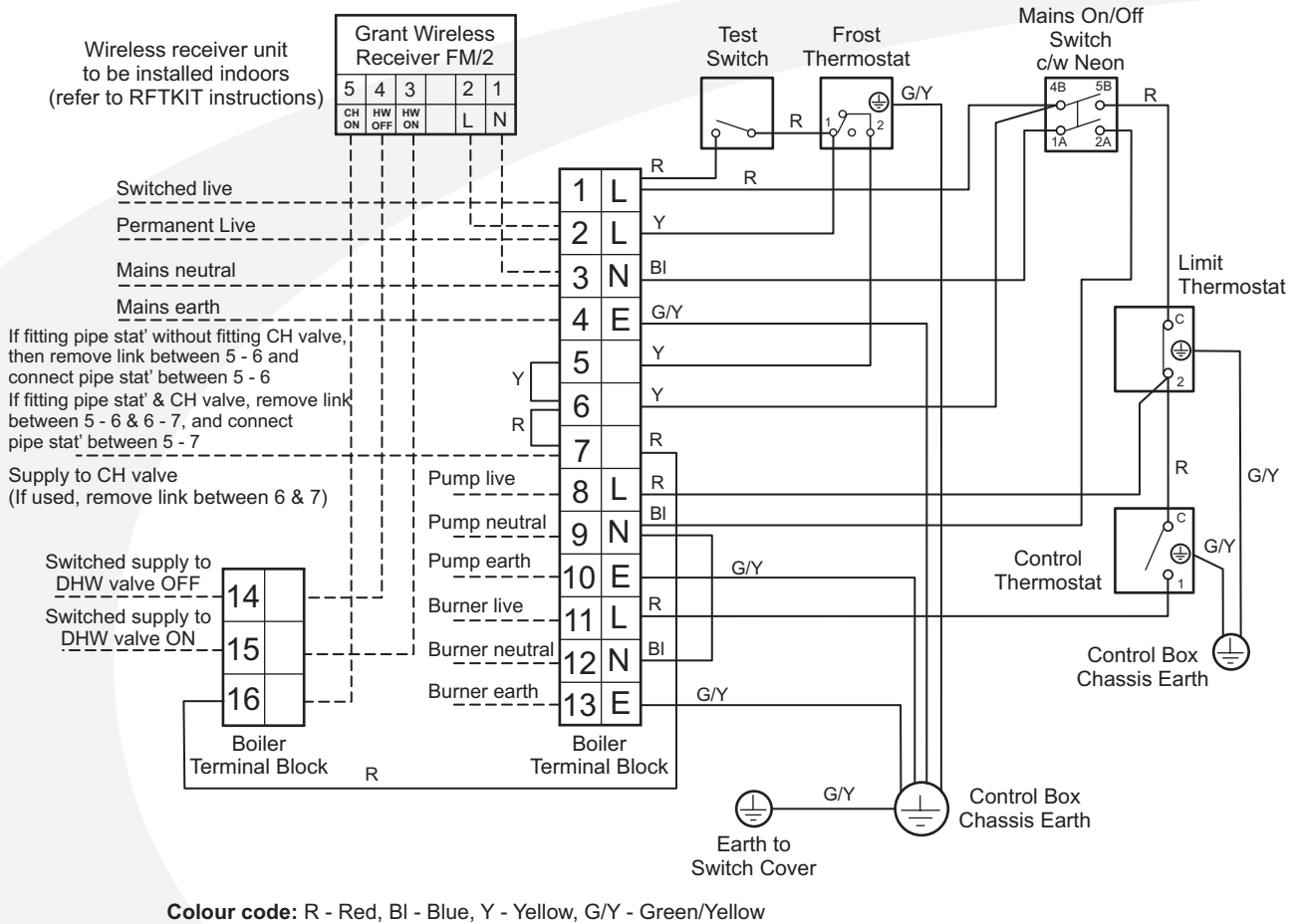


Figure 8-5: Receiver for optional Grant wireless twin channel control (RFTKIT) shown

A programmable room thermostat - Part No. RSKIT is available from Grant UK. The thermostat has a 5/2 day operation and enables six time and temperature changes each day. The thermostat incorporates frost protection and an On/Off facility.

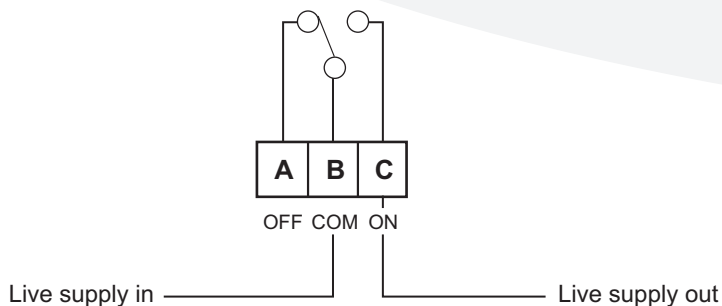


Figure 8-6: Grant programmable room thermostat

9 Flue System and Air Supply

9.1 Low Level Discharge Flue

The Grant VORTEX Pro 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 warranty.

9.2 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 9-2.

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

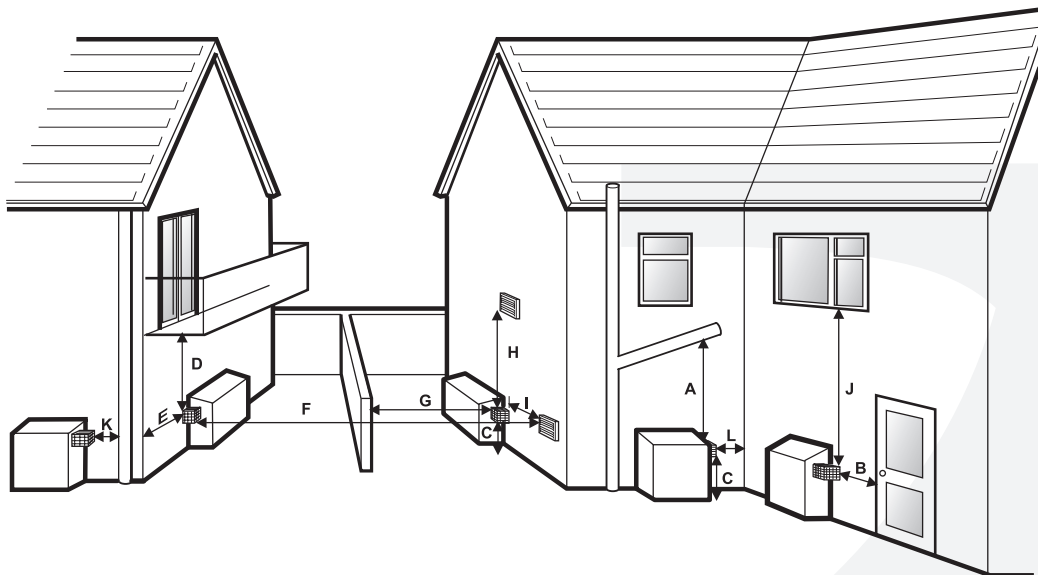


Figure 9-1: Clearances for flue terminals

Terminal position	Min. distance (mm)
A Below a gutter or sanitary pipework	600 *
B Horizontal from an opening, air brick or window	600
C Above ground or balcony level	300
D Below eaves or balcony	600 *
E From an internal or external corner	300
F From a terminal facing the terminal	1200
G From a surface facing the terminal	600
H Vertical from terminals on the same wall	1500
I Horizontal from terminals on the same wall	750 **
J Below an opening, air brick, window etc.	600
K From vertical sanitary pipework	300
From an oil storage tank	1800

Notes:

* 75 mm with protection.

** Only applies if one or both terminals are balanced flues.

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

Distances measured to rim of terminal.

Clearances recommended by Grant UK in accordance with British Standards and Building Regulations.

! NOTE

1. An opening means an openable element, such as an openable window, or a permanent opening such as a permanently open air vent.
2. Notwithstanding the dimensions given, a terminal should be at least 300 mm from combustible material, e.g. a window frame.
3. A way of providing protection of combustible material would be to fit a heat shield at least 750 mm wide.

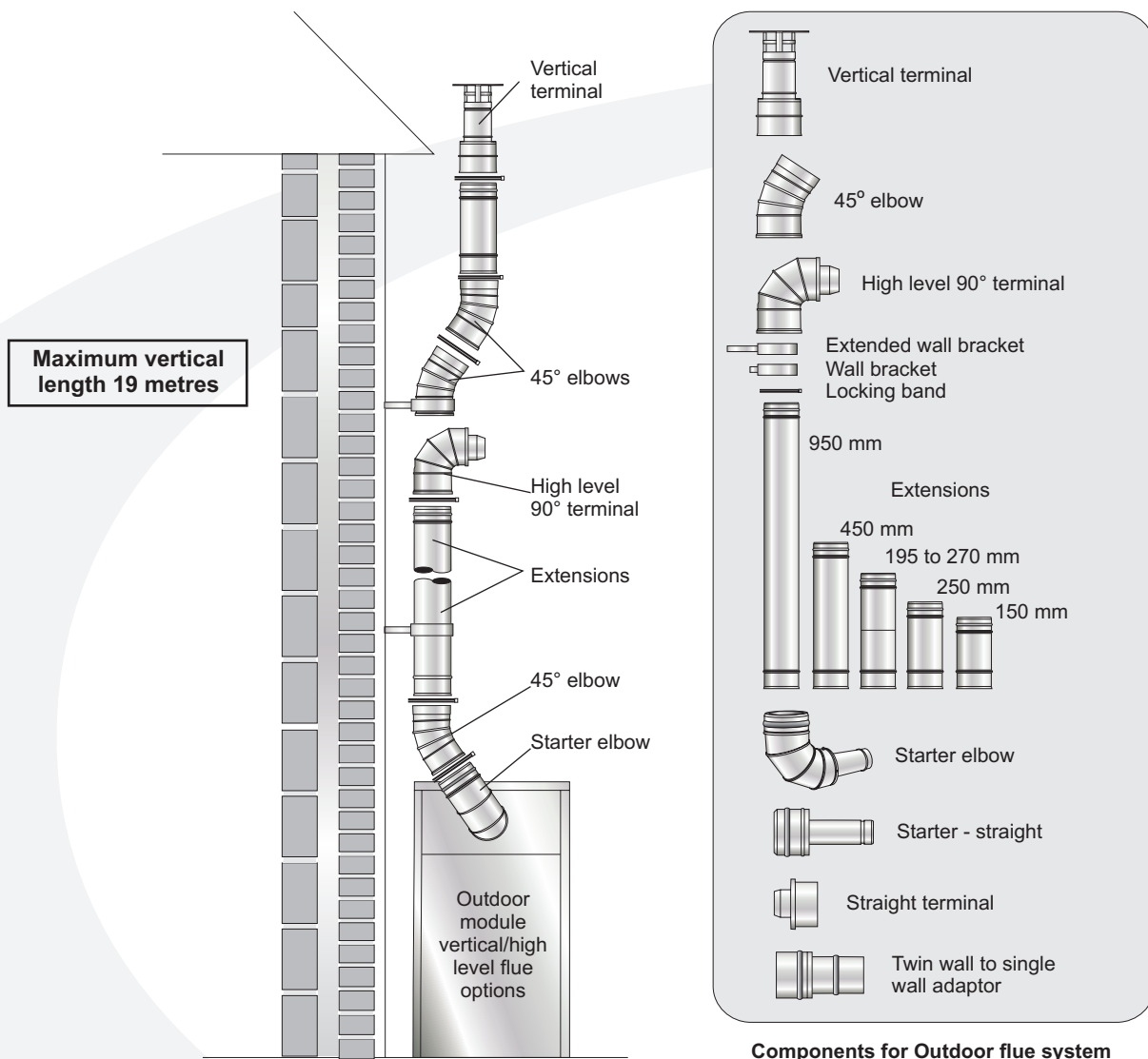


Figure 9-2: Vertical external conventional flue (Green system)

Green System Components			
Item - for models up to 26 kW output	Part No.	Item - for models 26 to 70 kW output	Part No.
External starter elbow	GKM90	External starter elbow	GKM200
External starter - straight	GKM90C	External starter - straight	GKM200C
150 mm extension	GX150/90	150 mm extension	GX150/200
250 mm extension	GX250/90	250 mm extension	GX250/200
450 mm extension	GX450/90	450 mm extension	GX450/200
950 mm extension	GX950/90	950 mm extension	GX950/200
195-270 mm adjustable extension	GXA250/90	195-270 mm adjustable extension	GXA250/200
45° elbow	GE45/90	45° elbow	GE45/200
High level terminal	GTH90	High level terminal	GTH200
Vertical terminal	GTV90	Vertical terminal	GTV200
Wall bracket - standard	GWB90	Wall bracket - standard	GWB200
Wall bracket - extended	GEB90	Wall bracket - extended	GEB200
Twin wall to single wall adaptor	GFCON80	Twin wall to single wall adaptor	GFCON100
Straight terminal - Horizontal flue	GTL90	Straight terminal - Horizontal flue	GTL200

9.3 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 9-3. This is only available for boilers up to 46 kW.

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 in).

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

! 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.

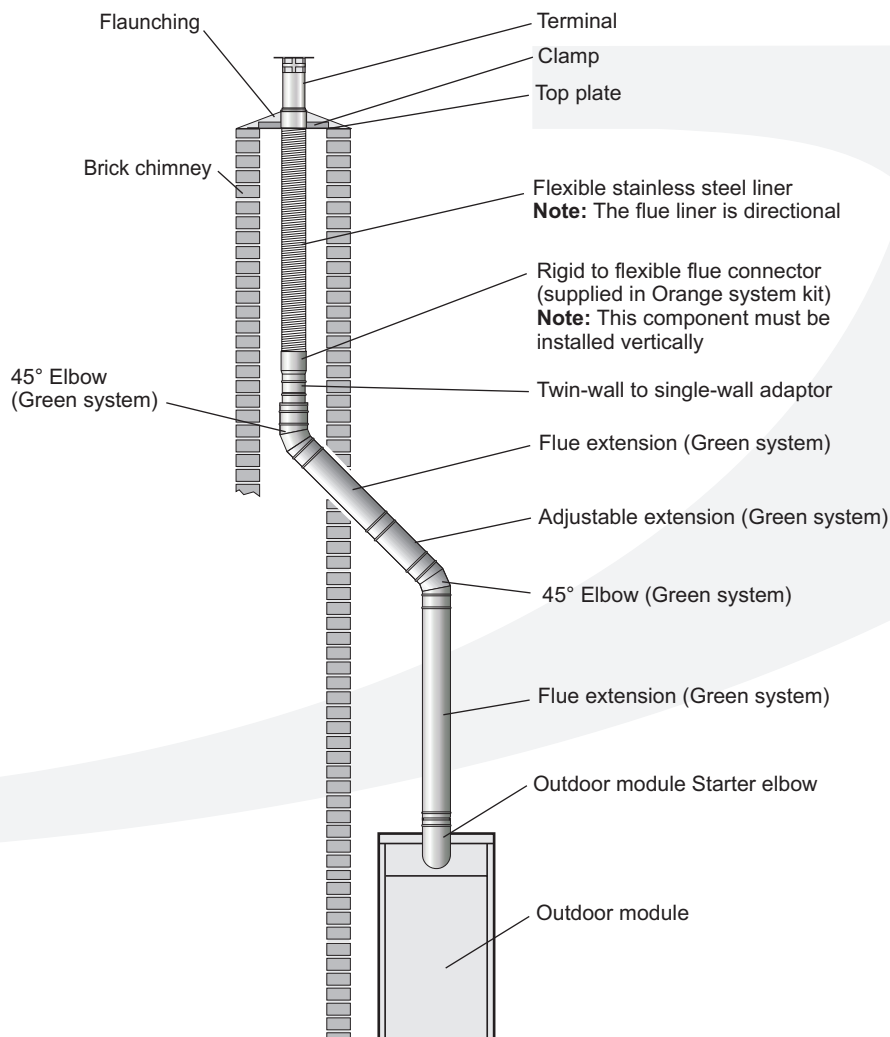


Figure 9-3: Vertical hybrid flue (Green to Orange system)

9.4 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 9-4.

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

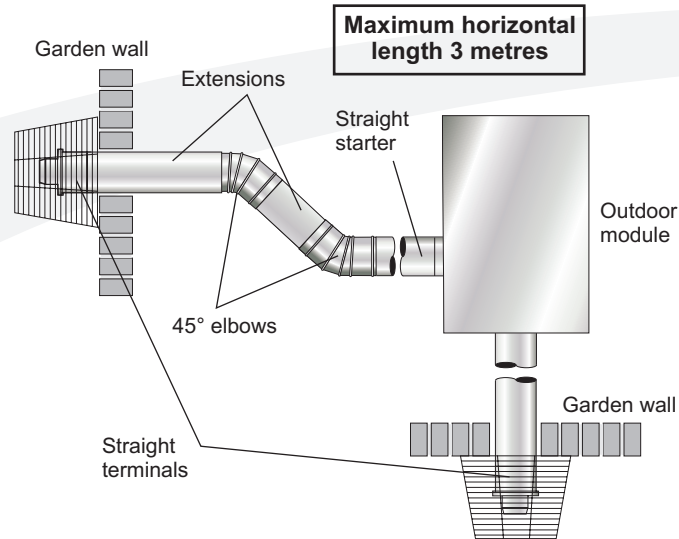


Figure 9-4: Horizontal external flue

9.5 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.



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.

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

! 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.

9.6 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.

10 Commissioning

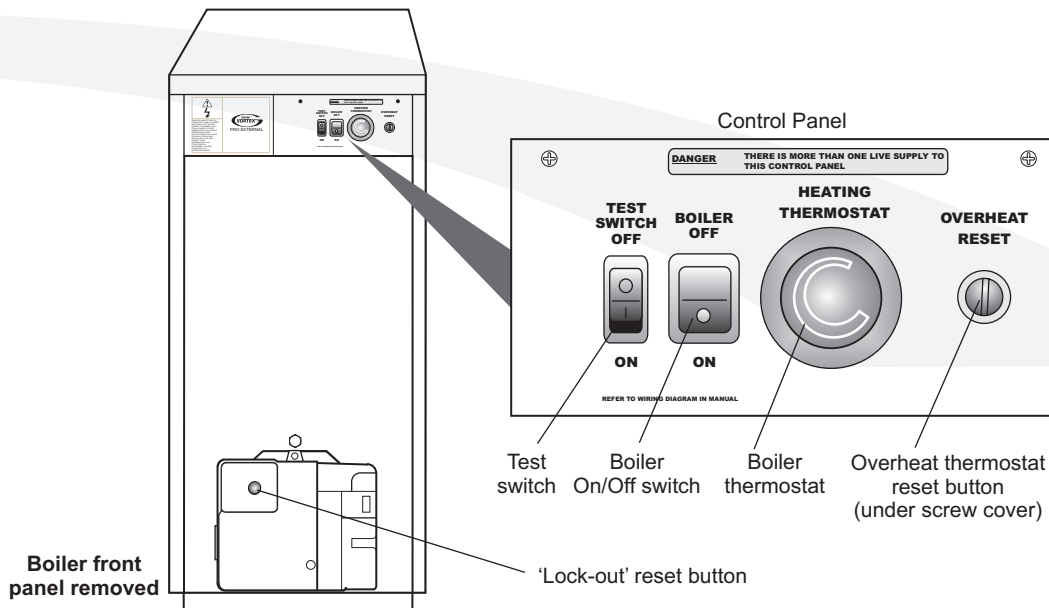


Figure 10-1: Boiler controls

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 Figures 5-1, 5-2 or 5-3. 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, 11-2, 11-3 or 11-4 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 (and set correctly on the 46/58 and 58/70 models). Refer to Section 2.3 and Figure 11-9.

Check the electrodes are set correctly. Refer to Figure 11-6 or 11-8 as required. Check the nozzle is correct for the output rating required. Refer to Section 2.3.

! NOTE

If a 15/21 model is down rated to 15 kW, 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 15/26 model is down rated to 20 or 15 kW, the burner head must also 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.
12. 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.

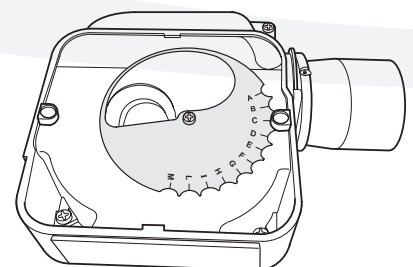


Figure 10-2:
15/21 air adjuster disc at position 'C'

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.

CAUTION

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 warranty.

WARNING

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.

NOTE

A test switch is fitted to the control panel to allow the boiler to be test-fired. 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. If in doubt replace the hoses. In any event, these hoses must be replaced every five years.

WARNING

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.

NOTE

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 to prevent any oil spillage.

NOTE

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.

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, 11-2, 11-3 or 11-4.
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, 11-2, 11-3 or 11-4.
7. Pull out the spiral turbulators from the heat exchanger tubes. See Figure 11-5.
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.

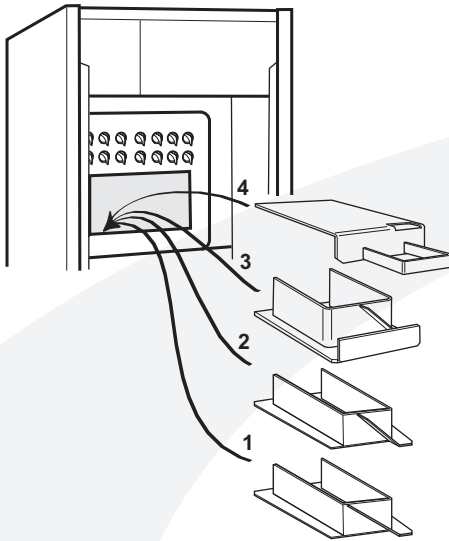


Figure 11-1: 15/21 baffles

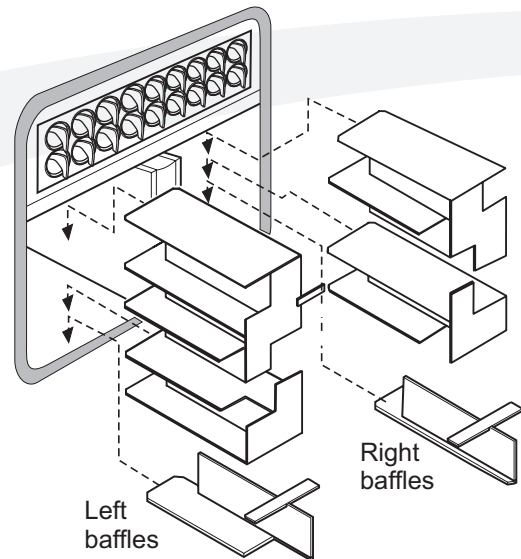


Figure 11-2: 15/26 baffles

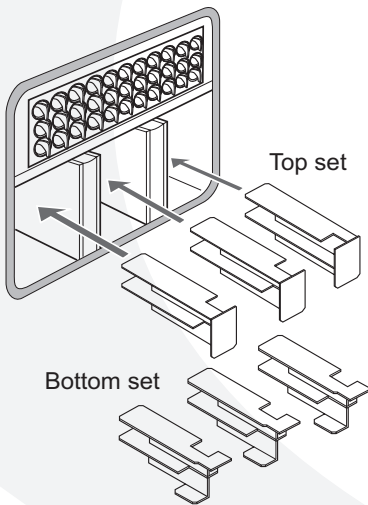


Figure 11-3: 26/36 and 36/46 baffles

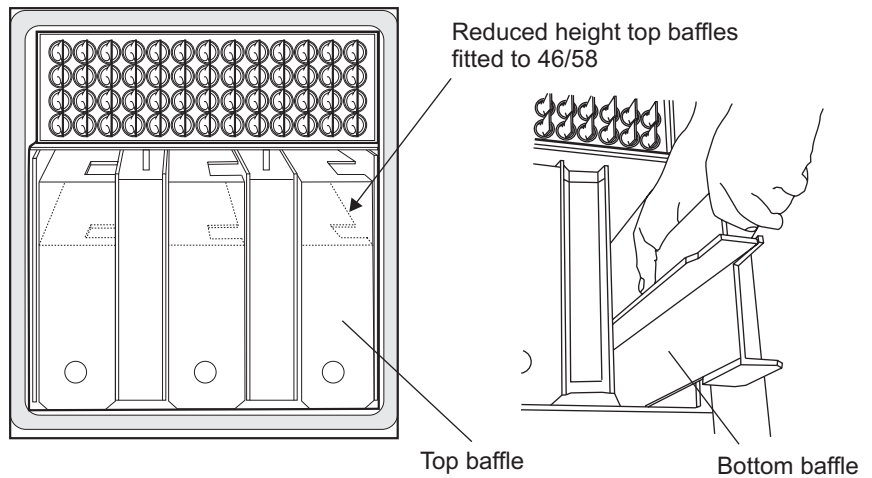


Figure 11-4: 46/58 and 58/70 baffles (58/70 shown) and turbulators (all models)

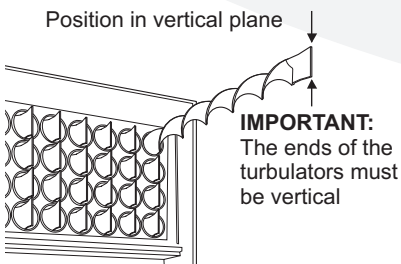


Figure 11-5: Turbulators

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

15/21, 15/26, 26/36, 36/46 models
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 11-6.

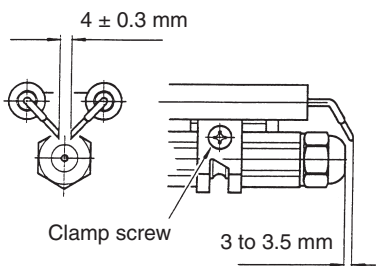


Figure 11-6: 15/21, 15/26, 26/36, 36/46 electrode settings

46/58 or 58/70 models

The procedure is as follows:

1. Combustion head: Loosen the two screws securing the combustion head (**not** the screws in the slotted ring, Figure 11-7) and withdraw the head.
2. Clean and refit the combustion head.
3. Inspect the ignition electrodes: Loosen the electrode clamp screw, disconnect the leads and withdraw the electrode assembly. Wipe clean and check for any cracks in the ceramic insulation. Replace if necessary.
4. Check the electrode and diffuser settings: Figure 11-8.

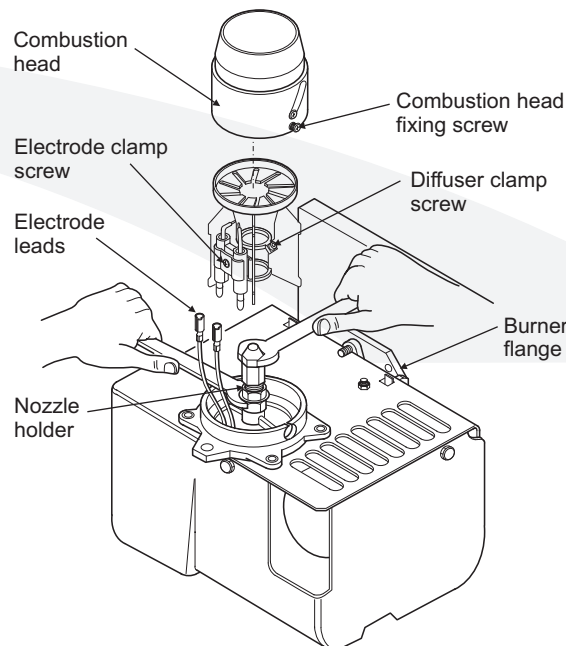


Figure 11-7: 46/58, 58/70 burner

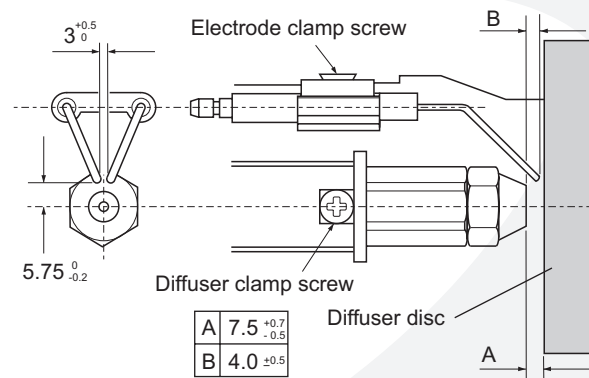


Figure 11-8: 46/58, 58/70 electrode settings

5. To adjust the diffuser disc: Loosen the diffuser clamp screw and slide the disc along the nozzle holder to achieve the gap 'A' in Figure 11-8, tighten the screw.
6. To adjust the electrodes: Loosen the electrode clamp screw and move the electrode unit to achieve the gap 'B' in Figure 11-8, tighten the screw.
7. The combustion head position is adjustable on the 46/58 and 58/70 burners. Check that it is fully closed (position 0), or the 4th line if the 58/70 has been set to maximum output (70 kW).
8. To adjust the head setting, refer to Figure 11-9 and proceed as follows: Loosen the two screws in the slotted ring - **not** the two fixing screws, and turn the blast tube until '0' or the 4th line lines up with the edge of the slotted ring (see paragraph 7 above). Tighten the two screws.

All models

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 re-commissioning 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.

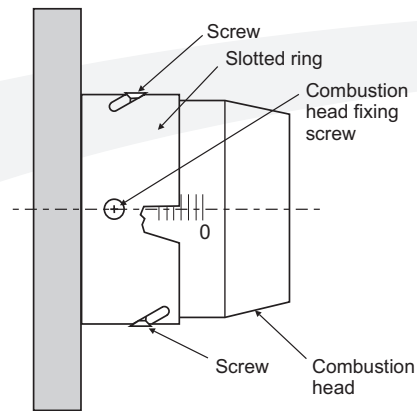


Figure 11-9: 46/58, 58/70 head settings

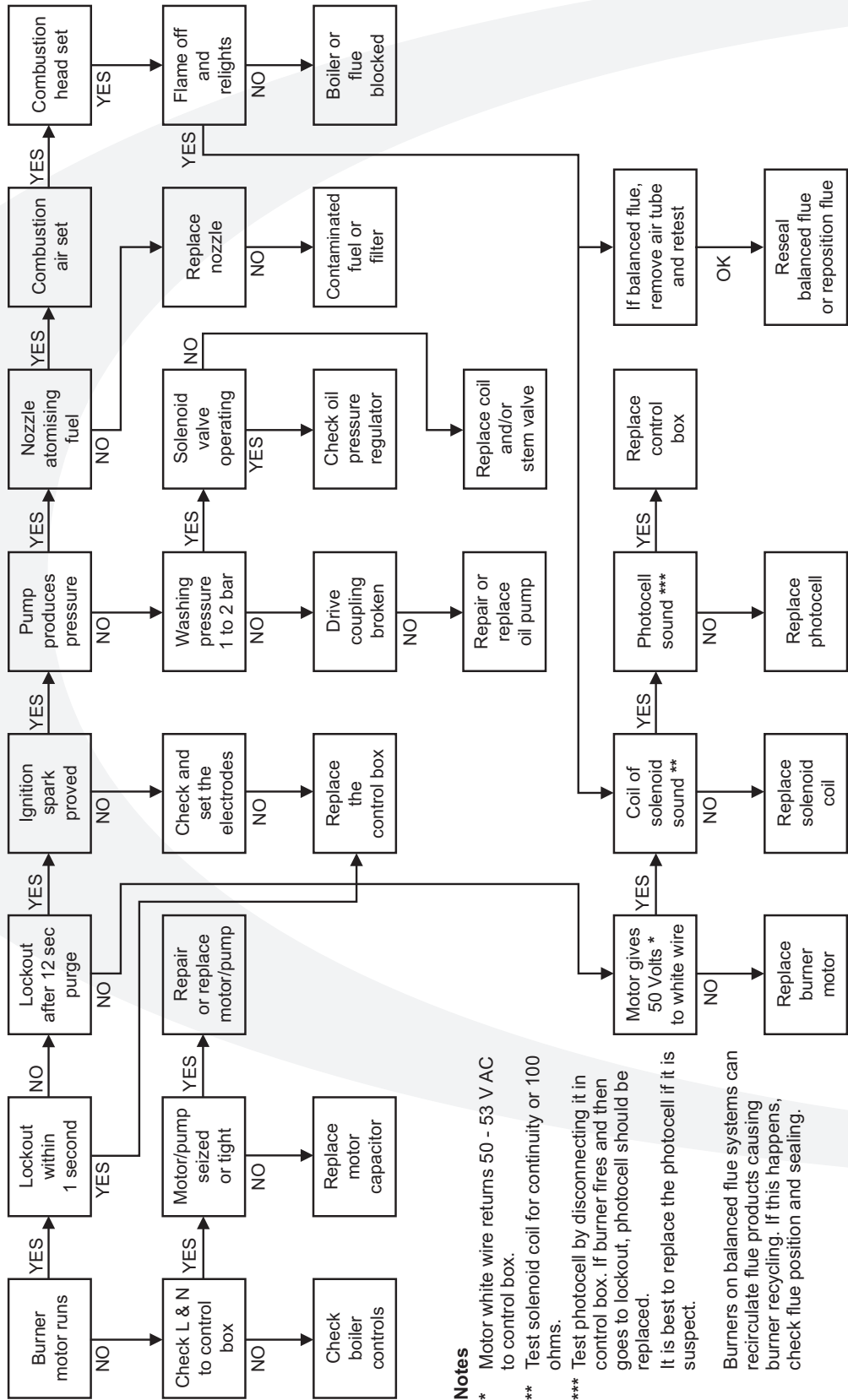
12 Fault Finding

12.1 Boiler Fault Finding

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

Fault	Remedies
Boiler will not start:	
1 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.
2 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.
3 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.
4 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:	
5 Visible smoke from flue or high smoke number.	Insufficient air supply - check the air damper setting and the condition of the fan. Check ventilation openings in door are clear, see Section 9.6. Check the nozzle size and type. Fuel pressure may be too high - check and adjust.
6 Burner pulses.	Insufficient air supply - check the air damper setting and the condition of the fan. Check ventilation openings in door are clear, see Section 9.6. Check the nozzle size and type.
7 Flame slow to stabilise during start up.	Insufficient air supply - check the air damper setting and the condition of the fan. Check ventilation openings in door are clear, see Section 9.6. 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.
8 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.
9 Boiler operating on overheat thermostat.	Faulty boiler thermostat. No circulation, check circulating pump. Check for air lock.
10 Oil odours.	Check all fuel line connections, remake as necessary.
11 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



Notes

* Motor white wire returns 50 - 53 V AC to control box.

** Test solenoid coil for continuity or 100 ohms.

*** Test photocell by disconnecting it in control box. If burner fires and then goes to lockout, photocell should be replaced. It is best to replace the photocell if it is suspect.

Burners on balanced flue systems can recirculate flue products causing burner recycling. If this happens, check flue position and sealing.

13 Spare Parts

13.1 Boiler parts list

Description	Part No.
Cleaning door nut and washer set	EFBS14
Double pole switch	EFBS19
Test switch	EFBS21
Frost thermostat	EFBS23
Baffle set (complete) - 15/21	VBS93
Baffle set (complete) - 15/26	VBS01
Baffle set (complete) - 26/36 and 36/46	VBS36
Baffle set (complete) - 46/58	VBS76
Baffle set (complete) - 58/70	VBS77
Turbulator baffle - single (all models)	VBS05
Sealed system - Expansion vessel 10 litre - 15/21	MPCBS27
Sealed system - Expansion vessel 12 litre - 15/26	MPSS01
Sealed system - Expansion vessel 16 litre - 26/36 and 36/46	MPSS07
Sealed system - Water pressure gauge	MPSS02
Sealed system pressure relief valve	MPSS03
Sealed system - Expansion vessel flexible hose	MPSS04
Cleaning door rope seal - 15/21 and 15/26	VBS15
Cleaning door rope seal - 26/36 and 36/46	VBS16
Cleaning door rope seal - 46/58 and 58/70	VBS111
Overheat thermostat	TPBS33
Boiler thermostat	TPBS34
Circulating pump - 6 m head	MPCBS23
Circulating pump - 7 m head	VBS54

13.2 Burner heads

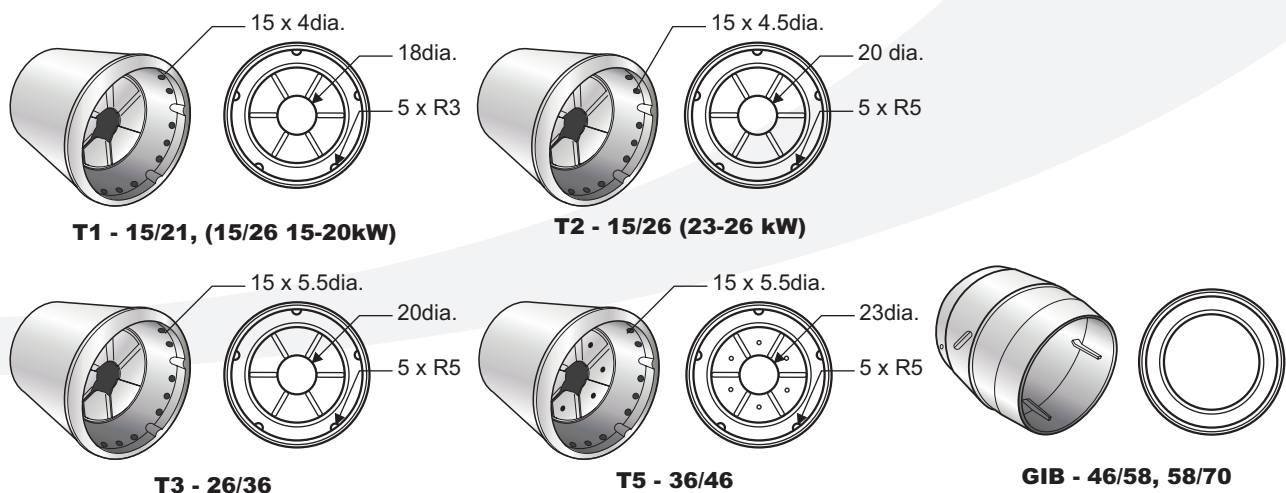


Figure 13-1: Burner heads

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

13.3 Riello RDB1, RDB2 and RDB2.2 burners

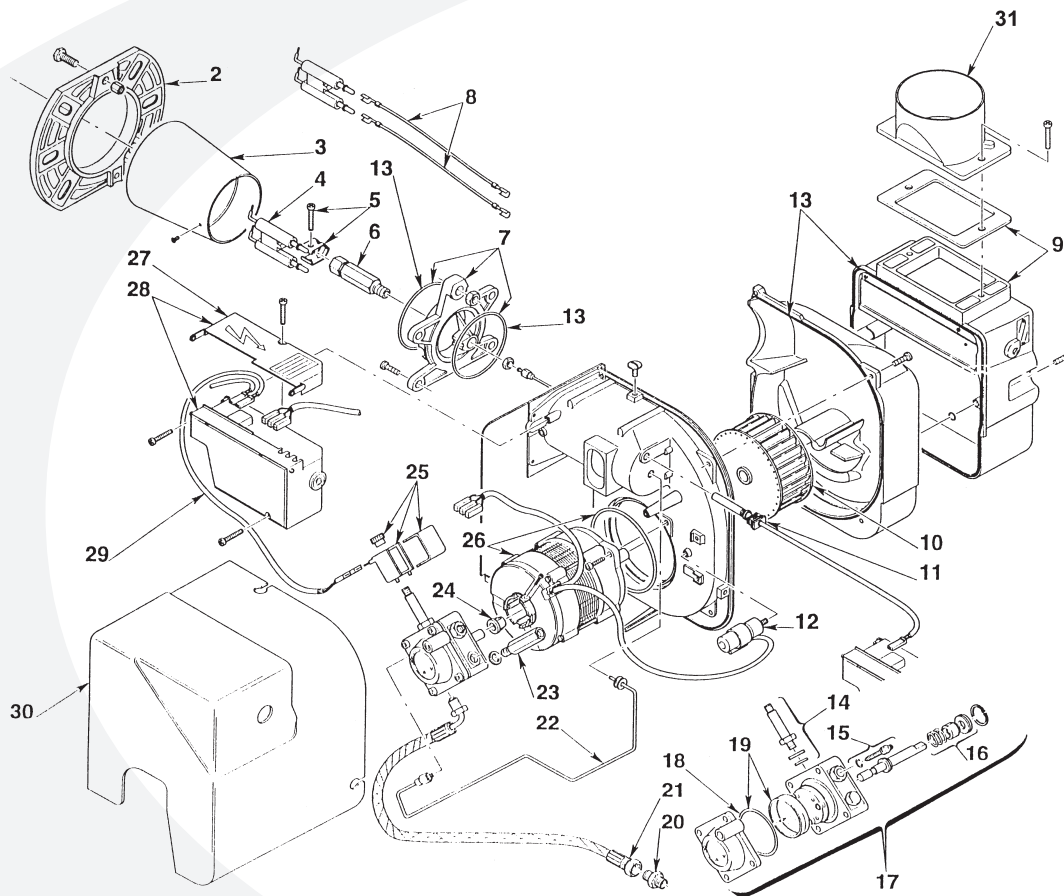


Figure 13-2: Riello RDB1, RDB2 and RDB2.2 burner components diagram

Riello RDB1, RDB2 and RDB2.2 burner parts list

Key No.	Description	Riello Part No.	Grant Part No.
1	Not applicable	-	-
2	Flange	3005786	RBS119
3	Combustion head T1 - 15/21 kW	3002507	RBS146
3	Combustion head T2 - 15/26	3002423	RBS147
3	Combustion head T3 - 26/36	3002447	RBS144
3	Combustion head T5 - 36/46	3002533	RBS150
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 - 15/26	3005708	RBS39
10	Fan - 26/36	3008645	RBS142
10	Fan - 15/21, 36/46	3005788	RBS151
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

13.4 Riello RDB3.2 burner

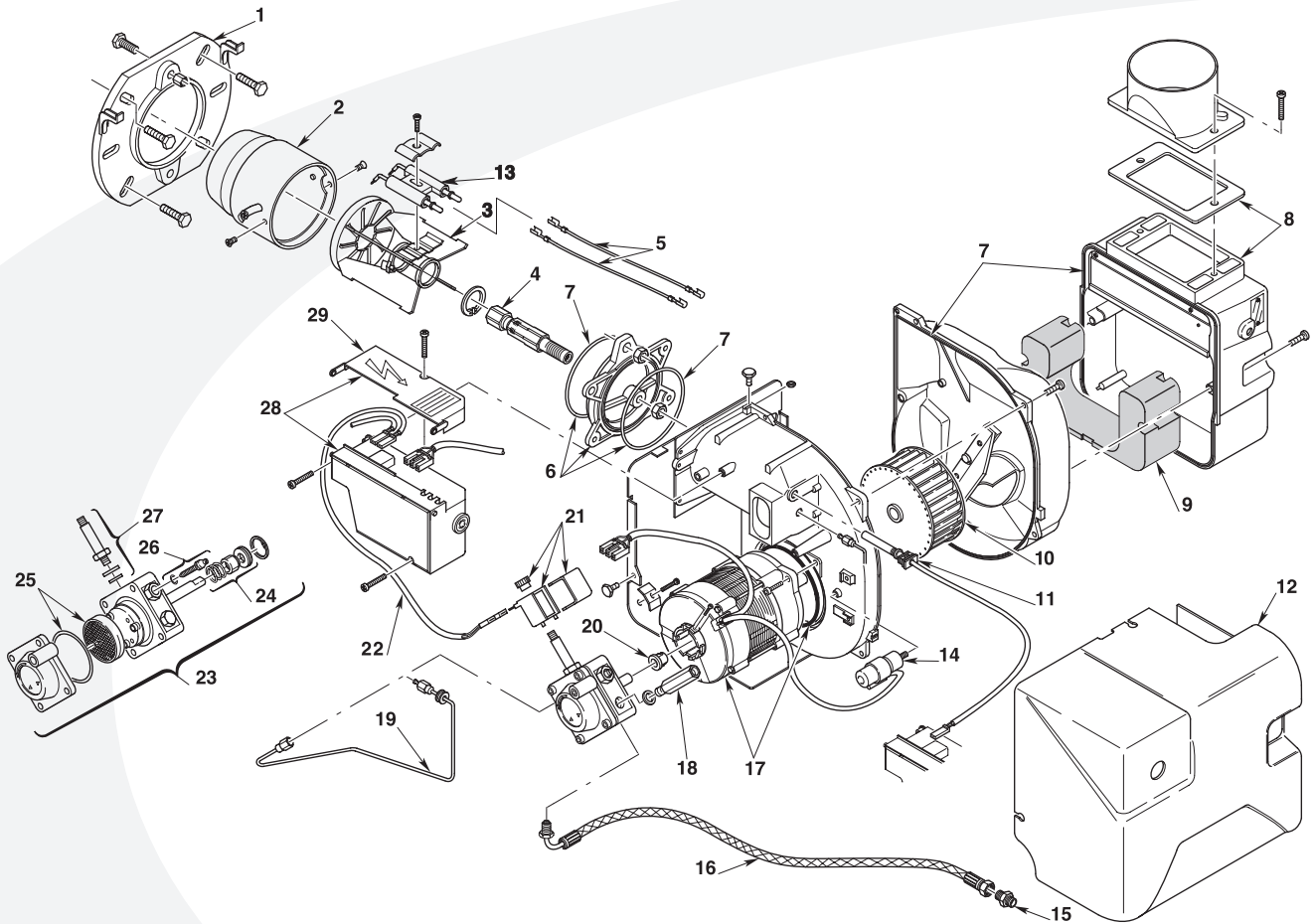


Figure 13-3: Riello RDB3.2 burner components diagram

Riello RDB3.2 burner parts list

Key No.	Description	Riello Part No.	Grant Part No.
1	Flange	3008637	RBS153
2	Combustion head	3002572	RBS163
3	Diffuser disc assembly	3020180	RBS154
4	Nozzle holder	3002570	RBS164
5	High voltage lead	3008794	RBS129
6	Collar	3008957	RBS165
7	Seal kit	3008963	RBS156
8	Air damper assembly	3008839	RBS166
9	Insulation	3008958	RBS157
10	Fan	3005799	RBS162
11	Photocell	3008646	RBS115
12	Cover	3008962	RBS168
13	Electrode	3020121	RBS158
14	Capacitor 5 μ F	3008960	RBS167
15	Connector	3003602	RBS35
16	Flexible hose	3005720	RBS36
17	Motor	3008964	RBS159
18	Pressure gauge connector	3008876	RBS138
19	Tube	3008961	RBS160
20	Drive coupling	3000443	RBS16
21	Solenoid	3008648	RBS117
22	Solenoid lead	3008851	RBS139
23	Pump	3008654	RBS101
24	Pump seal	3000439	RBS14
25	Filter - 'O' ring	3008653	RBS122
26	Regulator	3008651	RBS120
27	Needle valve	3007582	RBS109
28	Control box assembly	3008652	RBS103
29	Cover	3008649	RBS118

14 Health and Safety Information

Under the Consumer Protection Act 1987 and Section 6 of the Health & 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 EC 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)

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.



16 Warranty

16.1 The Vortex Oil Boiler Warranty

Dear Customer

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

Grant Engineering (UK) Ltd. guarantees the manufacture of the boiler including all electrical and mechanical components for a period of twelve months from the date of purchase, provided the boiler is installed in full accordance with the installation instructions provided. This will be extended to a period of two years if the boiler is registered with Grant UK within thirty days of installation and it is serviced at twelve month intervals. See Terms and Conditions below.

Important

Please register your Grant Vortex Pro boiler with Grant UK within thirty days of installation. To do so visit www.grantuk.com and follow the links to 'Householder Zone', where you can register your boiler for a further one year warranty (giving two years from the date of purchase). This does not affect your statutory rights.

Breakdown During the Manufacturer's Warranty

If your Grant boiler should fail within the first two years, you must contact Grant Engineering (UK) Ltd. who will arrange for the repair under the terms of their Warranty, providing that the boiler has been correctly installed and commissioned, serviced (if older than twelve months) and the fault is not due to tampering, running out of oil, oil contamination, system water contamination, misuse or the failure of any external components not supplied by Grant UK (e.g. fire valve, motorised valve etc.). This extended two year warranty only applies if the boiler is registered with Grant UK within thirty days of installation.

In the First Instance

Contact your installer or commissioning engineer to ensure that the fault does not lie with the system or any other components, or any incorrect setting of the system controls.

If a Fault is Found

Ask your installer to contact Grant Engineering (UK) Ltd. Service Department on 01380 736920 who will arrange for a qualified service engineer to attend to the fault.

Free of Charge Repairs

During the first two years 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 instructions, it was registered with Grant UK within thirty days of installation and, for boilers over twelve months old, details of annual maintenance is available. The following documents must be made available to Grant UK on request:

- Proof of purchase
- CD10 Installation Completion form
- CD11 Commissioning report form
- Service documents (CD11 or equivalent document).

Chargeable Repairs

A charge may be made (if necessary following testing of parts at Grant UK) if the cause of the breakdown is due to any of the following:

- Faults caused by the plumbing or heating system, e.g. contamination of parts due to system contamination, debris or trapped air.
- Faults due to incorrectly sized expansion vessel or incorrect vessel charge pressure.
- Faults caused by external electrics and external components.
- The boiler has not been commissioned, or serviced in accordance with the installation and servicing manual.
- Problems caused by lack of oil or faults with the oil supply system.
- The flue system has been incorrectly fitted or does not meet installation requirements.
- The boiler has been installed for over two years and no extended warranty cover has been taken.

Note: The nozzle supplied with the boiler is only covered for a period up to the time of the first service (twelve months).

Remember - before you contact Grant

Ensure the boiler has been commissioned and serviced in accordance with the installation and servicing manual.

Ensure there is oil supply to the burner.

Ensure the problem is not being caused by the heating system or its controls.

Consult the boiler handbook for guidance.

Please note: Do not wait until the fuel supply runs out before you order some more. 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 supply is delivered and that the fuel is allowed to settle for an hour before restarting the boiler.

Terms of Manufacturer's Guarantee

1. The Company shall mean Grant Engineering (UK) Limited.
2. The boiler is guaranteed for two years from the date of purchase, providing that after twelve months the annual service has been completed and the boiler registered with the Company within thirty days of the installation date. Any work undertaken must be authorised by the Company and carried out by an approved service agent.
3. The shell (heat exchanger) of the oil boiler supplied by the Company is covered by a five year parts only guarantee from the date of purchase subject to correct operation of the boiler. Proof of annual maintenance must be provided.
4. 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 instructions.
5. The boiler is registered with the Company within thirty days of installation. Failure to do so does not affect your statutory rights.
6. This guarantee is not transferrable unless sanctioned by the Company.

7. 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.
8. This guarantee applies to Grant boilers installed on the UK mainland, Isle of Man and Channel Islands only. Provision of in-warranty cover elsewhere in the UK is subject to agreement with the Company.
9. 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.
10. Proof of purchase and date of installation, commissioning and service documents must be provided on request.
11. If a replacement boiler is supplied under the warranty (due to a manufacturing fault) the product warranty continues from **the installation date of the original boiler**, and **not** from the installation date of the replacement.

Please note that this special offer is only available if the application form is submitted to Bluefin Insurance Services Ltd. within three months of the installation date.

16.2 Extended Warranty

For further peace of mind Grant Engineering (UK) Ltd. offer the option to insure all the components of your Grant Vortex Pro boiler for a further three years, following on from the two year product warranty period. For a single premium payment (inclusive of Insurance Premium tax) you get five years of protection against breakdown costs. At the end of this period you will have the opportunity to continue this cover on an annual basis.

To access full details and an application form for this extended cover, first visit www.grantuk.com follow the links to the 'Householder Zone', register your Grant Vortex Pro boiler for a further one year product warranty (giving two years from the date of purchase), and then download the extended warranty details and application form.

17 Notes





89/336/EEC
73/23/EEC
92/42/EEC



Frost Protection

Your installer may have fitted a frost thermostat. If not, and you are likely to be away for a short time, leave the boiler on with the boiler thermostat set at a low setting. For longer periods the boiler and system should be drained.

Contact your Service engineer for draining and filling the system.

The control panel of the External module includes a built-in frost thermostat factory set to 2°C.

NOTE

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

Cleaning and Servicing

Lightly wipe over the case with a damp cloth and a little detergent. Do not use abrasive pads or cleaners.

You must have your boiler serviced at least once a year to ensure safe and efficient operation. Contact your Service engineer for further details.

WARNING

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

Failure of Electricity Supply

If the electricity supply fails, the boiler will not operate. It should relight automatically when the supply is restored.

Electricity Supply

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

WARNING

The electricity connections to the boiler must be earthed.

Sealed Central Heating System

If your boiler is operating on a sealed heating system, the installer will have pressurised the system and should have told you (or set it on the pressure gauge) the system pressure when cold (this is normally between 0.5 and 1.0 bar, which will increase slightly when hot). If the pressure (when cold) is below the set pressure mentioned above, you can re-pressurise the system. If this is frequently required, ask your installer or Service engineer to check the heating system for leaks and to check the expansion vessel air charge.

The boiler or system will be fitted with an automatic air vent to remove air from the system. Any air trapped in the radiators should be removed by venting the radiators using the vent screw at the top of each radiator. Only vent a radiator if the top is cool and the bottom is hot. Excessive venting will reduce the system pressure, so only vent when necessary and check the system pressure as mentioned above.

Re-pressurise the system if necessary. **The sealed system is fitted with a safety valve to release excess pressure from the system. If water or steam is emitted from the end of the safety valve discharge pipe, switch off the boiler and contact your installer or Service engineer.**

To re-pressurise the system by adding water:

1. Only add water to the system when it is cold and the boiler is off. Do not overfill.
2. Ensure the flexible filling loop (see Figure 3) is connected and that the shut off valve connecting it to the boiler is open and the double check valve at the front 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. Gradually open the double check valve on the front of the filling loop until water is heard to flow. When the automatic air vent to remove air from the system. Any air trapped in the radiators should be removed by venting the radiators using the vent screw at the top of each radiator. Only vent a radiator if the top is cool and the bottom is hot. Excessive venting will reduce the system pressure, so only vent when necessary and check the system pressure as mentioned above.
4. Vent each radiator in turn, starting with the lowest one in the system, to remove air.
5. Continue to fill the system until the pressure gauge indicates between 0.5 and 1.0 bar. Close the fill point valve.
6. Repeat steps 4 and 5 as required.
7. Close the valves either side of the filling loop and disconnect the loop.

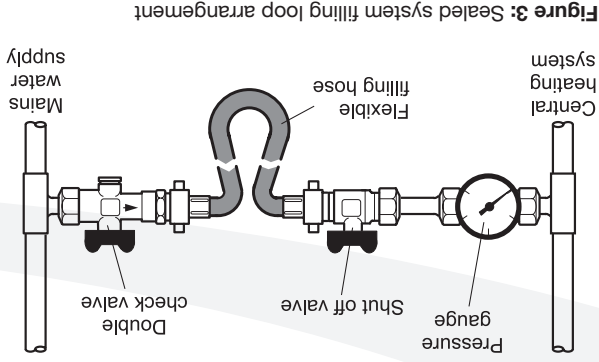


Figure 3: Sealed system filling loop arrangement



General Notes and Care of your

System

Boiler thermostat

This control allows the temperature of the water leaving the boiler to heat the radiators and domestic hot water to be adjusted.



NOTE

If you have a cylinder thermostat

on your hot water cylinder, this will control the temperature of your domestic hot water. The boiler thermostat setting must be equal to or above the cylinder thermostat setting to enable the cylinder thermostat to control the domestic hot water system.

Burner Lock-out reset button

If there is a burner malfunction, a built-in safety circuit switches the burner off and the 'Lock-out' reset button (on the burner) will light. Usually such malfunctions are short lived and pressing the reset button will restore normal operation. Figure 1 shows the position of the Lock-out Reset button on the burner. Make the following checks:

1. Check that the boiler On/Off switch is ON.
2. Check that the programmer (if fitted) is working and is in an 'on' period.
3. Check that all thermostats are set to the desired setting and are calling for heat.
4. Check if the burner 'Lock-out' reset button (on the burner) is lit. If it is, press it to start the burner. If the burner fails to light and goes to 'Lock-out' again, check that you have sufficient fuel in the storage tank and that the fuel supply valve is open.
5. Check that the fire valve in the oil supply line has not tripped
6. Ensure that a fuse has not blown or that the electricity supply has not failed.

4. Check if the burner 'Lock-out' reset button (on the burner) is lit. If it is, press it to start the burner. If the burner fails to light and goes to 'Lock-out' again, check that you have sufficient fuel in the storage tank and that the fuel supply valve is open.
5. Check that the fire valve in the oil supply line has not tripped
6. Ensure that a fuse has not blown or that the electricity supply has not failed.
7. Check to see if the safety thermostat has operated (see Section Overheat Thermostat).

Turning Off your Boiler

For short periods - Set the boiler On/Off to OFF.
To restart, simply set the switch to ON.
For long periods: Set the boiler On/Off switch to OFF and switch off the electricity supply to the boiler. If required, the fuel supply valve may be closed and the water and electricity supplies turned off at the mains.

About your Fuel

Grant VORTEX Pro External modules only operate on Class C2 Kerosene to BS 2869:1998.
You should always quote this type of fuel when ordering from your supplier.
Do not wait until the fuel runs out before you order some more. Sludge in the bottom of the tank may be drawn into the fuel lines. If it is possible, switch off the boiler when the new supply is delivered and leave the fuel to settle for an hour before restarting the boiler.

7. Check to see if the safety thermostat has operated (see Section Overheat Thermostat).

If the burner still fails to light after carrying out these checks then a fault exists or the fuel supply is low.

If you have sufficient fuel, switch off the electricity supply to the boiler and contact your Service engineer.

Overheat Thermostat

Your boiler is fitted with a safety overheat thermostat which will automatically switch off the boiler in the case of a control malfunction causing overheating. If your boiler goes off and you try to light it but nothing happens and the 'Lock-out' reset button on the burner is not lit, the overheat thermostat has probably operated. The boiler will not light until the thermostat is reset. To reset, unscrew the small plastic cap marked reset (see Figure 1), press the button then replace the cap.

If this condition continually repeats, contact your Service engineer.

Ventilation

Always ensure that the boiler has adequate ventilation. Any ventilation openings provided by the installer **must not** be obstructed. Periodically check that they are clear.

Do not attempt to 'box in' the boiler or build a compartment around it before consulting your installer.

Do not place any combustible material around or on the boiler or flue pipe. **Do not** place anything against the door or the External module that might obstruct the ventilation openings.

Flue Terminal

The flue terminal must not be obstructed or damaged. In severe conditions check that the terminal does not become blocked by snow.

User Instructions

Introduction

This User Guide is intended to assist the User in the operation of the Grant VORTEX Pro External modules. The engineers manual for the installation and maintenance of this boiler is attached to the reverse of these instructions

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.

NOTE

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

About your boiler

The boiler is fully automatic once switched on, providing central heating (and also heating your domestic hot water if you have a hot water cylinder fitted). An illuminated On/Off switch, see Figure 1, is fitted to the External modules which lights when the boiler is switched on, but does not necessarily indicate the burner is firing.

Boiler Controls

To gain access to the External module controls, remove the front panel by turning the handle and withdrawing it forwards at the bottom.

The lighting procedure is:

1. Ensure that there is sufficient fuel, of the correct type, in the supply tank and all fuel supply valves are open. The water supply is on. The electricity supply to the boiler is off. The boiler On/Off switch is set to OFF (the

Lighting your Boiler

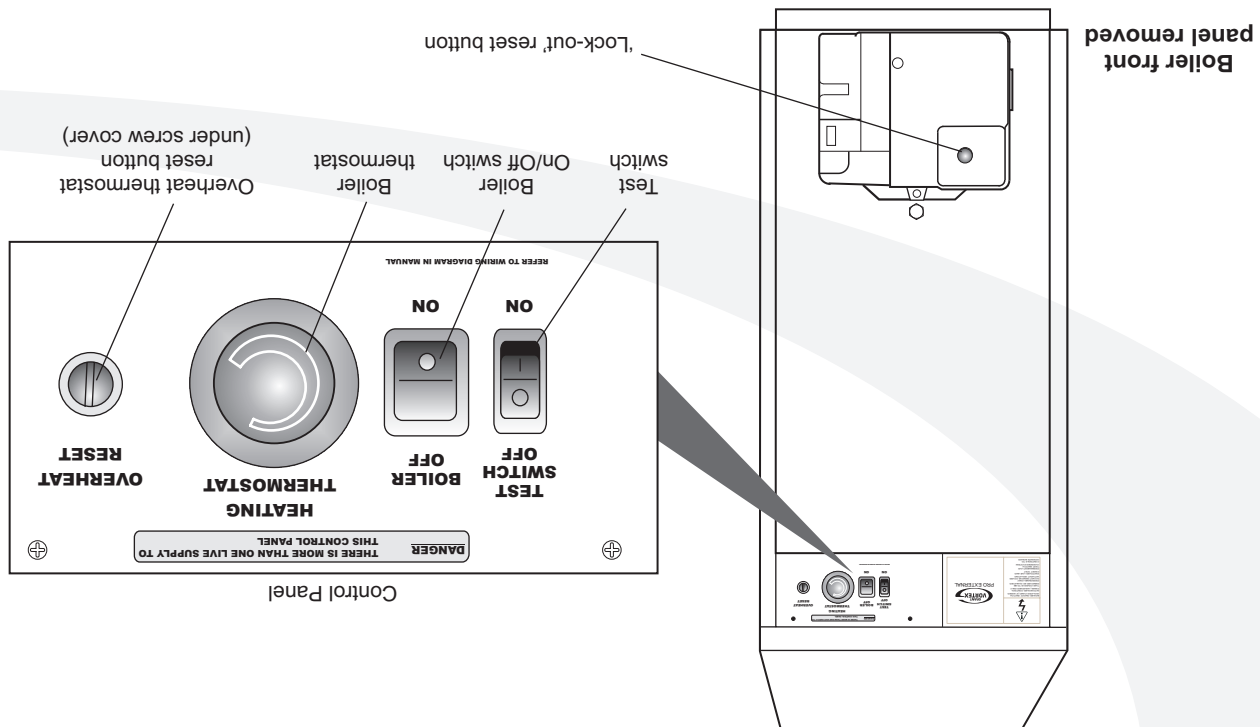
Make the following checks:

1. Check that the boiler On/Off switch is ON.
2. Check that any remote programmer (if fitted) is working and is in an 'on' period.
3. Check that all thermostats are set to the desired setting and are calling for heat.

If your Boiler Fails to Light

1. Check that the room thermostat is set to the required setting. The boiler thermostat (if fitted) is at the desired setting. The boiler thermostat is set to the required setting.
2. Switch on the electricity supply to the boiler.
3. Set the boiler On/Off switch to ON. The neon in the switch lights when it is in the on position.
4. The boiler will now light automatically.

Figure 1: Boiler controls



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For use with Kerosene* only.**Service Log**

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 Pro 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:

- a) Use a bio-kerosene (B30K) compatible flexible oil line in place of the oil line supplied with this boiler.
- b) Have your oil storage tank and oil supply line (including all pipework, sight gauges, filters, isolating valves, fire valves, de-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.
- c) Check the suitability of the flue system with Grant UK.
- d) 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.

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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.

Grant Vortex Pro

External Module Condensing Oil Boiler Range

User Instructions

