



Part No. DOC 58 Rev. 01 March 2006

USER, INSTALLATION  
and  
SERVICING INSTRUCTIONS

# **Outdoor Combi 90 V3, Combi Max and Outdoor Vortex Combi 26 and 36**

For use with Kerosene or Gas Oil (Vortex Combi Kerosene only)



Outdoor Vortex Combi shown

**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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## ***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.

## ***COMMISSIONING REPORT***

Date: .....

Commissioning engineer: ..... Tel. No: .....

Boiler model/output: ..... Btu/h Fuel type: Kerosene or Gas oil

Nozzle size: ..... Pump pressure: ..... Air setting: .....

Flue gas % CO<sub>2</sub>: ..... Net flue gas temp: ..... Smoke No: .....

## 1.1 About your Combi 90 V3 or Combi Max

Your Grant Combi boiler is fully automatic when the boiler On/Off switch is set to ON, and will provide domestic hot water at mains pressure on demand and central heating when the boiler and heating system controls call for it.

Your installer may have fitted either:-

- a) A simple timer - either 7-day or 24-hour timer, to control the central heating operation of the boiler only, or
- b) A Grant programmable room thermostat (ref. RSKIT), to control the central heating operation of the boiler only, or
- c) A Grant 24-hour mini programmer (ref. TCRKIT) - to control the central heating On/Off times AND allow the hot water to be switched off when required.

Whichever type of time control is used, it will allow you to set the operating times of the central heating. Domestic hot water will be available continuously, irrespective of the central heating settings, UNLESS the hot water is set to OFF on the programmer (if fitted).

## 1.2 Boiler controls (see Fig. A)

To access the Outdoor Combi controls, remove the front panel by turning the handle at the bottom and pull it forward at the bottom.

- 1 **Boiler On/Off switch** - This switches the boiler on and off.

**Note:** The boiler will not supply central heating OR domestic hot water if this switch is set to OFF, but the built in frost thermostat will still operate - provided that the electrical supply to the boiler is still switched on.

- 2 **Burner and Pump switches** - These switches isolate the burner and pump respectively and are intended for the service engineer to use.

They should NOT be switched off during normal use of the boiler.

- 3 **Test switch** - This is also for the Service engineer to use and should be left set to OFF.

- 4 **Boiler thermostat** - This control allows adjustment of the temperature of the water leaving the boiler to heat either the radiators or the hot water, via the hot water heat exchanger.

The boiler thermostat has an operating range of 75°C to 85°C. **For optimum hot water operation, ensure this is set to maximum.**

## 1.3 Useful tips

**To ensure that the hot water performance is not reduced first thing in the morning, or in the evening if the heating is off through the day, set the heating timer/programmer to switch the heating on at least 30 minutes before hot water will normally be required in the morning (or evening).**

If a timer/programmer has been fitted, it is useful to remember when setting the times for the 'on' periods that it might take up to an hour for the house to become warm, especially in colder weather. Also the effect of the central heating will remain for a time when the central heating is turned off.

## 1.4 About your fuel

The boiler will operate on either Class C2 Kerosene or Class D Gas Oil to BS 2869:1998. Your Installer will have informed you of the type of fuel your boiler has been set to use and he will have marked this on the boiler data label. You should always quote the type of fuel you require when ordering from your supplier.

**Note:** Low level flue installations (flue terminal directly from the Outdoor module case) **must only be used with Kerosene.**

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 - OUTDOOR VORTEX COMBI USER INSTRUCTIONS

### 2.1 About your Outdoor Vortex Combi

Your Grant Vortex Combi boiler is fully automatic once switched on, and will provide domestic hot water at mains pressure on demand and central heating when the boiler and heating system controls call for it. The boiler On/Off switch incorporates a 'mains on' neon, see Fig. B, which lights when the boiler is switched on, but does not necessarily indicate the burner is firing.

Your installer may have fitted either:-

- a) A simple timer - either 7-day or 24-hour timer, to control the central heating operation of the boiler only, or
- b) A Grant programmable room thermostat (ref. RSKIT), to control the central heating operation of the boiler only, or
- c) A Grant 2-channel programmer to control the central heating On/Off times AND allow the hot water to be switched off when required.

Whichever type of time control is used, it will allow you to set the operating times of the central heating. Domestic hot water will be available continuously, irrespective of the central heating settings, UNLESS the hot water is set to OFF on the programmer (if fitted).

### 2.2 Boiler controls (see Fig. B)

**To access the Outdoor module controls, remove the front panel by turning the handle at the bottom and pull it forward at the bottom.**

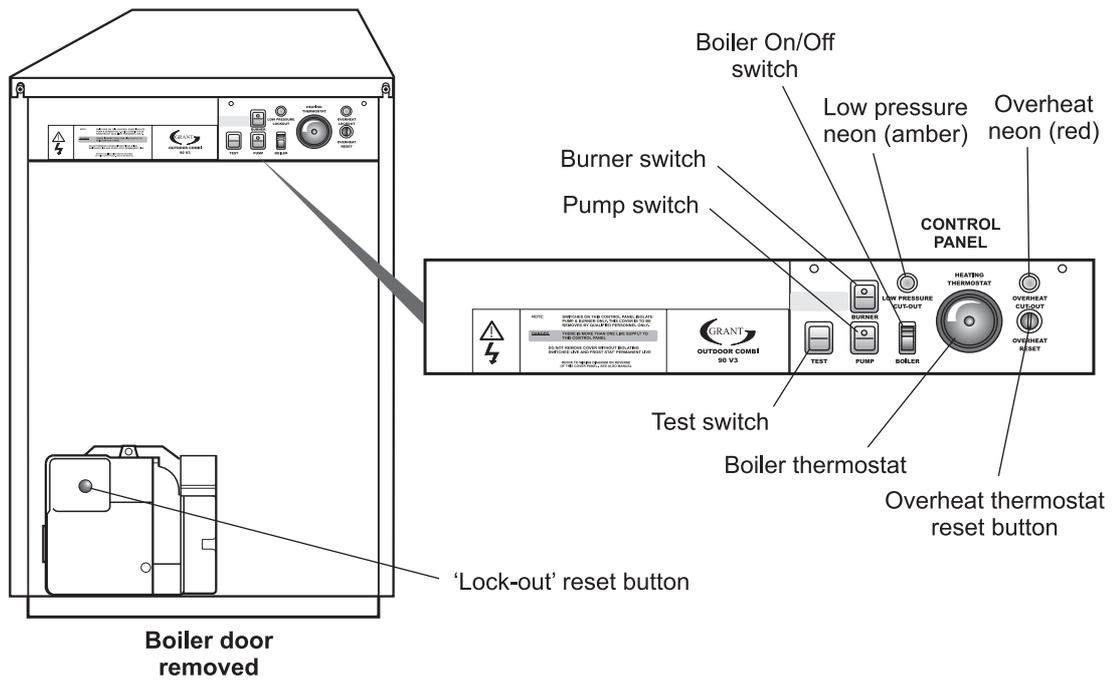
- 1 **On/Off switch** - This switches the boiler on and off.  
**Note:** The boiler will not supply central heating OR domestic hot water if this switch is set to OFF, but the built in frost thermostat will still operate - provided that the electrical supply to the boiler is still switched on.
- 2 **Test switch** - This is for the Service engineer to use and should be left set to OFF.
- 3 **Boiler heating thermostat** - Controls the temperature of the water leaving the boiler to the central heating system. Operation of this control does not affect the temperature of the hot water flowing to the taps.

### 2.3 About your fuel

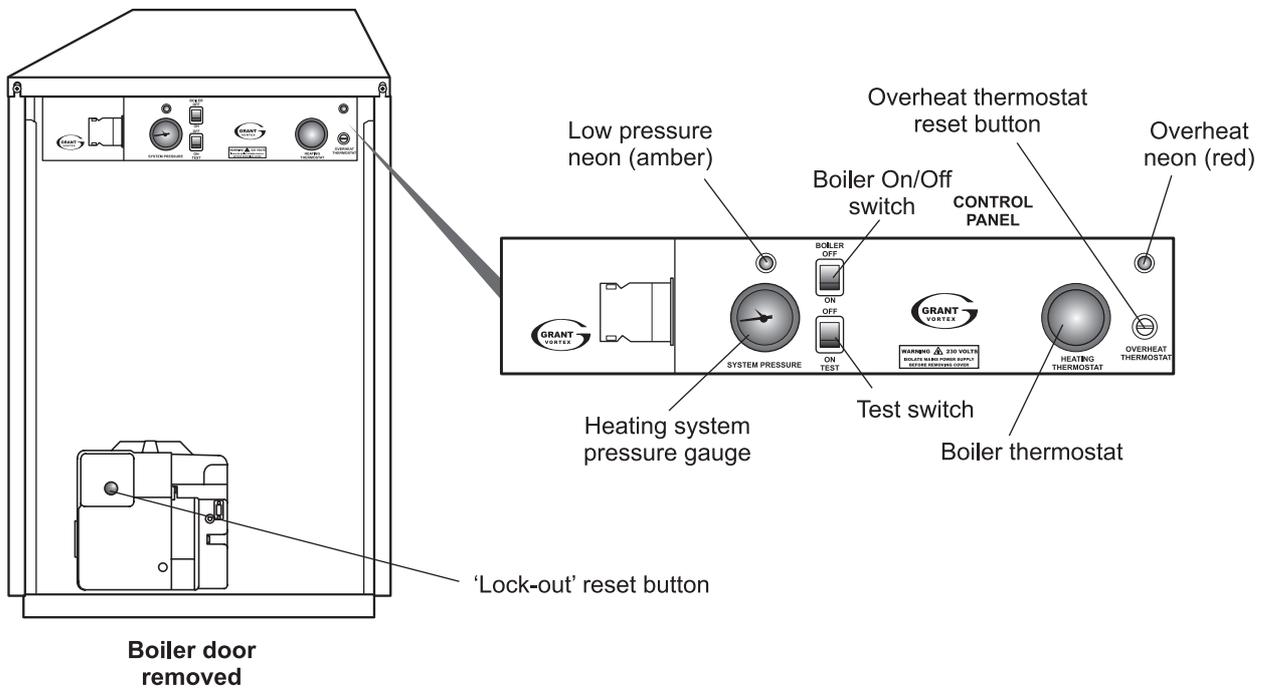
Grant Vortex Combi boilers only operate on Class C2 Kerosene to BS 2869:1998.

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.



**Fig. A - Boiler controls (Outdoor Combi 90 V3 and Combi MAX)**



**Fig. B - Boiler controls (Outdoor Vortex Combi)**

#### 3.1 Lighting your boiler (see Fig. A or B)

- 1 **Ensure that** - There is sufficient fuel 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 white pointer on the pressure gauge is not below the red pointer, the room thermostat (if fitted) is at the desired setting and the timer/programmer (if fitted) is correctly set.
- 2 Switch on the electricity supply to the boiler.
- 3 Set the On/Off switch to ON.
- 4 The boiler will light automatically to heat the water stored in the boiler.  
If the timer/programmer is set to an 'on' period the boiler will continue to run to provide central heating. If a hot tap is opened the boiler will supply hot water.

#### 3.2 Turning off your boiler (see Fig. A or B)

**For short periods** - Set the On/Off switch to OFF.

To restart, simply set the switch to ON.

**For long periods:** Set the 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. To restart, refer to the full lighting instructions above.

**Note:** The built in frost thermostat will **not** operate the boiler if the electricity supply to the boiler is switched off.

#### 3.3 Points to check if burner fails to light

- 1 Check that the boiler On/Off switch is set to ON.
- 2 Check that the timer/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 Ensure that a fuse has not blown or that the electricity supply has not failed.
- 6 Check to see if the overheat thermostat has operated (see note 4 in Section 3.6).
- 7 Check that the white pointer on the pressure gauge is not below the red pointer.

- 8 If the heating system water pressure falls below 0.2 bar the boiler low pressure cut-out switch will activate and an amber neon on the control panel (see Fig. A or B) will light. The system must be recharged to between 0.5 and 1 bar. If the heating system loses pressure on a regular basis then contact your Installer to investigate the cause.  
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.

#### 3.4 Domestic hot water system

The boiler will supply domestic hot water whenever a hot tap is opened, providing the Boiler On/Off switch is set to ON, and the hot water switch of the programmer (if fitted) is also set to ON.

The flow of water from the taps (hot or cold) depends upon the mains water pressure, and in some homes it may not be possible to use more than one tap at the same time.

#### 3.5 Sealed central heating system

The boiler operates on a sealed central heating system which will have been pressurised by your Installer. He will have set the red pointer on the pressure gauge (see Fig. A or B), to indicate the system pressure (when cold) usually between 0.5 and 1.0 bar. **Do not** adjust this pointer. The white pointer indicates the actual system pressure which will increase slightly when the boiler is operating. If the white pointer falls below the red pointer (when the boiler is switched off and cold), you should contact your Service Engineer to re-pressurise the system. If the system requires frequent re-pressurising, ask your Service Engineer to check the heating system for leaks.

If the heating system water pressure falls below 0.2 bar the boiler low pressure cut-out switch will activate and an amber neon on the control panel (see Fig. A or B) will light. The system must be recharged to between 0.5 and 1 bar. If the heating system loses pressure on a regular basis then contact your Installer to investigate the cause.

The boiler is fitted with an automatic air vent which removes air trapped in the boiler. Any air trapped in the radiators needs removing by venting the radiators using the vent screw at the top of the radiators. 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.

**Note:** Your sealed system may incorporate a 'Top-Up' vessel, advice on how to use it should be obtained from your Installer.

The boiler 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.

**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 overfill.**
- 2 Ensure the flexible filling loop 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 the required pressure between 0.5 and 1.0 bar. Close the fill point valve.
- 9 Close the valves either side of the filling loop and disconnect the loop.

The temperature of the water leaving the boiler to the radiators can be increased by turning the boiler thermostat (see Fig. A or B) clockwise.

The boiler will provide central heating whenever the timer/ programmer (if fitted) is in an 'on' period and the room thermostat (if fitted) is calling for heat.

#### 3.6 General notes and care of your system

- 1 **Boiler controls** - Refer to Section 1.2 or 2.2.
- 2 **Pressure switch** - If the heating system water pressure falls below 0.2 bar the boiler low pressure cut-out switch will activate and an amber neon on the control panel (see Fig. A or B), will light. The system must be recharged to between 0.5 and 1 bar. If the heating system loses pressure on a regular basis then contact your Installer to investigate the cause.
- 3 **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 (see Fig. A or B), will light. Usually such malfunctions are short lived and pressing the reset button will restore normal operation.  
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.

- 4 **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. A red neon on the control panel (see Fig. A or B), will light indicating the thermostat has operated.

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 or B), press the button then replace the cap.

**Note:** You may have to wait for the boiler to cool down before the button will reset. If this condition continually repeats, contact your Service engineer.

- 5 **Flue terminal** - The boiler flue terminal **must not** be obstructed or damaged.  
In severe conditions check that the terminal does not become blocked by snow.
- 6 **Failure of electricity supply** - If the electricity supply fails, the boiler will not operate. It should relight automatically when the supply is restored.  
**Note:** The timer/programmer may need to be reset after a power failure.

#### 3.7 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.**

## 4 - BOILER TECHNICAL INFORMATION

### 4.1 Boiler technical data - Outdoor Combi 90 V3 and Outdoor Combi Max boilers

Model		Combi 90 V3	Combi Max
Boiler water content	litre	40	40
	gal	8.8	8.8
* Weight (dry)	kg	158	159
	lb	348	350
Max. heat input (Kerosene)	kW	27.6	36.8
	Btu/h	94 200	125 500
Connections:	Heating flow and return	22 mm copper pipe	
	Cold water mains inlet	15 mm copper pipe	
	Domestic hot water outlet	15 mm copper pipe **	
	Pressure relief valve discharge	15 mm copper pipe	
Waterside resistance Flow/Return temp. diff. of 10°C		26.5 mbar	
Waterside resistance Flow/Return temp. diff. of 20°C		9.5 mbar	
Boiler thermostat range		75 to 85°C	
Limit (safety) thermostat switch off temp.		111°C ± 3°C	
Maximum heating system pressure (cold)		1.0 bar	
Minimum heating system pressure (cold)		0.5 bar	
Pressure relief valve		2.5 bar	
Expansion vessel		12 litres (pre-charged at 1.0 bar)	
Maximum heating system volume ***		128 litres	
Maximum operating pressure		2.5 bar	
Minimum domestic hot water flow rate		3.0 litres/min (0.66 gal/min)	
Maximum domestic hot water temperature		65°C (factory set)	
Maximum mains water inlet pressure		8.0 bar	
Minimum recommended mains water inlet pressure		2.5 bar	
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		2.60 Amp	
Running current		0.85 Amp	
Oil connection		¼" BSP Male (on end of flexible fuel line)	

\* Weight includes burner but excludes flue

\*\* 22 mm hot water pipe can be connected to the Combi Max if required.

\*\*\* Based on expansion vessel charge and initial cold system pressure of 0.5 bar.

## 4 - BOILER TECHNICAL INFORMATION

### 4.2 Boiler technical data - Outdoor Vortex Combi boilers

Model		Vortex Combi 26	Vortex Combi 36
Boiler water content (including 32.5 litre primary store)	litre	48.5	53.5
	gal	10.7	11.8
* Weight (dry)	kg	188	218
	lb	415	481
Max. heat input (Kerosene)	kW	26	36
	Btu/h	88 700	123 000
Connections: Heating flow and return - copper		22 mm	28 mm
Cold water mains inlet - copper		15 mm	22 mm
Domestic hot water outlet - copper		15 mm	22 mm
Pressure relief valve discharge		15 mm copper pipe	
Condensate connection		22 mm plastic pipe	
Waterside resistance Flow/Return temp. diff. of 10°C		28.5 mbar	26.0 mbar
Waterside resistance Flow/Return temp. diff. of 20°C		10.0 mbar	9.5 mbar
Boiler thermostat range		65 to 80°C	
Limit (safety) thermostat switch off temp.		111°C +0 -3°C	
Maximum heating system pressure (cold)		1.0 bar	
Minimum heating system pressure (cold)		0.5 bar	
Pressure relief valve		2.5 bar	
Expansion vessel (pre-charged at 1 bar)		12 litres	14 litres
Maximum heating system volume**		128 litres	148 litres
Maximum operating pressure		2.5 bar	
Minimum domestic hot water flow rate		3.0 litres/min (0.66 gal/min)	
Maximum domestic hot water temperature		65°C (factory set)	
Maximum mains water inlet pressure		8.0 bar	
Minimum recommended mains water inlet pressure		2.5 bar	
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		2.60 Amp	
Running current		0.85 Amp	
Oil connection		¼" BSP Male (on end of flexible fuel line)	

\* Weight includes burner but excludes flue

\*\* Based on expansion vessel charge and initial cold system pressure of 0.5 bar

## 4 - BOILER TECHNICAL INFORMATION

### 4.3 Outdoor Combi 90 V3 & Outdoor Combi MAX Boilers using Class C2 kerosene

**Note:** Boilers are despatched for use with kerosene.

#### Combi 90 V3 (Riello RDB1 burner)

Heat Output		Net Heat Input		Net eff. *	Head type	Nozzle size	Oil press. (bar)	Smoke No.	Fuel flow rate (kg/h)	Net flue gas temp. (°C)	Flue gas mass flow rate (kg/h)	CO <sub>2</sub> (%)
(kW)	(Btu/h)	(kW)	(Btu/h)									
26.4	90 000	28.5	97 402	92.4	LD3	0.75/60°EH	9.5	0 - 1	2.40	180	38.7	12.0

#### Combi MAX (Riello RDB2.2 burner)

Heat Output		Net Heat Input		Net eff. *	Head type	Nozzle size	Oil press. (bar)	Smoke No.	Fuel flow rate (kg/h)	Net flue gas temp. (°C)	Flue gas mass flow rate (kg/h)	CO <sub>2</sub> (%)
(kW)	(Btu/h)	(kW)	(Btu/h)									
33.3	113 600	36.8	125 500	90.5	T5	1.00/80°EH	9.0	0 - 1	3.10	190	51.5	12.0

### 4.4 Outdoor Combi 90 V3 & Outdoor Combi MAX Boilers using Class D gas oil - High level flue only

#### Combi 90 V3 (Riello RDB1 burner)

Heat Output		Net Heat Input		Net eff. *	Head type	Nozzle size	Oil press. (bar)	Smoke No.	Fuel flow rate (kg/h)	Net flue gas temp. (°C)	Flue gas mass flow rate (kg/h)	CO <sub>2</sub> (%)
(kW)	(Btu/h)	(kW)	(Btu/h)									
26.4	90 000	28.5	97 402	92.4	LD3	0.60/60°S	12.0	0 - 1	1.97	200	38.7	12.0

#### Combi MAX (Riello RDB2.2 burner)

Heat Output		Net Heat Input		Net eff. *	Head type	Nozzle size	Oil press. (bar)	Smoke No.	Fuel flow rate (kg/h)	Net flue gas temp. (°C)	Flue gas mass flow rate (kg/h)	CO <sub>2</sub> (%)
(kW)	(Btu/h)	(kW)	(Btu/h)									
32.9	112 463	36.0	122 910	90.5	T5	0.75/80°S	11.0	0 - 1	3.02	200	51.5	12.0

#### Notes:

- 1 The data given above is approximate only.
- 2 The above settings may have to be adjusted on site for the correct operation of the burner.
- 3 Gas Oil is **not** suitable for use with the low level discharge of the Outdoor modules.
- 4 Net flue gas temperatures given are ± 10%.
- 5 \* Net thermal efficiency (BSRIA).
- 6 Flue gas temperatures taken at combustion door test point will be approximately 25°C higher.

### 4.5 Approximate air damper settings

**Note:** The burner is supplied factory set at the output given in Section 4.3.

When commissioning, or when the type of fuel is changed, the air damper **must** be adjusted to obtain the correct CO<sub>2</sub> level and the installer must amend the data label.

## 4 - BOILER TECHNICAL INFORMATION

### 4.6 Outdoor Vortex Combi Boilers using Class C2 kerosene

**Note:** Vortex Combi boilers are only for use with kerosene.

Model	Burner type	Heat Output		Net eff * (%)	Nozzle	Oil press. (bar)	Smoke No.	Burner head	Fuel flow rate (kg/h)	Flue gas temp. (°C)	CO <sub>2</sub> (%)
		(kW)	(Btu/h)								
26	Riello RDB1	26.0	88 700	101.0	0.75/80°EH	8.0	0 - 1	T2	2.16	78	12.0
36	Riello RDB2.2	36.0	123 000	101.5	1.00/80°EH	9.1	0 - 1	T5	3.01	78	12.0

**Notes:**

- 1 The data given above is approximate only and is based on the boiler being used with a low level balanced flue.
- 2 The above settings may have to be adjusted on site for the correct operation of the burner.
- 3 **Gas Oil is not suitable for use with a Vortex Combi boiler.**
- 4 \* Net thermal efficiency.
- 5 The net flue gas temperatures given above are  $\pm 10\%$ .
- 6 When commissioning the air damper **must** be adjusted to obtain the correct CO<sub>2</sub> level.
- 7 The combustion door test point may be used for CO<sub>2</sub> and smoke readings only. Do not use this test point for temperature or efficiency readings.

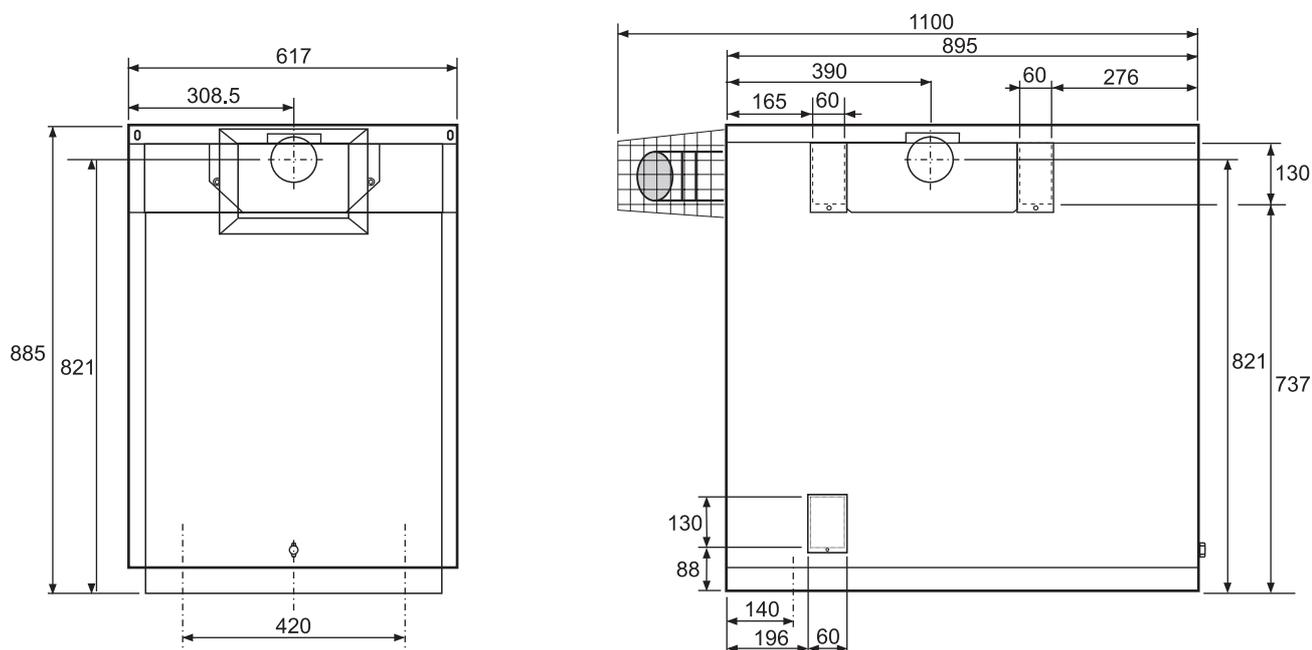
**Flue gas analysis**

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:

1. The test point is for CO<sub>2</sub> and smoke readings only.
2. The temperature and efficiency readings must be taken from the flue terminal.

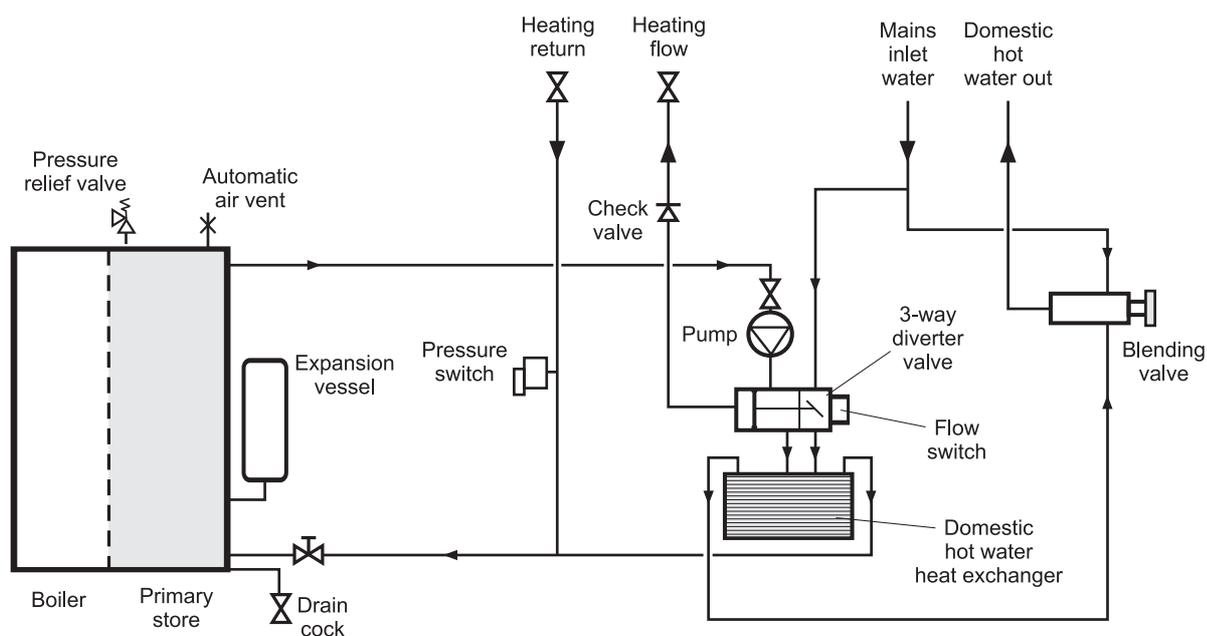
## 4 - BOILER TECHNICAL INFORMATION

### 4.7 Boiler dimensions - Outdoor Combi 90 V3 and Combi Max



**Fig. 1**

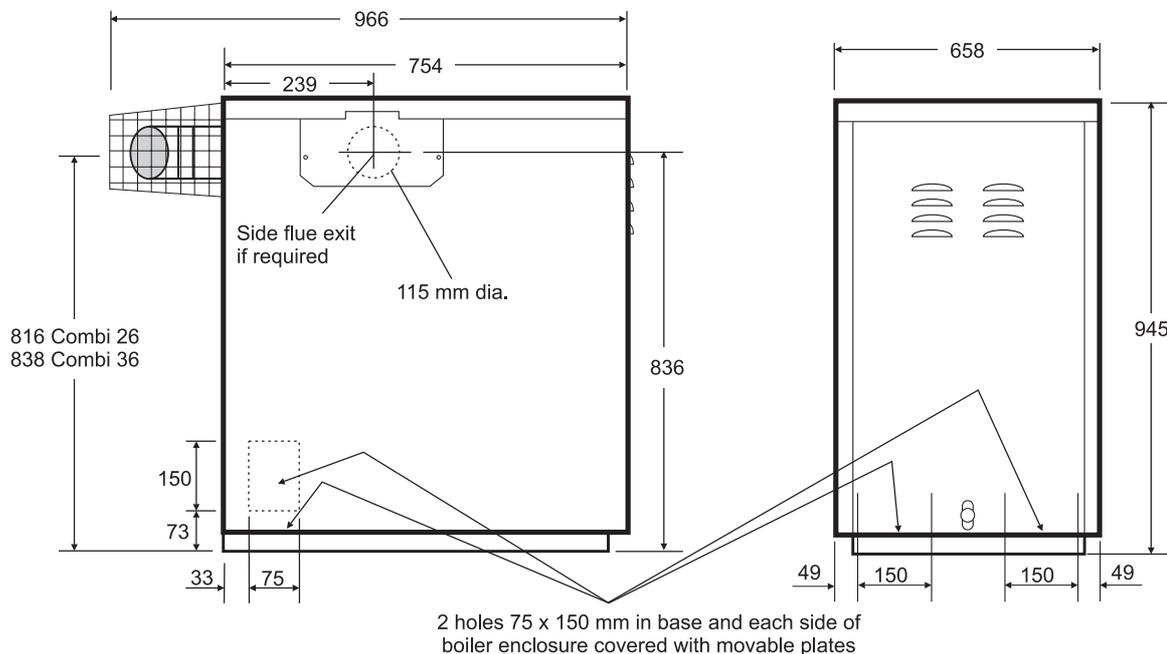
### 4.8 Water schematic of boiler - Outdoor Combi 90 V3 and Outdoor Combi Max



**Fig. 2**

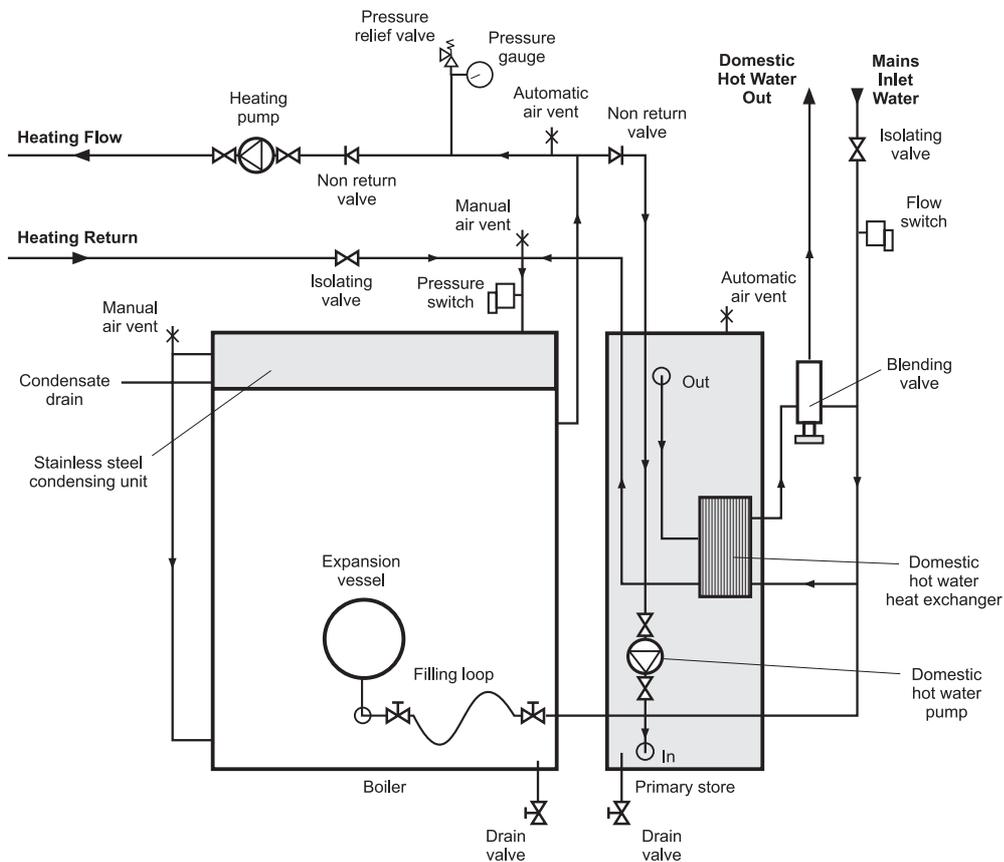
## 4 - BOILER TECHNICAL INFORMATION

### 4.9 Boiler dimensions - Outdoor Vortex Combi



**Fig. 3**

### 4.10 Water schematic of boiler - Outdoor Vortex Combi



**Fig. 4**

### 5.1 Boiler description

The Grant Outdoor Combination boilers are automatic pressure jet oil appliances designed for use with a sealed central heating system and to provide domestic hot water at mains pressure.

All boilers are supplied with the control panel and burner factory fitted and set for use on Class C2 kerosene.

**Note:** As Class D gas oil should not be used unless the flue terminal concerned is more than 2 metres above ground level, only kerosene can be used with the low-level discharge flue system factory fitted to all Grant Outdoor Combi boilers.

Where required, a twin-wall stainless steel high-level flue system (Green system) is available from Grant Engineering (UK) Limited. Refer to Section 6.3 for details.

If a high-level flue system is used, the Outdoor Combi 90 V3 and Combi Max models can be adapted for use on Class D gas oil. Refer to the technical information in Section 4.4 for gas oil burner settings.

**Vortex Combi boilers are only suitable for use with Class C2 kerosene.**

**IMPORTANT:** If the boiler is to be used on gas oil, it must not be operated on that fuel until the burner nozzle and pump pressure have been changed to suit.

To change the nozzle, remove the burner from the boiler and then remove the nozzle as described in Section 10.4. The installer/commissioning engineer must amend the information on the boiler data label accordingly.

**All burners** are ready to be connected to a single pipe system with a loose flexible fuel line (600 mm) and  $\frac{3}{8}$ " to  $\frac{1}{4}$ " BSP male adaptor supplied with the boiler. If required, an additional flexible fuel line (600 mm) and  $\frac{3}{8}$ " to  $\frac{1}{4}$ " BSP male adaptor are available to purchase from Grant Engineering (UK) Limited, for two-pipe oil supply systems, Part No. RBS104.

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

The temperature of the primary water leaving the boiler to heat the radiators may be adjusted using the boiler thermostat.

The temperature of the domestic hot water leaving the boiler is controlled by a thermostatic mixing valve, located in the rear compartment of the boiler on the Outdoor Combi 90 V3 and Combi Max, and in the front burner compartment on the Outdoor Vortex Combi 26 and 36 boilers. Refer to Section 5.13 for boiler operating details.

To achieve the optimum hot water performance from the Outdoor Combi 90 V3 and Combi Max, the boiler thermostat should be set to maximum.

The setting of the boiler thermostat on the Outdoor Vortex Combi boilers has no effect on the domestic hot water temperature.

A remotely located timer and room thermostat, or alternatively a programmable room thermostat, can be connected to the boiler to allow the User to set the central heating operating times and temperature.

A programmable room thermostat - Part No. RSKIT - is available to purchase from Grant Engineering (UK) Limited. Refer to Section 12 for electrical connection details.

Alternatively a remote programmer, located in a convenient position for the User, can be connected to the boiler to control the operating times of both the central heating and domestic hot water.

The Grant TCR programmer - Part No. TCRKIT - available to purchase from Grant Engineering (UK) Limited, is suitable for use with the Outdoor Combi 90 V3 and Combi Max boilers. Refer to Section 12 for electrical connection details.

For the Outdoor Vortex Combi 26 and 36 boilers a Grant two-channel heating/hot water programmer, available to purchase from Grant Engineering (UK) Limited, can be used. Refer to Section 12 for electrical connection details.

### 5.2 Delivery

The Grant Outdoor Combi boilers are supplied in one pack with the burner and control panel factory fitted.

The low level discharge flue terminal and terminal guard are supplied loose inside the boiler enclosure, as is the wall flashing strip, for fitting on site.

### 5.3 Regulations to comply with

Installation of a Grant Combi 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 15 on page 58.

**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.**

### 5.4 Fuel supply

#### 5.4.1 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.

#### 5.4.2 Fuel pipes

- 1 Fuel supply pipes should be of copper tubing, of a suitable internal diameter. Galvanised pipe must not be used.
- 2 Flexible pipes must not be used outside the boiler case.
- 3 A remote sensing fire valve must be installed in the fuel supply line. Recommendations are given in BS 5410:1:1997.
- 4 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.
- 5 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 (600 mm) and  $\frac{3}{8}$ " to  $\frac{1}{4}$ " BSP male adaptor are available from Grant Engineering (UK) Limited (Part No. RBS104).

## 5 - GENERAL BOILER INFORMATION

- The flexible fuel lines supplied should be inspected annually when the boiler is serviced and replaced at least every two years.

### 5.4.3 Single pipe system - (See Fig. 5)

- 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.

### 5.4.4 Two pipe system - (See Fig. 6)

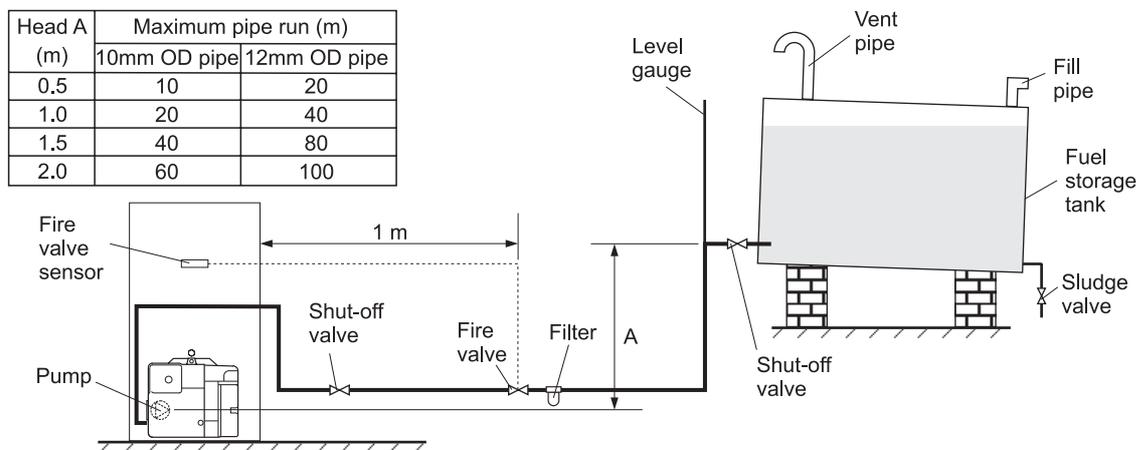
- When the storage tank outlet is below the burner, the two pipe system should be used. The pipe runs should be as shown in Fig. 5. The return pipe should be at the same level in the tank as the supply pipe, both being 75 to 100 mm above the base of the tank. The pipe ends should be a sufficient distance apart so as to prevent any sediment disturbed by the return entering the supply pipe.

- Avoid the bottom of the tank being more than 3 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.

4 To be used with a two-pipe system, the burner **must** be fitted with an additional flexible fuel line (a flexible fuel line (600 mm) and  $\frac{3}{8}$ " to  $\frac{1}{4}$ " BSP male adaptor are available to purchase from Grant Engineering (UK) Limited - Part No. RBS104). See Section 5.4.6.

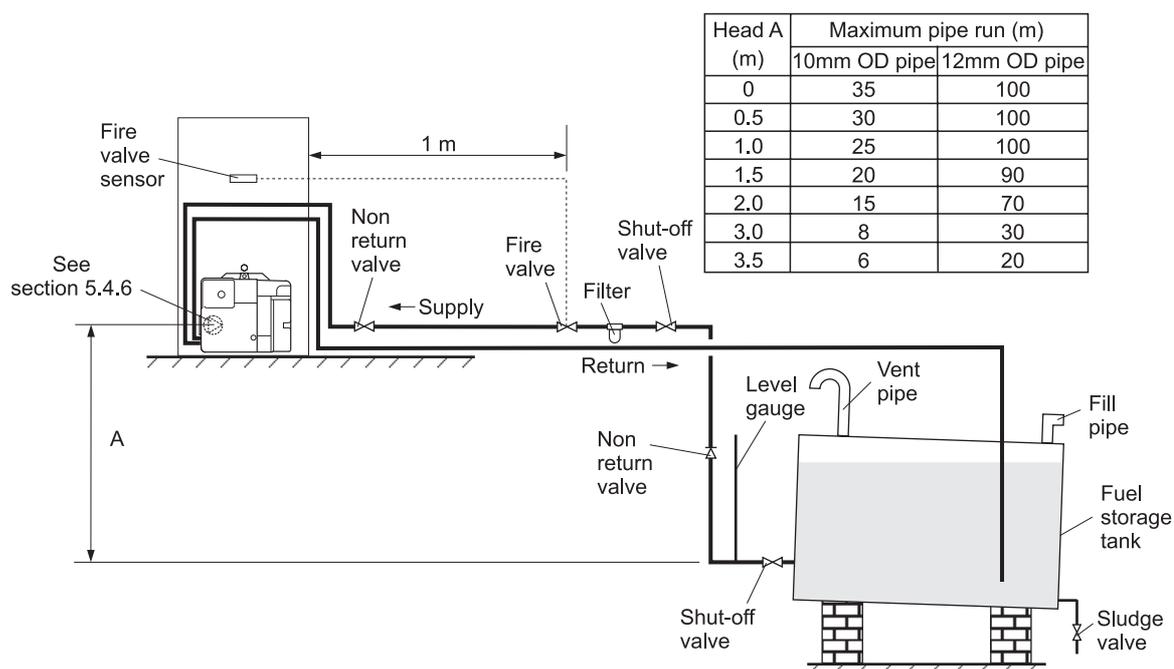
- The pump vacuum should not exceed 0.4 bar. Beyond this limit gas is released from the oil. A vacuum gauge must be fitted to the fuel pump to check the vacuum reading.

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](http://www.oftec.org.uk)



**Fig. 5 - Single pipe system**

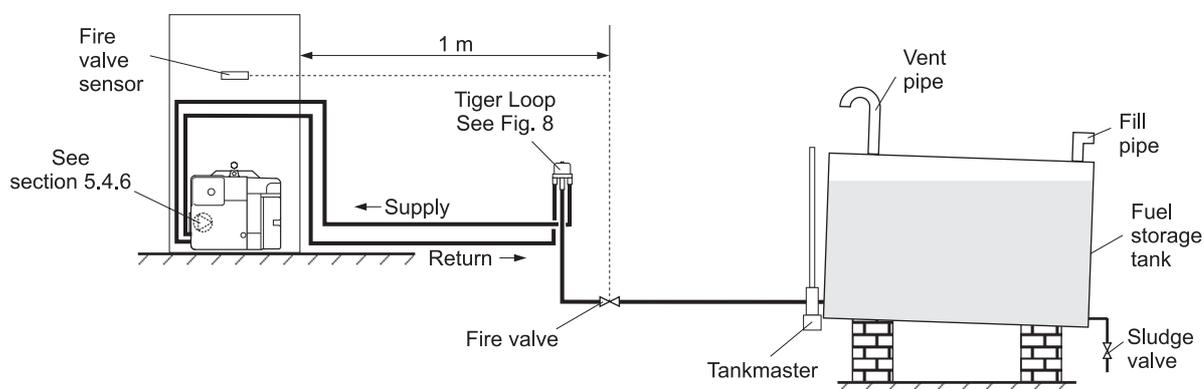
## 5 - GENERAL BOILER INFORMATION



**Fig. 6 - Two pipe system**

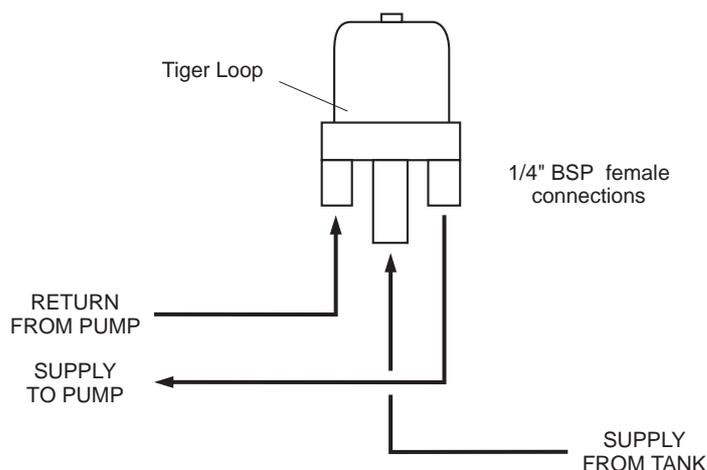
### 5.4.5 Tiger Loop system - (See Figs. 7 and 8)

- 1 When the storage tank is below the burner, an alternative to a two pipe system can be achieved using the Tiger Loop 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. 7. 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 (a flexible fuel line (600 mm) and  $\frac{3}{8}$ " to  $\frac{1}{4}$ " BSP male adaptor are available to purchase from Grant Engineering (UK) Limited - Part No. RBS104). See Section 5.3.6.



**Fig. 7 - Tiger loop system**

## 5 - GENERAL BOILER INFORMATION

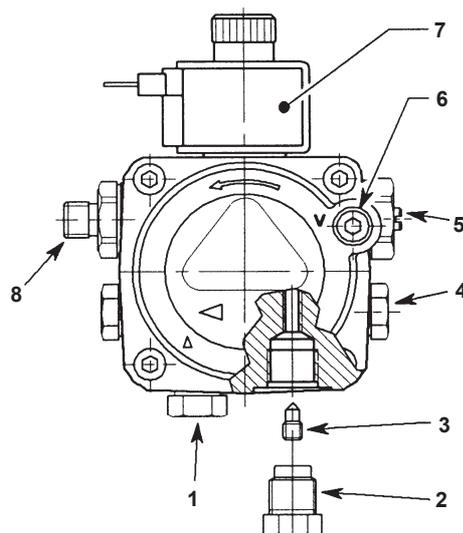


**Fig. 8 - Tiger loop**

### 5.4.6 Two pipe oil supplies

See Fig. 9

- 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. 9) 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  $\frac{3}{8}$ " to  $\frac{1}{4}$ " BSP adaptor to the flexible fuel line.
- 7 Flexible fuel lines and adaptors are available to purchase from Grant Engineering (UK) Limited.
- 8 The burner cover may be left off until the boiler is commissioned.



**Fig. 9 - RDB pump**

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

## 5 - GENERAL BOILER INFORMATION

### 5.4 Electricity supply

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

#### The boiler must be earthed.

- 2 The supply must be fused at 5 Amp and there must only be one common isolator for the boiler and control system, and it must provide 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 mm<sup>2</sup> 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.

### 5.5 Frost protection

- 1 Grant Outdoor Combi boilers are supplied with a factory fitted frost protection thermostat. It is pre-wired to the boiler control system and factory set to 5°C. This thermostat is located **inside** the control panel of the Outdoor Combi 90 V3 and Combi Max boilers, and on the **back** of the control panel of the Vortex Combi 26 and 36 models.
- 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.

### 5.6 Underfloor heating systems

See Fig. 17

On underfloor systems it is essential that the return is pre-heated by mixing flow water into the return before it enters the boiler. To prevent internal corrosion of the boiler water jacket, the return water temperature must be maintained above 55°C for the Combi 90 V3 and Combi Max and 40°C for the Vortex Combi.

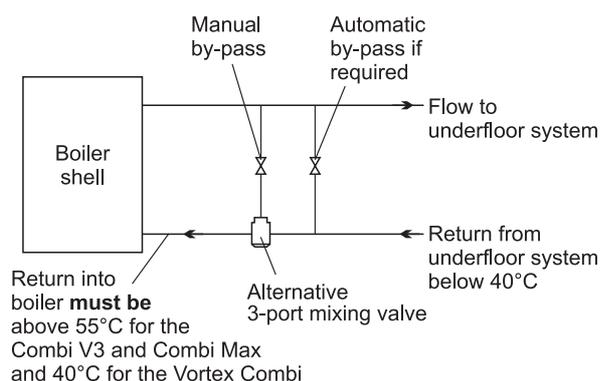


Fig. 10 - Underfloor system

### 5.7 Pipework materials

**General** - 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 1:1990) for the application concerned.

**IMPORTANT:** The first metre of pipework connected to both the heating flow and return connections of the boiler **must** be made in copper.

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. Pipe must be Class S to BS 7291: Part 1:1990.

The boiler is fitted with a low-pressure switch to shut off power to the boiler if the system pressure drops below 0.2 bar.

**Underfloor systems (see Section 5.6)** - 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 - GENERAL BOILER INFORMATION

### 5.8 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. 11, 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.

Distances measured to rim of terminal.

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

**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.

**Note:** \*75 mm with protection.

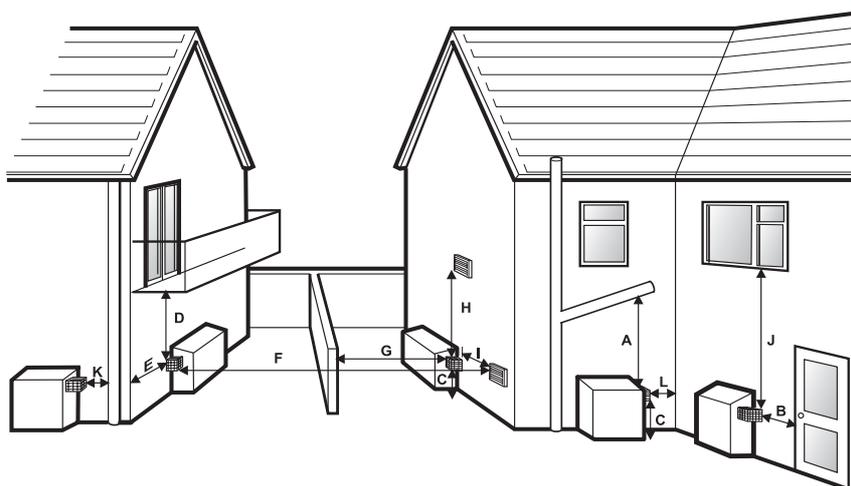


Fig. 11 - Flue terminal positions

Terminal position	Min. distance (mm)
A Below gutters (without 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
M From an oil storage tank (not shown)	1800

### 5.9 Domestic hot water system

1 A flow restrictor is factory fitted to all models except the Combi Max and Vortex Combi 36, to limit the flow rate to approximately 15 litres/min. The flow restrictor is located in the outlet side of the cold water inlet isolating valve.

2 The incoming mains water pressure should be between 1 and 8 bar to ensure efficient operation. If the pressure is above 8 bar a pressure reducing valve must be fitted.

The boiler may still operate down to a pressure of 1.0 bar but with a reduced flow rate. The minimum flow rate needed for the flow switch to operate is 3 litres/min.

3 To ensure economic use, the pipe runs between the boiler and hot taps should be as short as possible and in 15 mm copper pipe or 22 mm for the Combi Max and Vortex Combi 36 only. Where possible the pipework should be insulated to reduce heat loss.

4 All taps and mixing valves used in the domestic hot water system must be suitable for operating at a mains pressure of up to 8 bar.

5 If required, a shower may be fitted in the domestic hot water system. It is recommended that thermostatically controlled shower valves are used to protect against a flow of water at too high a temperature. If a fixed head type shower is used, no anti-syphonage devices are required. If a loose or flexible head type shower is used, it must be arranged so that the head cannot fall closer than 25 mm above the top of the bath, thereby preventing immersion in the bath water. If this is not practicable, an anti-syphonage device must be fitted at the point of the flexible hose connection.

6 The supply of hot and cold mains water direct to a bidet is allowed (subject to local Water Undertaking requirements) provided that the bidet is of the over-rim flushing type. The outlets should be shrouded and unable to have a temporary hand held spray attached. Arrangements for anti-syphonage are not necessary.

7 Before the mains water supply pipe is connected to the boiler, it should be thoroughly flushed out to avoid the danger of dirt or foreign matter entering the boiler.

8 The mains water connection to the boiler must be the first connection from the mains supply.

### 5.10 To use the water hardness kit

A water hardness kit is supplied with the boiler. This should be used to determine the water hardness as follows:

Fill a clean container with a sample of water from the mains cold water supply to the boiler.

Immerse the test strip in the water for approximately one second, ensuring that all the test zones on the strip are fully wetted.

**IMPORTANT:** Do not immerse the test strip in running water and avoid contact.

Shake off the surplus water and wait for one minute.

Assess the hardness of the water by the colouration of the test zones on the strip using the following chart.

Green areas	Violet areas	Hardness	Total hardness mg/l (ppm)
4	0	very soft	<50 mg/l calcium carbonate
3	1	soft	>70 mg/l calcium carbonate
2	2	medium	>125 mg/l calcium carbonate
1	3	hard	>250 mg/l calcium carbonate
0	4	very hard	>370 mg/l calcium carbonate

Note: (1 mg/l = 1 ppm (part per million))

Should the total hardness of the water exceed 125 ppm it is essential that an in-line scale inhibitor or, preferably, a water softener is fitted in the cold water supply to the boiler to reduce scale formation within the boiler. Failure to do so may invalidate both the manufacturers warranty and any extended warranty covering the appliance. Consult the local water undertaking if in any doubt about the hardness of the water or the use of a water softener.

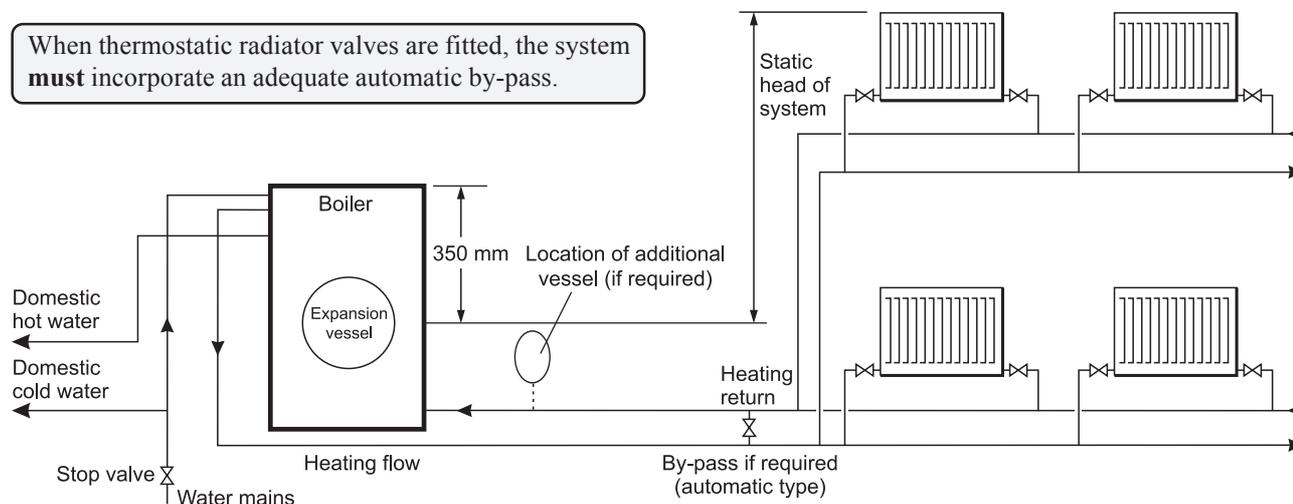
The water conditioner or softener should be fitted to the cold water supply serving the appliance and in accordance with the manufacturers instructions. Grant Engineering (UK) Limited cannot be held responsible for any damage or misuse caused by the fitting of any water conditioning device.

**Please protect the domestic hot water system from harmful effects of scale. Problems caused by the build-up of limescale are not covered under the terms of the warranty.**

### 5.11 Sealed central heating system

See Fig. 16

- 1 The boilers are only suitable for use with a sealed system complying with the requirements of BS 5449. The maximum temperature of the central heating water is 85°C for the Combi 90 V3 and Combi Max and 75°C for the Vortex Combi models.  
**Design notes** - when designing the system, the pump head, expansion vessel size, radiator mean temperature, etc. must all be taken into account.
- 2 The boilers are supplied with the following items factory fitted:-
  - a 12 litre diaphragm expansion vessel complying with BS 4814, pre-charged at 1.0 bar. A 14 litre vessel is fitted in the Vortex Combi 36 model.
  - b System pressure gauge, with an operating range of 1 to 4 bar.
  - c Pressure relief safety valve complying with BS 6759 and set to operate at 2.5 bar. The discharge pipe must be routed clear of the boiler to a drain, in such a manner that it can be seen, but cannot cause injury to persons or property.
  - d Automatic air vent, fitted to the top of the boiler, ensures the boiler is vented.
  - e Filling loop. This **must be** isolated and disconnected after filling the system.
- 3 Refer to Sections 4.1 or 4.2 for maximum heating system volume and BS 7074: for further guidance. If the system volume **exceeds** the maximum value given for the boiler, an additional vessel will be required. This should be connected to the system on the return. Refer to Fig. 12.  
Refer to Section 6.5 for further details of the expansion vessel.
- 4 The system design pressure (cold) should be between 0.5 and 1.0 bar. This pressure is equivalent to the maximum static head (see Fig. 16) in bar + 0.3 (1 bar = 10.2 metres of water).
- 5 When thermostatic radiator valves are fitted, a system by-pass must be fitted. The by-pass must be an automatic type.
- 6 Provision should be made to replace water lost from the system. This may be done manually (where allowed by the local Water Undertaking) using the filling loop arrangement supplied with the boiler.
- 7 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).
- 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 The expansion vessel is connected via a flexible hose to allow it to be moved to gain access to the cleaning cover. When replacing the vessel, care should be taken to ensure that the flexible connecting hose is not twisted.



**Fig. 12 - Sealed system**

### 5.12 Condensate disposal - Vortex models only

When in condensing mode the Vortex Combi boiler produces condensate from the water vapour in the flue gases. Provision must be made for the safe and effective removal of the condensate.

Condensate can be disposed either internally - into an internal domestic waste system or directly into the soil stack, or externally - to an external soil stack, gully, hopper or soakaway.

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

#### Pipework

Condensate disposal pipework must be plastic (plastic waste pipe is suitable). Copper or steel pipe is **NOT** suitable and should **NOT** be used.

The internal diameter of condensate disposal pipes should not be less than 20 mm - e.g. 22 mm plastic plumbing pipe or 19 mm (¾") plastic overflow pipe.

Condensate disposal pipes must be fitted with a fall of 2.5° (1:20).

For boilers installed 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, 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.

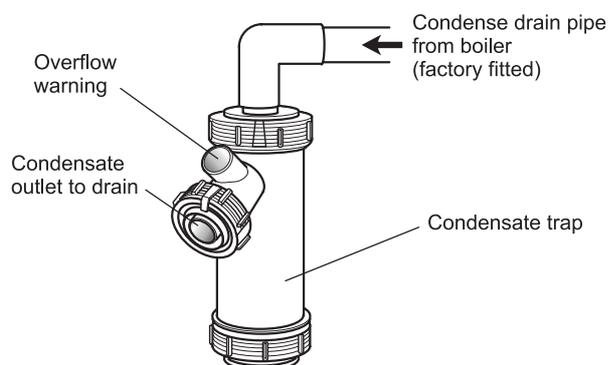
External pipework should be kept as short as possible (less than 3 metres) and 32 mm waste pipe used to minimise the risk of freezing.

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

#### Condensate trap

Condensate disposal pipes **MUST** be fitted with a trap.

Grant Outdoor Vortex Combi 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 rubber bung), See Fig. 13. A short length of flexible pipe is supplied connected to the outlet of the trap. The end of this flexible pipe should be connected to the condensate discharge pipe.



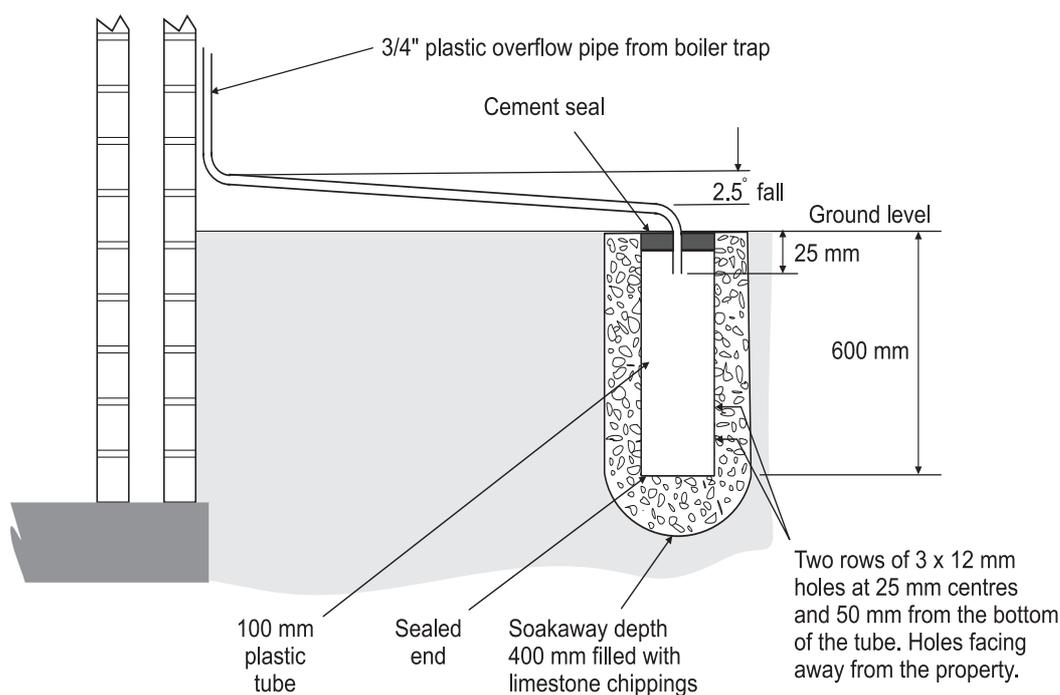
**Fig. 13 - Vortex condensate trap**

If connecting the condensate discharge internally - into a waste system or soil stack - the bung must be fitted in the overflow outlet of the trap.

On external discharge systems to a gully or soakaway, the bung should be removed from the overflow outlet. If connected to an external soil stack, the bung must be fitted on the trap.

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 contact your service engineer.

**IMPORTANT:** 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.



**Fig. 14 - Purpose made condensate soakaway**

### 5.13 Method of operation

Once the boiler is switched on, and the store is up to temperature, it will provide domestic hot water on demand.

A timer and room thermostat, or alternatively a programmable room thermostat, connected to the boiler will only control the operation of the central heating.

When central heating is not required, e.g. in the summer months, the timer switch should be set to OFF.

**Combi 90 V3 and Combi Max** - If the Grant TCR programmer is fitted, the hot water operation is turned off if the right hand 'Boiler' switch is set to OFF.

**Vortex Combi boilers** - If the Grant 2-channel programmer is connected to the boiler, hot water will not be provided if the 'Hot Water' channel is switched OFF.

Domestic hot water supply always takes priority over central heating. If a demand for hot water occurs during a period of central heating, the boiler mode will automatically change to provide hot water until the demand ceases. This interruption in the central heating only lasts for as long as hot water is required and should not be noticed by the User.

**Central Heating Mode** - If there is a call for heat, i.e. the timer/programmer and room thermostat (if fitted) are calling for heat, the pump will start to circulate the central heating water and the burner will light. When the temperature in the boiler reaches that set on the boiler thermostat, the burner is turned off. The pump continues

to run, circulating water around the system, for as long as both the timer/programmer and room thermostat (if fitted) are calling for heat. As the heating system water cools, the temperature drop is detected by the boiler thermostat and the burner is automatically restarted for the cycle to continue until either the timer or room thermostat stops calling for heat. The burner and pump are then turned off.

**Domestic Hot Water Mode (Combi 90 V3 and Combi Max)** - When there is a demand for hot water (from a hot water tap, shower, etc.) the water flow operates the diverter valve and in turn the flow switches. The pump starts and the primary water from the boiler is diverted through the domestic hot water plate heat exchanger, heating the incoming mains water.

The hot water produced is mixed with incoming mains cold water in the thermostatic blending valve to automatically ensure that the leaving hot water temperature does not exceed 65°C.

When the hot water demand ceases (the hot tap or shower valve is turned off), the diverter valve and flow switches are no longer operated.

The boiler will return to the central heating mode, if there is a heating demand from the timer/programmer and room thermostat, with the pump and burner running.

## 5 - GENERAL BOILER INFORMATION

If there is no heating demand from the timer/programmer and room thermostat, the pump stops but the burner will continue to run for a short period until the primary water in the boiler reaches the required temperature ready for another hot water operation.

**Domestic Hot Water Mode (Vortex Combi)** - When there is a demand for hot water (from a tap, shower, etc.) the water flow operates the flow switch. The Hot Water pump starts and circulates water from the primary store through the domestic hot water plate heat exchanger, heating the incoming mains cold water.

The hot water produced is mixed with incoming mains cold water in the thermostatic blending valve to automatically ensure that the leaving hot water temperature does not exceed 65°C.

When the hot water demand ceases (the hot tap or shower valve is turned off), the flow switch is no longer operated. The Hot Water pump will continue to run and the burner continues to fire until the primary store reaches the required temperature and the store temperature control is satisfied.

The boiler will return to the central heating mode, if there is a heating demand from the timer/programmer and room thermostat, with the Heating pump and burner running.

**Note:** As the temperature of the boiler will now be higher than the boiler thermostat setting, the burner may not fire immediately, but only after the primary flow temperature has fallen to below the thermostat setting.

If there is no heating demand from the timer/programmer and room thermostat, the Heating pump will not operate.

For optimum performance the thermostatic blending valve has been factory set to provide a hot water temperature of approximately 50°C.

If the water in the boiler is already up to temperature when a hot tap is opened, there will be a delay before the burner fires to maintain the hot water temperature in the boiler (to heat the hot water).

### 5.14 How Vortex condensing boilers work

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 Vortex Combi condensing boilers contain an extra heat exchanger which is designed to recover the latent heat normally lost by conventional boilers. This is done by cooling the flue gases to below 55°C, thus extracting more sensible heat and some of the latent heat.

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 a Vortex Combi 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 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.

### 5.15 Vortex heating system design considerations

To achieve the maximum efficiencies possible from a 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.

## 6 - BOILER INSTALLATION

### 6.1 Unpack the boiler

- Carefully remove the packaging from the boiler and lift it off the pallet. If the optional high level flue (Green system) is to be used, follow the instructions supplied with the kit.
- The low-level discharge flue terminal, terminal guard and wall flashing strip are supplied loose inside the boiler.
- Remove the casing top panel (four screws).
- The flue may exit the boiler from the left, right or rear of the casing. To allow for this the boiler is supplied with three removable panels - two blank panels and one with the flue outlet hole and seal.

**Note:** A spare blanking plate with a 112 mm dia. hole is supplied with the Outdoor Vortex Combi boilers. This is intended to provide an opening into the boiler if a 110 mm soil pipe is used as a pipe duct through the wall.

The panel with the flue hole is supplied fitted at the rear of the boiler, but can be re-positioned on either side to give the flue outlet position required. If so, a hole for the flue must be cut in the insulation (inside the casing side panel) using the hole in the plate as a guide.

- Slacken the wing nuts holding the flue elbow and rotate the elbow to the required direction for the flue to exit the casing.
- 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.

- 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.

- Tighten the wing nuts holding the flue elbow and fit the stainless steel flue guard using the two screws provided.
- 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. 15.
- A painted steel wall flashing strip is supplied with the boiler to cover the gap between the wall and the boiler casing. It should be secured to the wall leaving a gap of 30 mm between the bottom edge and the top of the casing top panel, to allow removal of the top panel for servicing.

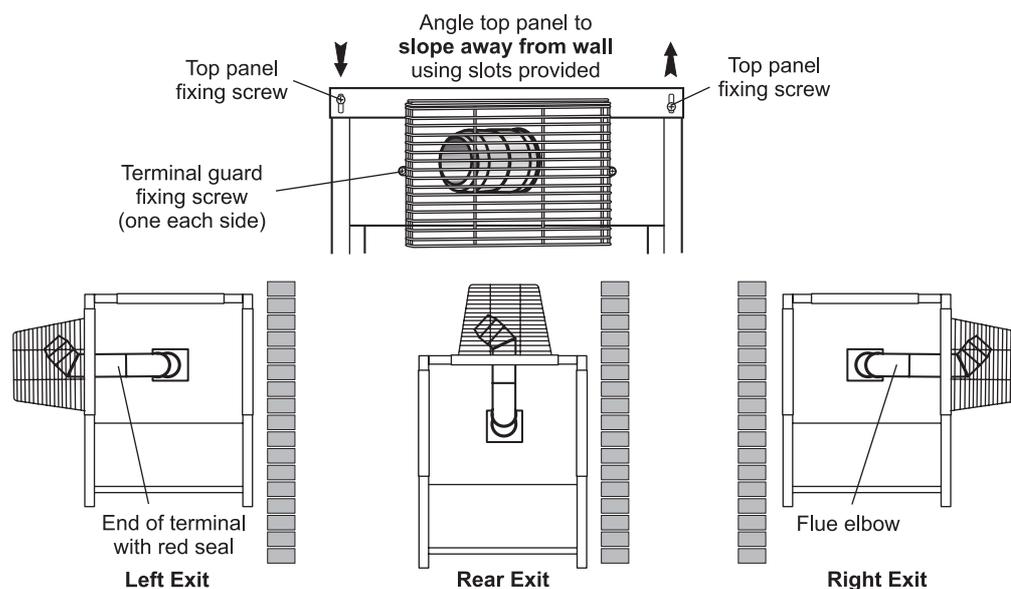


Fig. 15

## 6 - BOILER INSTALLATION

### 6.2 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 or 3 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 mm<sup>2</sup> 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 5.4.2 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.

### 6.3 High level flue - Green system

#### See Fig. 16

Where it is not practical to use the factory supplied low level flue, the Outdoor Combi boilers may be fitted with the Grant 'Green System'. This is a twin wall stainless steel insulated vertical flue system .

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. 16.

- 1 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.
- 2 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.
- 3 **Vortex Combi only** - The condensate can be allowed to run back into the boiler. A condensate drain at the base of the flue system is not required.

If the flue terminal is fitted less than 2 metres above a surface to which people have access, the terminal must be protected by a guard. The guard must be fitted centrally over the flue terminal and securely fixed to the wall

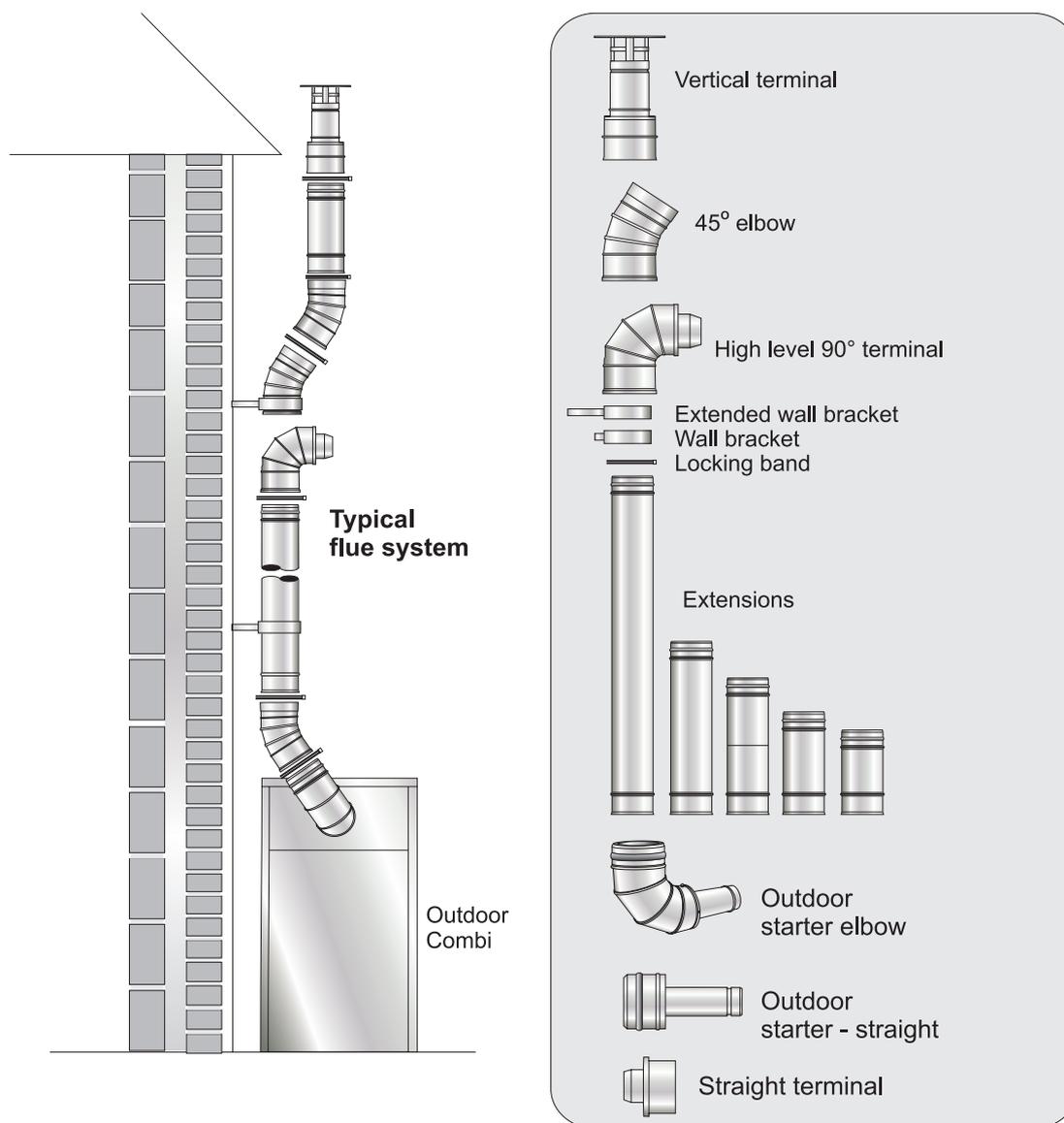
**Vortex Combi only - It is important to ensure that all joints in the flue system are sealed and that condensate cannot escape. Up to 1.5 l/h of condensate can be produced in a conventional flue system.**

**Combi 90 V3 and Combi Max only - When using gas oil the flue must terminate a minimum of 2 metres above outside ground level.**

Fitting instructions for the high level flue (Green system) is supplied with the flue kit.

The items listed below are available from Grant Engineering (UK) Limited.

Item	Combi 90 V3, Combi Max & Vortex Combi 26 Part No.	Vortex Combi 36 Part No.
Outdoor starter elbow	GKM90	GKM200
150 mm extension	GX150/90	GX150/200
250 mm extension	GX250/90	GX250/200
450 mm extension	GX450/90	GX450/200
950 mm extension	GX950/90	GX950/200
195-270 mm adjustable extension	GXA250/90	GXA250/200
45° elbow	GE45/90	GE45/200
High level 90° terminal	GTH90	GTH200
Vertical terminal	GTV90	GTV200
Wall bracket - standard	GWB90	GWB200
Wall bracket - extended	GEB90	GEB200
Outdoor starter - straight	GKM90C	GKM200C
Straight terminal	GTL90	GTL200



Components for External flue system (Green System)

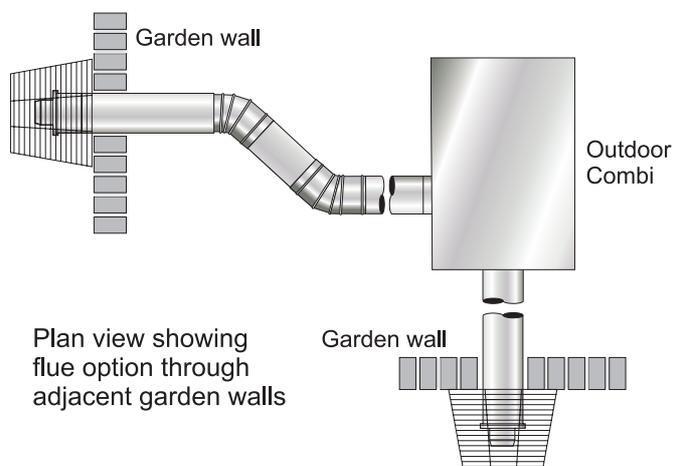


Fig. 16 - Outdoor high level flue (Green system)

### 6.4 Make the water connections

The pipework can exit the boiler enclosure through the openings provided in either side (under the removable cover plates) to pass through the wall when installed against the building. The side flue exit openings may also be used to route the pipework and cables through the casing sides and into the building.

**Note:** A spare blanking plate with a 112 mm dia. hole is supplied with the Outdoor Vortex Combi boilers. This is intended to provide an opening into the boiler if a 110 mm soil pipe is used as a pipe duct through the wall.

Alternatively for free standing installations, pipework can be routed down and through the openings provided in the base of the enclosure, to be run underground to the building.

#### Combi 90 V3 and Combi MAX - see Figs. 1 and 17

- 1 The pipework connections are housed within the insulated compartment at the rear end of the boiler casing (opposite end to the burner). These connections are accessed by removing the rear and top panels of the enclosure.

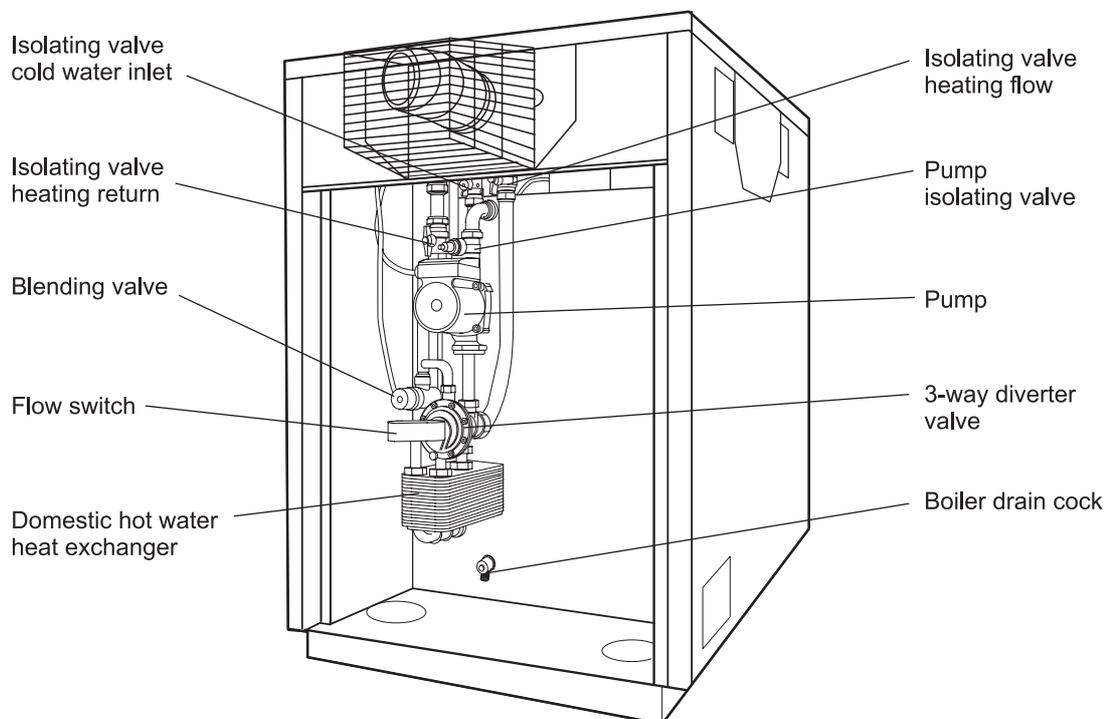
**Note:** Always remove the front panel (burner end) before removing the top casing panel.

- 2 **Flow and return connections** - Both models are supplied with push-fit elbows for connection of the heating flow and return pipes, allowing either left or right hand pipe entry as required.
- 3 **Hot water connections** - Both models are supplied with push-fit elbows for the connection of the cold water mains inlet and domestic hot water pipes, allowing either left or right hand pipe entry as required.
- 4 **Safety valve** - A 15 mm discharge pipe is factory fitted to the safety valve outlet. This is routed down the front of the boiler and passes through a hole in the bottom of the left side panel (viewed from the burner end). The outlet from this discharge pipe must be free of any restriction or obstruction.

#### Vortex Combi 26 and 36 - see Figs. 3 and 18

- 1 The pipework connections are located on the top of the boiler and are accessed by removing the front and top panels of the enclosure.

**Note:** Always remove the front panel (burner end) before removing the top casing panel.



**Fig. 17 - Outdoor Combi 90 V3 and Combi MAX**

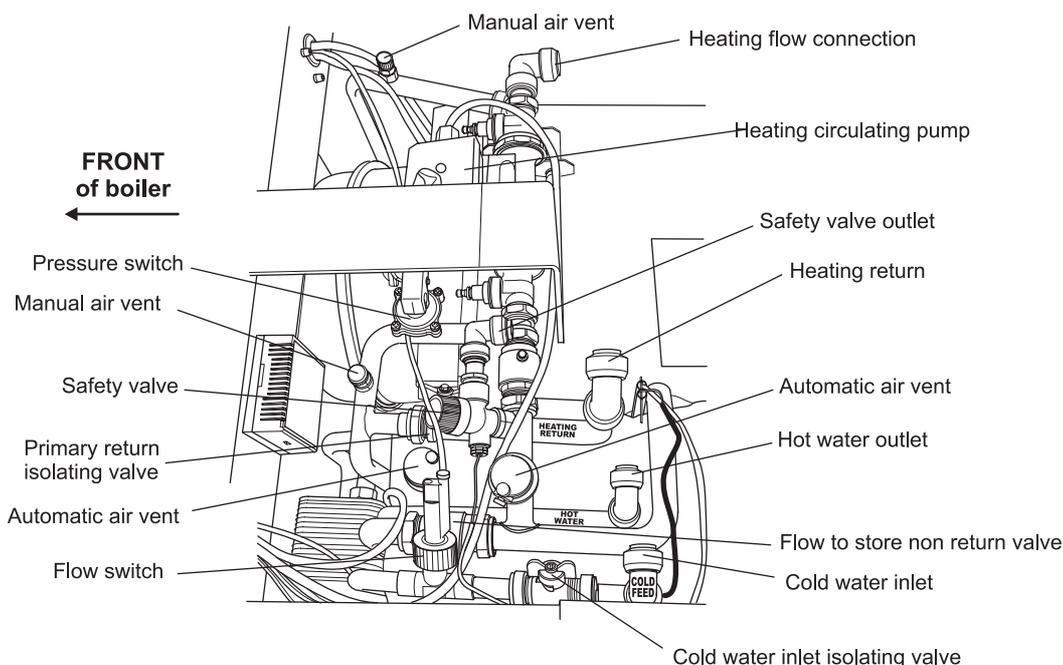
## 6 - BOILER INSTALLATION

- 2 **Flow and return connections** - Both models are supplied with push-fit elbows fitted on the heating flow and return pipes, allowing either left or right hand pipe entry as required - 22 mm for the Vortex Combi 26 and 28 mm for the Vortex Combi 36.
- 3 **Hot water connections** - Both models are supplied with push-fit elbows fitted on the cold water mains inlet and domestic hot water pipes, allowing either left or right hand pipe entry as required. - 15 mm for the Vortex Combi 26 and 22 mm for the Vortex Combi 36.
- 4 **Safety valve** - A 15 mm push-fit elbow is factory fitted to the safety valve outlet. A 15 mm pipe must be connected to this fitting and routed to either the back left or back right of the boiler where it must pass through the hole provided in the bottom edge of both side panels. This discharge pipe must be unrestricted (i.e. no valves) and the outlet must be free of any restriction or obstruction.
- 5 **Condensate drain** - Provision must be made for the safe and effective removal of condensate. Refer to Section 5.12.
- 3 If the boiler is installed against a wall, fit the wall flashing strip. Position the strip with the bottom edge of the wider flange 30 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).
- 4 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. 15.
- 5 Fill and vent the water system and check for leaks, rectifying where necessary. Refer to Section 7.1.
- 6 Do not replace the top panel until the power supply has been connected. See Section 6.6.

### All models.

- 1 A drain tap is provided at the bottom on the front of the boiler. A second drain tap is fitted on the primary store of the Vortex Combi boilers.
- 2 Carefully manoeuvre the boiler into position. Complete the water connections.

**IMPORTANT:** 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.



*Fig. 18 - Outdoor Vortex Combi*

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.

### 6.5 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.

### 6.6 Connect the power supply

**Important:** Ensure that the electrical supply has been isolated before commencing.

See wiring diagrams in Section 12

**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.

#### Combi 90 V3 and Combi MAX

- 1 Undo the three screws from the left hand cover on the control panel to gain access to the boiler wiring terminal block.
- 2 Pass the mains power supply cable through the cable grommet into the control panel, through the cable clamp and connect to the 7-way terminal block as follows:-

Permanent Live (brown) to terminal 3 - marked L3  
Neutral (blue) to terminal 4 - marked N4  
Earth (green/yellow) to terminal 5 - marked E5

#### Vortex Combi

The Vortex Combi boilers are supplied fitted with an electrical isolation plug - located in the left hand end of the boiler control panel. All electrical wiring to the boiler **must** be made to this plug.

- 1 Locate the plug, lift the retaining tab and pull the plug to the left to remove it from the socket in the control panel.
- 2 Prise open the clips on either side of the plug and open the top to access the five terminals.

**IMPORTANT:** Pass the cable from the electrical power supply and heating/hot water controls through the cable clamp on the underside of the control panel **before** making connections to the isolating plug.

- 3 Connect the electrical supply and heating/hot water controls to the terminals in the isolating plug as follows:

Terminal 1 - Heating on (from timeswitch, thermostat or programmer)

Terminal 2 - Hot water on (from programmer)

Terminal  $\perp$  - Earth

Terminal N - Neutral

Terminal 3 - Mains live (including permanent live for frost thermostat)

**Note:** The terminal numbers are marked on the top cover of the plug.

- 4 Replace the cover on the plug ensuring it is securely fitted. Measure a maximum of 350 mm of cable between the plug and the cable clamp below the control panel and tighten the cable clamp to secure the cable.

**IMPORTANT:** Check that the cable is securely clamped and that the cable length between the clamp and plug is no more than 350 mm.

- 5 Re-fit the isolating plug into the socket in the control panel.

**Do not switch on the electricity supply at this stage.**

### 6.7 Connect the controls

To control the central heating on/off periods only, it is recommended that the boiler be wired to a single channel timer and room thermostat, or the Grant programmable room thermostat, sited at a convenient location within the property.

#### Combi 90 V3 and Combi MAX

The switched live from the central heating controls must be connected to terminal 1 on the 7-way terminal block - marked S/L1.

**Note:** When connected in this way, a link **must** be fitted between terminal 2 and 3 - marked S/L2 and L3 to enable the boiler to operate for hot water.

#### Vortex Combi 26 and 36

The switched live from the central heating controls must be connected to Terminal 1 on the electrical isolation plug.

**Note:** When connected in this way, a link **must** be fitted between terminal 2 and 3 - to enable the boiler to operate for hot water.

Alternatively, if some control over hot water operation of the boiler is required, then for the Combi 90 V3 and Combi Max use the Grant TCR mini programmer (refer to Section 6.8 for connection details) or for the Vortex Combi 26 and 36 use the Grant VCR programmer (refer to Section 6.9 for connection details).

### 6.8 Connect the Grant TCR mini-programmer

**For Outdoor Combi 90 V3 or Combi Max only (not suitable for Outdoor Vortex Combi boilers).**

Refer to Fig. 12.4 for connection diagram.

- 1 Select the desired fixing position for the heating controller.
- 2 When fixing the wallplate remember the connections are at the top and the vertical centre line of the unit is at the position shown (C/L) - in line with the terminal E. See Fig. 19.
- 3 Fix the wallplate to the wall or flush mounted box as required.
- 4 Surface cables can only enter from below the unit. If mounted on a flush mounted box, cables can enter from the rear through the aperture in the wallplate.

Connections from the programmer are as follows:  
Switched Live Heating to terminal 1 - marked S/L1  
Switched Live Hot Water to terminal 2 - marked S/L2  
Permanent Live Frost stat to terminal 3 - marked L3  
Mains Neutral to terminal 4 - marked N4  
Mains Earth to terminal 5 - marked E5

**Note:** If the Combi 90 V3 or Combi MAX are connected in this way, the User must be made aware that if the hot water channel is left in the off position, hot water may not be available upon demand and that the primary store may need to recover before any hot water is available.

**Do not switch on the electrical power to the boiler at this stage.**

- 5 **Important:** Links must be fitted between terminal L and 5 and between 2 and 4. See wiring diagram in Section 5.3.
- 6 Whilst the unit does not require an Earth connection, a terminal is provided on the wallplate for Earth continuity purposes.
- 7 Ensure that all dust and debris are cleared from the area.
- 8 Locate the module on the latches at the bottom of the wallplate and hinge upwards to fully engage the unit connectors into the wallplate. Tighten the two fixing screws to secure the unit to the wallplate.
- 9 Before setting the programme, the unit and circuit should be checked. Switch ON the mains electricity supply and set the left hand rocker switch to 'CONSTANT' and the right hand rocker switch to 'ON'. Adjust any remote thermostats to check that the services operate correctly.

## 6 - BOILER INSTALLATION

- 10 Set the left hand rocker switch to 'OFF', check that the heating goes off and that the hot water operation stays on.
- 11 Set the right hand rocker switch to 'OFF' and check that both services do not operate.
- 12 Finally, return the left rocker switch to 'TIMED' and the right hand rocker switch to the 'ON' position.

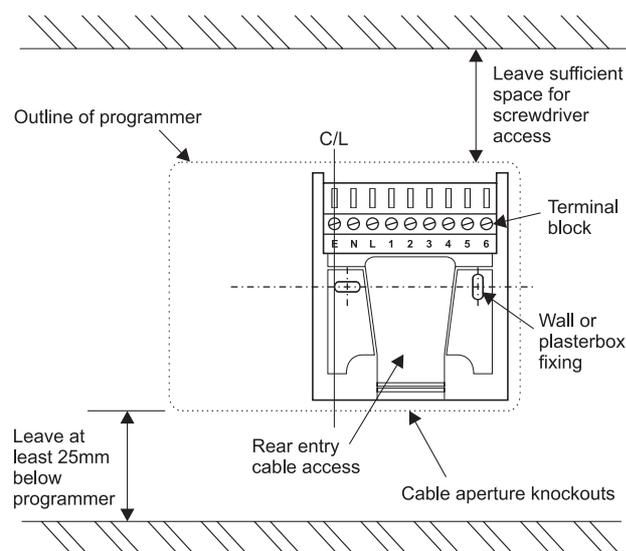


Fig. 19

### 6.9 Connect the Grant 2-channel programmer

**For Outdoor Vortex Combi 26 and 36 only (not suitable for Outdoor Combi 90 V3 or Combi Max).**  
Refer to Fig. 12.9 for connection diagram.

Connections from the programmer are as follows:  
Switched Live heating to terminal 1 on boiler plug  
Switched Live hot water to terminal 2 on boiler plug  
Permanent Live frost stat to terminal 3 on boiler plug  
Mains Neutral to terminal N on boiler plug  
Mains Earth to terminal  $\perp$  on boiler plug

**Note:** If a two-channel programmer is used with the Outdoor Vortex Combi 26 or 36, the User **must** be made aware that if the hot water channel is left in the OFF position, hot water may not be available on demand and that the primary store may need to recover before any hot water is available.

### 6.10 Pipe thermostat connection

Grant Outdoor Combi boilers are supplied with a factory fitted pre-set frost protection thermostat. In order to prevent overheating of the property when this frost thermostat operates, it is recommended that a pipe thermostat be used, e.g. a Danfoss type ATF pipe thermostat. This should be mounted on the heating return pipe to the boiler and set to 25°C.

**For Outdoor Combi 90V3 and Max boilers -**  
Remove link from terminals P1 and P2 on the boiler terminal block. Connect the pipe thermostat (via 'common' and 'on' connections) between these terminals.

**For Outdoor Vortex Combi 26 and 36 boilers -**  
Remove link from terminals 4 and 5 on the boiler terminal block. Connect the pipe thermostat (via 'common' and 'on' connections) between these terminals.

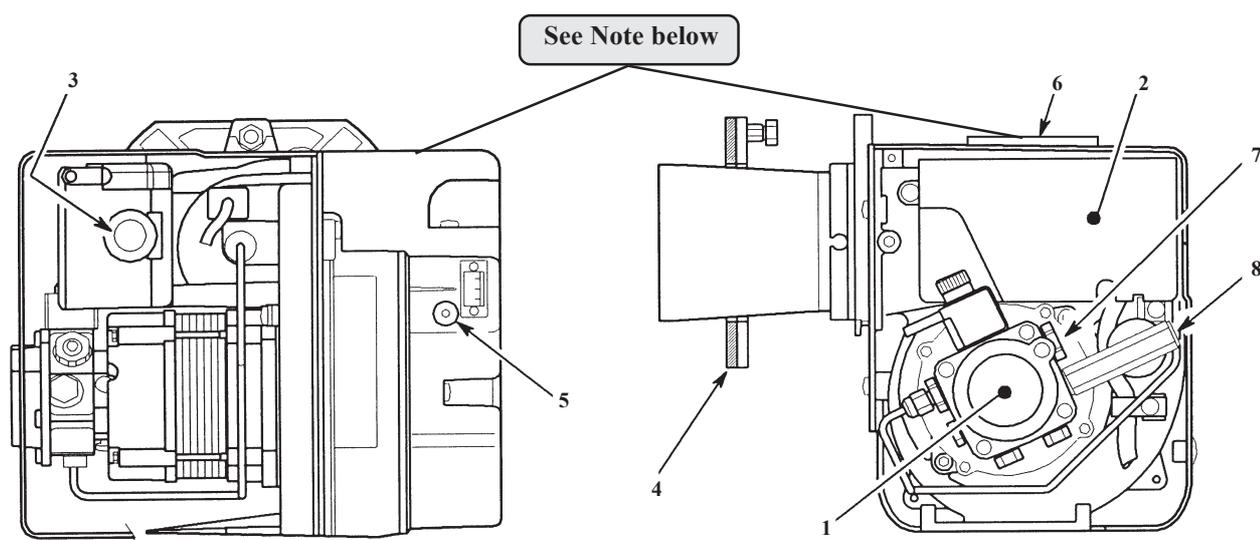
Refer to boiler wiring diagrams in Section 12 for connection details.

### 6.11 Connect the fuel supply

See Fig. 9

If a two pipe system is to be used refer to Section 5.4.6.

- 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 at the bottom of the case sides.



**Fig. 20 - RDB burner components**

- 1 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

**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.**

### 7.1 Fill the system

- 1 **To vent the boiler** - The Combi 90 V3 and Combi Max boilers are fitted with a single automatic air vent on the top of the boiler.

The Vortex Combi 26 and 36 boilers are fitted with two automatic air vents and two manual air vents. See Fig. 18.

**On all boilers** - Check that the small cap on the automatic air vent(s) is screwed in fully, then unscrew it one complete turn - leave the cap in this position.

- 2 If the flexible filling loop is used to fill the system, ensure it is connected and that the valve connecting it to the boiler 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. On the Vortex Combi boilers - open the manual air vents in the boiler to vent air and then close them.
- 5 It is important the circulating pump(s) are properly vented to avoid them running dry and the bearings being damaged.

**Outdoor Combi 90 V3 and Combi Max** - Remove the rear casing panel to access the single circulating pump.

**Outdoor Vortex Combi boilers** - Remove the front casing panel for access to the Hot Water pump and the top casing panel for access to the Heating pump.

Unscrew and remove the plug from the centre of the pump. Using a suitable screwdriver rotate the exposed spindle about one turn. When water starts to trickle out, replace the plug.

On the Vortex Combi both the Hot Water and Heating pumps must also be vented as described above.

- 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.

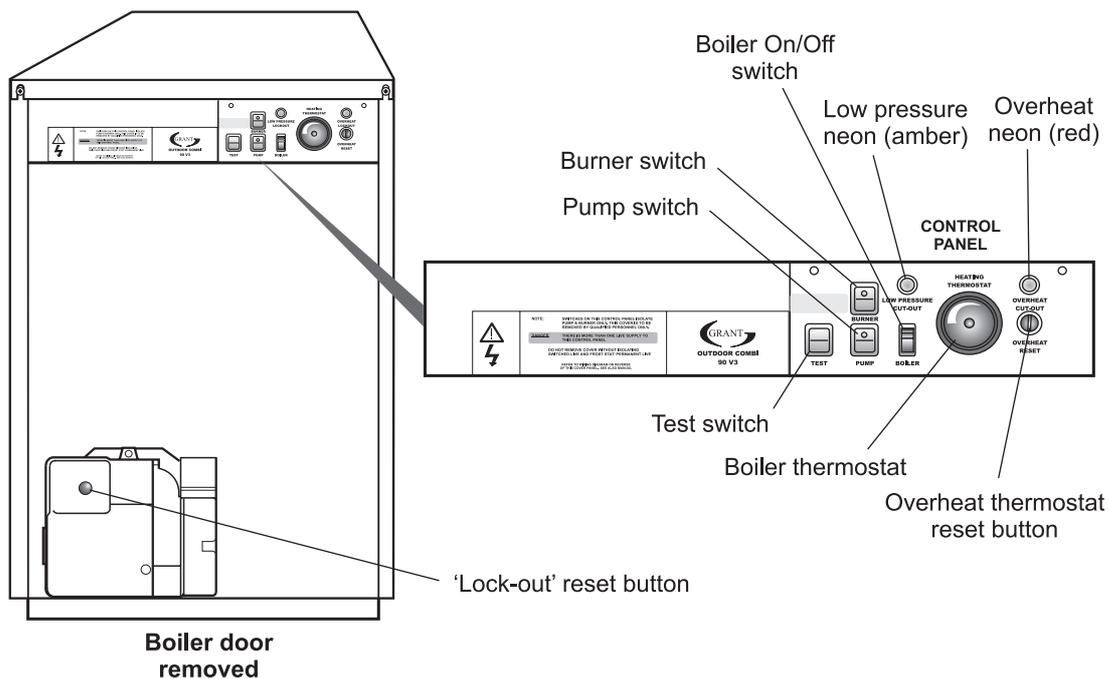
- 7 Continue to fill the system until the pressure gauge indicates between 0.5 and 1.0 bar. Close the fill point valve and check the system for water soundness, rectifying where necessary. Water may be released from the system by manually operating the safety valve until the system design pressure is 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.

### 7.2 Completion

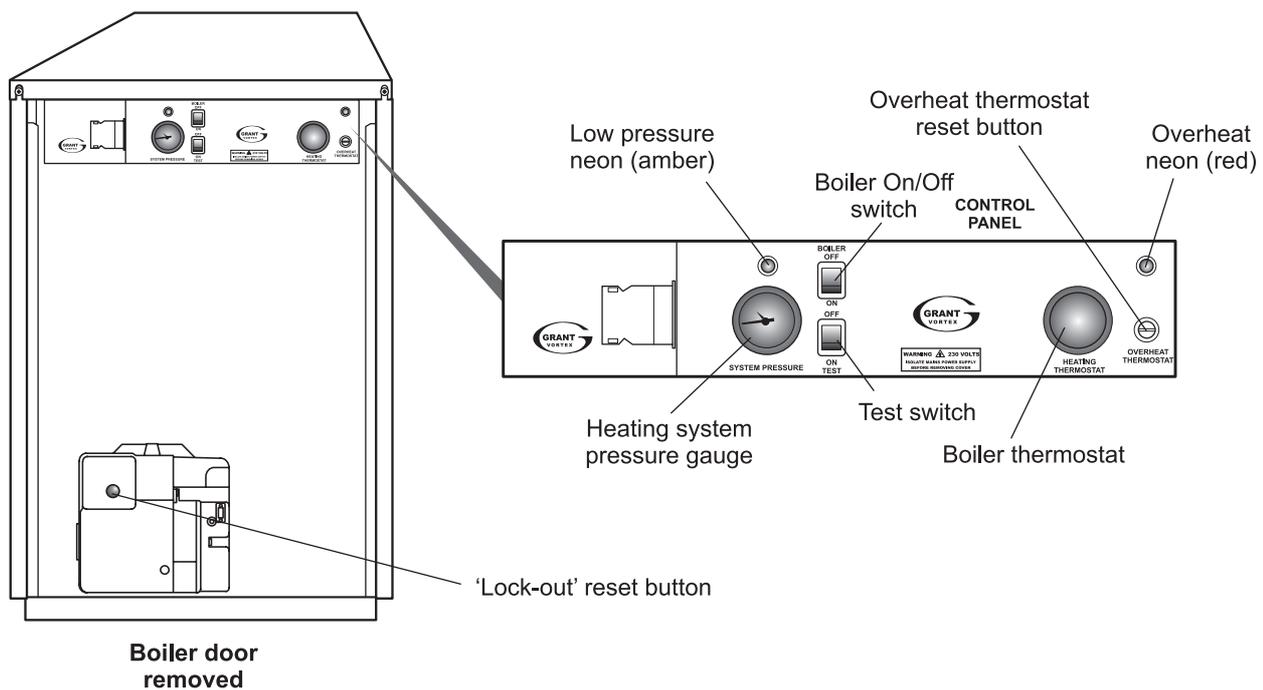
Please ensure that the OFTEC CD/10 installation completion report (provided with the boiler) is completed in full.

Leave the top copy with the User. Retain the carbon copy for your records.

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



**Fig. 21 - Boiler controls (Outdoor Combi 90 V3 and Combi MAX)**



**Fig. 22 - Boiler controls (Outdoor Vortex Combi)**

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.  
Check that the Vortex Combi turbulators are in position and that the ends are vertical, see Fig. 28.

- 1 Check that the water system has been vented and pressurised, and there are no leaks.
- 2 Check that all fuel line valves are open.
- 3 Remove the plastic burner cover (two screws) if it was not previously removed.

## 8 - COMMISSIONING

- 4 Connect a combined vent manifold and pressure gauge to the pressure gauge connection port on the oil pump. See Fig. 20. 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 set the boiler thermostat to maximum (on Combi 90 V3 and Max) or to give the required heating flow temperature (on Vortex Combi boilers). If a Grant TCR programmer is fitted (with the Combi 90 V3 or Combi Max) set the 'boiler' switch to ON. If a Grant VCR programmer is fitted (with the Vortex Combi 26 or 36) set the 'hot water' function to ON. Switch on the electricity supply to the boiler.

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

- 6 Fully open a hot tap and allow it to run for a few moments to vent the internal primary circuit. The boiler pump in the Combi 90 V3 and Combi Max or the Hot Water pump in the Vortex Combi will operate 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 during first lighting. Close the hot tap. The burner will continue to fire to heat the primary water in the boiler or primary store (Vortex Combi) until the required temperature is reached.

**Note:** On the Vortex Combi the Hot Water pump will continue to run for a short period after the burner has stopped.

- 7 With the burner alight, check the fuel pressure. Refer to the Technical Information, Section 4.3, 4.4 or 4.6. Adjust the pressure if necessary - see Fig. 20.
- 8 Operate the boiler until it reaches normal operating temperature. Check oil supply/return pipe for leaks, rectifying where necessary.
- 9 Switch 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. Tighten the two fixing screws. Ensure the flexible air tube is connected to the burner.

- 11 Insert combustion probe into the end of the flue terminal to measure the CO<sub>2</sub> level.  
Do not use the test point on the boiler.

- 12 After allowing the burner to run for 20 minutes - Check the smoke number, if satisfactory check the CO<sub>2</sub> level. Set the CO<sub>2</sub> to the value given in Section 4.3, 4.4 or 4.6. for the boiler and fuel used. Adjust the burner air regulator, see Fig. 24, turning the screw anti-clockwise closes the damper and increases CO<sub>2</sub> level, turning the screw clockwise opens the damper and reduces CO<sub>2</sub> level. Re-check the smoke number if the air 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.

- 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 Switch off the boiler.
- 16 With the system hot, check again for leaks, rectifying where necessary. Drain the heating system while it is hot to complete the flushing process.
- 17 Refill, vent and pressurise the system as described in Section 7.1, adding a suitable inhibitor. For further information concerning inhibitors contact Grant Engineering (UK) Limited.

**Note:** After commissioning the boiler, complete the Commissioning Report on page 2 of these instructions 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, timer (see Section 1) and room thermostat (if fitted) to the User's requirements then refer to Section 9.

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.

## 9 - BOILER HANDOVER

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 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.**

**Ensure the User information pack has been given to the Householder.**

## 10 - 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.

**Important: Details of every service should be recorded in the Service Log in the Boiler Handbook. 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 15 on page 58.

### 10.1 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. Check the expansion vessel air charge. See Section 6.5. Check the system pressure. Refill, vent and re-pressurise the system as necessary. See Section 7.1.
- 4 Remove any sludge/water from the fuel tank by opening the sludge valve at the lower end of the tank.
- 5 With the fuel supply valve closed, clean/replace the filter element and clean the filter bowl.
- 6 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 fuel used and nozzle fitted.

## 10 - BOILER SERVICING

### 10.2 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.

### 10.3 Cleaning the boiler

See Fig. 24, 25, 26 or 27

- 1 Remove the four 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. 24, 25, 26 or 27.
- 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. 24, 25, 26 or 27.

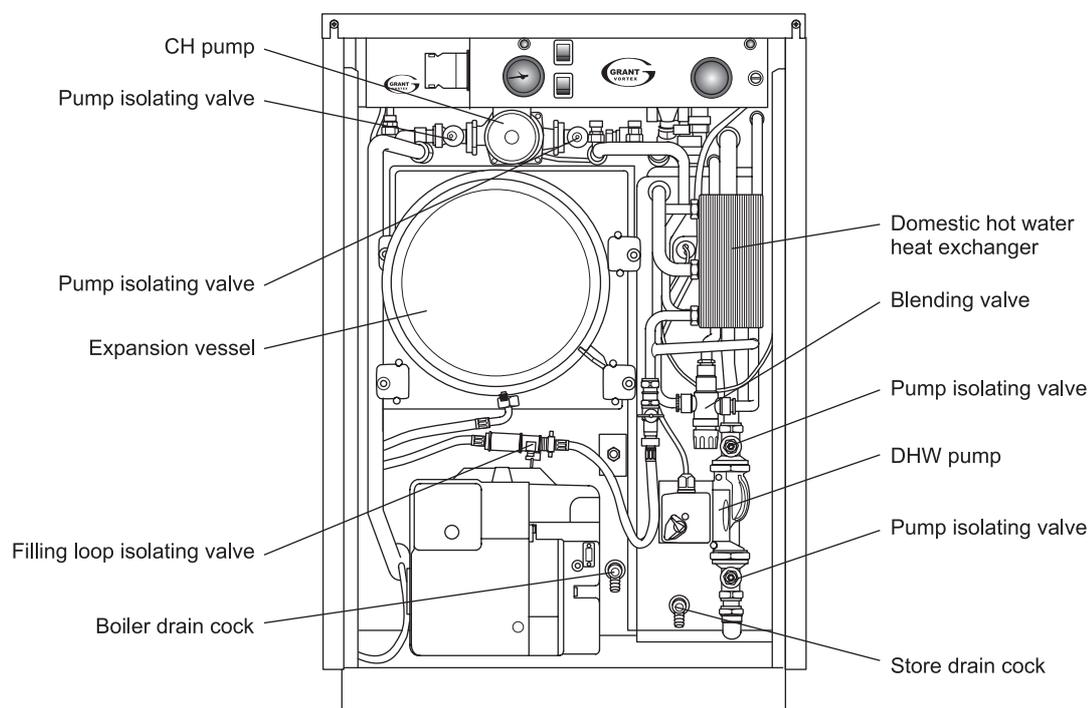
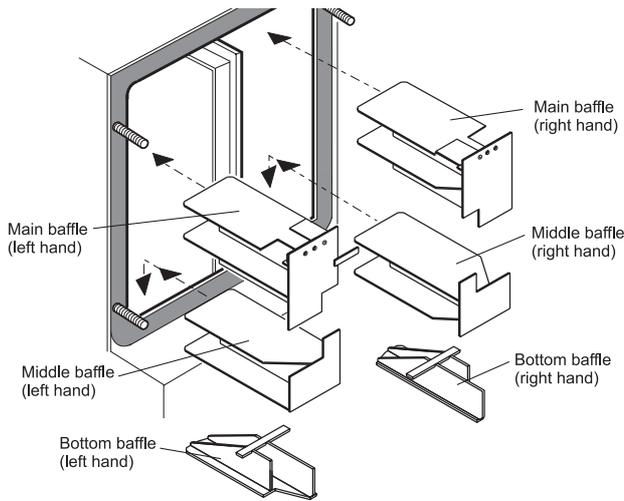
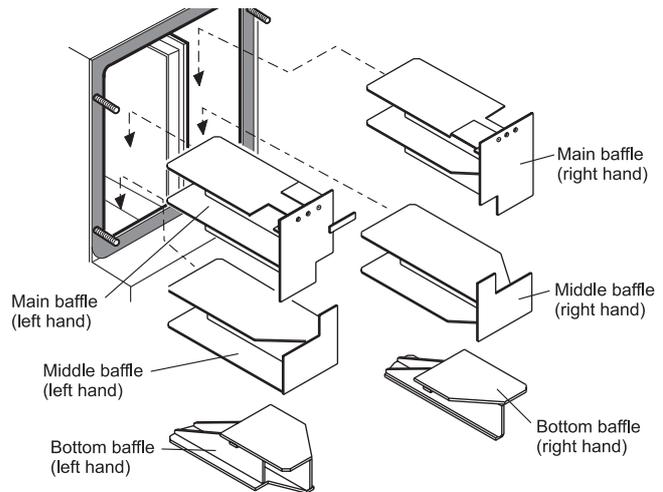


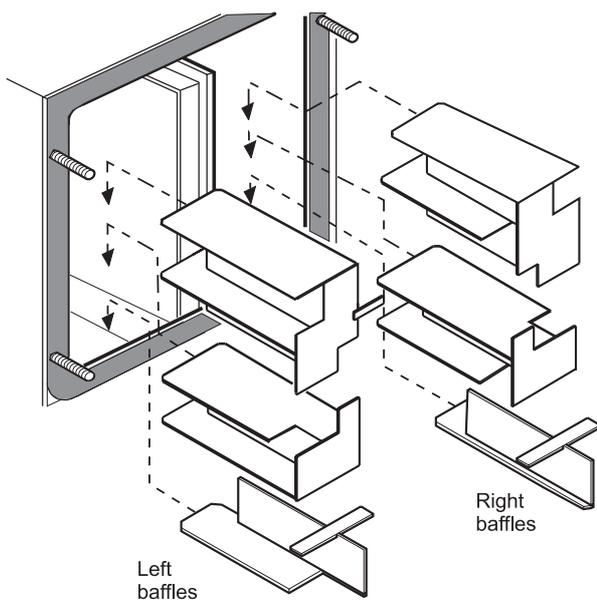
Fig. 23 - Outdoor Vortex Combi components



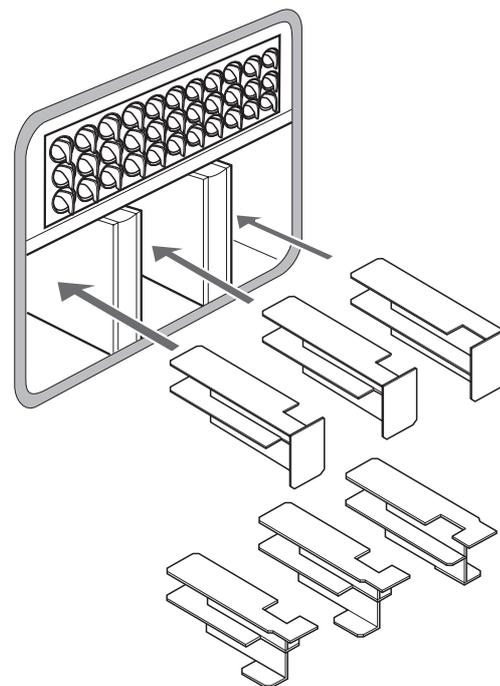
**Fig. 24 - Combi 90 V3 baffle positions**



**Fig. 25 - Combi Max baffle positions**



**Fig. 26 - Vortex Combi 26**

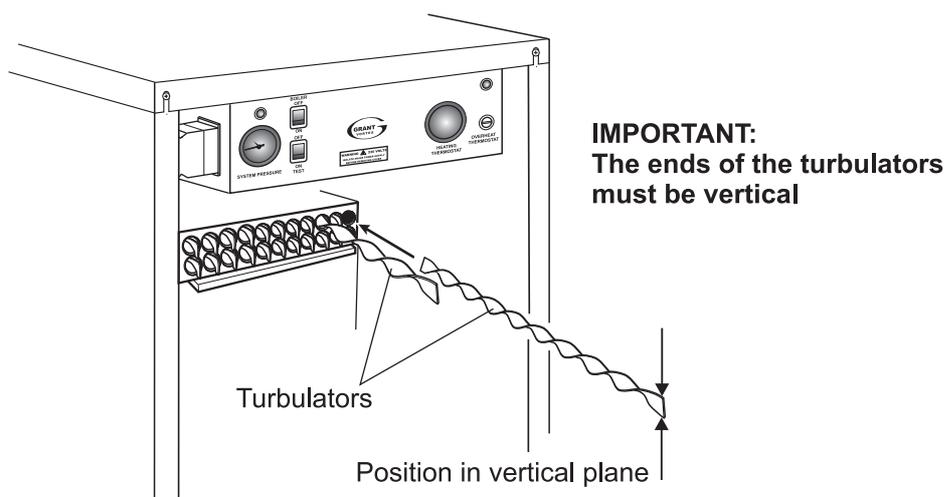


**Fig. 27 - Vortex Combi 36**

- 7 **Vortex Combi** - Pull out the spiral turbulators from the heat exchanger tubes. See Fig. 28. 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 22 mm condensate outlet. Replace the turbulators.
- 8 **All boilers** - Replace the cleaning door, securing it in position with the nuts and washers previously removed.

- 9 **Vortex Combi** - 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. Check that the boiler condensate outlet is unobstructed. Clean if necessary.

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



**Fig. 28 Outdoor Vortex Combi turbulators**

### 10.4 Cleaning the burner

See Section 14.1

- 1 **Combustion head** - Loosen the two screws securing the combustion head to the burner flange and withdraw the head. Clean and refit the combustion head.
- 2 **Inspect the ignition electrodes** - With the combustion head removed, 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 29.
- 3 **Nozzle** - The nozzle should be replaced on an annual service.  
Check that the nozzle fitted is the correct size and type, refer to tables in Section 4.3, 4.4 or 4.6 and boiler data label.

Do **NOT** attempt to clean the nozzle.

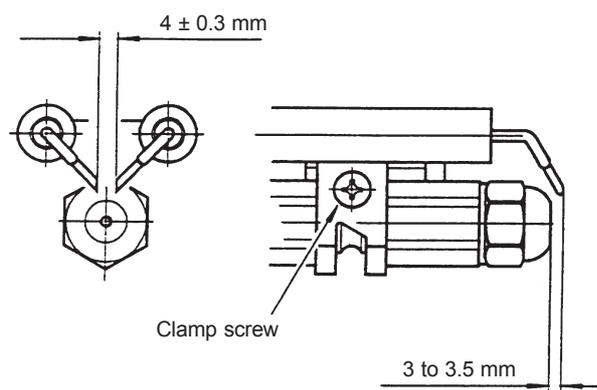
Remove and replace the nozzle using a good fitting spanner (16 mm). The use of an ill-fitting spanner will damage the nozzle and could lead to an incorrect flame pattern. Always check the electrode settings after replacing the nozzle, see Fig. 29.

- 4 **Photocell** - The photocell is a push-fit in the burner body. Carefully pull out the photocell to clean.
- 5 **Fan** - With the plastic air intake grille 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 and re-fit the plastic grille.

- 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.

**To ensure safe and efficient operation of the boiler it is important that re-commissioning is carried out, especially combustion checks (CO<sub>2</sub> level, flue gas temperature and smoke number) after the boiler has been serviced.**

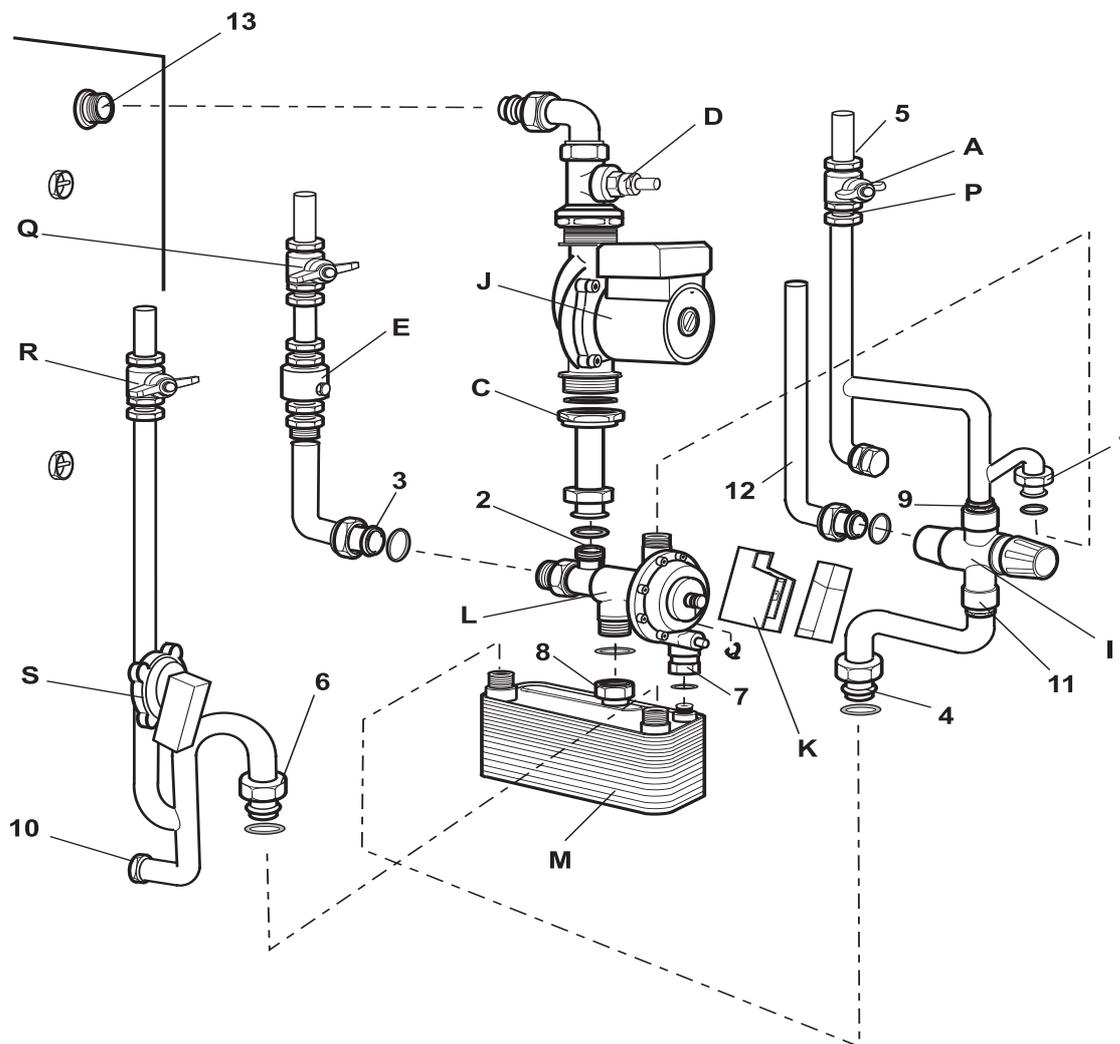
Refer to the Commissioning instructions starting on page 36.



**Fig. 29**

**IMPORTANT: The electrode settings given above MUST be observed**

## 11 - BOILER COMPONENTS



**Fig. 30 - Combi 90 V3 and Combi Max components/connections**

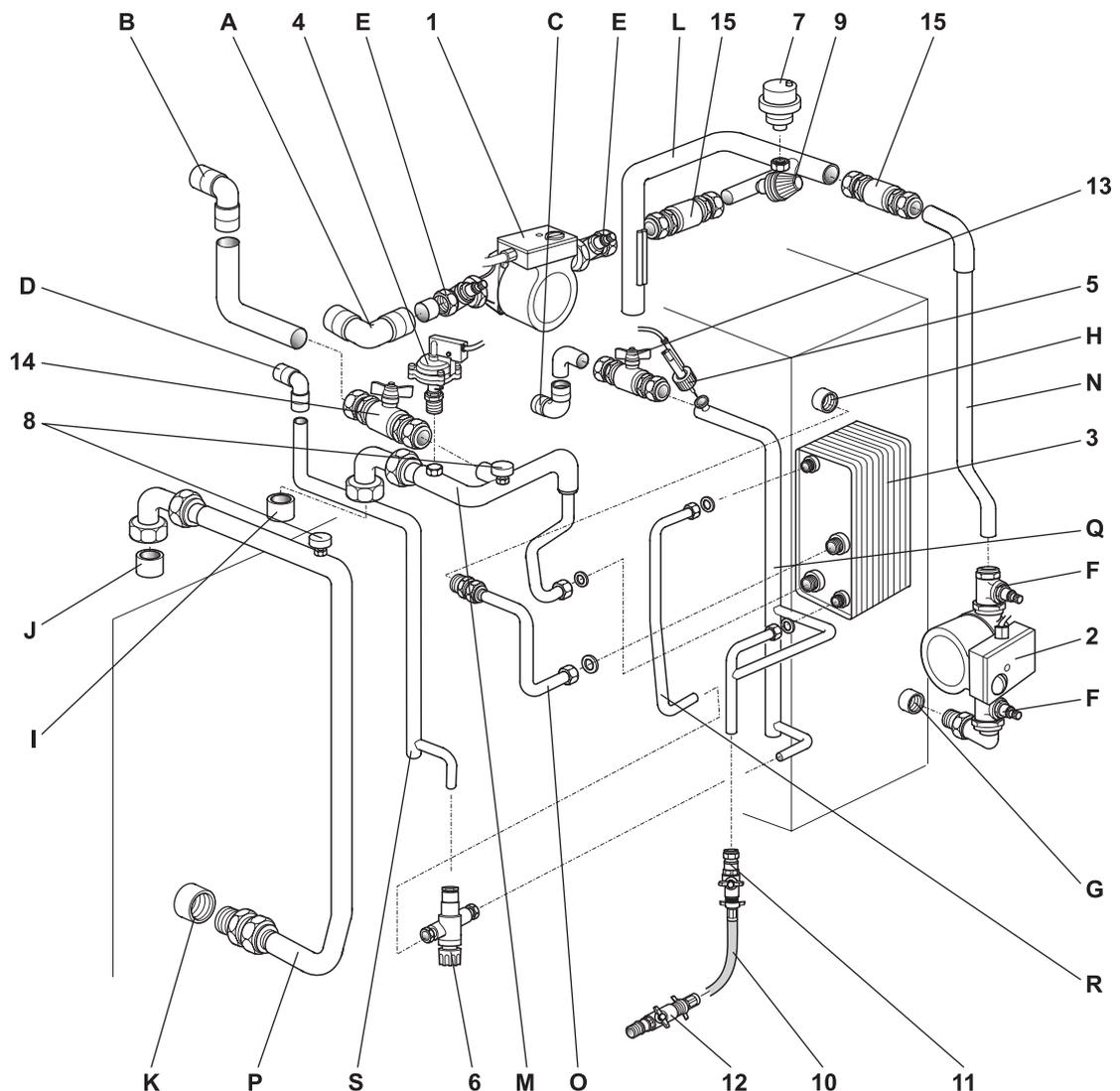
### Main Components

A	Cold water inlet isolating valve
C	Lower pump union
D	Upper pump union - isolating valve
E	Heating check valve
I	Thermostatic mixing valve
J	Circulating pump
K	Microswitch assembly
L	Diverter valve
M	Plate heat exchanger
P	Flow restrictor
Q	Heating flow isolating valve
R	Heating return isolating valve
S	Pressure switch

### Connections

1	Diverter valve - cold water inlet
2	Diverter valve - primary inlet
3	Diverter valve - primary outlet
4	Plate heat exchanger - hot water outlet
5	Cold water Inlet isolating valve - outlet
6	Plate heat exchanger - primary outlet
7	Plate heat exchanger - cold water inlet
8	Plate heat exchanger - primary inlet
9	Mixing valve - cold water inlet
10	Primary return isolating valve - inlet
11	Mixing valve - hot water inlet
12	Mixing valve - blended water outlet
13	Primary flow from boiler

## 11 - BOILER COMPONENTS



*Fig. 31 - Vortex Combi components/connections*

### Main Components

- 1 Circulating pump - heating
- 2 Circulating pump - hot water (primary store)
- 3 Plate heat exchanger
- 4 Pressure switch
- 5 Flow switch
- 6 Thermostatic mixing valve
- 7 Automatic air vent
- 8 Manual air vent (x 2)
- 9 Pressure relief valve
- 10 Filling hose
- 11 Filling loop - cold inler isolating valve
- 12 Filling loop - heating system isolating valve
- 13 Isolating valve - cold inlet
- 14 Isolating valve - heating return
- 15 Non return valve (x 2)

### Connections/pipe

- A Heating system flow - push-fit elbow
- B Heating system return - push-fit elbow
- C Cold water inlet - push-fit elbow
- D Hot water outlet - push-fit elbow
- E Pump isolating valves - heating pump
- F Pump isolating valves - hot water (store) pump
- G Primary inlet to store
- H Primary outlet from store
- I Primary inlet to condensing heat exchanger
- J Primary outlet from condensing heat exchanger
- K Primary return to main heat exchanger
- L Primary flow manifold
- M Primary return manifold
- N Primary flow to heating (store) pump
- O Primary flow to plate heat exchanger
- P Primary return to boiler
- Q Cold water inlet manifold
- R Hot water flow to blending valve
- S Hot water outlet from blending valve

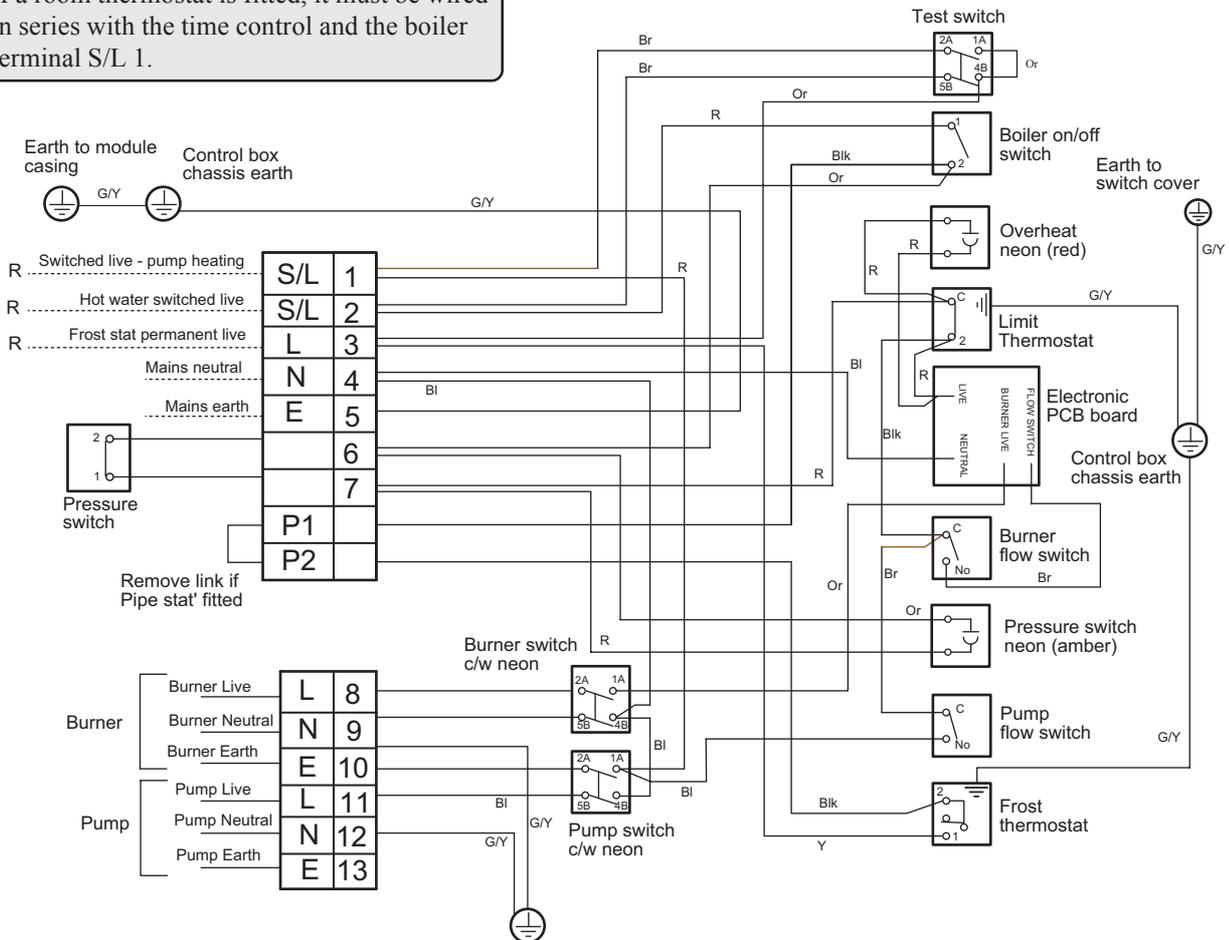
## 12 - WIRING DIAGRAMS

### 12.1 Control panel wiring diagram - Outdoor Combi 90 V3 and Combi Max

Refer to Section .6.

**Note:** If a single channel timer is used, a link **must** be fitted between terminals 2 and 3.

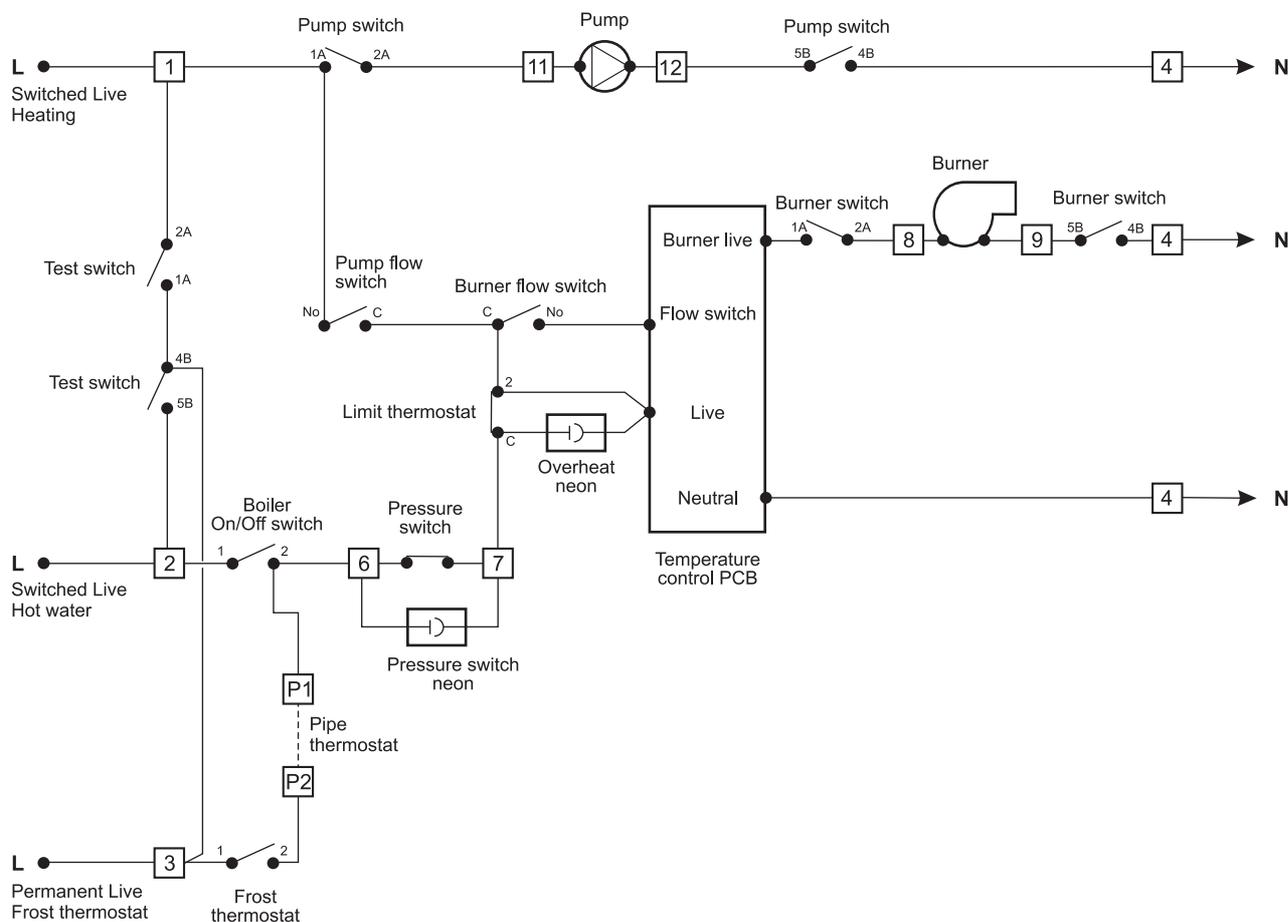
If a room thermostat is fitted, it must be wired in series with the time control and the boiler terminal S/L 1.



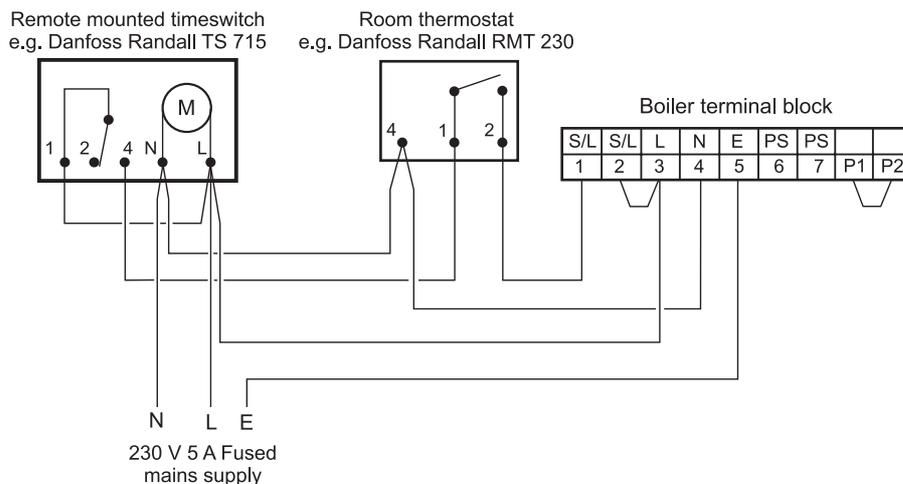
**Colour code:** Br - Brown, R - Red, Bl - Blue, Y - Yellow, G/Y - Green/Yellow, Blk - Black, Or - Orange

## 12 - WIRING DIAGRAMS

### 12.2 Functional flow wiring diagram - Outdoor Combi 90 V3 and Combi Max



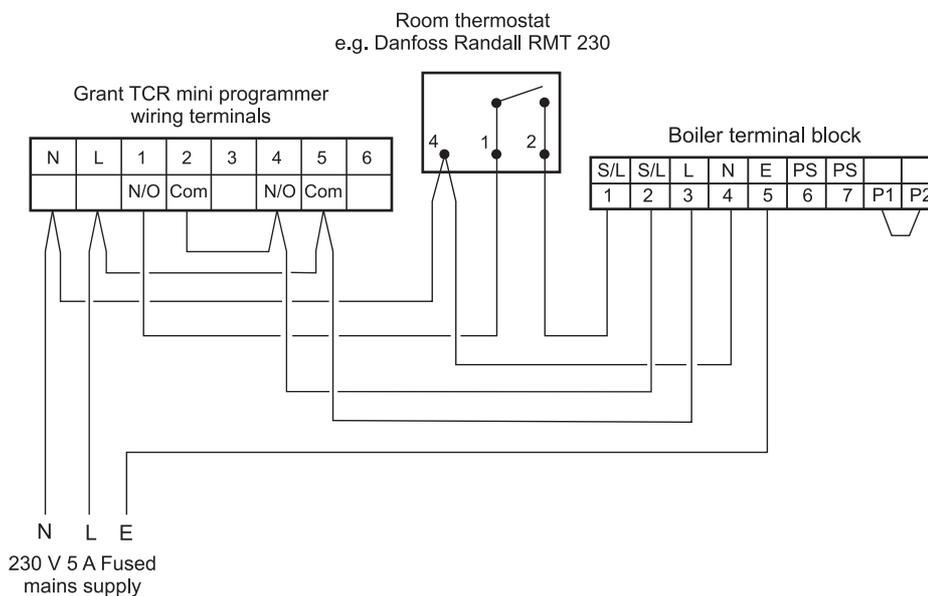
### 12.3 Typical connection of external timer - Outdoor Combi 90 V3 and Combi Max only



## 12 - WIRING DIAGRAMS

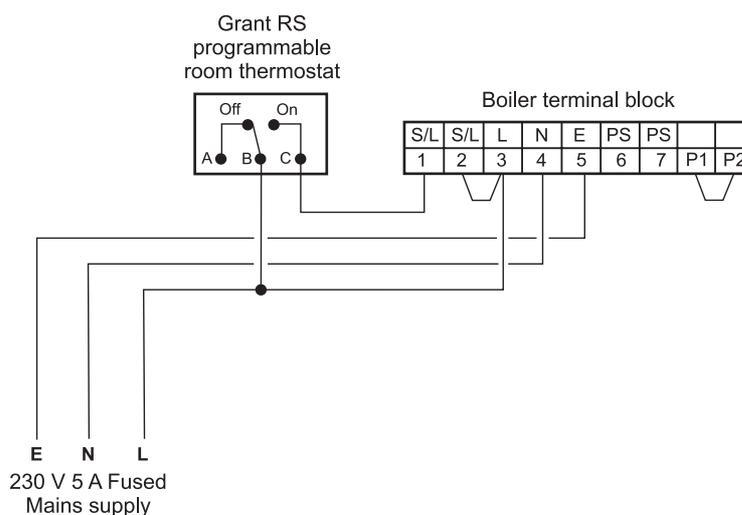
### 12.4 Connection of Grant TCR remote wall mounted programmer - Outdoor Combi 90 V3 & Combi Max only

Refer to Section 6.8.



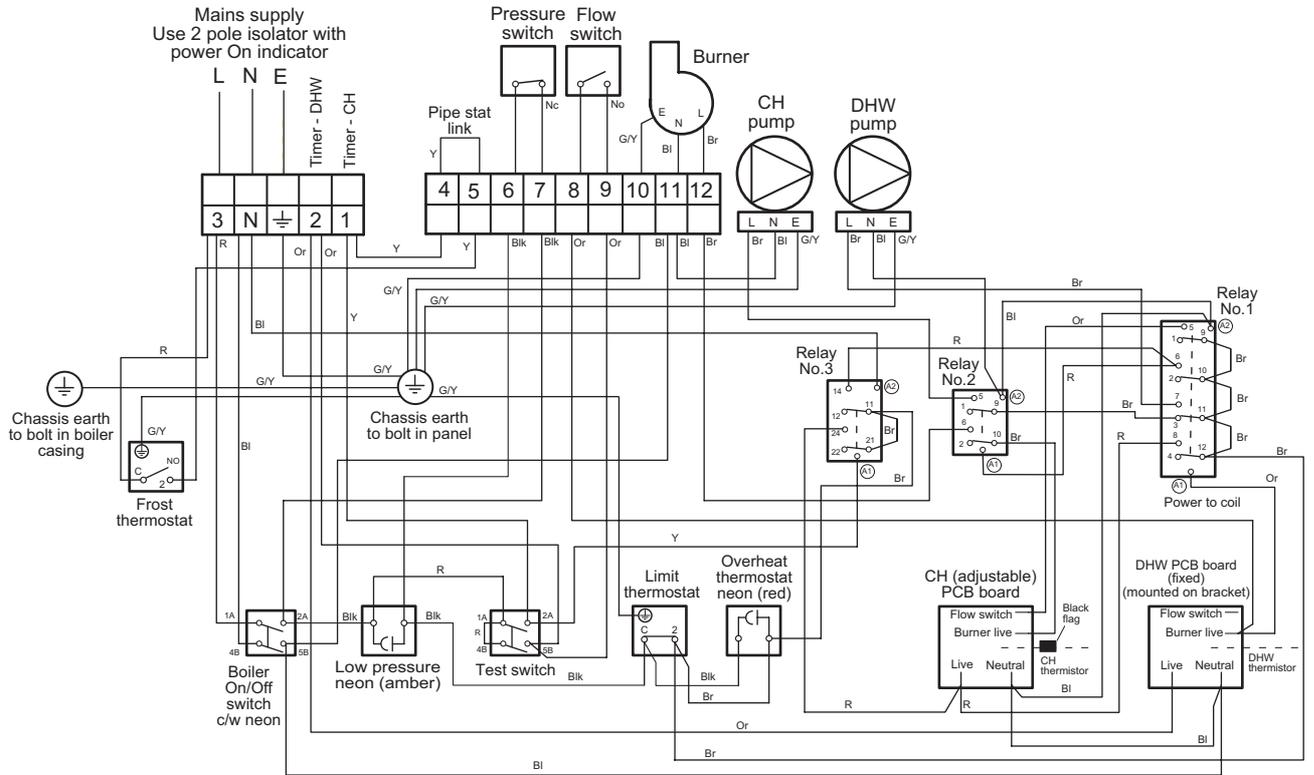
### 12.5 Connection of Grant programmable room thermostat - Outdoor Combi 90 V3 & Combi Max only

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.



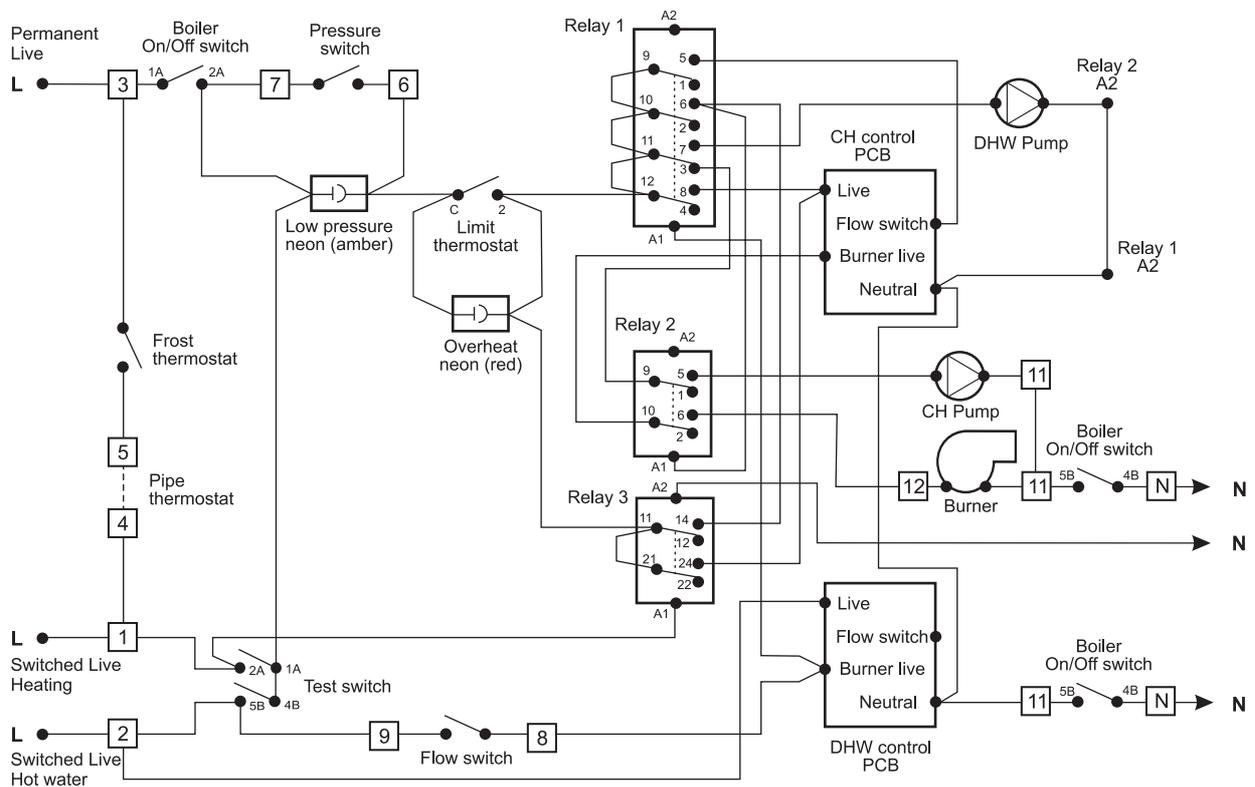
## 12 - WIRING DIAGRAMS

### 12.6 Control panel wiring diagram - Outdoor Vortex Combi

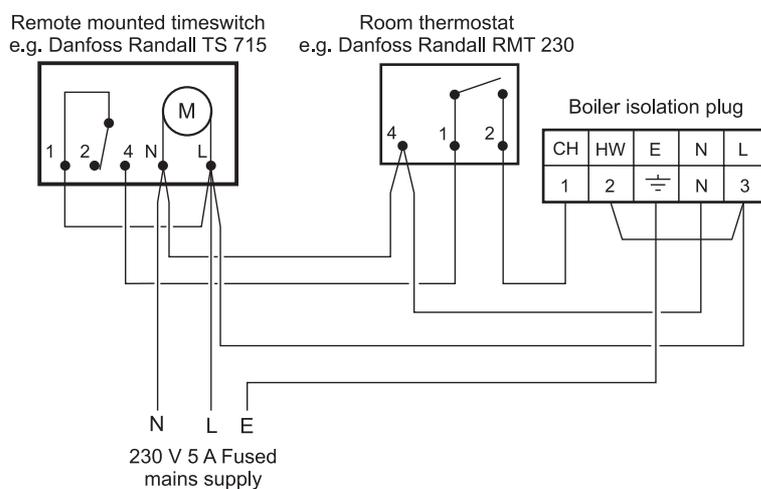


**Colour code:** Br - Brown, R - Red, Bl - Blue, Y - Yellow, G/Y - Green/Yellow, Blk - Black, Or - Orange

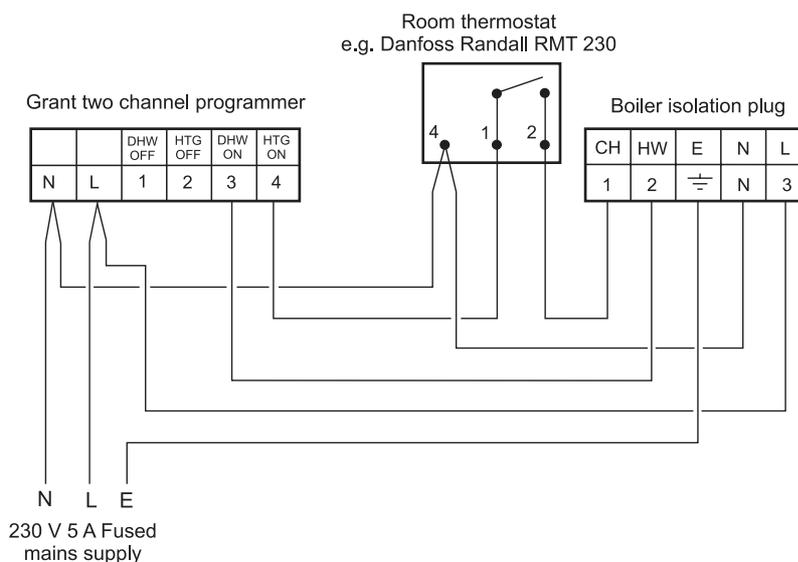
### 12.7 Functional flow wiring diagram - Outdoor Vortex Combi



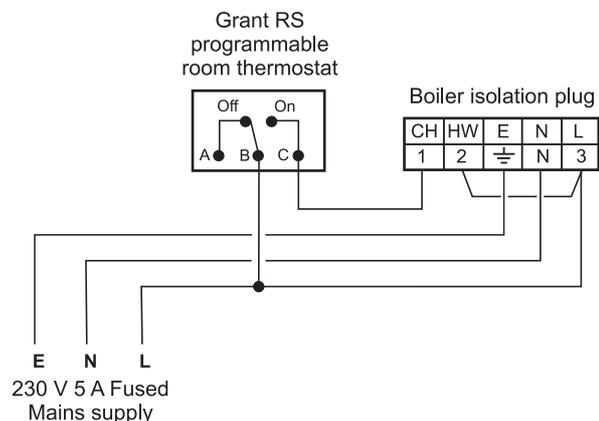
## 12.8 Typical connection of external timer - Outdoor Vortex Combi only



## 12.9 Connection of typical two - channel programmer - Outdoor Vortex Combi only



## 12.10 Connection of Grant programmable room thermostat - Outdoor Vortex Combi only



**13.1 Combi 90 V3, Combi Max and Vortex Combi - Boiler faults on central heating and hot water**

<b>FAULT</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
<b>Boiler will not start</b>	<p>Low pressure cut-out activated (amber neon on panel lit).</p> <p><b>No electrical supply to burner.</b>                      No electrical supply to boiler.                      Check controls are switched on and calling for heat.                      Overheat thermostat has operated (red neon on panel lit).                      Boiler thermostat and/or overheat thermostat faulty.</p>	<p>Refill system to 0.5 - 1.0 bar.</p> <p>Check for 230 V at boiler terminal block.                      Check boiler On/Off switch is set to 'ON'.                      Set boiler thermostat to maximum.                      Check and reset thermostat as necessary.                      Check for 230 V output from BURNER LIVE terminal of heating PCB.                      Check continuity of overheat thermostat - replace as necessary.</p>
<b>Burner lights but goes to lock-out</b>	<p>Fault with burner.</p>	<p>Press reset button - no more than twice.                      If burner does not operate refer to burner fault finding chart.</p>
<b>Burner not lighting</b> Oil & electricity present at burner	<p><b>No fuel supply</b>                      Oil tank empty.                      Isolating valve(s) in fuel supply line closed.                      Fire valve closed.                      Fuel line filter is blocked.                      Oil supply line is air locked.                      Excessive combustion air.                      Fault with burner.</p>	<p>Check tank and refill as necessary.                      Check and open valves as necessary.                      Check and reset as necessary.                      Check and clean as necessary.                      Vent oil supply line at pump.                      Reset burner air damper and check combustion.                      Refer to burner fault finding chart.</p>
<b>Burner fires but smoke visible from flue or high smoke number</b>	<p>Insufficient combustion air supply to burner.</p> <p>Incorrect or faulty nozzle fitted.                      Fuel pressure too high.</p> <p>Insufficient combustion air supply to burner.</p> <p>Contaminated combustion air (balanced flue).                      Insufficient oil flow to burner due to restriction in supply line.                      Excessive combustion air.</p>	<p>Check flue terminal is clear (balanced flue).                      Check room ventilation is adequate (conventional flue).                      Check condition of burner fan.                      Check air damper setting on burner.                      Check nozzle size and type and replace if necessary.                      Check fuel pressure and adjust as necessary.</p> <p>Check as for high smoke number (above).</p> <p>Check the flue terminal is unobstructed                      Connect vacuum gauge to pump and check pump vacuum.                      Check for blockage in filter, fire valve, valves or pipe and rectify.                      Reset burner air damper and check combustion.</p>
<b>Burner pulsates</b>		
<b>Burner cycles On and Off</b>		

**13.2 Combi 90 V3, Combi Max and Vortex Combi - Boiler faults on central heating and hot water - continued**

<b>FAULT</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
<b>Fumes and puffing on starting</b> (Conventional flue)	Flue is blocked. Insufficient flue draught. Flue pipe or liner is too large or existing stack is unlined. Insufficient combustion air supply to burner.	Check flue is clean and unobstructed - rectify as necessary. Check flue draught and improve flue as necessary. Check flue condition/size and alter as necessary. Check as for high smoke number (above). Check that an extract fan is not pulling combustion gases from burner.
<b>Flame slow to stabilise on starting</b>	Insufficient combustion air supply to burner. Incorrect or faulty nozzle fitted. Fuel pressure too low.	Check as for high smoke number (above). Check nozzle size and type and replace if necessary. Check fuel pressure and adjust as necessary.
<b>Oil smells</b>	Oil leak in supply line or burner.	Check all joints and flexible hose for leaks and rectify as necessary.
<b>Combustion fume smells or condensation within casing</b>	Leak around boiler cleaning door. Burner not correctly fitted on mounting flange. Burner seal 'O' ring damaged or missing. Leakage around flue connection. Leakage at condensation trap (Vortex Combi only).	Check gasket, re-tighten nuts or replace gasket as necessary. Remove and re-fit burner ensuring correct fitting. Check and replace 'O' ring as necessary. Check and re-seal flue as necessary. Check discharge pipe correctly fitted into trap.
<b>Overheat thermostat operating</b>	Faulty boiler thermostat. Thermostat sensor not connected to PCB (Vortex Combi only). Faulty overheat thermostat.	Check and replace as necessary. Check and rectify as necessary. Check and replace as necessary.

## 13.3 Combi 90 V3 and Combi Max only - Central heating OK - poor or no domestic hot water

<b>FAULT</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
<b>No water flowing from hot tap</b>	Mains water supply is not connected to cold water inlet of boiler.	Check and rectify as necessary.
	One or more isolating valves, stop cocks, etc. in the pipework are closed.	Open all valves in pipework to and from boiler.
	The cold water isolating valve in the boiler is closed.	Open valve (situated above pump in front of boiler).
	There is a blockage (or blockages) in the pipework.	Check and rectify as necessary.
<b>No hot water operation</b>	Hot tap is not connected to hot water outlet of boiler.	Check and rectify as necessary.
	Insufficient flow of water through boiler.	Check flow is at least 3 litres/min - rectify as necessary.
	Boiler cold water and hot water connections reversed.	Check and rectify as necessary.
	Thermostatic mixing valve incorrectly fitted.	Check hot and cold inlets are connected correctly.
	Pump is not operating in hot water mode.	Check operation of diverter valve. Check pump is free to rotate and is vented. Check for 230V supply to pump.
<b>Low water temperature at tap</b>	Diverter valve microswitch(es) faulty.	Check electrical continuity of pump microswitch.
	Diverter valve microswitches not operated.	Check wiring continuity from pump to microswitch.
	Diverter valve seized.	Check switch continuity, replace if faulty.
	Diverter valve diaphragm failed.	Check diverter valve diaphragm. Remove, dismantle and clean. Replace diaphragm or complete diverter valve.
	Flow of water through boiler too high.	Reduce flow and check water temperature.
	Boiler thermostat incorrectly set	Set boiler thermostat to maximum.
	Thermostatic mixing valve incorrectly set.	Set mixing valve to setting '4.5'.
	Faulty boiler thermostat.	Check continuity and replace if necessary.
	Pump speed setting too low.	Set pump speed switch to maximum (top position).
	Pump is incorrectly fitted.	Check and rectify as necessary.
<b>Hot water for short period only</b>	Burner not firing for hot water (after a short time).	Check operation of burner on central heating. If burner faulty, refer to burner fault finding chart.
	Burner oil pressure set too low at oil pump.	Check electrical continuity of burner microswitch.
	Incorrect oil nozzle fitted to burner.	Check electrical continuity of thermostat. Check operation of diverter valve. Check wiring continuity from burner to microswitch.
		Check and set oil pressure to correct value (see Section 4.3, 4.4, 4.6).
		Check and fit correct nozzle (see Section 4.3, 4.4, 4.6).

**FAULT****No operation on heating****POSSIBLE CAUSE**

Timeswitch either not set, or not in an 'ON' period.  
 Timeswitch not operating.  
 Faulty timeswitch.  
 Faulty timeswitch switch contacts.  
 Timeswitch OK but not switching boiler on.  
 Heating switch on programmer set to 'HOT WATER ONLY'.  
 Room thermostat not calling for heat.  
 Faulty room thermostat.  
 No room thermostat or external timeswitch connected to boiler.

**ACTION**

Check setting and set to 'Constant' to test.  
 Check power supply to timeswitch.  
 Check and replace if necessary.  
 Check continuity of switch, replace if necessary.  
 Check continuity of wiring to timeswitch.  
 Check and set programmer switch to ON to test.  
 Set thermostat to call and check boiler operates.  
 Check continuity of thermostat, replace if necessary.  
 Check on boiler terminal block for 230 V supply to S/L1.

**Flow temperature low**

Boiler thermostat is set too low.  
 Boiler thermostat faulty.  
 Boiler is underfired.  
 Combustion setting of burner incorrect.  
 Boiler heat exchanger is sooted up.

Check and reset as necessary.  
 Check and replace if necessary.  
 Check nozzle size & fuel pressure, correct as necessary.  
 Check settings and correct as necessary.  
 Check boiler & baffles and clean as necessary.

## 13.5 Vortex Combi only - Central heating OK - poor or no domestic hot water

### FAULT

#### POSSIBLE CAUSE

#### ACTION

#### No water flowing from hot tap

Mains water supply is not connected to cold water inlet of boiler.  
 One or more isolating valves, stop cocks, etc. in the pipework are closed.  
 The cold water isolating valve in the boiler is closed.  
 There is a blockage (or blockages) in the pipework.

Check and rectify as necessary.  
 Open all valves in pipework to and from boiler.  
 Open valve fully (located in the top right of boiler).  
 Check and rectify as necessary.

#### No hot water operation

Hot water channel of programmer is set to OFF.  
 Insufficient flow of water through boiler.  
 Hot tap is not connected to hot water outlet of boiler.  
 Boiler cold water and hot water connections reversed.  
 Flow switch is not operating.

Check programmer is set to ON for hot water.  
 Check flow is at least 3 litres/min - rectify as necessary.  
 Check and rectify as necessary.  
 Check and rectify as necessary.  
 Check flow switch is correctly fitted - in line with flow.  
 Check continuity across flow switch between terminals 10 and 11.  
 Set HW channel on programmer to ON - burner and hot water pump should start.

Primary store (hot water) pump is not operating.  
 Faulty Hot Water PCB sensor.  
 Faulty Hot Water PCB.

Check for 230 V supply to pump with water on.  
 Replace sensor and check operation.  
 Check for 230 V output from 'Burner' terminal on PCB.  
 If no output - replace Hot Water PCB and check operation.

Relay No.1 faulty - not switching.

Check for 230 V to 'Flow switch' terminal of Heating PCB.

#### Low water temperature at tap

Flow of water through boiler too high.  
 Thermostatic mixing valve incorrectly set.  
 Primary store (hot water) pump speed too low.  
 Faulty Hot Water PCB sensor.  
 Faulty Hot Water PCB.

Reduce flow and check water temperature.  
 Set mixing valve to setting '4.5'.  
 Check pump speed is set to maximum - setting 3.  
 Replace sensor and check operation.  
 Check for 230 V output from 'Burner' terminal on PCB.  
 If no output - replace Hot Water PCB and check operation.

#### Hot water for short period only

Burner not firing for hot water (after a short time).  
 Note: Burner will not necessarily fire as soon as tap is opened.  
 Burner oil pressure set too low on oil pump.  
 Incorrect nozzle fitted to burner.

Check operation of boiler on heating - set switch to 'Constant'.  
 If burner faulty, refer to burner fault finding chart.  
 Check and set oil pressure to correct value (see Section 4.3, 4.4, 4.6).  
 Check and fit correct nozzle (see Section 4.3, 4.4, 4.6).

**FAULT****No operation of boiler on heating**

**POSSIBLE CAUSE**

Boiler switch is set to OFF.  
 Room thermostat (if fitted) not calling for heat.  
 Programmer/timeswitch either not set or not in an ON period.  
 Programmer/timeswitch not operating.  
 Faulty programmer/timeswitch.  
 Faulty programmer/timeswitch contacts.  
 Faulty room thermostat.  
 No room thermostat or external timeswitch fitted.  
 Faulty Heating PCB sensor.  
 Faulty Heating PCB.  
 Faulty relay No. 2.

**ACTION**

Check boiler On/Off switch is set to ON (on boiler control panel).  
 Set thermostat to call for heat and check boiler operates.  
 Check setting and set to **CONSTANT** to check boiler operates.  
 Check power supply to timeswitch.  
 Check and replace as necessary.  
 Check continuity of switch and replace as necessary.  
 Check continuity of thermostat and replace if necessary.  
 Check for 230 V supply to terminal 1.  
 Replace sensor and check operation.  
 Check for 230 V output from BURNER LIVE terminal.  
 If no 230 V output - replace PCB.  
 Check for 230 V supply to burner - between relay terminals 6 & 10.  
 Check for 230 V supply to heating pump - between relay terminals 5 & 9.

**Flow temperature low**

Boiler temperature control set too low.

Check and set as necessary.

**Little or no heating flow**

Heating pump speed too low.

Check pump speed and set as required.

Heating pump not operating.

Check for 230 V supply to pump.

Primary store sensor not operating correctly.

Check sensor is correctly located in pocket on front of store.  
 Check sensor lead is correctly connected to Hot Water PCB.

Faulty relay No. 1.

Check for 230 V supply to Hot water pump.

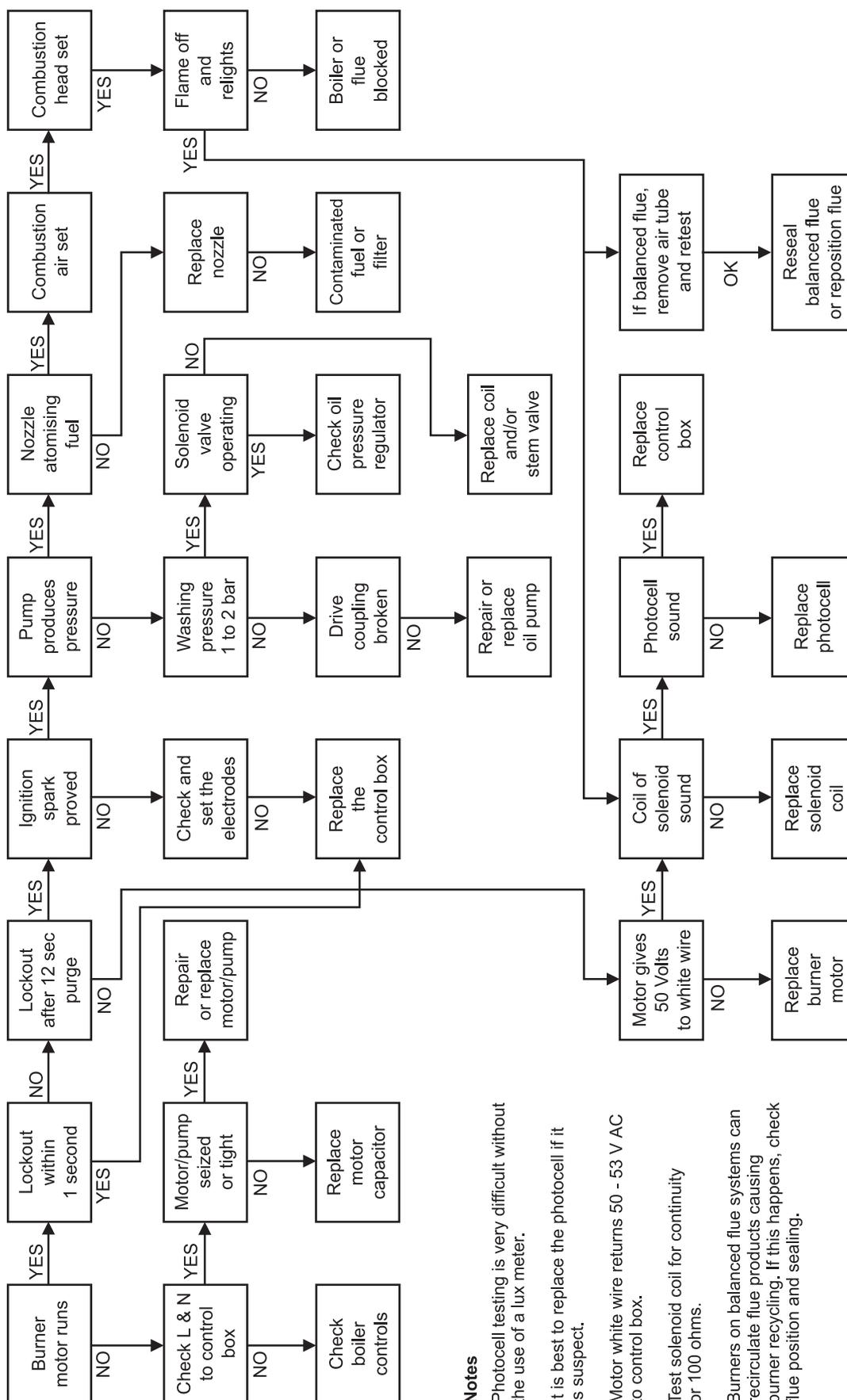
**ATTENTION**

If either sensor is disconnected from it's respective PCB, then that PCB will operate as if there is no demand present and the 230 V from the BURNER LIVE terminal will be interrupted, producing the following conditions:

**Heating PCB sensor disconnected** - Burner and heating pump will stop.

**Store (hot water) PCB sensor disconnected** - Store pump will stop. The boiler will continue to operate and provide flow to the heating system, but will not heat the store or provide domestic hot water.

13.7 Riello RDB burner fault finding



Notes

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

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

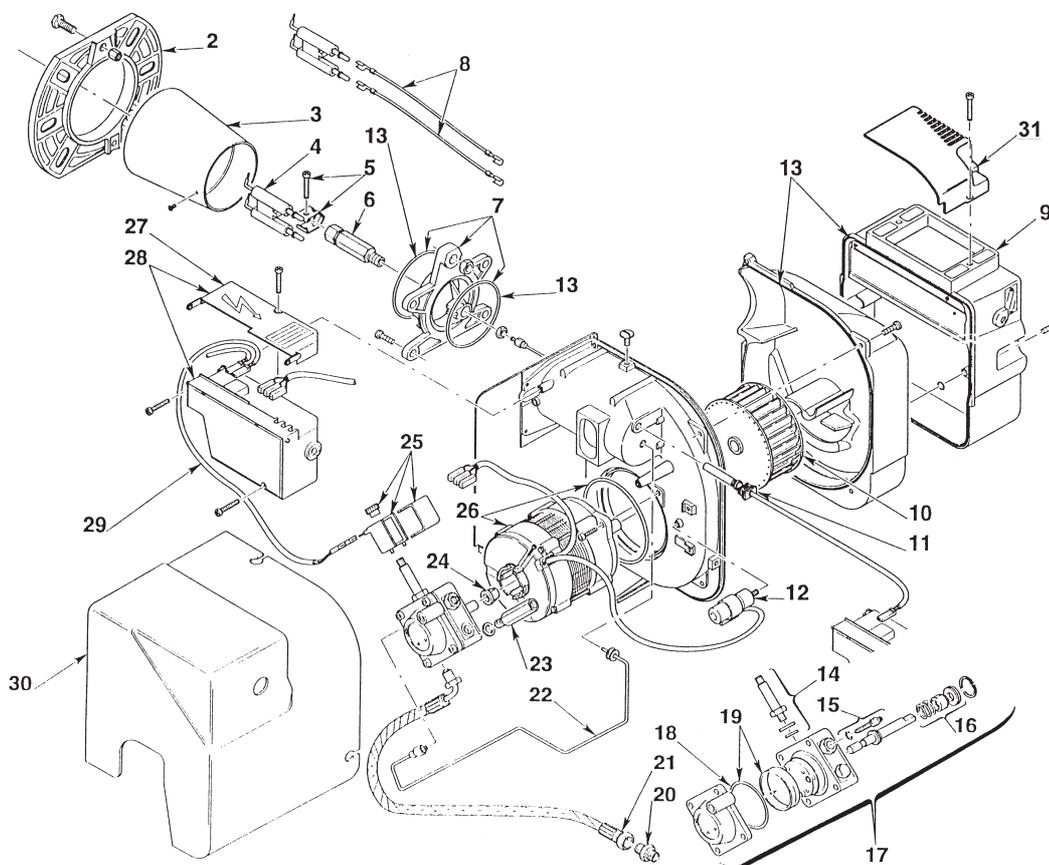
Motor white wire returns 50 - 53 V AC to control box.

Test solenoid coil for continuity or 100 ohms.

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

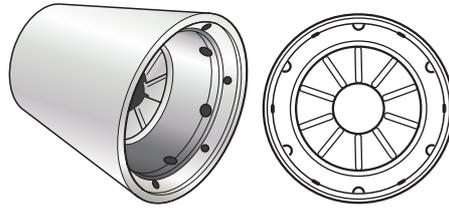
## 14 - BURNER SPARE PARTS

### 14.1 Riello RDB burner - exploded view

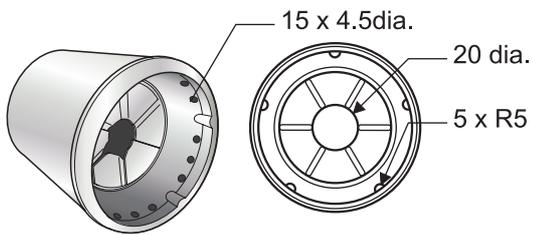


Key No.	Description	Riello Part No.	Grant Part No.	Key No.	Description	Riello Part No.	Grant Part No.
1	Not applicable	-	-	15	Regulator	3008651	RBS120
2	Flange	3005786	RBS28	16	Pump seal	3000439	RBS14
3	Combustion head LD3 (90V3)	3008768	RBS127	17	Pump	3008654	RBS101
3	Combustion head T2 (Vortex 26)	3002423	RBS147	18	'O' ring	3007162	RBS08
3	Combustion head T5 (Max & Vortex 36)	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 (90V3 & Vortex 26)	3005708	RBS39	26	Motor	3002836	RBS102
10	Fan (Max & Vortex 36)	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
14	Needle valve	3007582	RBS109	31	Air intake cover		RBS152

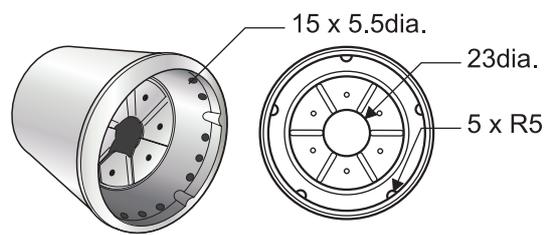
*Burner Heads*



LD3 Combustion head  
Combi 90 V3



T2 Combustion head  
Vortex Combi 26



T5 Combustion head  
Combi MAX and Combi 36

## 15 - 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:

### *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.

## *16 - EC DECLARATION OF CONFORMITY*

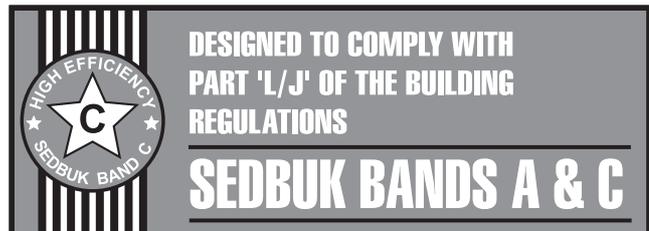
We declare that the Combi 90 V3, Combi Max, Vortex Combi 26 and Vortex Combi 36 Oil Boilers equipped with Riello RDB burner approved to EN 267: 1991 satisfy the requirements of the following European Directives:-

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)



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

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



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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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