



GRANT^{UK}

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USER, INSTALLATION
and
SERVICING INSTRUCTIONS

GRANT VORTEX Condensing Oil Boiler range

**Outdoor Modules
with outputs up to 46 kW**

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



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COMMISSIONING REPORT

Date:

Commissioning engineer: Tel. No:

Boiler model/output: kW Fuel type: Kerosene

Nozzle size: Pump pressure: Air setting:

Flue gas % CO₂: Net flue gas temp: Smoke No:

SERVICE LOG

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

Date	% CO ₂	Net flue gas temp.	Smoke No.	Service engineer/Tel. No.



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 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 nett thermal efficiencies of 100%.

To achieve maximum performance from the Grant Vortex 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 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 80° C.

1.2 Heating system design considerations

To achieve the maximum efficiencies possible from the Grant Vortex 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

- 1 Size radiators with a mean water temperature of 60° C.
- 2 Design system controls with programmable room thermostats or use weather compensating controls to maintain return temperatures below 55° C.

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

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



2 - USER INSTRUCTIONS

2.1 About your boiler

The boiler will provide domestic hot water and central heating and is fully automatic once switched on. An illuminated On/Off switch, see Fig. A, is fitted to the Outdoor modules, which lights when the boiler is switched on, but does not necessarily indicate the burner is firing.

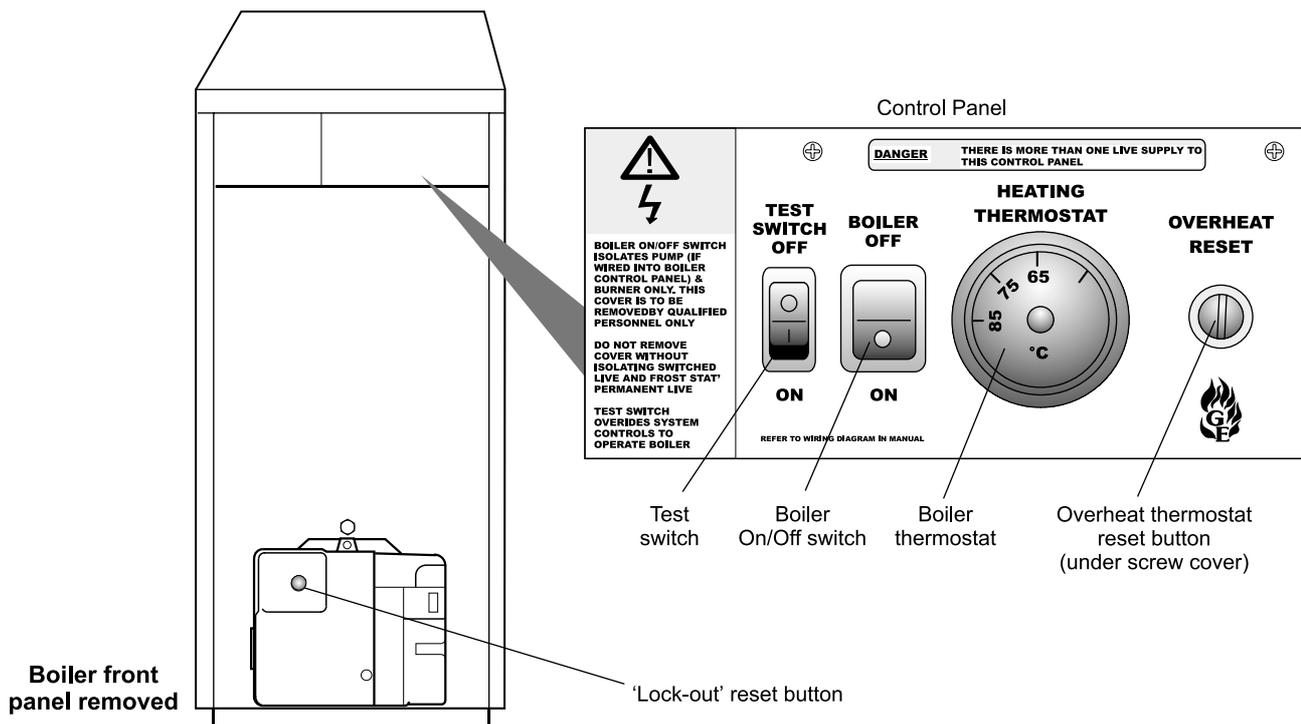
2.2 Boiler controls (see Fig. A)

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

2.3 Lighting your boiler (see Fig. A)

- 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 neon in the switch is not alight). The Test switch is set to Off. The room 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. A neon in the switch lights when it is in the on position.

The boiler will now light automatically.



Controls for Outdoor modules - Fig. A



2.4 Turning off your boiler (see Fig. A)

For short periods - Set the boiler switch to OFF. To restart, set the switch to ON.

For long periods - Set the boiler switch to OFF. If required, the fuel supply valve may be closed and the water and electricity supplies turned off at the mains.

Note: If the electricity, fuel and water supplies are turned off, the built-in frost thermostat will **not** operate.

2.5 Points to check if burner fails to light

- 1 Check that the boiler 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.
- 4 Check if the burner 'Lock-out' reset button 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 Ensure that a fuse has not blown or that the electricity supply has not failed.
- 6 Check to see if the safety thermostat has operated (see section 2.7).

If the burner still fails to light after carrying out these checks then a fault exists. Switch off the electricity supply to the boiler and contact your Service engineer.

2.6 About your fuel

The Vortex Outdoor modules operate on Class C2 Kerosene only. You should always quote the type of fuel you require 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.

2.7 General notes and care of your system

- 1 **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.

The boiler thermostat has an operating range of 65 to 80°C. The following settings are recommended:-

- a Heating and hot water in Winter 75°C
- b Hot water only in Summer 65°C

- 2 **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 will light. Usually such malfunctions are short lived and pressing the reset button will restore normal operation.
- 3 **Safety 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 the burner continually goes to 'Lock-out' a fault exists **or** the fuel supply is low. If you have sufficient fuel, you will need to call your Service engineer.

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 (see Fig. A), press the button then replace the cap.

If this condition continually repeats, contact your Service engineer.

- 4 **Ventilation** - Always ensure that the boiler has adequate ventilation. Any ventilation openings **must not** be obstructed. Periodically check that they are clear.
- Do not** attempt to 'box in' the boiler or build a compartment around.
- Do not** place any combustible material around or on the boiler or flue pipe.
- Do not** place anything against the door of the Outdoor modules that might obstruct the ventilation openings.



- 6 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 Outdoor modules includes a built-in frost thermostat factory set to 5°C.

Note: For Vortex Outdoor modules we recommend that a combined antifreeze and corrosion inhibitor be used in the primary water system.

- 7 Cleaning and servicing** - Lightly wipe over the case with a damp cloth and a little detergent. **Do not** use abrasive pads or cleaners.
- You should have your boiler serviced at least once a year to ensure safe and efficient operation. Contact your Service engineer for further details.

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

- 8 Failure of electricity supply** - If the electricity supply fails, the boiler will not operate. It should relight automatically when the supply is restored.

2.8 Electricity supply

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

Warning: This appliance must be earthed.

2.9 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 0.8 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 the system requires frequent re-pressurising, ask your Installer or Service engineer to check the heating system for leaks and to check the expansion vessel air charge.

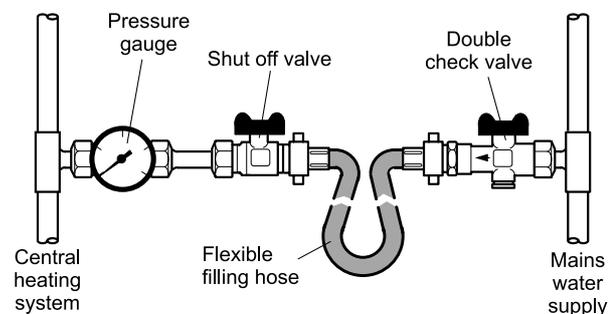
The boiler or system will be fitted with an automatic air vent to remove air from the system. Any air trapped in the radiators should be removed by venting the radiators using the vent screw at the top of each radiator. Only vent a radiator if the top is cool and the bottom is hot. Excessive venting 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 boiler or system may be 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.

The expansion vessel air charge must be checked annually. Failure to maintain an adequate air charge in the vessel may invalidate the warranty.

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 overflow.**
- 2 Ensure the flexible filling loop (see Fig. B) 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.
- 4 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 1.0 bar. Close the fill point valve.
- 9 Close the valves either side of the filling loop and disconnect the loop.



Sealed system filling loop arrangement - Fig. B



3.1 *Boiler technical data*

Model	Vortex Outdoor Module			
	15/26	26/36	36/46	
Water content	litre	19	21	21
	gal	4.2	4.7	4.7
* Weight (dry)	kg	157	174	174
	lb	346	384	384
Max. heat output	kW	26	36	46
	(kerosene) Btu/h	88 700	122 840	157 000
Flow connection		22 mm	28 mm	28 mm
Return connection		22 mm	28 mm	28 mm
Condensate connection	22 mm plastic pipe			
Waterside resistance				
Flow/Return temp. diff. of 10°C	28.5 mbar	26.0 mbar	26.0 mbar	
Flow/Return temp. diff. of 20°C	10.0 mbar	9.5 mbar	9.5 mbar	
Maximum static head	28 m			
Minimum circulating head	1m			
Boiler thermostat range	65 to 80°C			
Limit (safety) stat shut off temp	111°C ± 3°C			
Max. hearth temperature	Less than 50°C			
Electricity supply	230/240 V ~ 50 Hz Fused at 5 Amp			
Motor power	90 W max.			
Starting current	2.6 Amp			
Running current	0.85 Amp			
Oil connection	¼" BSP Male (on end of flexible fuel line)			
Max operating press - sealed sys	2.5 bar			
Max operating press - open sys	2.5 bar			

* Weight includes burner but excludes flue.

All Heating Return connections are in stainless steel pipe - compression fittings must be used.



3 - BOILER TECHNICAL INFORMATION

3.2 Sealed system data

Heating system pressure (cold)	Maximum 1.0 bar, Minimum 0.5 bar
Operating pressure of pressure relief valve	2.5 bar
Expansion vessel size (15/26)	12 litres (pre-charged at 1 bar)
Expansion vessel size (26,36 and 36/46)	16 litres (pre-charged at 1 bar)
Max heating system volume (including boiler) (15/26)	75 litres (approximately)
Max heating system volume (including boiler) (26/36 and 36/46)	120 litres (approximately)
Cold water mains connection	15 mm copper pipe
Pressure relief valve discharge connection	15 mm copper pipe
Circulating pump (15/26)	6 m Head
Circulating pump (26/36 and 36/46)	7 m Head

3.3 Grant Vortex oil boilers using Class C2 kerosene

Note: Grant Vortex boilers are only for use with kerosene.

Model	Heat Output		Net eff * (%)	Nozzle	Oil press. (bar)	Smoke No.	Burner head	Fuel flow rate (kg/h)	Flue gas temp. (°C)	CO ₂ (%)
	(kW)	(Btu/h)								
15/26	15.0	51 180	100.4	0.50/80°EH	7.0	0 - 1	T1	1.25	60 - 65	12.0
	20.0	68 240	101.0	0.60/80°EH	8.0	0 - 1	T1	1.67	65 - 70	12.0
	**23.0	78 475	101.0	0.65/80°EH	8.5	0 - 1	T2	1.94	70 - 75	12.0
	26.0	88 700	101.5	0.75/80°EH	8.0	0 - 1	T2	2.18	68	12.0
26/36	**26.0	88 700	101.5	0.75/80°EH	8.0	0 - 1	T3	2.18	68	12.0
	31.5	107 500	101.5	0.85/80°EH	9.0	0 - 1	T3	2.57	70	12.0
	36.0	123 000	101.5	1.00/80°EH	9.1	0 - 1	T3	3.01	78	12.0
36/46	**36.0	123 000	101.5	1.00/80°EH	9.0	0 - 1	T3	3.01	78	12.0
	41.5	142 000	98.5	1.20/80°S	8.0	0 - 1	T5	3.56	80	12.0
	46.0	157 000	97.0	1.25/80°S	8.0	0 - 1	T5	3.90	88	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 boiler range.
- * Net thermal efficiency.
- The net flue gas temperatures given above are $\pm 10\%$.
- When commissioning the air damper **must** be adjusted to obtain the correct CO₂ level.
- ** Factory settings: 15/26 - 23 kW, 26/36 - 31.5 kW, 36/46 - 41.5 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 15/26 to 15 or 20 kW the combustion head must be changed.

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 and vertical flue adaptors.
- Low level flues do not contain a test point. The temperature and efficiency readings must be taken from the flue terminal.



3.4 Boiler dimensions

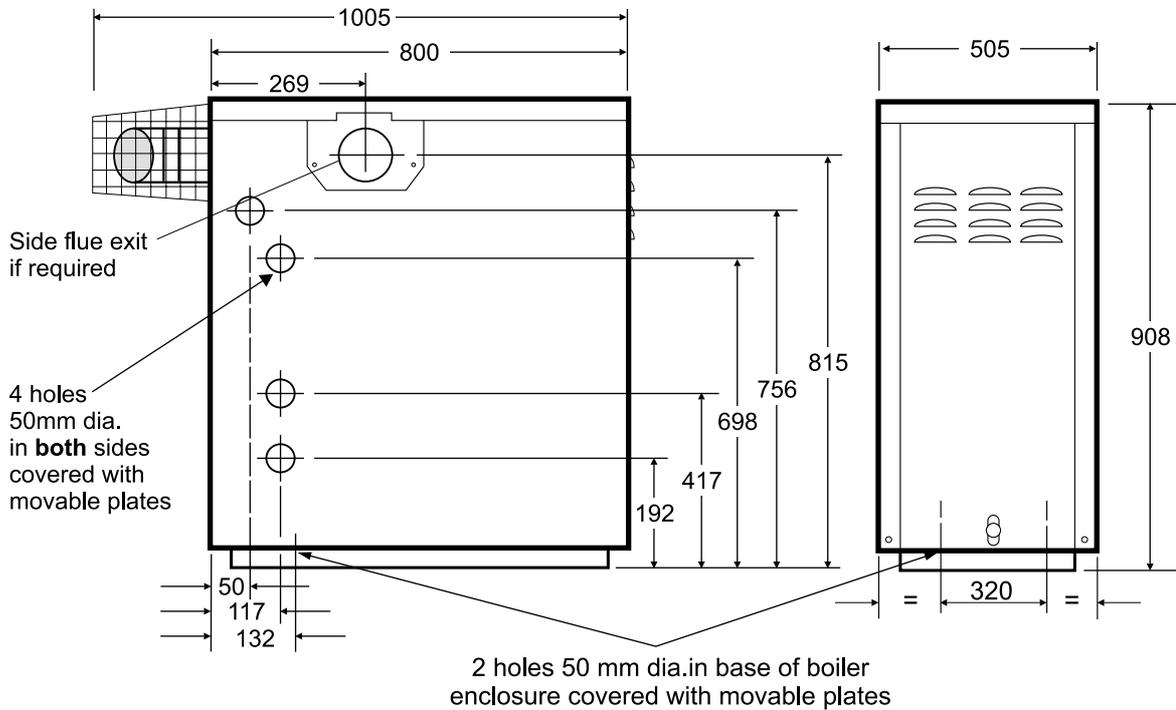


Fig 1a - 15/26 dimensions

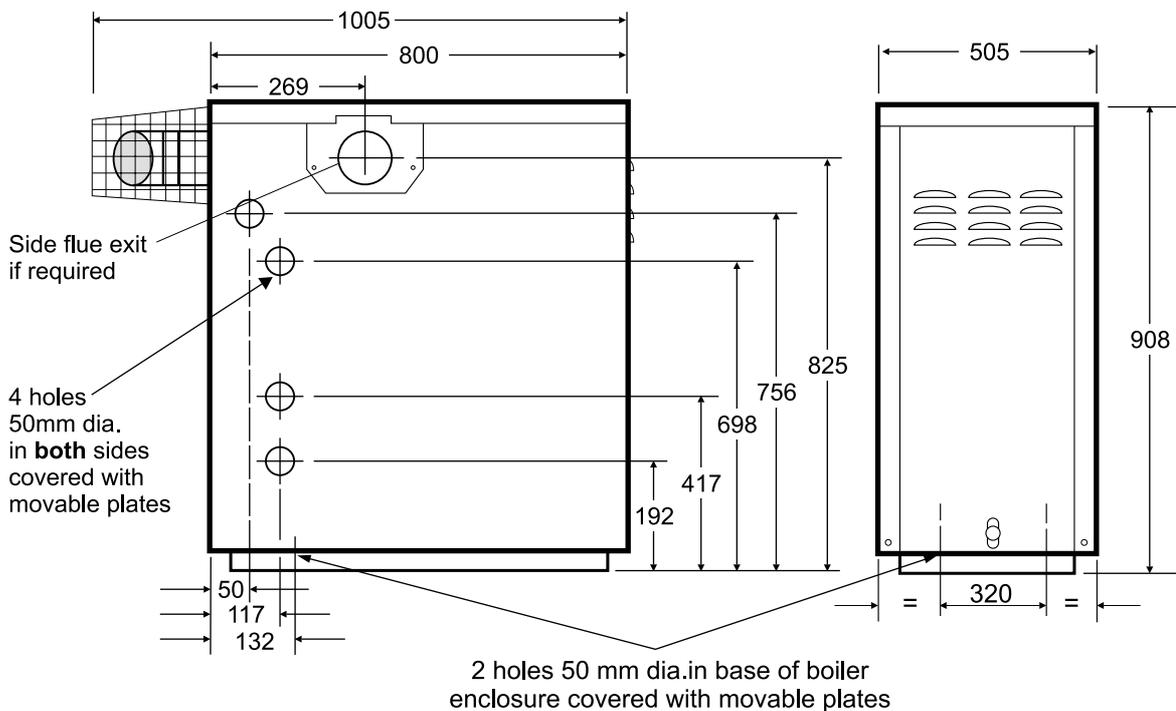


Fig 1b - 26/36 and 36/46 dimensions



4 - GENERAL BOILER INFORMATION

4.1 Boiler description

The Vortex Outdoor 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 Vortex Outdoor modules are part of the Grant range of automatic pressure jet oil boilers 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 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.

A conventional flue (Green) system is also available from Grant UK. Refer to Section 5.3 for further details.

Green system Standard external high level/ vertical flue starter elbow with test point - components available:

Extensions 150 mm, 250 mm, 450 mm, 950 mm and adjustable 195 to 270 mm
45° elbow
High level terminal
Vertical terminal

4.2 Boiler components

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

If required, an additional flexible fuel line and $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP male adaptor are available from Grant Engineering (UK) Limited, for two-pipe oil supply systems.

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

4.3 Regulations to comply with

Installation of a Grant Vortex boiler must be in accordance with the following recommendations:-

- a Building Regulations for England and Wales, and the Building Standards for Scotland issued by the Department of the Environment and any local Byelaws etc.
- b Model and local Water Undertaking Byelaws.
- c Applicable Control of Pollution Regulations.
- d 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 Information Book 3 (Installation requirements for oil fired boilers and oil storage tanks).

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. |

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

IMPORTANT

Before starting any work on the boiler, or fuel supply please read the health and safety information given in Section 13 on page 39.



Regional statutory requirements may deem this appliance to be a 'controlled service'. Where this is the case, it is a legal requirement that the appliance is installed and commissioned either under the remit of building control or by a 'Competent person' such as a suitably qualified Oftec registered technician.

4.4 Fuel supply

4.4.1 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 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.

4.4.2 Fuel pipes

- Fuel supply pipes should be of copper tubing with an internal diameter of at least 8 mm. Galvanised pipe must not be used.
- Flexible pipes 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. A shut-off valve should be fitted before the filter, to allow the filter to be serviced.
- A flexible fuel line, adaptor and $\frac{1}{4}$ " BSP isolation valve are supplied loose with the boiler for the final connection to the burner. If a two pipe system or Tiger Loop system is used, an additional flexible fuel line and $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP male adaptor are available from Grant Engineering (UK) Limited.
- Flexible pipes should be inspected annually when the boiler is serviced and replaced every two years.

4.4.3 Single pipe system - (See Fig. 2)

- Where the storage tank outlet is above the burner the 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.

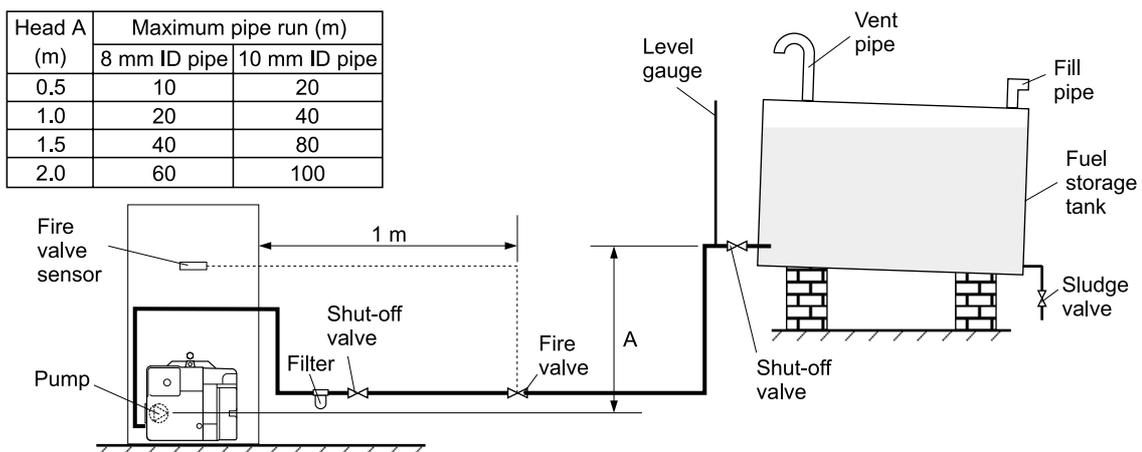


Fig. 2 - Single pipe system

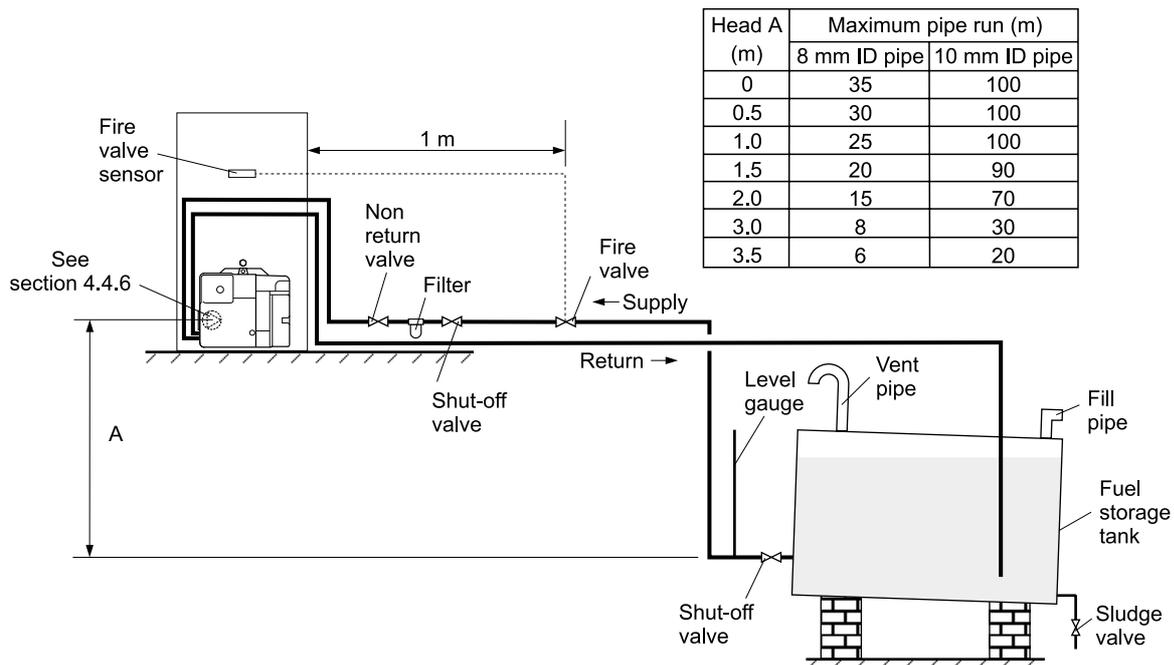


Fig. 3 - Two pipe system

4.4.4 Two pipe system - (See Fig. 3)

- 1 When the storage tank outlet is below the burner, the two pipe system should be used. The pipe runs should be as shown in Fig. 3. The return pipe should be at 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.
 - 2 Avoid the bottom of the tank being more than 3 m below the burner.
 - 3 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.
- 4 To be used with a two-pipe system, the burner **must** be fitted with an additional flexible fuel line (a flexible fuel line and $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP male adaptor are available from Grant Engineering (UK) Limited). See Section 4.4.6.
- 5 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 booklet T1/139. Available at www.oftec.org.uk

4.4.5 Tiger Loop system - (See Figs. 4 and 5)

- 1 When The storage tank is below the burner, an alternative to a two pipe system can be achieved using the TigerLoop oil deaerator. This effectively removes the air from the oil supply on a single pipe lift.
- 2 The Tiger Loop is connected close to the boiler as a two pipe system (omitting the non-return valve) as shown in Fig. 4. Refer to the manufacturers instructions supplied with the Tiger Loop. The Tiger Loop **must** be mounted vertically.
- 3 To be used with a Tiger Loop system, the burner **must** be fitted with an additional flexible fuel line. See Section 4.4.6.

Flexible fuel lines and adaptors are available from Grant Engineering (UK) Ltd.

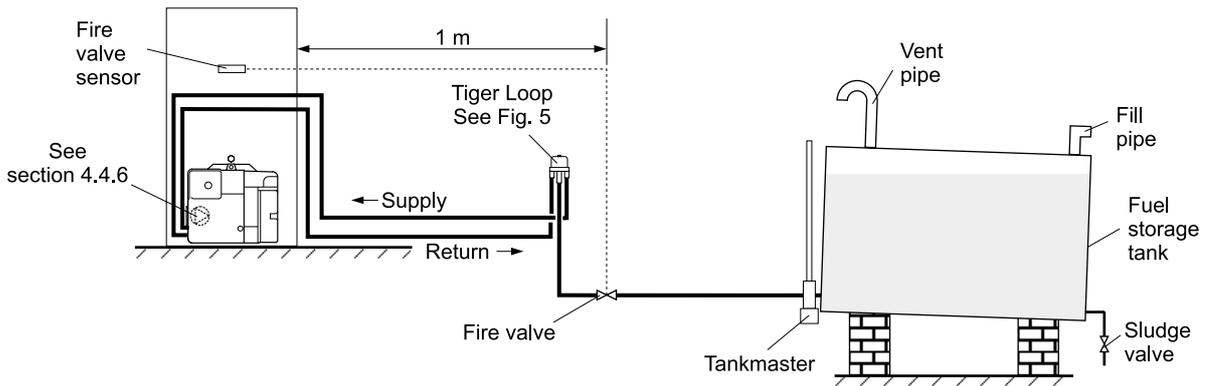


Fig. 4 - Tiger loop system

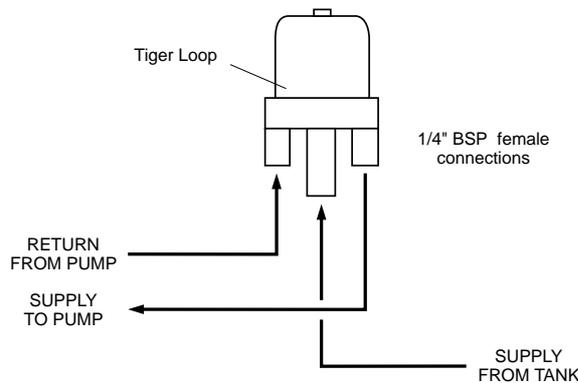


Fig. 5 - Tiger loop

4.4.6 Two pipe oil supplies

Riello RDB burner - See Fig. 6

- 1 The 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 (see Fig. 6) into the tapping in the return port.
- 2 The By-pass screw is supplied in the boiler accessory pack.
- 3 Remove the plastic burner cover (two screws).
- 4 Remove and discard the blanking plug from the return connection of the pump and fit the By-pass screw using an hexagonal key.
- 5 Connect the return oil flexible fuel line to the pump.
- 6 Connect the 3/8" to 1/4" BSP adaptor to the flexible fuel line.

7 Flexible fuel lines and adaptors are available from Grant Engineering (UK) Ltd.

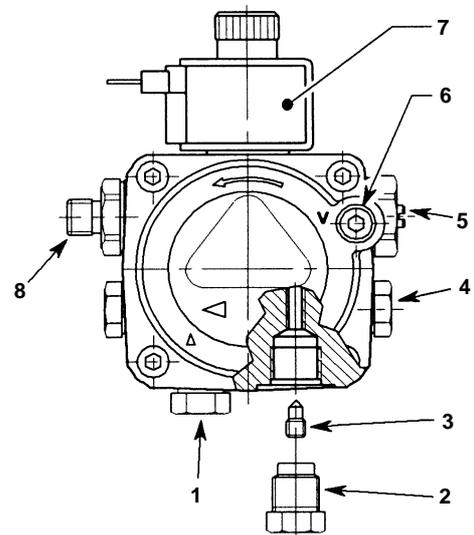


Fig. 6 - Riello RDB pump

- 1 Oil inlet connection
- 2 Return connection
- 3 By-pass screw
- 4 Pressure gauge connection
- 5 Pressure adjuster
- 6 Vacuum gauge connection
- 7 Solenoid
- 8 Supply to nozzle



4.5 Connect the fuel supply

See Fig. 6

If a two pipe system is to be used refer to Section 4.4.6.

- 1 Remove the oil inlet plug from the fuel pump and connect the elbow of the flexible fuel line supplied with the boiler.
- 2 Connect the flexible fuel line to the rigid supply using the adaptor supplied. The supply enters through one of the holes in the underside of the side casing panels.

4.6 Electricity supply

- 1 A 230/240 V ~ 50 Hz mains supply is required.

The boiler must be earthed.

- 2 The electrical supply to the boiler **and** control system should be fed from a single separate 5 Amp circuit breaker with earth leakage protection, providing complete electrical isolation.
- 3 A fused double pole switch or a fused three pin plug and shuttered outlet socket should be used for the connection.
- 4 The power supply cable should be at least 0.75 mm² PVC as specified in BS 6500, Table 16.
- 5 All the wiring external to the boiler must be in accordance with the current I.E.E. Wiring Regulations.
- 6 Any room thermostat or frost thermostat used must be suitable for use on mains voltage.
- 7 The boiler requires a permanent mains supply, do not interrupt it with any external time control.
- 8 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 and Resistance to earth.

4.7 Frost protection

- 1 Outdoor 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 5°C.
- 2 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.

4.8 Boiler location

- 1 The Outdoor 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 Fig. 7, 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.
- 5 The flue terminal must be a minimum distance of 1.8 m from an oil storage tank.

The flue terminal should be positioned so as to avoid products of combustion accumulating in stagnant pockets around the building or entering into buildings.

4.9 Pipework materials

General - Grant boilers are compatible with both copper and plastic pipe. Where plastic pipe is used it must be of an oxygen barrier type. The first metre of pipe connected to the boiler must be made in copper.

Sealed systems - Where a sealed heating system is fitted to the boiler only copper tube may be used.

Underfloor systems - 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 the primary pipework between the boiler and the underfloor mixing/blending valves.



4.10 Flue terminal locations

The minimum dimensions for positioning the flue terminal are shown in Fig. 7.

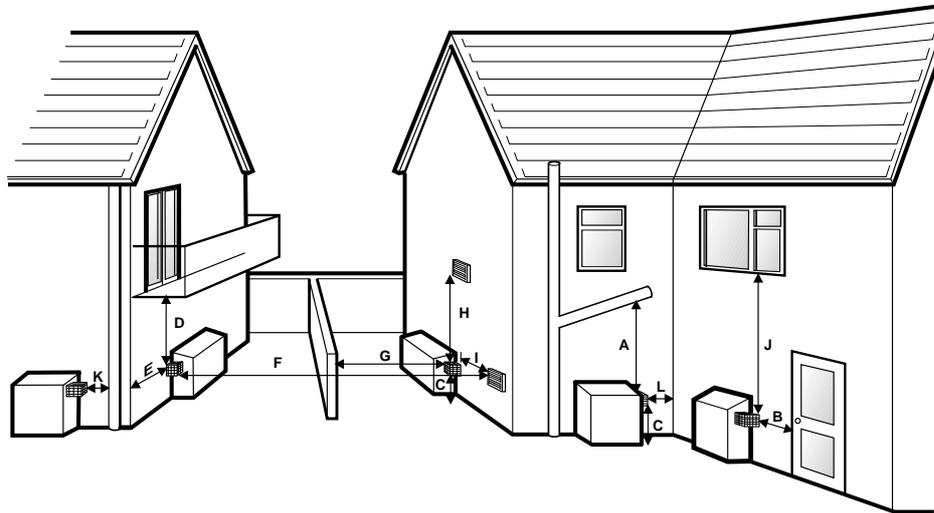


Fig. 7 - Flue terminal positions

Terminal position	Min. distance
A Below gutters, eaves or balconies (with protection)	*600
B Horizontally from a door, window or air vent	600
C Above ground, flat roof or balcony level	**300
D Below gutters, eaves or balconies (without protection)	*600
E From an external corner	300
F From a terminal facing the terminal	1200
G From a surface facing the terminal	600
H Vertically from a terminal on the same wall	1500
I Horizontally from a terminal on the same wall	750
J Directly below an opening, air brick, window, etc.	600
K From a vertical drain pipe or soil pipe	300
L From an internal corner	300

Notes: * 75 mm with protection.
** 300 mm British Standards.

Distances measured to rim of terminal.

Clearances recommended by Grant Engineering (UK) Limited in accordance with British Standards and Building Regulations.

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.

- Notes:**
- 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.



4 - GENERAL BOILER INFORMATION

4.11 Water connections

Flow connection - All models

A 22 mm (28 mm 26/36 and 36/46 models) Tectite push-fit elbow connection is provided for the heating flow. The flow and return pipework can exit the boiler enclosure either through the openings provided in both sides (under the movable cover plates) and through the wall when installed against the building, or down and through the openings provided in the base of the enclosure for 'free standing' installations.

Return connection (see also Section 5.4) - All models have a stainless steel pipe on the left hand side (when viewed from the back) for the return connection - 22 mm for the 15/26 models or 28 mm for the 26/36 and 36/46 models.

Compression fittings **must** be used for the return connection.

All water connections have been temporarily sealed with plastic caps to prevent any residual water (from factory pressure testing) leaking from the boiler during storage and transit. **All** the caps must be removed before connecting any fittings.

Plug all unused connections.

Fit drain cocks in the central heating and domestic hot water systems to allow the complete system to be fully drained.

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 central 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 immediate information, please contact BetzDearborn on 0151 4209563 or Fernox on 0179 9550811.

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 the guidelines will invalidate the warranty.

4.12 Boiler components

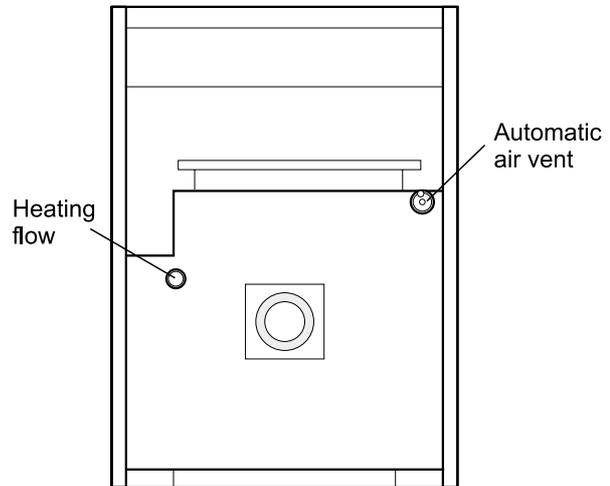


Fig. 8 - Top view

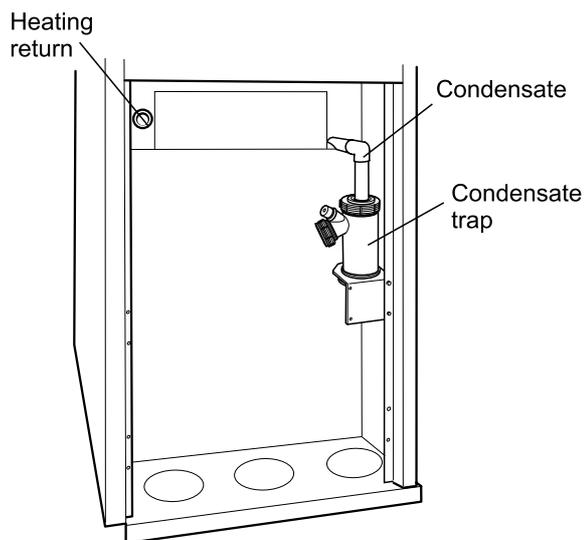


Fig. 9 - Rear view



4.13 Sealed systems

See Fig. 10

Grant sealed system kits, incorporating circulating pumps are available.

- 1 The boiler is only suitable for use with a sealed system complying with the requirements of BS 5449. The maximum temperature of the central heating water is 80°C.
- 2 The system must be provided with the following items:-
 - a Diaphragm expansion vessel complying with BS 4814.
 - b Pressure gauge.
 - c Safety valve.
 - d Approved method for filling the system.

Refer to BS 7074:1 for further guidance.

- 3 The expansion vessel can be fitted in either the return or flow pipework in any of the recommended positions as shown in Fig. 10. 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.

- 4 The pressure gauge should have an operating range of 0 to 4 bar.
- 5 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.
- 6 Provision should be made to replace water lost from the system. This can be done manually. A double check valve assembly must be used.
- 7 An automatic air vent should be fitted to the highest point of the system.
- 8 All fittings used in the system must be able to withstand pressures up to 3 bar.
- 9 Radiator valves must comply with the requirements of BS 2767(10):1972.
- 10 One or more drain taps (to BS 2879) must be used to allow the system to be completely drained.
- 11 For proprietary expansion vessel/valve/gauge packs, refer to the manufacturers instructions for the correct location on the heating system.

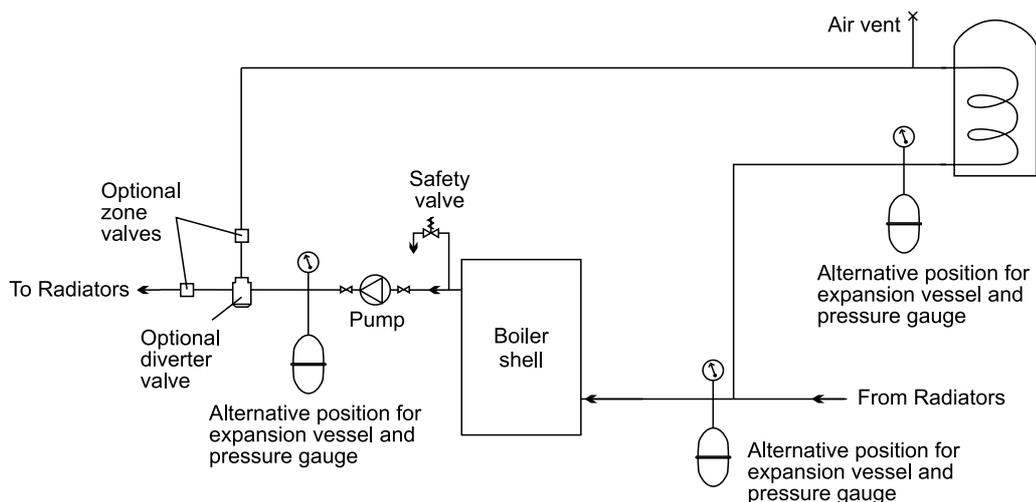


Fig. 10 - Sealed system



4.14 Underfloor heating systems

See Fig. 11

On underfloor systems it is essential that the return is pre-heated by mixing flow water into the return before it enters the boiler. The return temperature **must be** maintained above 40°C to prevent internal corrosion of the boiler water jacket.

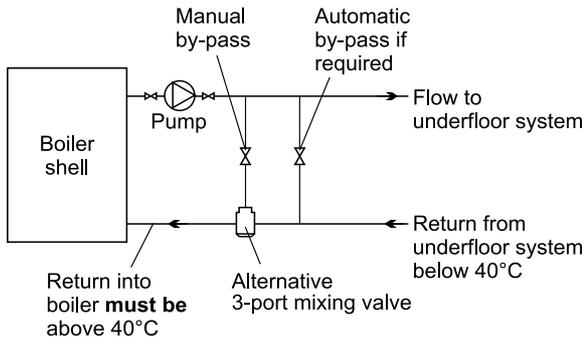


Fig. 11 - Underfloor system

4.15 Condensate disposal

When in condensing mode the Grant Vortex boiler produces condensate from the flue gases. Provision must be made for the safe and effective removal of the condensate. All Vortex boilers are supplied with a float valve condensate trap (the float creates a seal against flue gases), see Figs. 9 and 12, that incorporates an overflow warning outlet. The bung should be removed from the overflow outlet.

The trap must be located inside the casing in an accessible position to allow for maintainance.

The mounting bracket (supplied) for the condensate trap must be used.

The trap should be checked at regular intervals to ensure that it is operating correctly and serviced at least annually.

If there is any discharge of condensate from the overflow outlet, turn off the boiler and contact a service engineer.

The condensate drainage line must be of a suitable material such as plastic.

Steel or copper must not be used.

The minimum diameter of the condensate drainage line is 3/4". The drainage line may run into a soil stack or waste pipe, an external gully, hopper or soak-away, see Fig. 13. Standard plastic overflow pipe (3/4" [19 mm] diameter) may be used to connect to the outlet of the condensate trap.

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

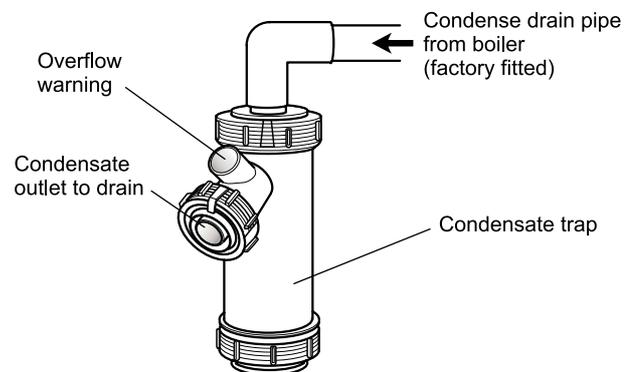


Fig. 12 - Condensate trap

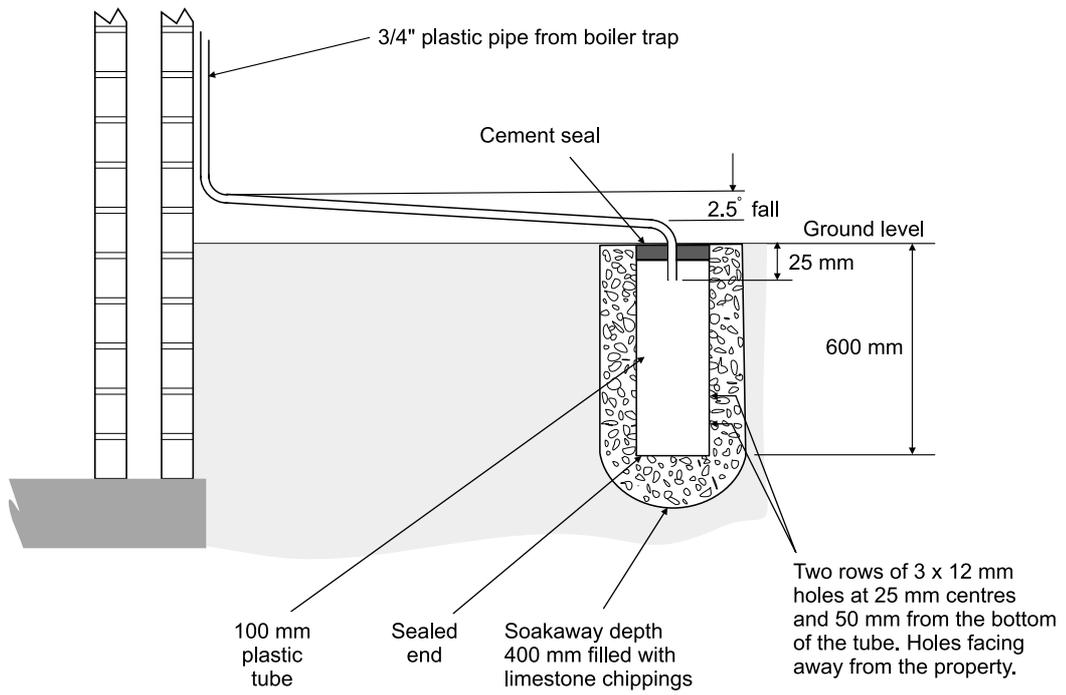


Fig. 13 - Purpose made condensate soakaway



5 - BOILER INSTALLATION

5.1 Unpack the boiler

- 1 Carefully remove the packaging from the boiler and lift it off the pallet.
- 2 The flue terminal guard is supplied loose inside the boiler.
- 3 Remove the case top panel (four screws).
- 4 The flue may exit the casing from the left, right or rear of the casing. The casing has two removable blanking panels and a flue exit panel. Fit the panel with the flue exit hole and seal in the required position.
- 5 Slacken the wing nuts holding the flue elbow and rotate the elbow to the required direction for the flue to exit the casing.
- 6 Push the end of the flue terminal section with the red seal through the seal in the casing. The terminal has been factory lubricated. Take care not to dislodge or damage the red seals.
- 7 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**.
- 8 Tighten the wing nuts holding the flue elbow and fit the stainless steel flue guard using the two screws provided.
- 9 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 Fig. 14.

5.2 Preparations for installation

- 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 Fig. 1 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, slide away the covers to open the two 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.

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.

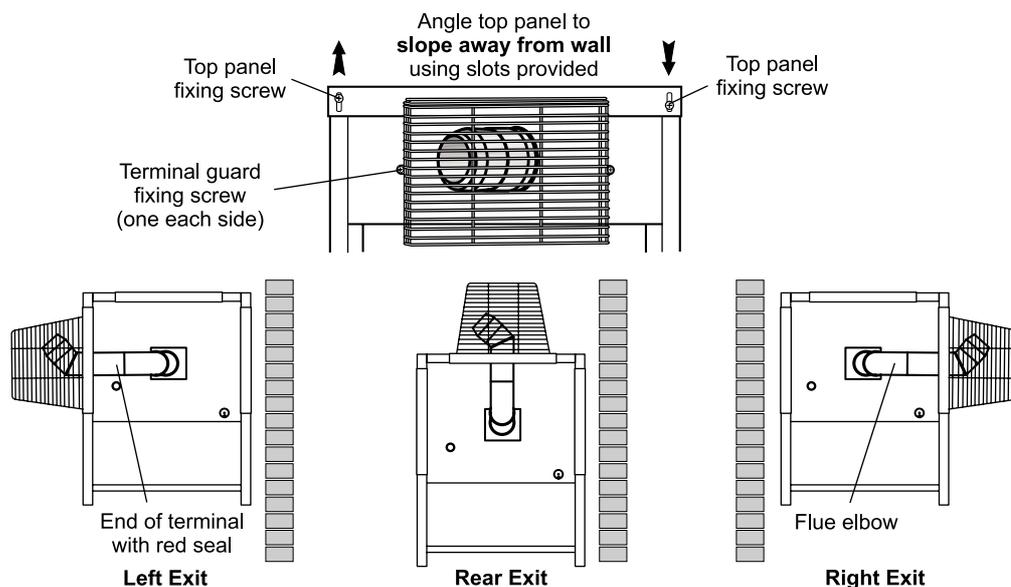


Fig. 14



- The oil supply line should be installed up to the position of the boiler. Refer to Section 3.3.2 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.

5.3 Conventional flue - Green system

See Fig. 15

Where it is not practical to use the factory supplied low level flue, the Vortex Outdoor Module may be fitted with a vertical flue system.

A twin wall stainless steel insulated flue system is available from Grant UK.

An insulated boiler connector elbow, complete with test point, replaces the low level terminal and flue guard supplied with the boiler.

The Grant Vertical flue system connects to the elbow and may terminate at high level or vertically as required. See Fig. 15.

- The flue must terminate in a down draught free area, i.e. at least 600 mm above the 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.

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.

The following components are available from Grant UK.

15/26 model	
Item	Part No.
Starter elbow	GKM90
150 mm extension	GX150/90
250 mm extension	GX250/90
450 mm extension	GX450/90
950 mm extension	GX950/90
195-270 mm adjustable extension	GXA250/90
45° elbow	GE45/90
High level terminal	GTH90
Vertical terminal	GTV90
Wall bracket - standard	GWB90
Wall bracket - extended	GEB90

26/36 and 36/46 models	
Item	Part No.
Starter elbow	GKM200
150 mm extension	GX150/200
250 mm extension	GX250/200
450 mm extension	GX450/200
950 mm extension	GX950/200
195-270 mm adjustable extension	GXA250/200
45° elbow	GE45/200
High level terminal	GTH200
Vertical terminal	GTV200
Wall bracket - standard	GWB200
Wall bracket - extended	GEB200

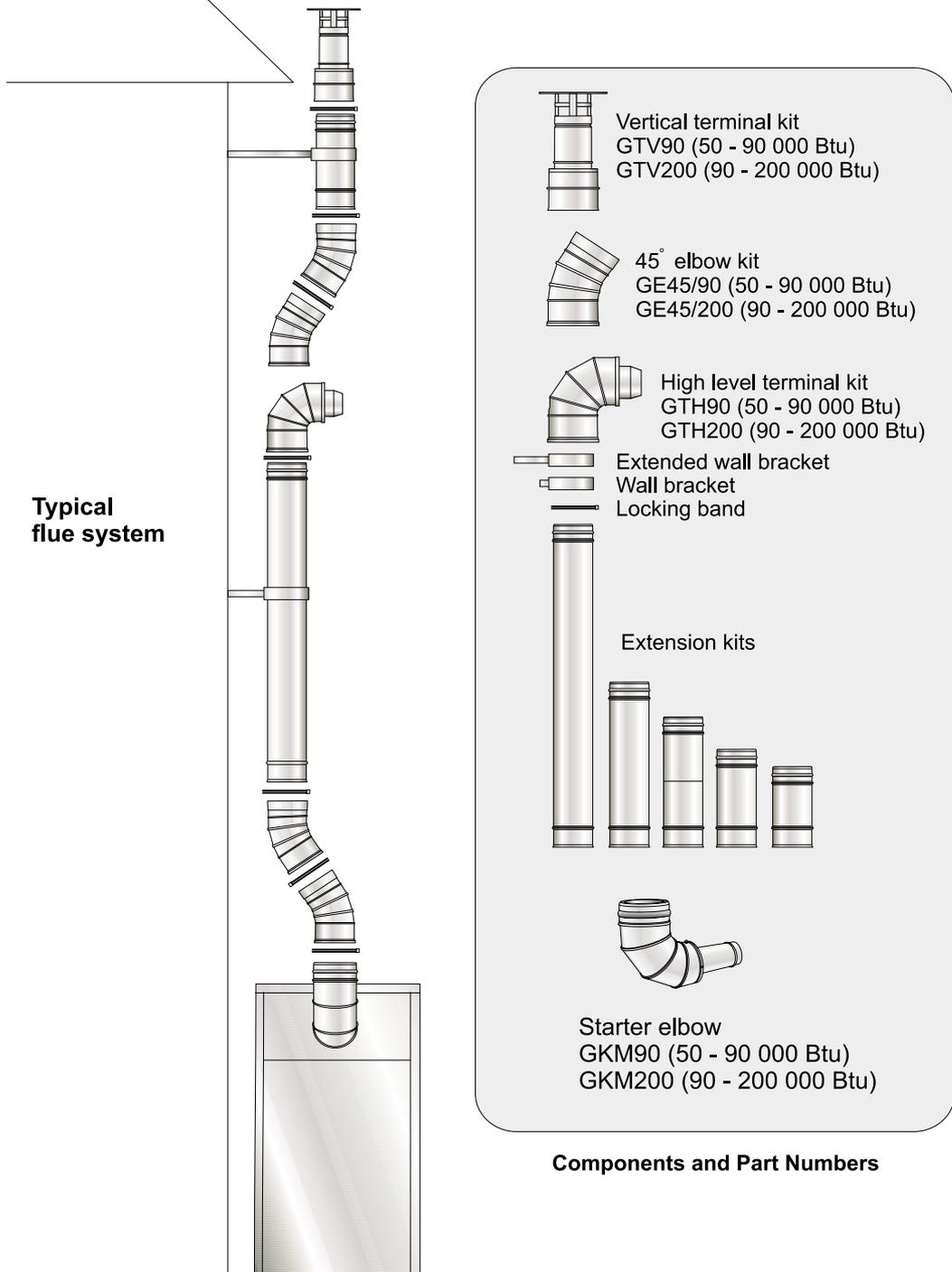


Fig. 15 - Conventional flue (Green system)



5.4 Make the water connections

See Figs. 8 and 9

- 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 To gain access to the burner, remove the front panel by turning the handle and withdrawing it forwards at the bottom..
- 3 If required, fit the Grant sealed system kit, see Section 5.5.
- 4 A Tectite elbow is fitted to the flow connection. Orientate the elbow in the required direction. A compression elbow is fitted to the return connection, orientate the elbow in the required direction.
- 5 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.

- 6 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.
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).
- 7 Fill and vent the water system and check for leaks, rectifying where necessary.
If the Grant sealed system kit is fitted, refer to Section 5.6 for details on filling and venting the sealed heating system.

5.5 Sealed system kit - 15/26

See Fig. 16

- 1 The kit includes the following items:
Pressure relief valve and automatic air vent assembly
22 mm Tectite elbow
12 litre expansion vessel with flexible hose and sealing washer
Filling loop kit
Pressure gauge
6 m head circulating pump with 22 mm gate type valves
15 mm copper pressure relief valve discharge pipe
- 2 Remove the ½" BSP black iron plug from the front of the boiler waterway.
- 3 Fit the ½" BSP straight end of the flexible expansion vessel hose to the tapping on the front of the waterway.
- 4 Position the 12 litre expansion vessel on the front of the boiler combustion door locating the bracket 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 fit the 22 mm Tectite elbow to the boiler flow connection.
- 7 Push fit the automatic air vent/pressure relief valve assembly into the Tectite elbow.
- 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 9.
- 12 The pressure gauge and filling loop should be installed in a convenient position inside the building.



5.5a Sealed system kit - 26/36 and 36/46

See Fig. 16

1. The kit includes the following items:

Pressure relief valve and automatic air vent assembly
28 mm Tectite elbow
16 litre expansion vessel with flexible hose and sealing washer
Filling loop kit
Pressure gauge
7 m head circulating pump with 28 mm gate type valves
15 mm copper pressure relief valve discharge pipe

- 2 Remove the ½" BSP black iron plug from the front of the boiler waterway.
- 3 Fit the ½" BSP straight end of the flexible expansion vessel hose to the tapping on the front of the waterway.
- 4 Remove the nuts and washers from the boiler combustion door.

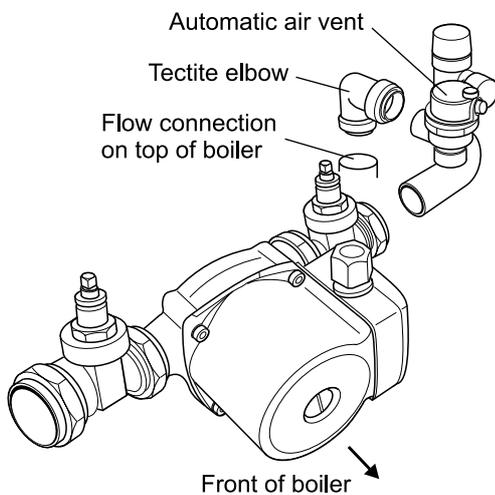


Fig. 16 - Sealed system pump assembly

- 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 Push fit the 28 mm Tectite elbow to the boiler flow connection.
- 10 Push fit the automatic air vent/pressure relief valve assembly into the Tectite elbow.
- 11 Fit both 28 mm pump valves to the circulating pump using the sealing washers supplied.
- 12 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.
- 13 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.
- 14 The circulating pump may be wired into the boiler control panel if required. Refer to Section 9.



5.6 Fill the sealed system

- 1 Automatic air vent(s) are fitted to the top of the boiler (see Figs. 8 and 16). 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.
- 2 If the flexible filling loop is used to fill the system, ensure it is connected and that the valve connecting it to the system is open and the 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 Ensure that the mains cold water supply valve is open (operating lever in line with the valve), then turn on the mains cold water supply and gradually open the front valve on the filling loop until water is heard to flow.
- 4 Vent each radiator in turn, starting with the lowest one in the system, to remove air.
- 5 It is important that the pump is properly vented to avoid it running dry and damaging its bearings. To gain access to the pump for venting it is necessary to remove the top panel.
Remove the cap, then unscrew and remove the plug from the centre of the pump. Using a suitable screwdriver rotate the exposed spindle about one turn. Replace the plug and cap.
- 6 Check the operation of the safety valve by turning the head anticlockwise until it clicks. The click is the safety valve head lifting off its seat allowing water to escape from the system.
Check that this is actually happening.
- 7 Continue to fill the system until the pressure gauge indicates 1.0 bar. Close the fill point valve and check the system for water soundness, rectifying where necessary. Water may be released from the system by manually operating the safety valve until the system design pressure is obtained.
- 8 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.
- 9 Close the valves either side of the filling loop and disconnect the loop.

5.7 Expansion vessel pressure

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 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 BS 7074:1 for further guidance.

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.

A simple test to check if the expansion vessel size is adequate, is to fill the system cold to 1.0 bar, then fully heat the system and if the pressure rises no more than 2.0 bar the vessel is adequate. A higher figure indicates that an extra vessel is required.

5.8 Connect the power supply

See wiring diagrams in Section 9

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.

- 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:-
 - Live (brown) to terminal 2 - marked permanent live
 - Neutral (blue) to terminal 3 - marked mains neutral
 - Earth (green/yellow) to terminal 4 - marked mains earth



5 - BOILER INSTALLATION

- 3 If an external control system is to be connected to the boiler (e.g. a S-plan system with programmer, room thermostat, cylinder thermostat, motorised valves, etc.), connect the 'switched live' from the control system to terminal 1. For an example of connecting a typical control system, see Fig. 25.
- 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:-

- Earth (green/yellow) to terminal 10 - marked E
- Neutral (blue) to terminal 9 - marked N
- Live (brown) to terminal 7

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.
- 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 electrical power to the Outdoor Module at this stage.

5.9 Connect the fuel supply

See Fig. 6

If a two pipe system is to be used refer to Section 4.4.6.

- 1 Remove the plug from the fuel pump oil inlet adaptor and connect the elbow of the flexible fuel line supplied with the boiler.
- 2 Connect the flexible fuel line to the rigid supply using the adaptor supplied. The supply enters the enclosure through one of the holes in the bottom of the side panels.

5.10 Burner components

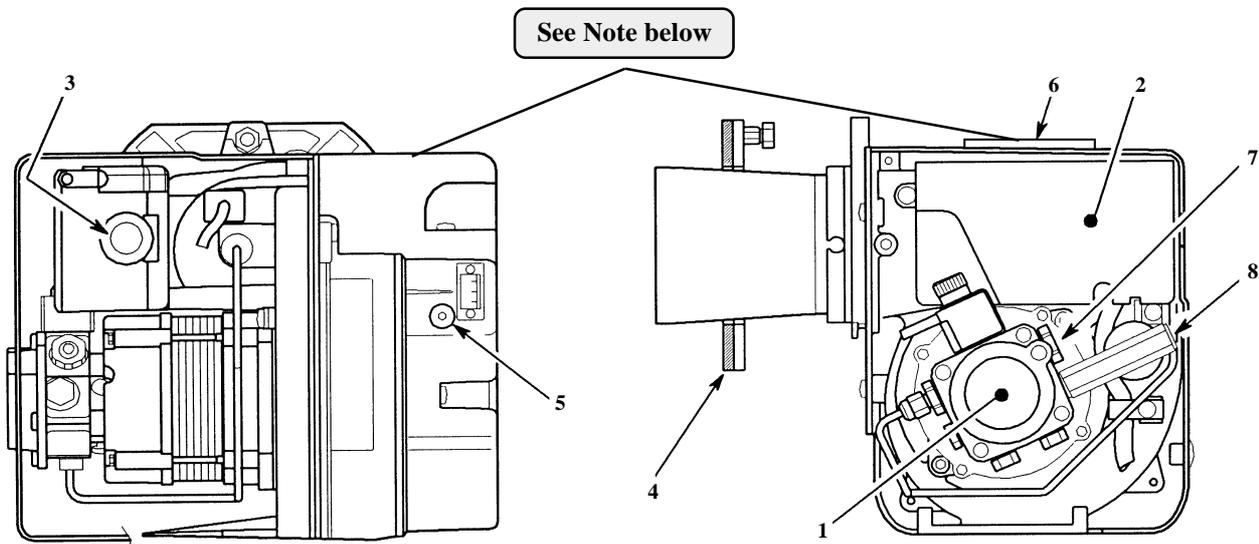


Fig. 17 - RDB burner components

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

Note:

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



Refer to Fig. 18 for boiler controls

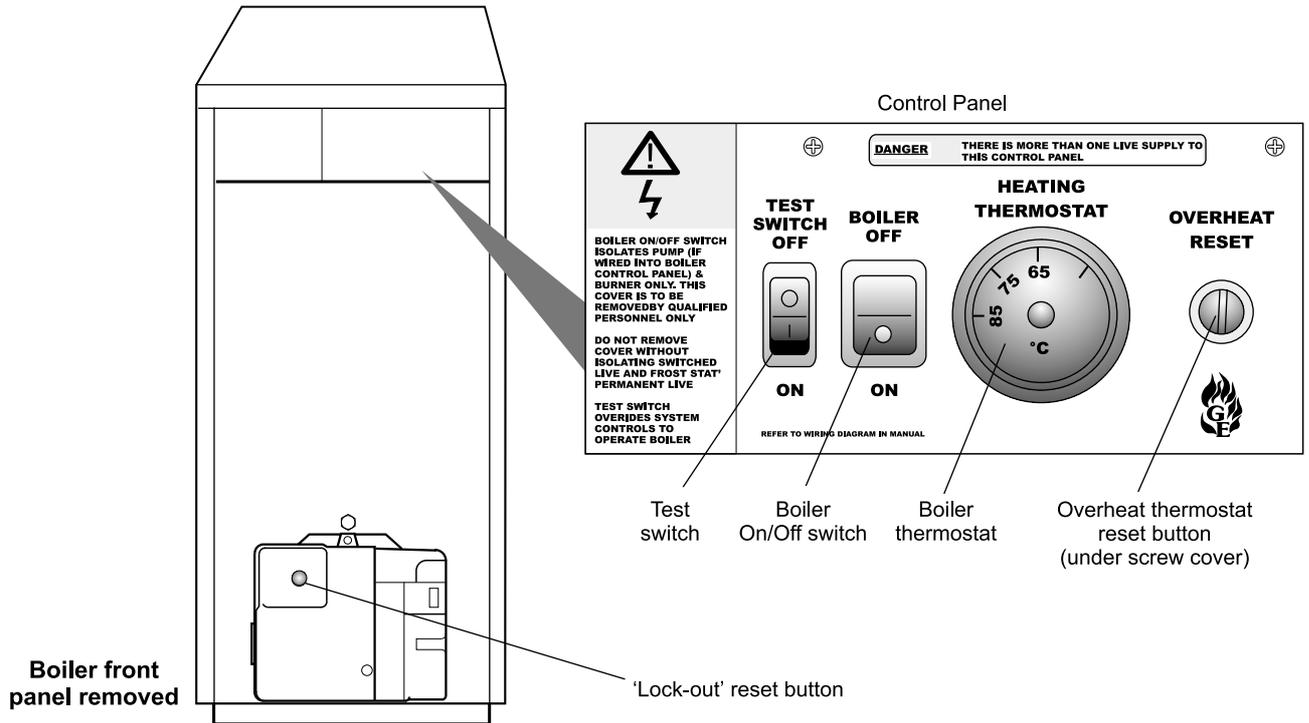


Fig. 18

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

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

IMPORTANT: Check that the turbulators are in position and that the ends are vertical (see Fig. 21).

- 1 Check that the water system has been vented (and pressurised if sealed system) and there are no leaks.

Ensure the automatic air vent on the condensing heat exchanger is open.

- 2 Check that all fuel line valves are open.
- 3 Remove the plastic burner cover (two screws) if it was not previously removed.
- 4 Connect a combined vent manifold and pressure gauge to the pressure gauge connection port on the oil pump. See Fig. 17. Open the vent screw on your vent manifold to vent the supply while the pump is running.

- 5 Check that all system controls are calling for heat and turn the boiler thermostat to maximum. Switch on the electricity supply.

Note: The boiler will start as soon as the electricity supply to it is switched on.

- 6 The burner fan should start and the burner should light within about 20 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.
- 7 With the burner alight, check the fuel pressure. Refer to the Technical Information, Section 3.3. Adjust the pressure if necessary - see Fig. 17.
- 8 Operate the boiler until it reaches normal operating temperature. Check oil supply/return pipe for leaks, rectifying where necessary.
- 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 Having ensured that there are no oil leaks, replace the burner cover.



- 11 Relight the boiler and allow it to run for 20 minutes then check the following:-
CO₂ level, Flue gas temperature and Smoke Number.
Refer to the Technical Information in Section 3.3.

Insert combustion probe into the end of the flue terminal to measure the CO₂ level.
Do not use the test point on top of the boiler.

- 12 Check the smoke number, if satisfactory check the CO₂. Use the hexagonal key supplied to adjust the burner air damper (see Fig. 17) as required. Turning the screw clockwise opens the damper and reduces CO₂ level, turning the screw anticlockwise closes the damper and increases CO₂ level.
Re-check the smoke number if the air damper has been moved.
Under no circumstances must the smoke number be above 1.
A suitable position for the air damper is one which gives 1% less CO₂ than that which has a smoke number of 1.

Note: To obtain the correct CO₂ level, the final flue gas reading must be taken with all casing panels fitted.

Note: It is important that the air damper is correctly set.

- 13 Check the flue gas temperature.
- 14 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.

- 15 Check that the condensate trap and pipe are discharging the condensate to drain.

- 16 Switch off the boiler.

- 17 With the hot water 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.

- 18 A suitable central heating system inhibitor must be added to protect the system against the effect of corrosion.

- 19 Replace the top, front and rear panels.

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 then refer to Section 6.

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

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

IMPORTANT NOTE:

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. 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 at the low level flue terminal or the test point on the conventional flue starter elbow where fitted.



The User must be advised (and demonstrated if necessary) of the following important points:-

- 1 How to light and turn off the boiler and how to operate the system controls.
- 2 The precautions necessary to prevent damage to the central heating system and to the building, in the event of the boiler not being in operation during frost conditions.
- 3 The importance of servicing the boiler to ensure safe and efficient operation. This should normally only be required once a year.
- 4 The type of fuel used.
- 5 That any servicing or replacement of parts must only be carried out by a suitably qualified engineer.
- 6 Ensure that the boiler controls and room thermostat (if fitted) are set to the User's requirements.
- 7 If the boiler is used on a sealed heating system, tell the user the system pressure and show them the position of the safety valve discharge pipe.
- 8 Show the User how to reset the overheat thermostat and how to restart the boiler if it goes to 'Lock-out'.

Leave this Instruction manual with the User.



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 should always be serviced once per year.

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

Important: Details of every service should be entered in the Service Log, on page 2 of these instructions. This information may be required to validate the Grant extended warranty.

IMPORTANT

Before starting any work on the boiler, or fuel supply please read the health and safety information given in Section 13 on page 39.

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.

8.1 Important notes prior to 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.
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.
Refill, vent and re-pressurise the system as necessary.
- 4 Check that the louvres in the front panel are clear.
- 5 Check for any sludge/water from the fuel tank.
- 6 With the fuel supply valve closed, clean/replace the filter element and clean the filter bowl.
- 7 Flexible fuel supply pipes should be inspected annually when the boiler is serviced and replaced every two years. If in doubt replace the pipes.

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 nozzle fitted.

8.2 Dismantling prior to servicing

- 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.

- 3 Remove the burner fixing nut (top of mounting flange) and withdraw the burner.

If required, disconnect the flexible oil pipe(s), use a suitable container to prevent any oil spillage.

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

8.3 Cleaning the boiler

- 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 Fig. 19 or 20.
- 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 Fig. 19 or 20.
- 7 Pull out the spiral turbulators from the heat exchanger tubes. See Fig. 21.
Clean the turbulators using a stiff brush
Test the heat exchanger condensate drain by pouring water into one of the lower tubes and observe whether the water discharges from the 22mm condensate outlet. Replace the turbulators.
- 8 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.
- 9 Remove the condensate trap and check that it is not blocked and is operating correctly.



10 Check that the boiler condensate outlet is unobstructed. Clean if necessary.

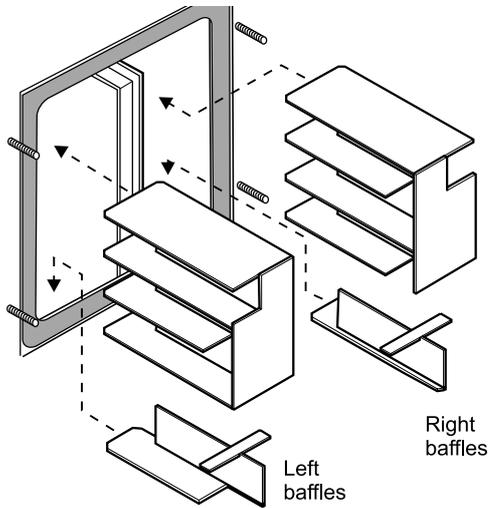


Fig. 19 - 15/26

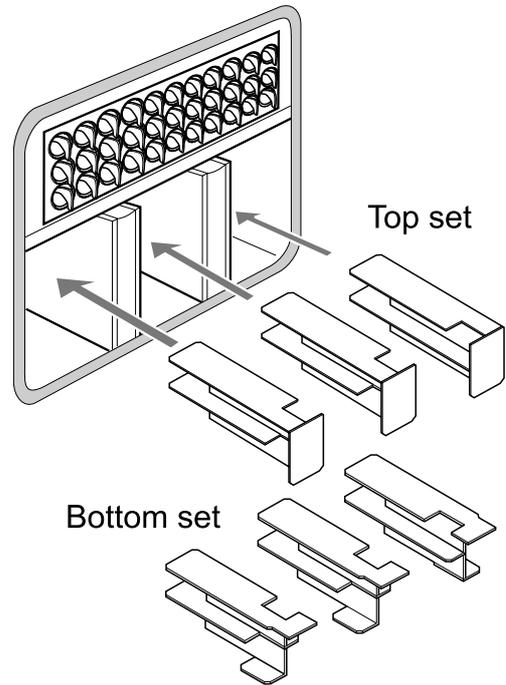


Fig. 20 - 26/36 and 36/46

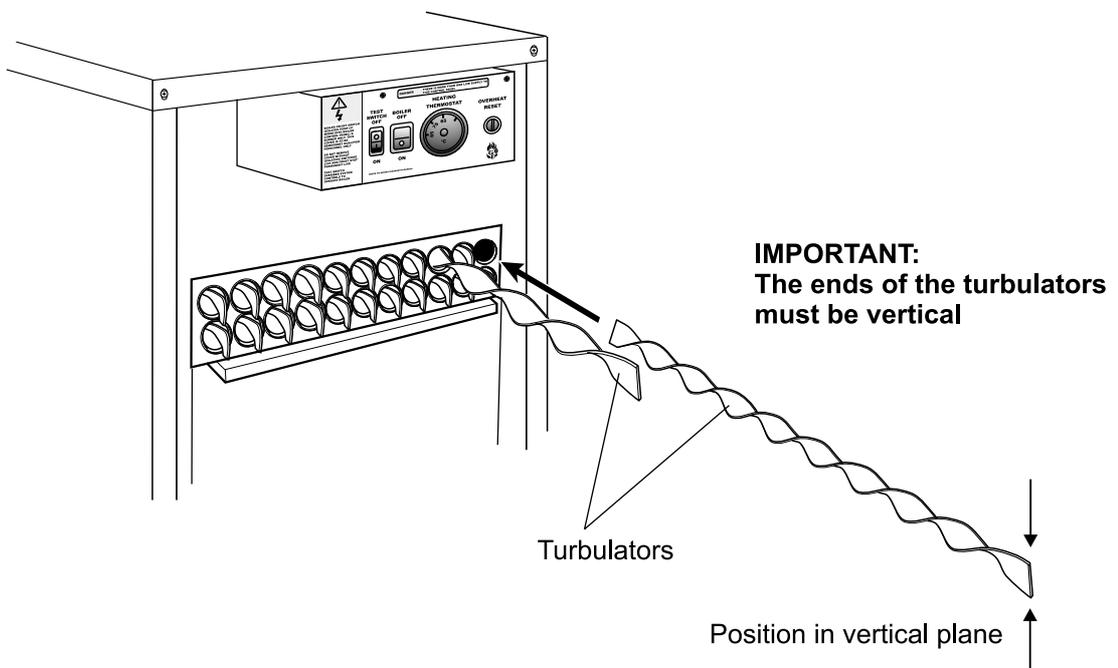


Fig. 21



8.4 Cleaning the burner

See Section 12

- 1 **Combustion head** - Loosen the two screws securing the combustion head and withdraw the head. Clean and refit the combustion head.
- 2 **Inspect the ignition electrodes** - Remove the combustion head.
Loosen the electrode clamp screw and withdraw the electrode assembly. Wipe clean and check for any cracks in the ceramic insulation. Replace if necessary.

Check the electrode settings

Electrode tips approximately 4 mm apart and 3 to 3.5 mm in front of the nozzle, see Fig 22.

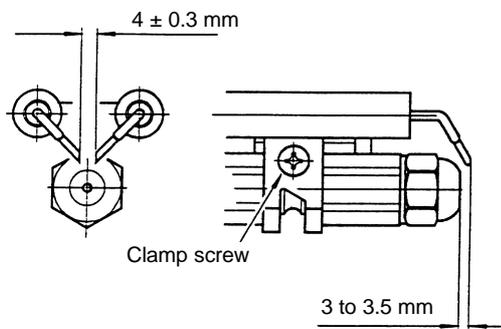


Fig. 22

- 3 **Nozzle** - The nozzle must be replaced annually. Check that the nozzle size and type are correct, refer to table in Section 3.3 and boiler data label. Clean the nozzle with kerosene if necessary. Do **not** use a pin or piece of wire to clean the nozzle.
Replace the nozzle if a build up of carbon is present.
With the combustion head removed, loosen the electrode assembly clamp screw and slide the electrodes away from the nozzle. Remove the nozzle using a good fitting spanner (16 mm). The use of an ill-fitting spanner will damage the nozzle and could lead to an incorrect flame pattern.
Always check the electrode settings after replacing the nozzle, see Fig. 22.
- 4 **Photocell** - The photocell is a push-fit in the burner body. Carefully pull out the photocell to clean.
- 5 **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.
- 6 **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.

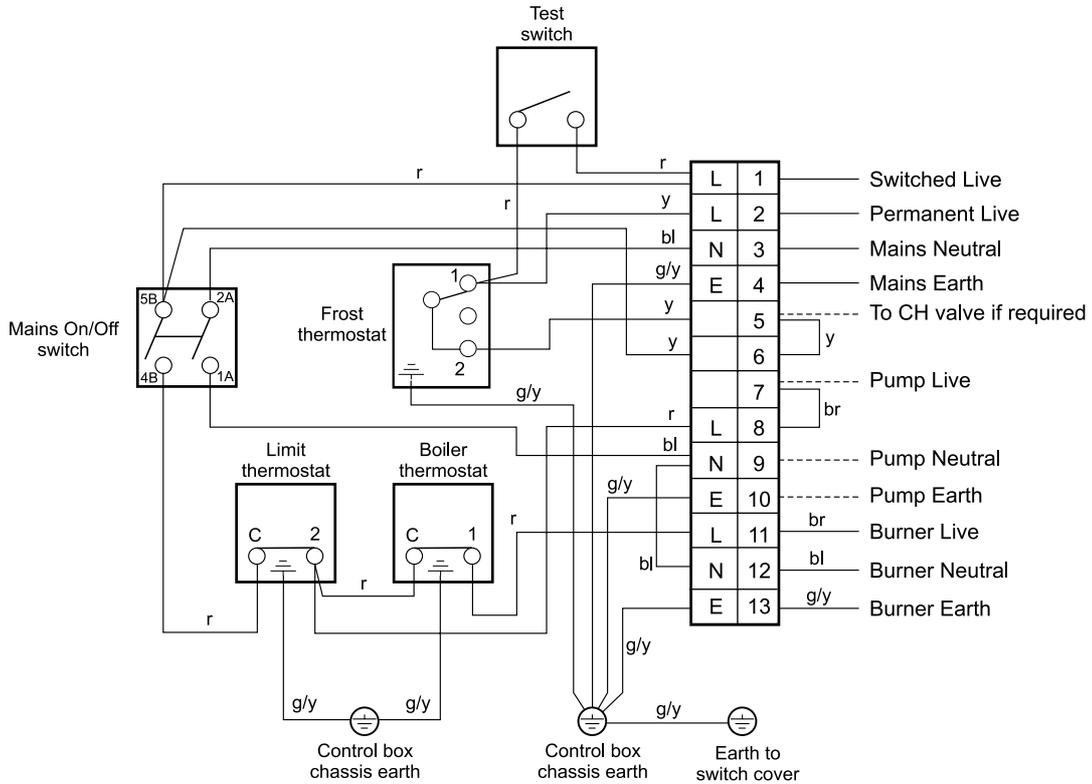
Re-assemble in reverse order.

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 starting on page 27.



9.1 Vortex Outdoor Module wiring diagram



Colour code: br - Brown, r - Red, bl - Blue, y - Yellow, g/y - Green/Yellow

Fig. 23

9.2 Grant programmable room thermostat

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.

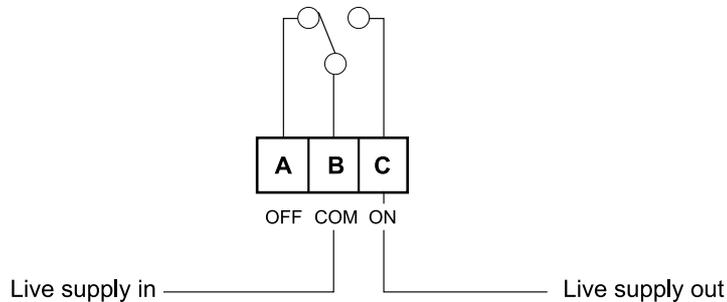


Fig. 24



9 - WIRING DIAGRAMS

9.3 Typical control system wiring diagram

Honeywell S Plan (HW & CH controlled by two valves)

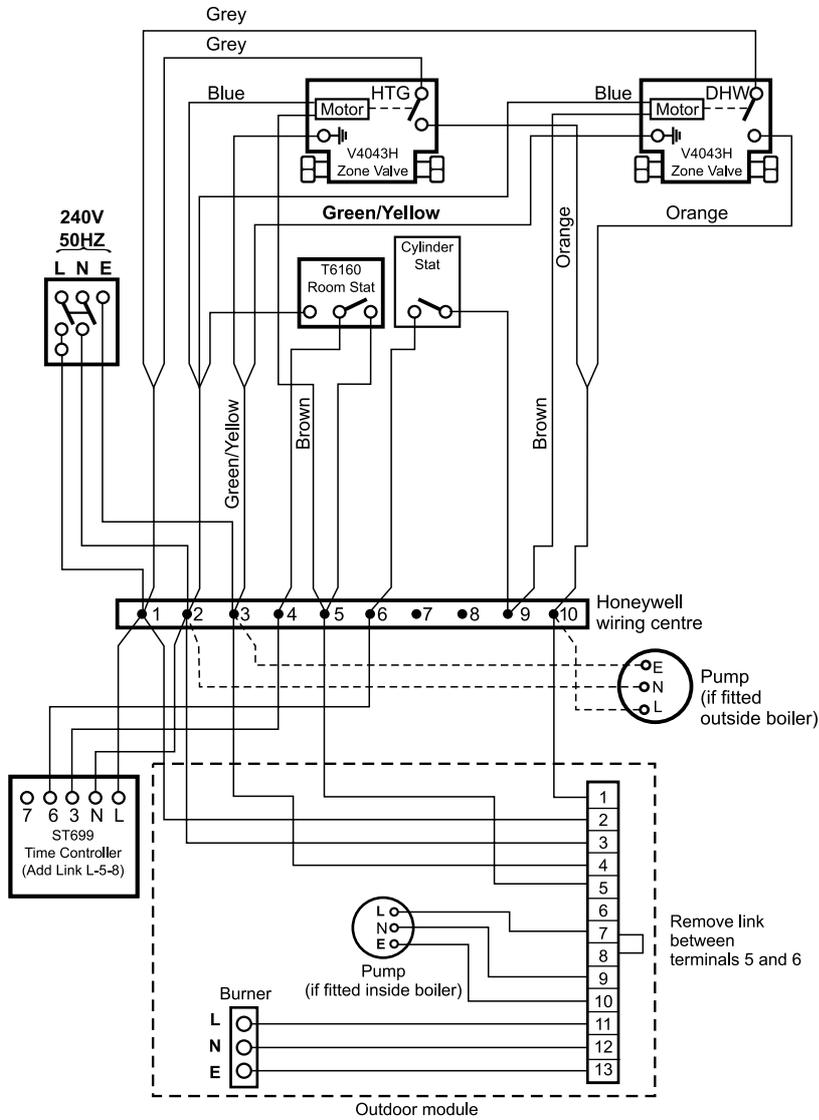


Fig. 25



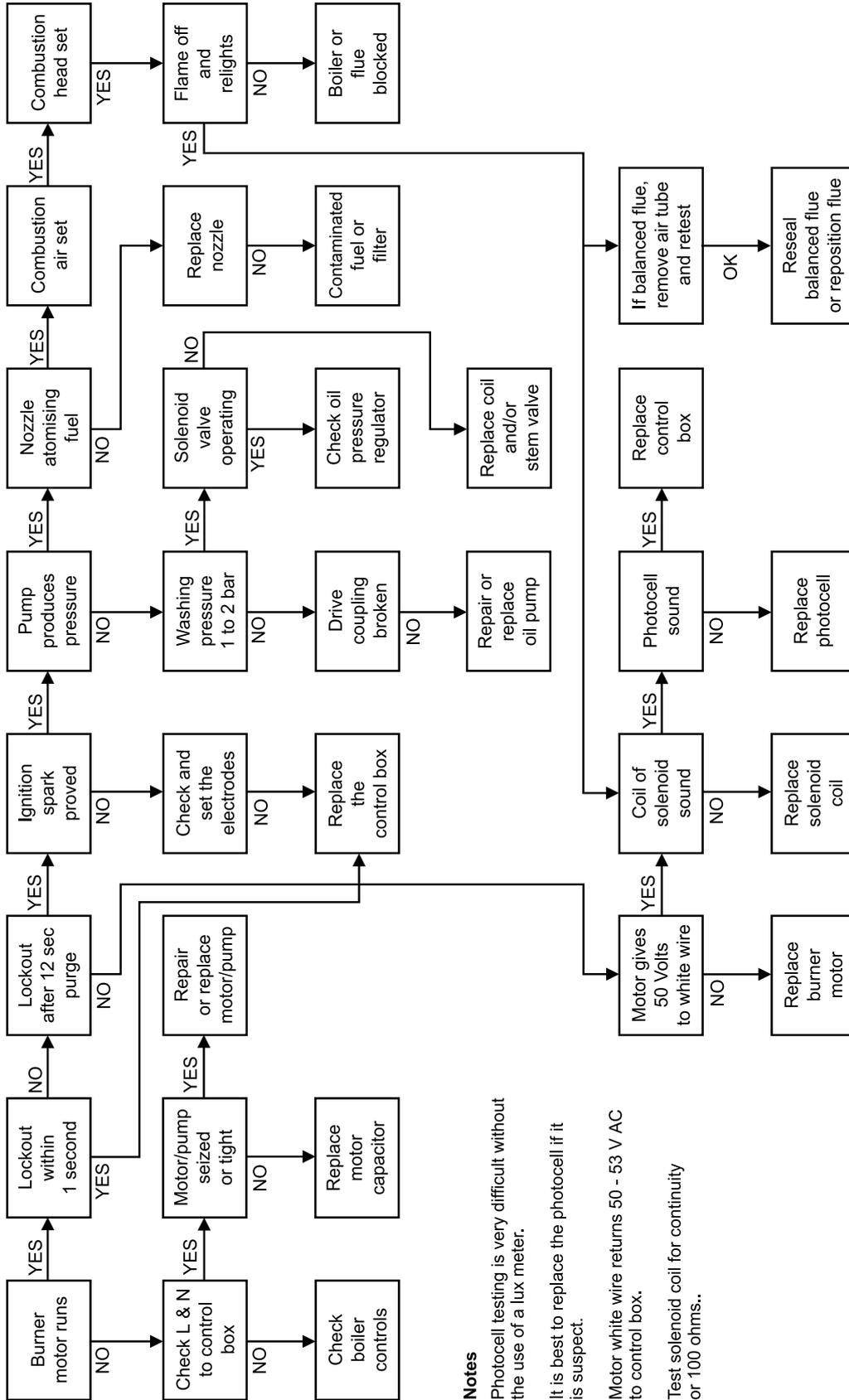
10.1 Boiler fault finding

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

<i>Faults</i>	<i>Remedies</i>
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 flow diagram.
4 Burner lights but goes to 'lock-out'.	If the flame is unstable, check the combustion settings. Refer to burner fault finding flow diagram.
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 the nozzle size and type. Fuel pressure may be too high - check and adjust.
6 Burner pulsates.	Insufficient air supply - check the air damper setting and the condition of the fan. 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 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.
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.



10.2 Riello RDB burner fault finding



Notes

Photoceill testing is very difficult without the use of a lux meter.

It is best to replace the photocell if it is suspect.

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

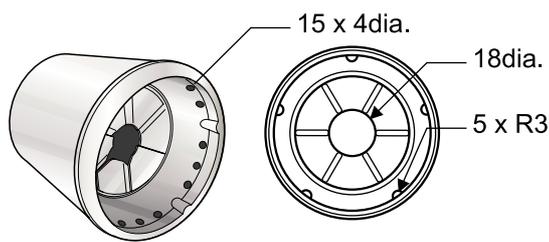
Test solenoid coil for continuity or 100 ohms..



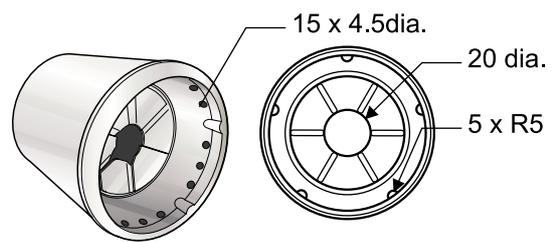
11.1 Vortex Outdoor Module - Spare Parts

Description	Part No.
Cleaning door nut and washer set	EFBS14
Double pole switch	EFBS19
Test switch	EFBS21
Frost thermostat	EFBS23
Baffle set - 15/26	VBS12
Baffle set - 26/36 and 36/46	VBS13
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 cover seal - 15/26	VBS15
Cleaning cover seal - 26/36 and 36/46	VBS16
Overheat thermostat	TPBS33
Boiler thermostat	TPBS34
Circulating pump - 6 m head	MPCBS23
Circulating pump - 7 m head	VBS54

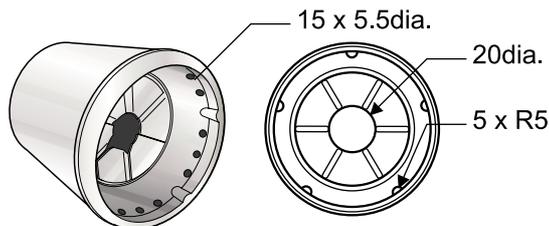
Burner Heads



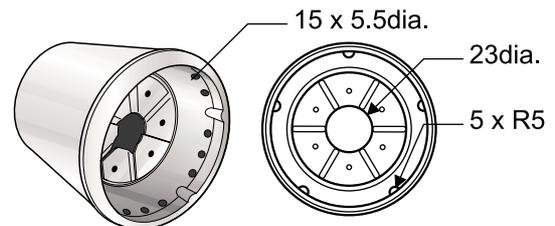
T1 - 15 and 20 kW



T2 - 15/26



T3 - 26/36

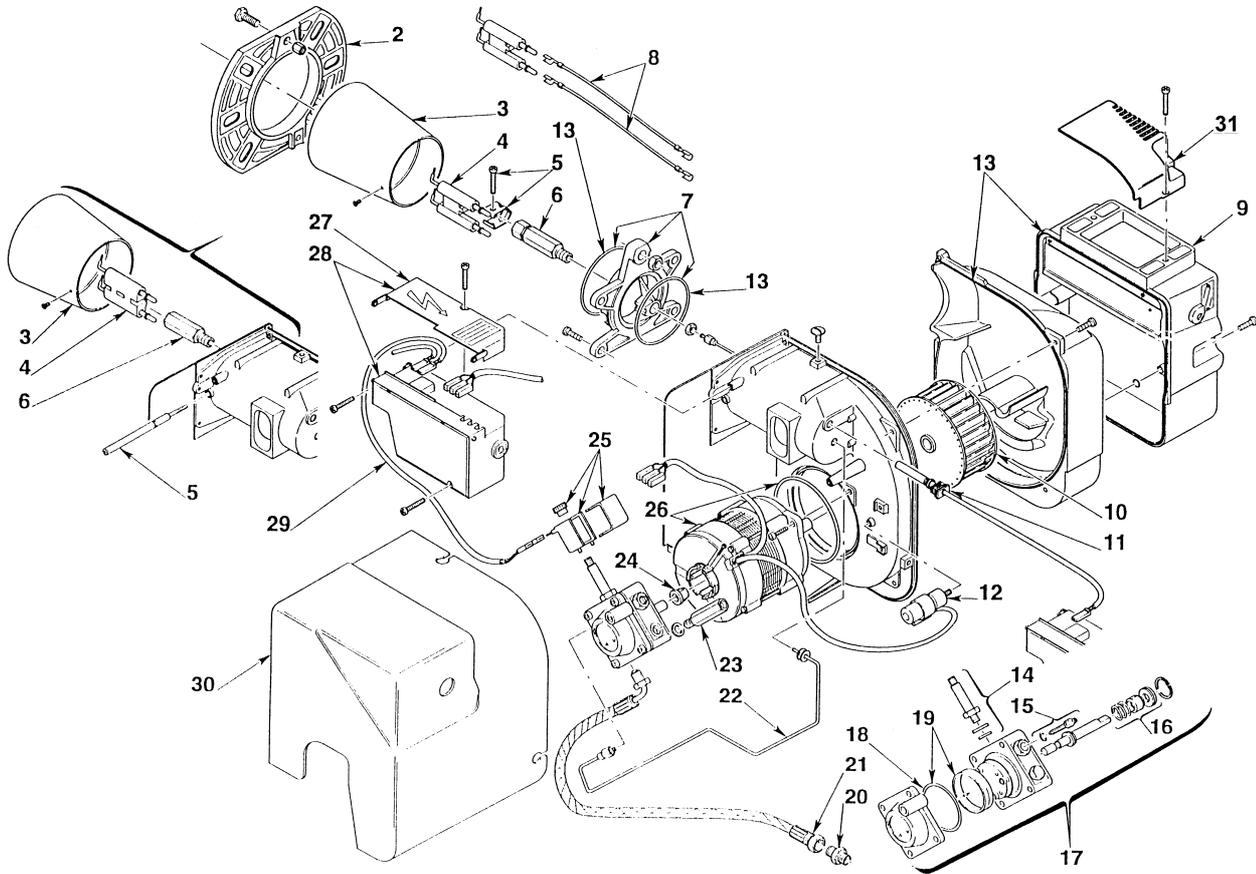


T5 - 36/46



12 - BURNER SPARE PARTS

11.1 Riello RDB burner - exploded view



Burner head identification

Key No.	Description	Riello Part No.	Grant Part No.	Key No.	Description	Riello Part No.	Grant Part No.
1	Not applicable	-	-	14	Needle valve	3007582	RBS109
2	Flange	3005786	RBS28	15	Regulator	3008651	RBS120
3	Combustion head T1 - 15 & 20 kW	3002507	RBS146	16	Pump seal	3000439	RBS14
3	Combustion head T2 - 15/26	3002423	RBS147	17	Pump	3008654	RBS101
3	Combustion head T3 - 26/36	3002447	RBS144	18	'O' ring	3007162	RBS08
3	Combustion head T5 - 36/46	3002533	RBS150	19	Filter - 'O' ring	3008653	RBS122
4	Electrode assembly	3007513	RBS108	20	Connector	3003602	RBS35
5	Electrode bracket	3006552	RBS29	21	Flexible pipe	3007672	RBS36
6	Nozzle holder	3008642	RBS111	22	Tube	3008644	RBS113
7	Collar	3008643	RBS112	23	Pressure gauge connector	3008876	RBS138
8	High voltage lead	3008794	RBS129	24	Drive coupling	3000443	RBS16
9	Air damper assembly	3008647	RBS116	25	Solenoid	3008648	RBS117
10	Fan - 15/26	3005708	RBS39	26	Motor RBS102	3002836	RBS102
10	Fan - 26/36, 36/46	3005788	RBS151	27	Cover	3008649	RBS118
11	Photocell	3008646	RBS115	28	Control box assembly	3008652	RBS103
12	Capacitor 4.5 µF	3002837	RBS149	29	Solenoid lead	3008851	RBS139
13	Seal kit	3008878	RBS140	30	Cover	3008879	RBS141
				31	Air intake cover		RBS142



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:

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.

Sealants

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.

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.

14 - EC DECLARATION OF CONFORMITY

We declare that the Grant Vortex range of Oil Boilers equipped with Riello RDB burners approved to EN 267: 1991 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)

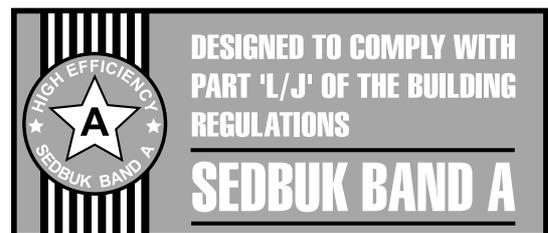
SEDBUK Rating:-

Vortex 15/26	94 - 95%
Vortex 26/36	97%
Vortex 36/46	92.62%

Complies with the EC Low voltage, Electromagnetic compatibility and Boiler efficiency Directives



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



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

All goods sold are subject to our official Conditions of Sale, a copy of which may be obtained on application.

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