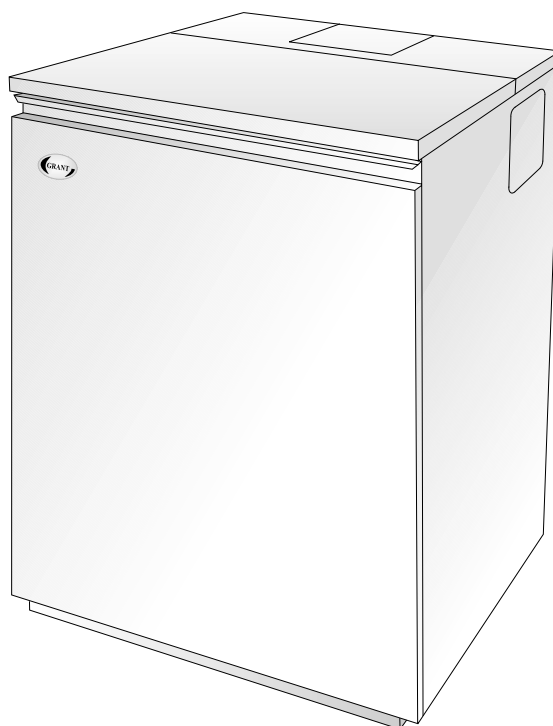


Part No. DOC 53 Rev. 01 November 2004

USER, INSTALLATION
and
SERVICING INSTRUCTIONS

COMBI 90 V3 MAX

For use with Kerosene or Gas Oil



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

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



1.1 About your boiler

Your Combi 90 V3 MAX 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 boiler may be fitted with either an electronic 7-day timer or mechanical 24-hour timer. Alternatively, your installer may have fitted a separate timer, in a convenient position remote from the boiler.

Whichever type of timer is connected to your boiler, it will allow you to set the operating times of the central heating. Domestic hot water is available continuously, provided the boiler is switched on, irrespective of the settings on the timer.

1.2 Control switches (see Fig. A)

- 1 Heating switch** - When set to TIMED the boiler will only provide central heating during the 'on' periods set on the timer. When set to the HOT WATER ONLY position the boiler will not provide central heating. When set to the CONSTANT position the boiler provides central heating continuously, overriding all of the timer settings.

- 2 Boiler On/Off** - This switches the boiler On/Off

Note: The timer will still operate with this switch set to OFF, providing the electricity supply to the boiler is still switched on, but the boiler will not operate to provide domestic hot water.

1.3 Lighting your boiler (see Fig. A)

- 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 Heating switch is set to TIMED, the black pointer on the pressure gauge is not below the red pointer, the room thermostat (if fitted) is at the desired setting and the timer is correctly set.
 - Switch on the electricity supply to the boiler.
 - Set the On/Off switch to ON.
 - The boiler will light automatically to heat the water stored in the boiler.
- If the timer 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.

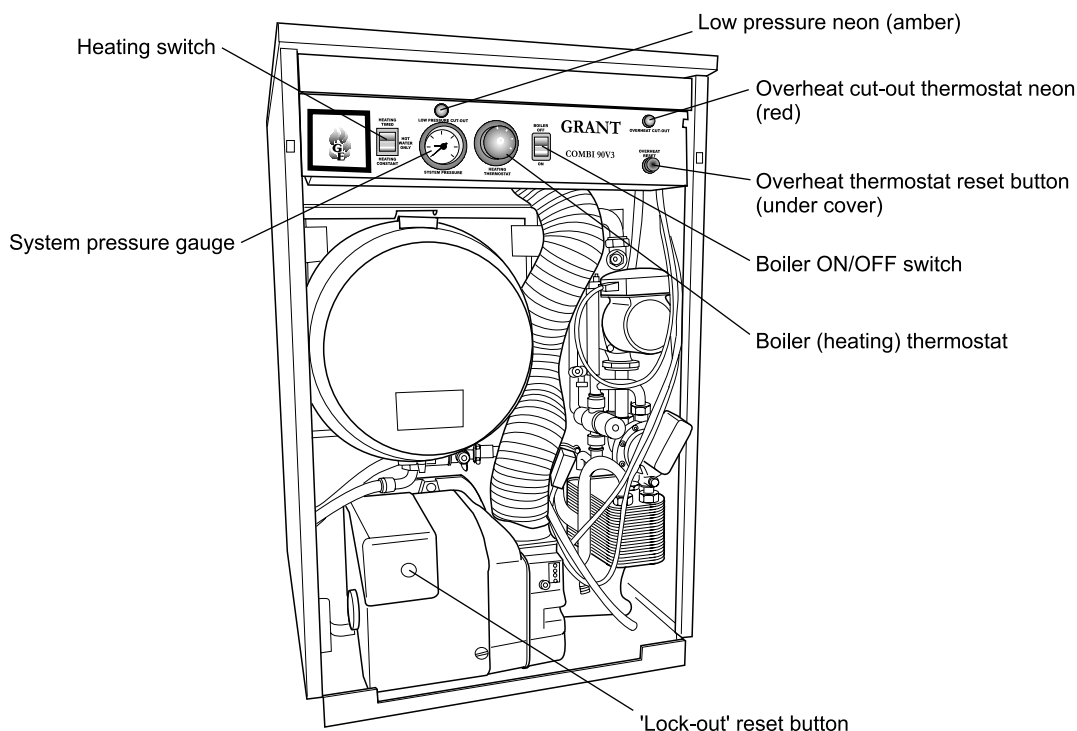


Fig. A - Boiler Controls



1 - USER INSTRUCTIONS

1.4 Turning off your boiler (see Fig. A)

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 in Section 1.3.

1.5 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 is working and is in an 'on' period.
- 3 Check that all thermostats are set to the desired setting and are calling for heat.
- 4 Check if the burner 'Lock-out' reset button is lit. If it is, press it to start the burner. If the burner fails to light and goes to 'Lock-out' again, check that you have sufficient fuel in the storage tank and that the fuel supply valve is open.
- 5 Ensure that a fuse has not blown or that the electricity supply has not failed.
- 6 Check to see if the safety thermostat has operated (see note 5 in Section 1.9).
- 7 Check that the black 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. The system must be recharged to 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.

1.6 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.

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.

1.7 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), to indicate the system pressure (when cold). **Do not** adjust this pointer. The black pointer indicates the actual system pressure which will increase slightly when the boiler is operating. If the black 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. The system must be recharged to 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 temperature of the water leaving the boiler to the radiators can be increased by turning the boiler (heating) thermostat (see Fig. A) clockwise.

With the Heating switch set to TIMED, the boiler will provide central heating whenever the timer is in an 'on' period and the room thermostat (if fitted) is calling for heat. For summer time operation, when central heating is not required, set the Heating switch (see Fig. A) to HOT WATER ONLY.

1.8 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 to switch the heating on at least 30 minutes before hot water will normally be required in the morning (or evening).

When setting the times for the 'on' periods it is useful to remember 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.



Do not forget that if you require central heating during an 'off' period, simply set the Heating switch to **CONSTANT**, remember the switch must be reset to **TIMED** at a later time for the timer to return to your pre-set periods.

1.9 General notes and care of your system

- 1 Control switches** - Refer to Section 1.2.
- 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 orange light will illuminate. The system must be recharged to 1 bar. If the heating system loses pressure on a regular basis then contact your Installer to investigate the cause.
- 3 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 to 85°C. For optimum hot water operation, ensure this is set to **at least 80°C**.
- 4 Burner Lock-out reset button** - If there is a burner malfunction, a built-in safety circuit switches the burner off and the Lock-out reset button will light. Usually such malfunctions are short lived and pressing the reset button will restore normal operation.
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.
- 5 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 (see Fig. A) 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), press the button then replace the cap.
If this condition continually repeats, contact your Service engineer.
- 6 Ventilation** - Always ensure that the boiler has adequate ventilation. Any ventilation openings provided by the Installer **must not** be obstructed. Periodically check that they are clear.
Do not attempt to 'box in' the boiler or build a compartment around it before consulting your Installer.
Do not place any combustible material around or on the boiler or flue pipe.

- 7 Flue terminal** - The flue terminal on the outside wall **must not** be obstructed or damaged.
In severe conditions check that the terminal does not become blocked by snow.
- 8 Frost protection** - Your Installer may have fitted a frost thermostat. If not, and you are likely to be away for a short time, leave the boiler on with the boiler thermostat set at a low setting. For longer periods the boiler and system should be drained. Contact your Service engineer for draining and filling the system.
- 9 Cleaning and servicing** - Lightly wipe over the case with a damp cloth and a little detergent. **Do not** use abrasive pads or cleaners.
You should have your boiler serviced at least once a year to ensure safe and efficient operation. Contact your Service engineer for further details.
- 10 Failure of electricity supply** - If the electricity supply fails, the boiler will not operate. It should relight automatically when the supply is restored.

1.10 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 balanced flue installations (flue terminal through the wall) must only be used with Kerosene, unless the flue terminal is higher than 2.0 m above outside ground level.

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.

1.11 Electricity supply

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

Warning: This appliance must be earthed.



2 - BOILER TECHNICAL INFORMATION

2.1 Boiler technical data

Model		Combi 90 V3 MAX
Boiler water content	litre	40
	gal	8.8
* Weight (dry)	kg	159
	lb	350
Max. heat input (Kerosene)	kW	36.8
	Btu/h	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
Flue size (conventional)		100 mm (4 in) diameter
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		90 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)
Conventional flue		Minimum flue draught - 8.7 N/m² (0.035 in wg)
		Maximum flue draught - 37 N/m² (0.15 in wg)

* Weight includes burner but excludes flue



2.2 Combi 90 V3 MAX oil boiler using class C2 kerosene

Note: All boilers are despatched for use with kerosene.

Heat Output (kW) (Btu/h)		Net Heat Input (kW) (Btu/h)		Net eff. ** (%)	Head type	Nozzle size	Oil press. (bar)	Smoke No.	Fuel flow rate (kg/h)	Net flue gas temp. (°C)	CO ₂ (%)
33.3	113 600	36.8	125 500	91.5	T5	1.00/80°EH	9.0	0 - 1	3.10	190	12.0

2.3 Combi 90 V3 MAX oil boilers using class D gas oil

Heat Output (kW) (Btu/h)		Net Heat Input (kW) (Btu/h)		Net eff. ** (%)	Head type	Nozzle size	Oil press. (bar)	Smoke No.	Fuel flow rate (kg/h)	Net flue gas temp. (°C)	CO ₂ (%)
33.3	113 600	36.8	125 500	91.5	T5	0.75/80°S	12.0	0 - 1	3.15	200	12.0

Notes:

- 1 The data given above is approximate only. The Kerosene table 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 low level balanced flue, unless the flue terminal is higher than 2.0 m above outside ground level.
- 4 The installer **must** amend the boiler data label if the type of fuel and nozzle used are changed.
- 5 Net flue gas temperatures given are $\pm 10\%$.
- 6 ** Net thermal efficiency (BSRIA).
- 7 Flue gas temperatures taken at combustion door test point will be approximately 45° C higher.

2.4 Approximate air damper settings

Note: Burners are supplied factory set at the outputs shown.

When commissioning, or when the type of fuel is changed, the air damper **must** be adjusted to obtain the correct CO₂ level and the Installer **must** amend the data label.



2.5 Boiler dimensions

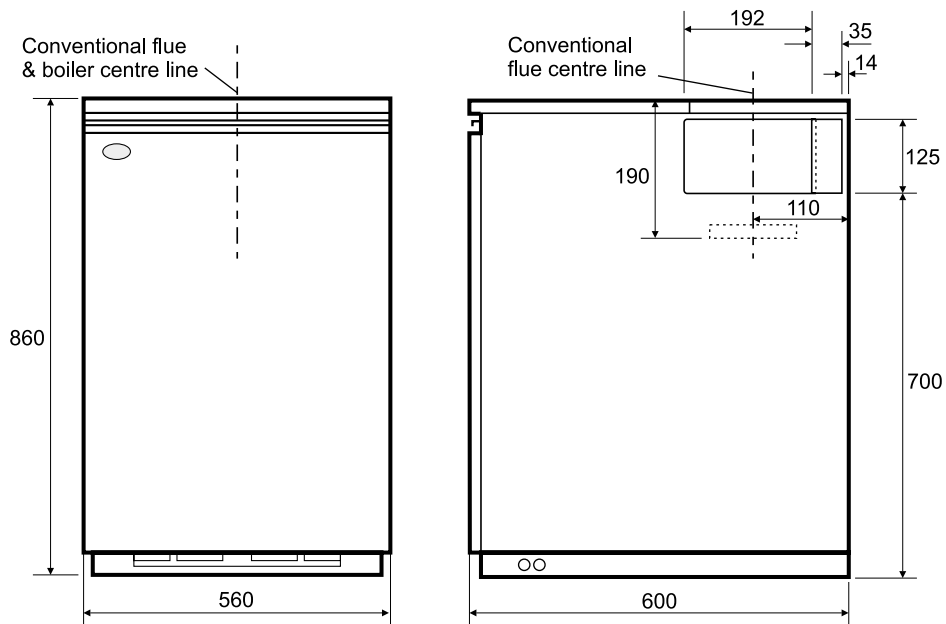


Fig. 1

Note: Water connections may be from the rear, left or right hand side. If using side exit flue, it **must be** on the opposite side to the water connections.

2.6 Water schematic of boiler

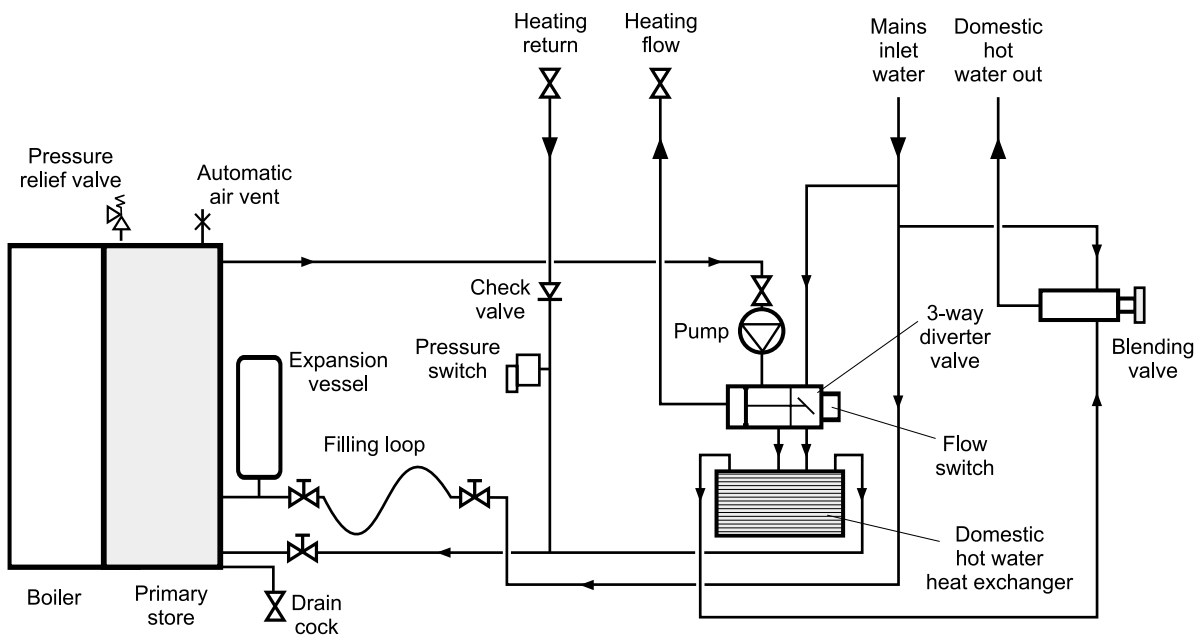


Fig. 2



3.1 Boiler description

The Combi 90 V3 MAX automatic pressure jet oil boilers have been designed for use with a sealed central heating system and will provide domestic hot water at mains pressure.

The boiler is supplied with the burner fitted and suitable for a conventional flue. If the boiler is to be used with a balanced flue, a Balanced Flue Kit is required.

The burner is ready to connect 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 from Grant Engineering (UK) Limited, for two-pipe oil supply system.

As supplied, the burner is suitable for use with Class C2 kerosene. If required, it can easily be adapted for use with Class D gas oil.

Note: Only Kerosene may be used with low level balanced flue models, unless the flue terminal is higher than 2.0 m above outside ground level.

If the fuel to be used is Gas Oil, it will be necessary to change the burner nozzle. Refer to the Technical Information in Section 2.3. To change the nozzle, remove the burner from the boiler then remove the nozzle as described in Section 8.4. The installer **must** amend the boiler data label accordingly.

The temperature of the water leaving the boiler to heat the radiators is User adjustable from 75 to 85°C, however, to achieve the optimum hot water performance the boiler thermostat should be set to maximum.

The boiler control panel has the facility to accommodate a plug-in timer to allow the user to set the operating times for the central heating. Two plug-in timer options are available - either a 24-hour mechanical timer or a 7-day electronic timer.

Alternatively, an external timer, located remotely from the boiler in a convenient position for the user, may be connected to the boiler for this purpose - the Grant TCR kit is ideal. Refer to Section 10 - Wiring diagrams.

A programmable electronic room thermostat, Part No. RSKIT is also available from Grant UK.

Domestic hot water is available at all times, provided the boiler is switched on.

3.2 Regulations to comply with

Installation of a 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 14 on page 46.

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.



3 - GENERAL BOILER INFORMATION

3.3 Delivery

The boilers are supplied as Conventional flue models, if a Balanced flue version is ordered, a Balanced Flue Kit is required. The following flue kits are available from Grant UK. Refer to Section 3.11 for further details.

Yellow system - Standard low level balanced flue

Short low level balanced flue
225 mm, 450 mm and 675 mm extensions
90° extension elbow
45° extension elbow
45° elbow

Green system - Standard external high level/vertical flue

starter kit (room sealed)
Short external high level/vertical flue starter kit (room sealed)
150 mm, 250 mm 450 mm and 950 mm extensions
195 - 270 mm adjustable extension
45° elbow
High level terminal
Vertical terminal

White system - High level balanced flue kit

225 mm, 450 mm and 950 mm extensions
275 - 450 mm adjustable extension
45° elbow
Vertical concentric balanced flue kit
225 mm, 450 mm and 950 mm extensions
275 - 450 mm adjustable extension
45° elbow

3.4 Fuel supply

3.4.1 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.

3.4.2 Fuel pipes

- 1 Fuel supply pipes should be of copper tubing with an internal diameter of at least 8 mm.
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 (outside) where it enters the building. Recommendations are given in BS 5410:1:1997.
- 4 A metal bowl type filter with a replaceable micronic 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).
- 6 The flexible fuel lines supplied should be inspected annually when the boiler is serviced and replaced at least every two years.

3.4.3 Single pipe system - (See Fig. 3)

- 1 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.
- 2 As supplied the burner is suitable for a single pipe system.

3.4.4 Two pipe system - (See Fig. 4)

- 1 When the storage tank outlet is below the burner, the two pipe system should be used. The pipe runs should be as shown in Fig. 4. The return pipe should be at the same level in the tank as the supply pipe, both being 75 to 100 mm above the base of the tank. The pipe ends should be a sufficient distance apart so as to prevent any sediment disturbed by the return entering the supply pipe.
- 2 Avoid the bottom of the tank being more than 3 m below the burner.
- 3 A non-return valve should be fitted in the supply pipe together with the filter and fire valve. A non-return valve should be fitted in the return pipe if the top of the tank is above the burner.

- 4 To be used with a two-pipe system, the burner **must** be fitted with an additional flexible fuel line (a flexible fuel line (600 mm) and $\frac{3}{8}$ " to $\frac{1}{4}$ " BSP male adaptor are available from Grant Engineering (UK) Limited - Part No. RBS104).
See Section 3.4.6.

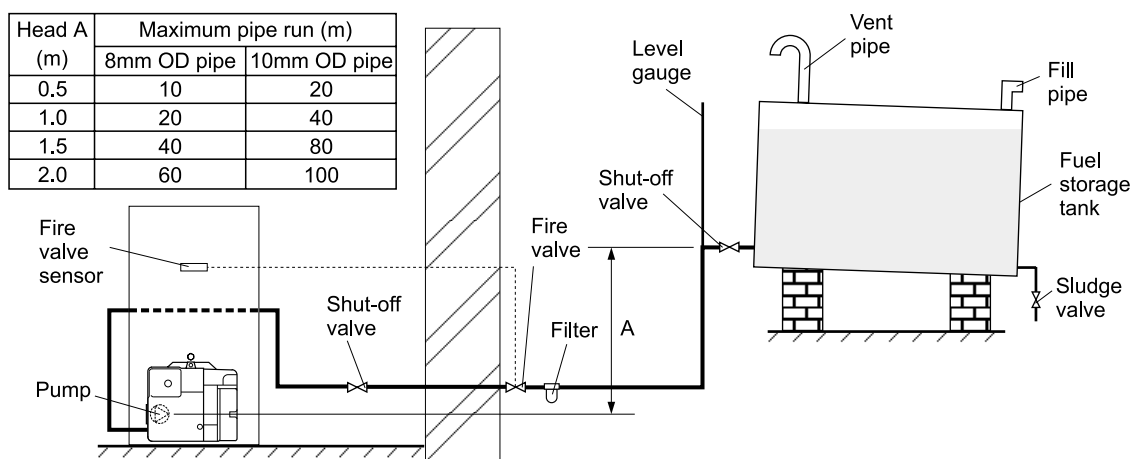


Fig. 3 - Single pipe system

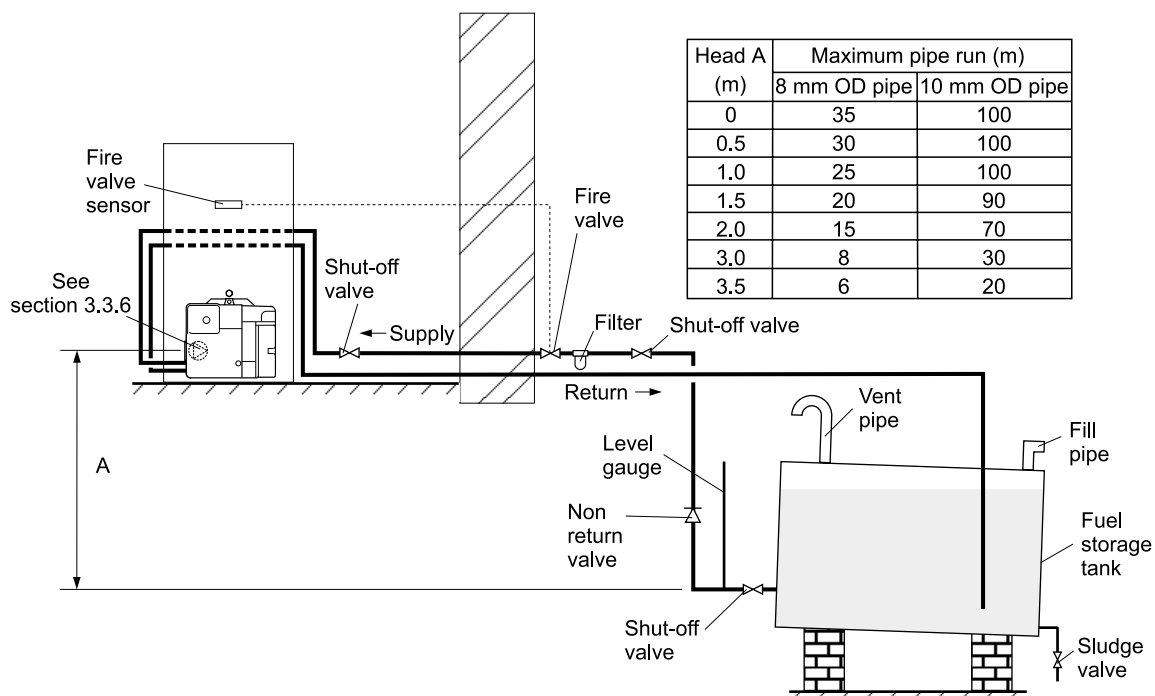


Fig. 4 - Two pipe system

- 5 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

3.4.5 Tiger Loop system - (See Figs. 5 and 6)

- 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. 5. Refer to the manufacturers instructions supplied with the Tiger Loop. The Tiger Loop **must** be mounted vertically.

Note: To prevent any possibility of fuel fumes entering the building, the Tiger Loop **must** be fitted outside.

- 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 from Grant Engineering (UK) Limited - Part No. RBS104). See Section 3.4.6.



3 - GENERAL BOILER INFORMATION

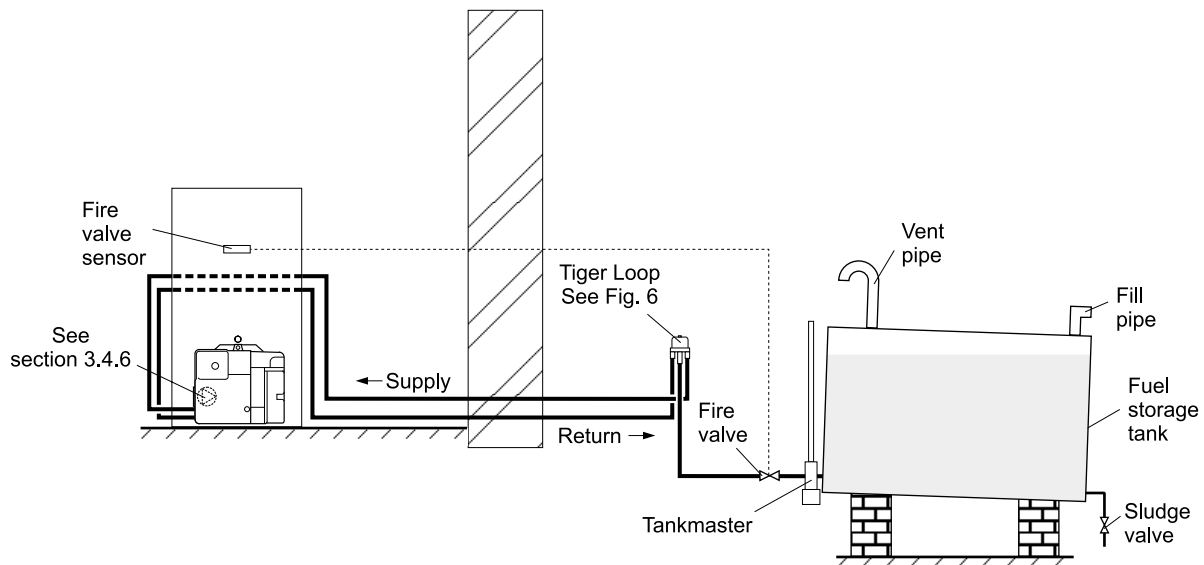


Fig. 5 - Tiger loop system

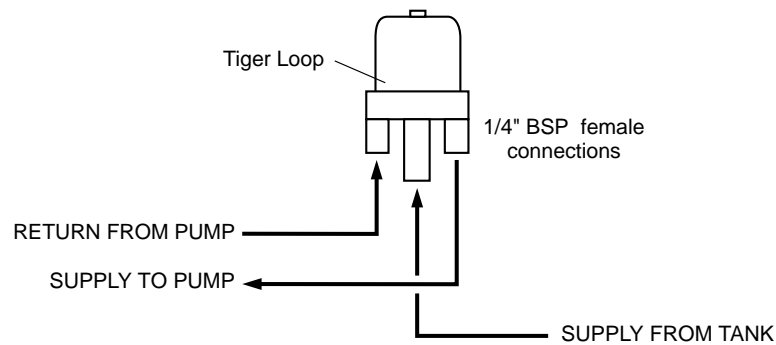


Fig. 6 - Tiger loop

3.4.6 Two pipe oil supplies

See Fig. 7

- 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. 7) 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.

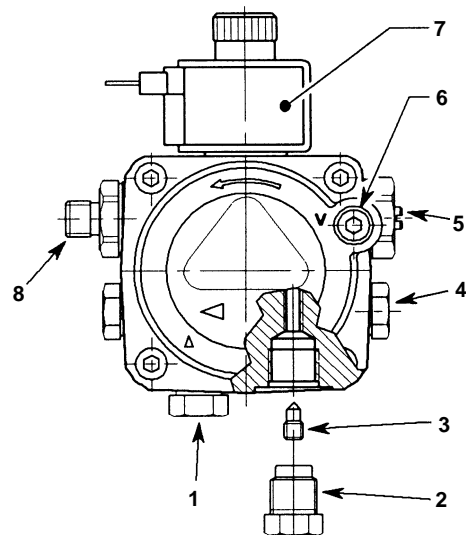


Fig. 7 - RDB pump

- | | |
|-----------------------------|---------------------------|
| 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 |



- 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 from Grant Engineering (UK) Ltd.
- 8 The burner cover may be left off until the boiler is commissioned.

3.5 Underfloor heating systems

See Fig. 8

On underfloor systems it is essential that the return is pre-heated by mixing flow water into the return before it enters the boiler. The return temperature **must be** maintained above 55°C to prevent internal corrosion of the boiler water jacket.

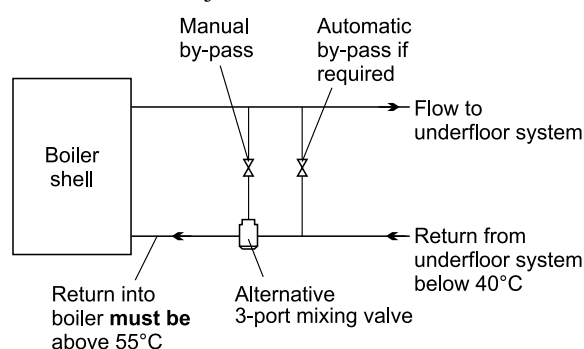


Fig. 8 - Underfloor system

3.6 Pipework materials

Sealed systems - The boiler incorporates a sealed heating system, only copper or steel tube may be used.

Underfloor systems - Plastic pipe may be used on underfloor systems where the plastic pipe is fitted after the thermostatic mixing valve. Copper tube must be used for the primary pipework between the boiler and the underfloor mixing/blending valves.

3.7 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 mm² PVC as specified in BS 6500, Table 16.
- 5 All the wiring external to the boiler must be in accordance with the current I.E.E. Wiring Regulations.
- 6 Any room thermostat or frost thermostat used must be suitable for use on mains voltage.
- 7 The boiler requires a permanent mains supply, do not interrupt it with any external time control.
- 8 In the event of an electrical fault after installation of the boiler, the following electrical system checks must be carried out:- Short circuit, Polarity, Earth continuity and Resistance to earth.

3.8 Air supply

See Figs. 9 and 10

A sufficient permanent air supply to the boiler should be provided:

- a For proper combustion of fuel and effective discharge of combustion products to the open air.
- b For the ventilation of any confined space in which the boiler is installed to prevent overheating of the boiler any equipment in and near the boiler.
- c For the satisfactory operation of any draught stabiliser which may be fitted.

It should be both the designer's and installer's concern that the air required for these functions be introduced so as to cause as little discomfort as possible to the building occupants and thus to offer them the least temptation to obstruct the ventilators.

Further details may be obtained from BS 5410:1:1997.

Notes:

For a boiler fitted in a compartment, which is ventilated as shown, no additional allowance is necessary.

Open flue - Extract fans, where needed, should be in accordance with Section 4.4.7 in BS 5410 Part 1 1997.



3 - GENERAL BOILER INFORMATION

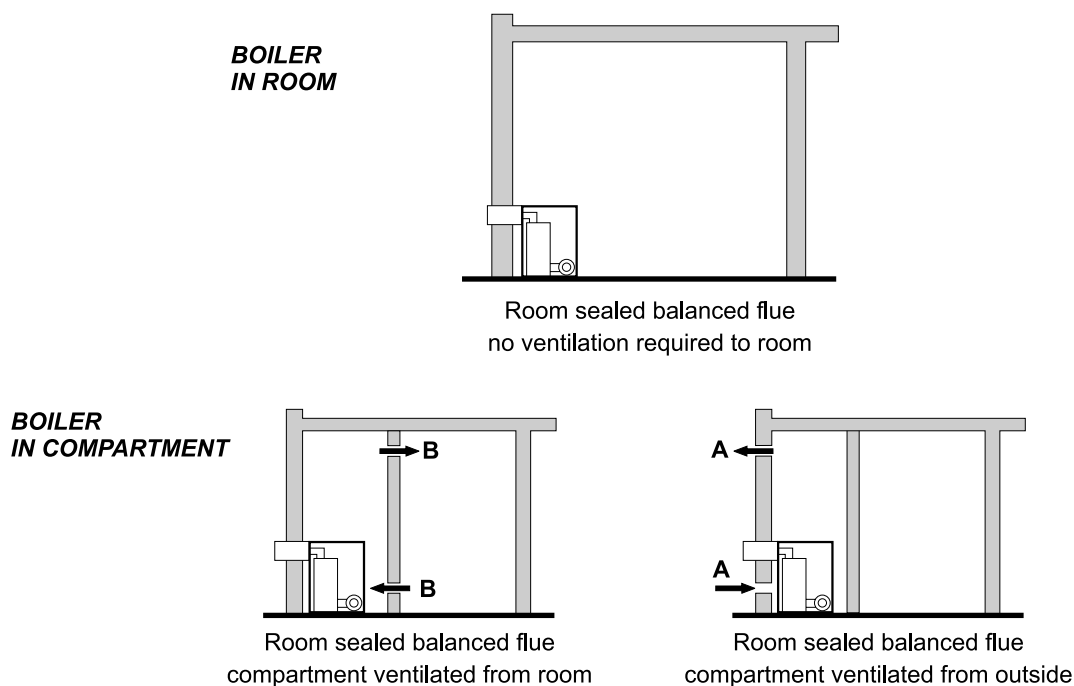


Fig. 9 - Air supply for room sealed balanced flue boilers

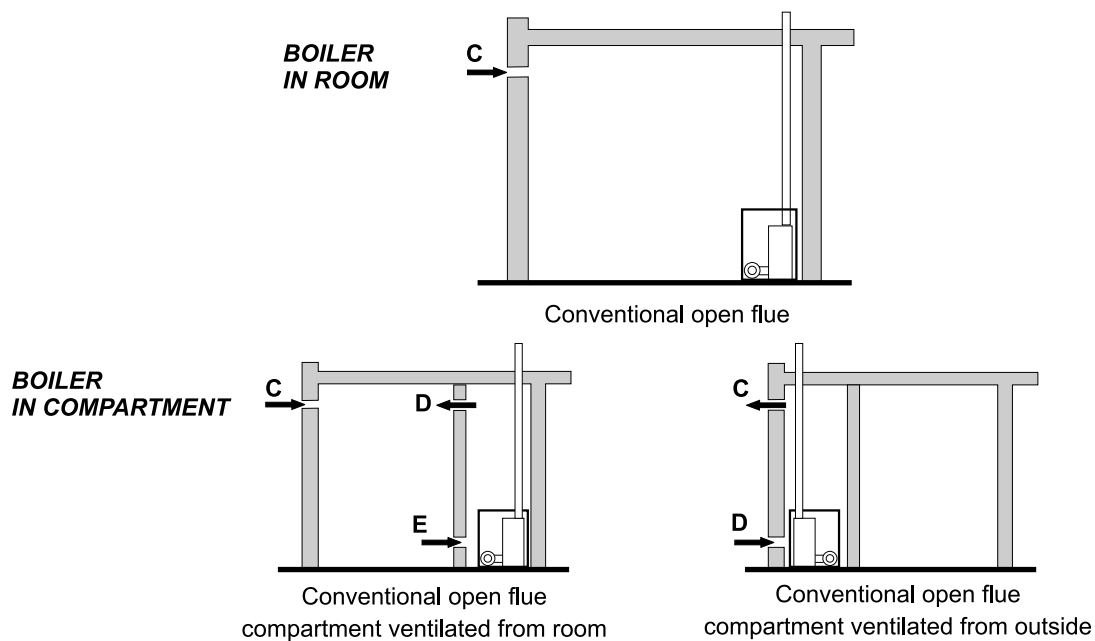


Fig. 10 - Combustion and ventilation air supply for conventional flue boilers

Minimum size of air vents required - see Figs. 9 and 10

	Combi 90 V3 MAX
Vent A	194 cm ² (30 in ²)
Vent B	388 cm ² (60 in ²)
Vent C	166 cm ² (26 in ²)
Vent D	388 cm ² (60 in ²)
Vent E	580 cm ² (90 in ²)



3.9 Conventional flue system

See Fig. 11

Grant boilers have high operating efficiencies. Care must be taken to ensure the flue system is suitable for the low flue gas temperatures.

- 1 An insulated flue terminating in a down draught free area, i.e. at least 1 m above the point of exit through the roof or preferably above the ridge level, will normally provide the necessary draught of at least 8.7 N/m^2 (0.035 in wg) as measured close to the boiler connection. If a draught of 37 N/m^2 (0.15 in wg) or more is measured, then a draught stabiliser should be fitted in the flue.
- 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 If an existing chimney is used, it must be lined with a stainless steel liner for use with fuel oil. The top and bottom of the annular space must be sealed and the void filled with a suitable insulating material to reduce cooling of the flue gases.
- 4 If a rigid flue is used either internally or externally, it must be of the twin wall type with a stainless steel inner skin suitably insulated and weather proofed.
- 5 **The flue diameter must be as specified in Section 2.1** for the size of boiler in question.
- 6 The flue must be run upwards following as near a vertical route as possible. Horizontal runs must be avoided and no bends should have an angle of more than 45° from the vertical. There should be at least 600 mm of vertical flue above the boiler before the first bend.
- 7 A sealed cleaning door must be provided near the base of the flue.
- 8 The exposed flue pipe between the boiler and the chimney must not be of an asbestos material and aluminium must not be used in any part of the flue.
- 9 If the draught conditions are satisfactory, the flue should terminate with a standard cowl. Where the flue cannot terminate above the ridge of the roof, use an 'OH' or similar type cowl where downdraughting occurs.
Ridge vent terminals **must not** be used.
- 10 Refer to the locally applicable Building Regulations, BS 5410:1 and OFTEC Installation Requirements (Books 2 and 3) for further guidance on conventional flue systems.

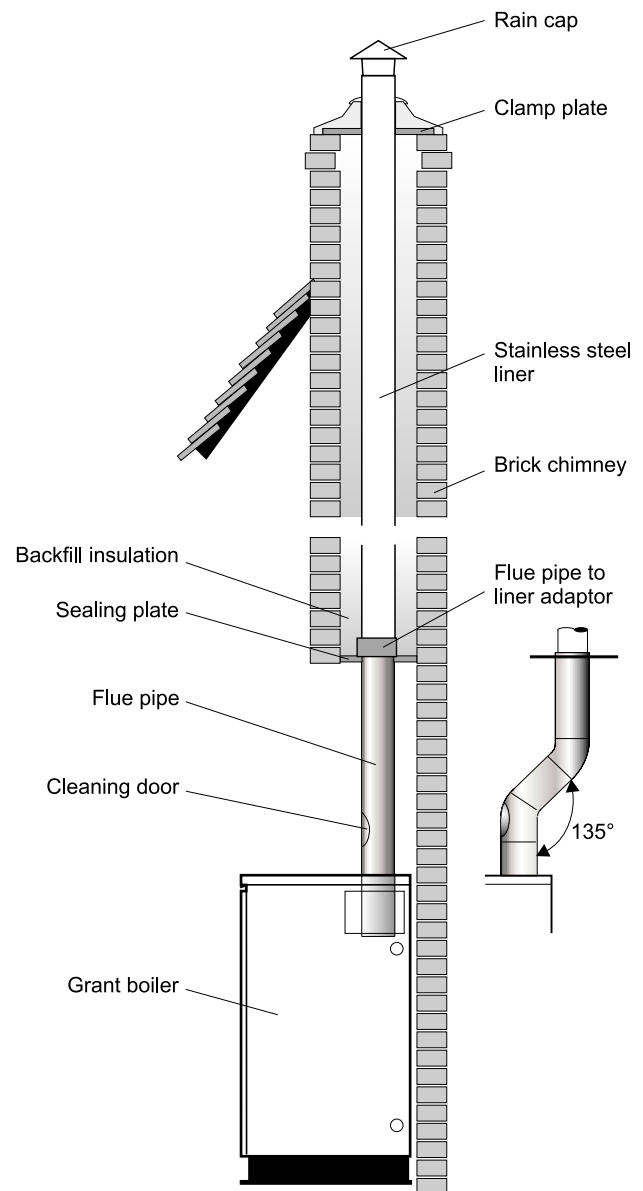


Fig. 11 - Typical conventional flue with brick chimney

11 To allow for flue gas analysis and combustion testing, a test point is provided in the boiler cleaning door.



3 - GENERAL BOILER INFORMATION

3.10 Connect a conventional flue

- 1 Remove the insulation from the rear top panel (do not discard it) and remove the blanking panel. Discard the panel, but retain the nuts and washers.
- 2 Unscrew the protective covers from the studs on the flue dress panel, supplied in the literature pack. Place the panel in position in the rear case top panel and secure in place using the washers and nuts previously removed.
- 3 Cut the insulation into three equal pieces and replace two - either side of the flue opening in the case top panel.
- 4 Fit the flue dress plate to the hole in the rear section of the case top.
- 5 Position the flue pipe into the boiler flue socket and make good the connection using a suitable flexible high temperature sealant (e.g. Silastic or similar) and rope seal.
- 6 Position the rear section of the case top over the first section of the flue.

3.11 Balanced flue options

- 1 Apart from a conventional flue/chimney, several balanced flue options are available for use with the Combi 90 V3 MAX boiler.
 - a **Low level horizontal balanced flue (Yellow system)** - available in Short and Standard kits. Extensions are available which extend the flue by 225 mm, 450 mm or 675 mm. A 90° and 45° elbow are also available.
The maximum flue length with or without elbows is 2.0 m.

Low level balanced flue kits	To suit wall thickness (mm)			
	Rear exit		Side exit	
Short Kit	Min.	Max.	Min.	Max.
	150	230	n/a	n/a
Standard Kit				
	260	440	70	250

The wall thicknesses quoted above for side flue assumes that the boiler will be spaced off the wall by a nominal 20 mm (to provide clearance for a heating return connection plug). Water connections may be taken from one side only, if required.

- b **High level horizontal balanced flue (White system)** - allows the flue to rise between approximately 1.7 to 2.2 m above floor level before exiting through the rear or side wall. It is adjustable to suit the following wall thicknesses:-

Rear	215 to 450 mm (approximately)
Side	120 to 350 mm (approximately)

Extension kits are available which extend the flue by 950 mm, 450 mm, 225 mm or 275 to 450 mm telescopic.

The maximum flue length must not exceed 4.0 m.

- c **A vertical balanced flue kit (White system)** - adjustable to 3 m (maximum 6 m with extensions). Extension kits are available which extend the flue by 950 mm, 450 mm, 225 mm or 275 to 450 mm telescopic.
A choice of two waterproof flashings (flat or pitched) and a wall bracket are also available.

The maximum height must not exceed 6.0 m.

- 2 If the terminal is fitted within 1 m of plastic or painted surfaces, a shield should be fitted to the underside of the surface to protect it from the combustion products.
- 3 The minimum dimensions for positioning the flue terminal are shown in Fig. 13.
- 4 If the lowest part of the flue terminal is fitted less than 2 m above a surface to which people have access, the terminal must be protected by a guard. A suitable guard is supplied with the Low level flue kit.
The guard must be fitted centrally over the flue terminal and securely fixed to the wall.

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

- 6 The terminal position must be at least 1.8 metres distant from an oil storage tank unless a wall with at least 30 mins fire resistance and extending 300 mm higher and wider than the tank is provided between the tank and the terminating position.

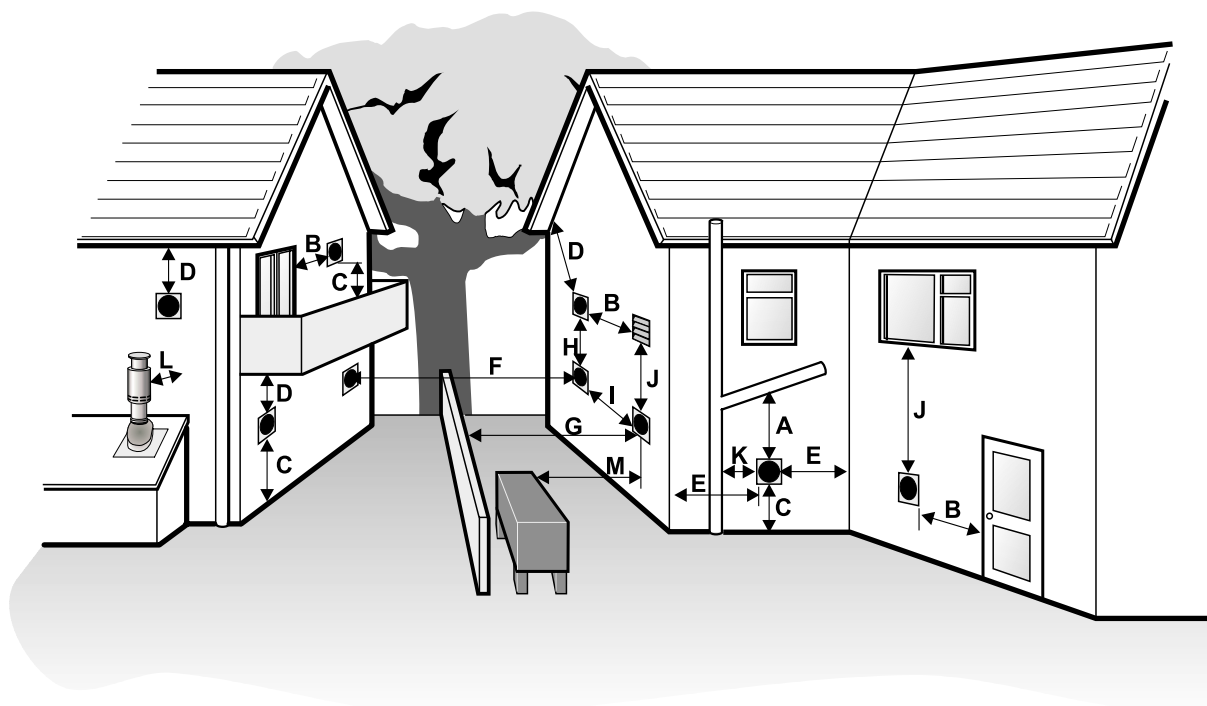


Fig. 12 - Clearances for Balanced flues

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

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

When a low level balanced flue is used, the terminal guard must be fitted in all circumstances to prevent objects entering the flue pipe.

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.



3 - GENERAL BOILER INFORMATION

3.12 Frost protection

For additional protection of either the entire heating system, or the boiler and localised pipework, it is recommended that a frost thermostat be installed. Refer to Section 10 for connection details.

To protect the heating system the frost thermostat should be sited within the house in such a place that it can detect any rise and fall in the ambient air temperature, i.e. in a room with a radiator.

Where the frost thermostat is installed outside the house (to protect a boiler installed in an external boiler room or garage) or in an attic, it is recommended that it be used in conjunction with a pipe thermostat to avoid unnecessary and wasteful overheating of the property. The pipe thermostat should be located on the boiler return pipe, and set to operate at 25°C. Refer to Section 10 for connection details.

3.13 Boiler location

- 1 The boiler must stand on a surface that is firm and level. It does not require a special hearth as the temperature of the boiler base is less than 50°C.
- 2 Sufficient clearance **must be** allowed around the boiler for the following:-
Access at the front of the boiler to remove the burner and baffles.

Note: Water connections may be from the rear, left or right hand side. If using low level side exit flue, the flue must be on the opposite side to the water connections.

The boiler may be installed under a fixed worktop, as the boiler incorporates a drop down control panel to gain access to components on the top of the boiler.

3.14 Water connections

- 1 Four push-fit elbows connections are supplied with the boiler for connection of the heating flow and return pipes (22 mm), cold water mains inlet pipe (15 mm) and domestic hot water outlet pipe (15 mm) to the four open pipe ends in the boiler. See Fig. 17.
The safety valve outlet has a 15 mm compression fitting for connection of the discharge pipe.
- 2 The heating flow and return connections have been fitted with isolation valves for maintenance.
- 3 A drain tap is provided at the bottom on the front of the boiler.

3.15 Sealed central heating system

See Fig. 13

- 1 The boiler is only suitable for use with a sealed system complying with the requirements of BS 5449.
The maximum temperature of the central heating water is 85°C.
Design notes - when designing the system, the pump head, expansion vessel size, radiator mean temperature, etc. must all be taken into account.
- 2 The boiler is supplied with the following items factory fitted:-
 - a 12 litre diaphragm expansion vessel complying with BS 4814, pre-charged at 1.0 bar.
 - 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 Using the expansion vessel as supplied and an initial system pressure (cold) of 0.8 bar, a heating system volume of approximately 90 litres can be used for the Combi 90 V3 MAX. For further guidance refer to BS 7074:1.
Refer to Section 5.1 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. 13) in bar + 0.3 (1 bar = 10.2 metres of water).
- 5 If thermostatic radiator valves are fitted to all radiators, 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.

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 MB1 or Copal is dosed in accordance with the guidelines given in BS 7593:1992.

Failure to implement the guidelines may invalidate the warranty.

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

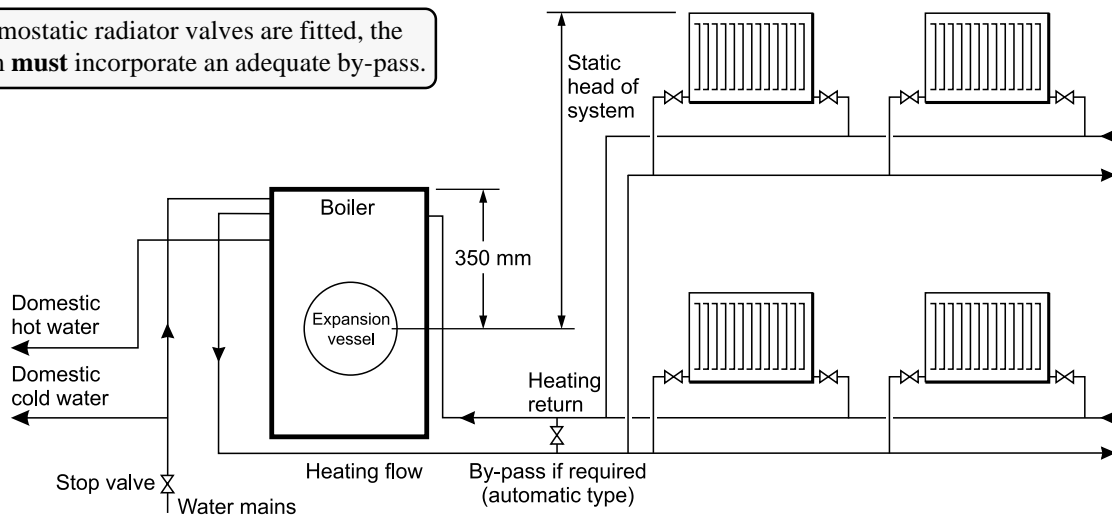


Fig. 13 - Sealed system



3 - GENERAL BOILER INFORMATION

3.16 Domestic hot water system

- 1 To maintain a longer and more consistent hot water temperature, a flow restrictor is factory fitted 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. Below 1.0 bar the hot water flow switch will turn the boiler off. 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 in 15 mm copper pipe and be as short as possible. 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-siphonage 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-siphonage 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-siphonage 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.

Note: Hard Water

A water hardness test kit is supplied with the boiler. Should the total hardness of the water supply exceed 125 ppm, an in-line scale inhibitor should be fitted in the cold water supply to the boiler. Consult the local Water Undertaking if in doubt.

3.17 To use the water hardness kit

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

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 are fully wetted.

Shake off the surplus water and wait for one minute.

Assess the colouration of the test zones 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))

If the hardness reading is found to be in the medium to very hard range (the shaded area), it is essential that some form of water conditioner or softener is fitted to reduce scale formation within the combination boiler. Failure to do so may invalidate both the manufacturers warranty and any extended warranty covering the appliance.

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) Ltd. 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.



3.18 Method of operation

Once the boiler is switched on it will always provide domestic hot water upon demand. The timer only controls the operating times of the central heating. When central heating is not required, the timer switch should be set to 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 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 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 - When a demand for hot water (by opening a hot tap, etc.) is sensed by the diverter valve flow switches, the pump starts and the water in the boiler is diverted through the domestic hot water heat exchanger, heating the incoming mains water. The hot water produced is mixed in the thermostatic blending valve with incoming mains water to automatically ensure that the temperature does not exceed 65°C.

Note: For optimum performance it is recommended that the thermostatic blending valve is set to provide a hot water temperature at the outlets between 45 and 50°C.

Note: If the water in the boiler is already up to temperature, there will be a delay before the burner starts to maintain the water temperature in the boiler.

When the hot tap is closed and the diverter valve flow switches sense that hot water is no longer required, if the timer switch is set to either TIMED or CONSTANT, the boiler will return to the central heating mode, with the pump and burner running. If the switch is set to HOT WATER ONLY, the pump is turned off but the burner will continue to run for a short period until the water in the boiler reaches the required temperature ready for another hot water operation.

4 - BOILER INSTALLATION

4.1 Unpack the boiler

- 1 Carefully remove the packaging from the boiler and remove it from the transit pallet.
- 2 Pull off the boiler front panel and remove the literature pack.
- 3 Lift off the two parts of the case top and remove the water connecting fittings.

4.2 Prepare the wall

See Figs, 14 and 15

If the boiler is to be used with a balanced flue, make the hole in the wall for the flue as shown in Fig. 14 (low level flue) or Fig. 15 (high level flue).

Note: Dimensions A and B given in Figs. 14 and 15 include an extra 10 mm over the size of the terminal to provide clearance for fitting.



4 - BOILER INSTALLATION

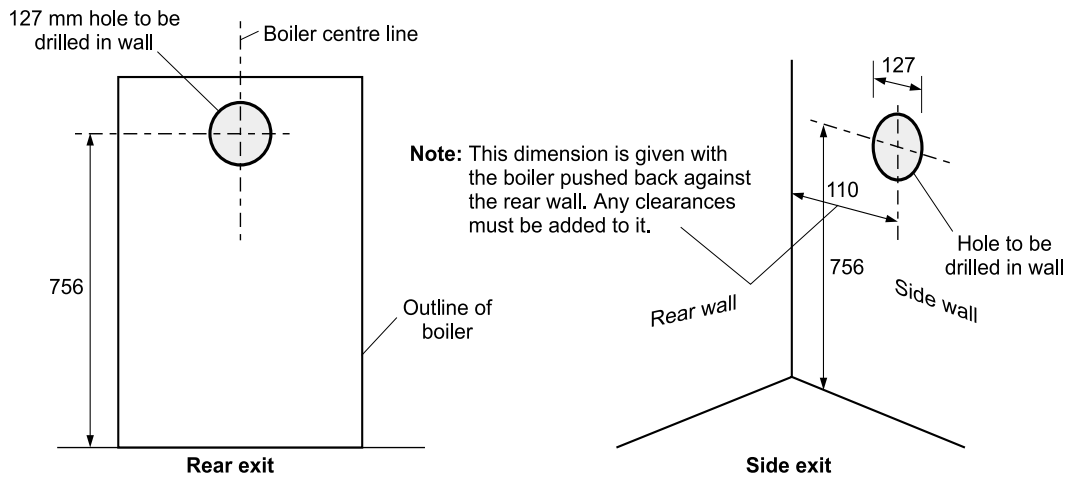


Fig. 14

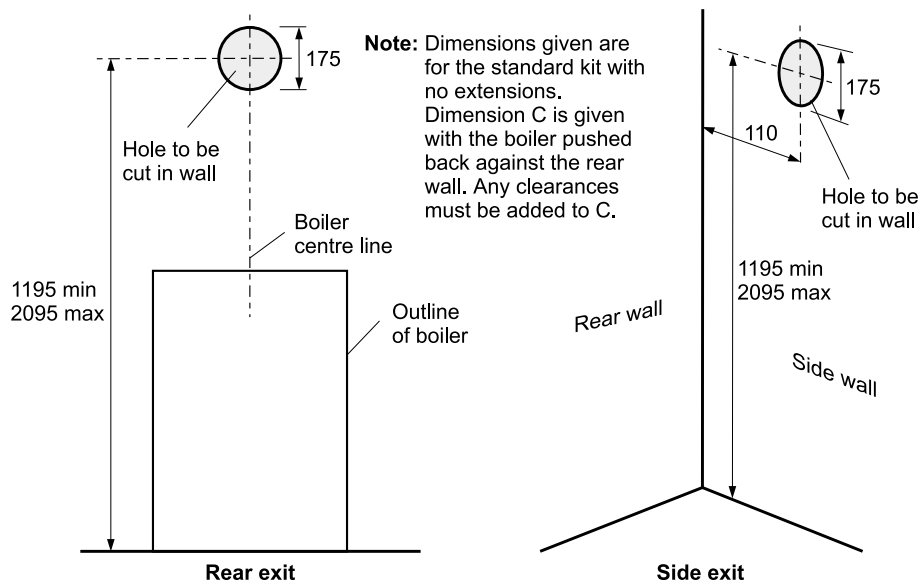


Fig. 15

4.3 High level and vertical balanced flue

Fitting instructions for the high level balanced flue and vertical balanced flue are supplied with the flue kits.

Adjustable sections: The adjustable extensions are telescopic. The wall terminal section is adjustable and is suitable for a wall thickness of 215 mm to 450 mm. Simply adjust to the required length using a twisting motion. The outer pipes **must** overlap by a minimum of 25 mm.

Extensions: The vertical height and horizontal length of the flue may also be increased using extensions. The extensions are available in fixed lengths of 225 mm, 450 mm and 950 mm. An adjustable extension (275 - 450 mm) is also available.

Bends: 45° bends are available and may be used to create an offset or deviation in the flue system. The distance between the bends should be kept as short as possible with a maximum length of 950 mm.

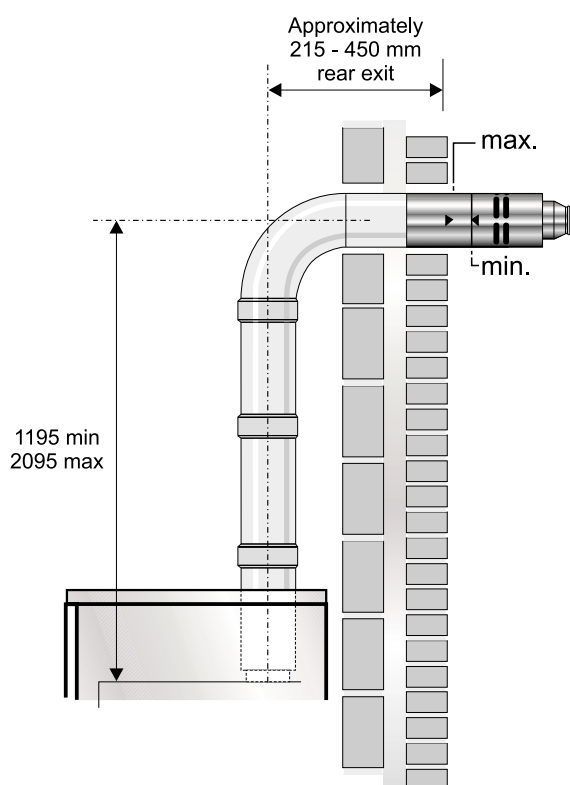


Fig. 15a - High level balanced flue

The equivalent flue length of each 45° bend is approximately one metre. Only two bends should be used.

Note: The overall assembled flue length should not exceed 4.0 metres from the top of the boiler to the end of the terminal.

Accessories available:

- Extension 225 mm
- Extension 450 mm
- Extension 950 mm
- Adjustable extension 275 - 450 mm
- 45° bend
- Wall bracket

Note: Flue sections cannot be cut.

4.4 External flue system

Where it is not practical to use a low level flue, the Grant Combi 90 V3 MAX may be fitted with an external vertical/high level flue system.

A boiler connector elbow and air intake tee section create a room sealed flue from the boiler to outside.

The Grant External flue system connects to the tee and may terminate at high level or vertically as required. See Fig. 16.

The flue system is suitable for use with class C2 kerosene and class D gas oil.

When using gas oil the flue must terminate a minimum of 2 metres above outside ground level.

The following components are available from Grant UK.

External Flue Part Numbers	
Item	Part No.
Starter kit - short	GK90S
Starter kit - standard	GK90
150 mm extension	GX150/90
250 mm extension	GX250/90
450 mm extension	GX450/90
950 mm extension	GX950/90
195-270 mm adjustable extension	GXA250/90
45° elbow	GE45/90
High level terminal	GTH90
Vertical terminal	GTV90
wall bracket	GWB90
Extended wall bracket kit	GE90



4 - BOILER INSTALLATION

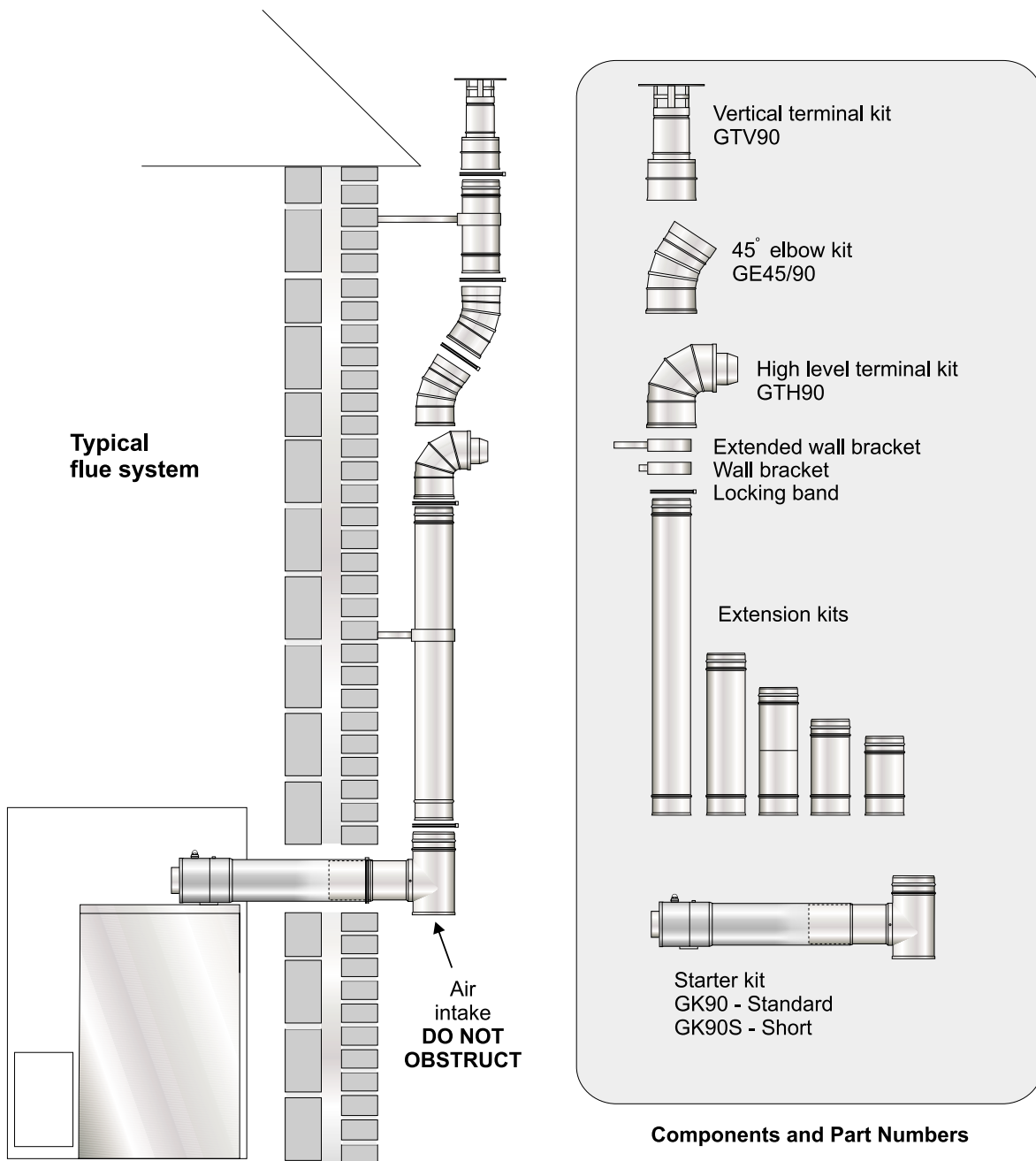


Fig. 16



4.5 Make the water connections

Note: Water connections may be from the rear, left or right hand side. If using low level side exit flue, the flue must be on the opposite side to the water connections.

- 1 If required, for easier access, the case bracing bracket may be removed. Remove the four screws securing the bracing bracket and lift it out.
- 2 Removable plates are provided on both side panels for pipe entry.
- 3 Fit the four push-fit elbow connectors onto the open pipe ends. See Fig. 17. Connect the pipework (not supplied with the boiler) to the elbows.
- 4 **Balanced flue models** - proceed with the flue installation as described in the separate fitting instructions.
- 5 **Conventional flue models** - proceed with the flue connection as described in Section 3.10.
- 6 The safety valve discharge pipe must be routed clear of the boiler to outside, to discharge in such a manner that it can be seen but cannot cause injury or damage to persons or property.
- 7 Do not turn on the mains water supply at this stage.

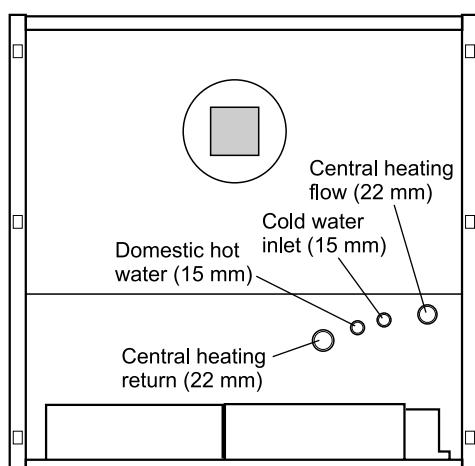


Fig. 17 - Pipe positions

4.6 Connect the power supply

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

- 1 Loosen (do not remove) the four screws securing the control panel to the side panels, hinge the panel forward and allow it to drop down to gain access to the rear of the panel.

- 2 Remove the two screws securing the terminal block cover and lift off the cover.
- 3 Remove the screws securing the cable clamp and open the clamp.
- 4 Connect the power supply cable to the left hand terminal block as follows:
Brown to mains Live - terminal 3
Blue to mains Neutral - terminal 2
Green/Yellow to mains Earth - terminal 1
- 5 Connect a room thermostat as follows:
Remove the room thermostat link wire 6 and 7 from the left hand terminal block and connect the room thermostat to the terminal block in accordance with the room thermostat manufacturers instructions.
- 6 Connect a frost thermostat as follows:
Connect the frost thermostat to the left hand terminal block using terminals 4 and 5 in accordance with the thermostat manufacturers instructions.
- 7 Replace the rear cover of the control panel.
- 8 Replace the terminal block cover and secure with two screws previously removed.

4.7 Connection of external remote timeswitch

See Section 10

Important: Any remote timer must be of a single channel 240 V type with voltage free output contacts.

Important: Ensure electrical supply to boiler has been isolated before fitting the timer.

- 1 Remove the screws securing the terminal block cover and lift off the cover.
- 2 Pass a 4-core cable (or 4-core and earth if the timer to be used has an earth connection) through the cable clamp in the panel. Connect the two switch wires from the timer to terminals 8 and 9. Connect the live, neutral (and earth if required) from the timer to terminals 3, 2 & 1 respectively on the boiler terminal block. See Section 10 for a typical wiring diagram.
- 3 Remove the link from terminals 8 and 9 on the boiler terminal block.
- 4 Secure the cable in the cable clamp, replace the wiring cover in position over the terminal block, taking care not to trap any wires, and secure in position with the screws previously removed.



4 - BOILER INSTALLATION

- 5 Ensure that all external wiring is adequately supported.
- 6 Do not switch on the electricity supply at this stage.

4.8 Optional Grant internal timer

Important: Ensure electrical supply to boiler has been isolated before fitting the timer.

- 1 From underneath the control panel, remove the screw securing the bracket behind the timer aperture.
- 2 Remove the blanking piece from the timer aperture in the control panel fascia by firmly pressing on the Grant logo (in the centre of the black square) until it is detached from the rear of the fascia. Remove the blanking piece from the panel and the bracket inside the aperture and discard both items.
- 3 **Loosen (do not remove) the four screws securing the control panel to the side panels,** hinge the panel forward and allow it to drop down to gain access to the rear of the panel.
- 4 Remove the two screws securing the terminal block cover and lift off the cover.
- 5 **Remove the factory fitted link from terminals 8 and 9.**
- 6 Remove the two top screws from the rear of the control panel and loosen the two lower screws. Remove the rear access cover.
- 7 Fit the 6-way plug on the timer wiring harness firmly into the 6-way socket to connect the timer to the boiler.

- 8 **ET and MT kits** - Carefully fit the timer into the aperture.
- 9 **MT kit only** - From the rear of the control panel fit the two fixing clamps, supplied, into the slots on each side of the timer housing with the two 'legs' towards the front of the timer. With the front of the timer held against the fascia, push both clamps towards the front of the timer as far as possible to secure the timer firmly in position.
- 10 Replace the rear cover of the control panel.
- 11 Replace the terminal block cover and secure with the two screws previously removed.
- 12 Do not switch on the electricity supply at this stage. Refer to the User Instructions provided for operating and setting the timer.

4.9 Connect the fuel supply

See Fig. 7

If a two pipe system is to be used refer to Section 3.4.6.

- 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.

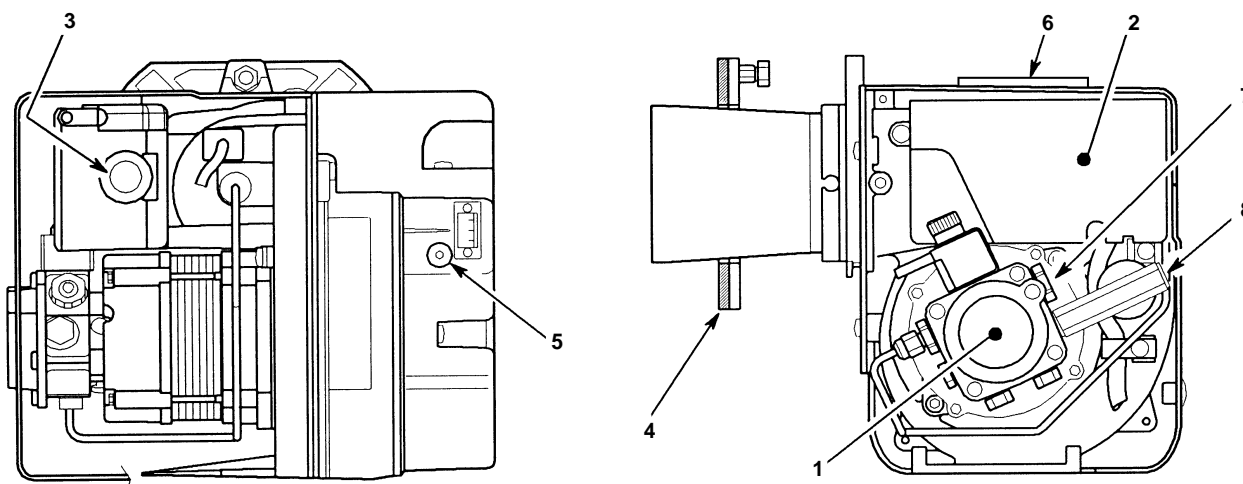


Fig. 18 - RDB burner components

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



5.1 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 (see Fig. 13). 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 90 litres. If the system volume is greater, an extra expansion vessel (complying with BS 4841) must be fitted as close as possible to the central heating return connection on the boiler. The charge pressure of the extra vessel must be the same as the vessel fitted in the boiler. Refer to BS 7074:1 for further guidance.

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

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

5.2 Fill the system

- 1 An automatic air vent is fitted to the top of the boiler. Check that the small cap on the top of the air vent is screwed on fully, then unscrew it one complete turn - the cap remains in this position from now on.
- 2 Ensure the primary return isolating valve and the heating flow and return valves (see Fig. 23) are fully open. The valve is open when the operating lever is in line with the valve.
- 3 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 at right angles to it.
- 4 Ensure 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.

- 5 Vent each radiator in turn, starting with the lowest in the system, to remove the air.
- 6 It is important that the pump is properly vented to avoid it running dry and damaging its bearings. Remove the cap then unscrew and remove the plug from the centre of the pump, using a suitable screwdriver rotate the exposed spindle about one turn. Replace the plug and cap.
- 7 Check the operation of the safety valve by turning the head anticlockwise until it clicks. The click is the safety valve lifting off its seat allowing water to escape from the system - check that this is actually happening.
- 8 Continue to fill the system until the pressure gauge indicates 1.0 bar. Close the fill point valve and check the system for water soundness, rectifying where necessary.
Water may be released from the system by manually operating the safety valve until the system design pressure is obtained.
- 9 The system design pressure (cold) should be between 0.5 and 1.0 bar. This pressure is equivalent to the maximum static head in bar + 0.3 (1 bar = 10.2 metres of water). See Fig. 13. Set the adjustable pointer on the pressure gauge to the system design pressure.
- 10 Close the valves either side of the filling loop and disconnect the loop.

5.3 Completion

Please ensure that the OFTEC oil firing installation completion report is completed in full.

Leave the top copy with the User. Retain the two carbon copies.



6 - COMMISSIONING

Refer to Fig. 19 for boiler controls

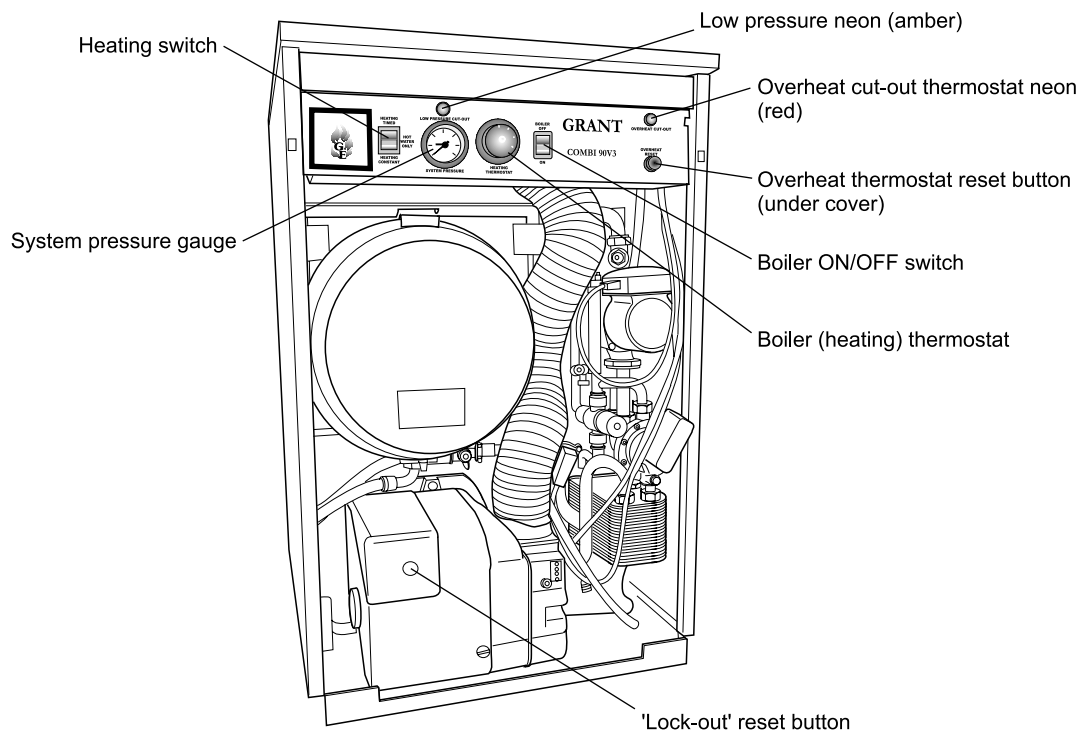


Fig. 19

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.

- 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.
- 4 Connect a combined vent manifold and pressure gauge to the pressure gauge connection port on the oil pump. See Fig. 18. Open the vent screw on your vent manifold to vent the supply while the pump is running.
- 5 Set the heating On/Off switch to 'OFF' and the timer switch to 'OFF'. Check that all system controls are calling for heat and turn the boiler thermostat to maximum. Switch on the electricity supply.
- 6 Fully open a hot tap and allow it to run for a few moments to vent the internal primary circuit. Set the heating On/Off switch to 'ON' (the green neon will light). The boiler pump will operate and the burner should light within about 10 seconds. If the burner does not light and the 'Lock-out' reset button lights, wait for about 45 seconds then press the reset button to restart the ignition process. This procedure may have to be repeated several times during first lighting.
- 7 Set the timer switch to 'CONSTANT' and close the hot tap, the boiler will now be operating in the central heating mode.
- 8 With the burner alight, check the fuel pressure. Refer to the Technical Information, Sections 2.2 and 2.3. Adjust the pressure if necessary - see Fig. 18.
- 9 Operate the boiler until it reaches normal operating temperature. Check oil supply/return pipe for leaks, rectifying where necessary.
- 10 With the burner alight, re-check the fuel pressure and re-adjust if necessary. Switch the boiler off, remove the pressure gauge and replace the plug in the pump.
- 11 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.



- 12 Relight the boiler and allow it to run for 20 minutes then check the following:-

CO₂ level, Flue gas temperature and Smoke Number. Refer to the Technical Information in Sections 2.2 and 2.3.

A flue gas sampling test point is provided in the cleaning door on the front of the boiler.

- 13 Check the smoke number, if satisfactory check the CO₂. Adjust the burner air regulator, see Fig. 18. Turning the screw anti-clockwise closes the damper and increases CO₂ level, turning the screw clockwise opens the damper and reduces CO₂ level. Re-check the smoke number if the air damper has been moved.

Under no circumstances must the smoke number be above 1.

A suitable position for the air damper is one which gives 1% less CO₂ than that which has a smoke number of 1.

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

- 14 Check the flue gas temperature.

- 15 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.

- 16 Switch off the boiler.

- 17 With the system hot, check again for leaks, rectifying where necessary. Drain the heating system while it is hot to complete the flushing process.

- 18 Refill, vent and pressurise the system as described in Section 5.2, adding a suitable inhibitor. For further information concerning inhibitors contact Grant Engineering (UK) Limited.

- 19 Replace the case bracing bracket and top panel, if not already fitted.

Note: After commissioning the boiler you should complete the Commissioning Report on page 2 of these instructions.

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 7.

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.

Set the thermostatic blending valve to provide a hot water temperature at the outlets between 45 and 50°C.



7 - INFORMATION FOR THE USER

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.

8 - 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 entered in the Service Log, on page 2 of these instructions. This information may be required to validate the Grant extended warranty.

IMPORTANT

Before starting any work on the boiler, or fuel supply please read the health and safety information given in Section 14 on page 46.

8.1 Important notes prior to servicing

- 1 Check the flue terminal and ensure it is not blocked or damaged.
- 2 Run the boiler and check the operation of its controls.

- 3 Ensure that all water/fuel system connections and fittings are sound. Remake any joints and check the tightness of any fittings that may be leaking. Check the expansion vessel air charge. See Section 5.1. Check the system pressure. Refill, vent and re-pressurise the system as necessary. See Section 5.2.
- 4 Check that any ventilation openings are adequate and are clear. See Section 3.8.
- 5 Remove any sludge/water from the fuel tank by opening the sludge valve at the lower end of the tank.
- 6 With the fuel supply valve closed, clean/replace the filter element and clean the filter bowl.
- 7 Flexible fuel supply pipes should be inspected annually when the boiler is serviced and replaced every two years. If in doubt replace the pipes.

Warning: Before servicing, set the boiler On/Off switch to 'OFF', isolate the electricity supply and close the fuel supply valve. Allow the boiler to cool.

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



8.2 Dismantling prior to servicing

- 1 Pull off the front panel.
- 2 Carefully lift up the expansion vessel and remove it from the front of the boiler. Place it on the floor, taking care not to strain the flexible pipe.
- 3 Disconnect the flexible air tube from the burner.
- 4 Remove the burner fixing nut (top of mounting flange) and withdraw the burner. If required, disconnect the flexible oil line(s), use a suitable container to prevent any oil spillage.

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

8.3 Cleaning the boiler

See Fig. 20

- 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. 20.
- 3 Remove all deposits from the baffle plates and all the boiler internal surfaces using a stiff brush and scraper if necessary.
- 4 Check the condition of the flue, clean as necessary.
- 5 Check the condition of the front cleaning door seal, replace if necessary.
- 6 Replace the baffles, ensuring they are correctly fitted. See Fig. 20.
- 7 Replace the front cleaning door, securing it in position with the four nuts and washers previously removed.

8.4 Cleaning the burner

See Section 13.1

- 1 **Combustion head** - Loosen the two screws securing the combustion head to the burner flange and withdraw the head. Clean and replace 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. 21.
- 3 **Nozzle** - Check that the nozzle size and type are correct, refer to tables in Sections 2.2 or 2.3 and boiler data label. Clean the nozzle with kerosene if necessary. Do **not** use a pin or piece of wire to clean the nozzle.
Replace the nozzle if a build up of carbon is present. With the combustion head removed, loosen the electrode assembly clamp screw and slide the electrodes away from the nozzle. Remove the nozzle using a good fitting spanner (16 mm). The use of an ill-fitting spanner will damage the nozzle and could lead to an incorrect flame pattern. Always check the electrode settings after replacing the nozzle, see Fig. 21.

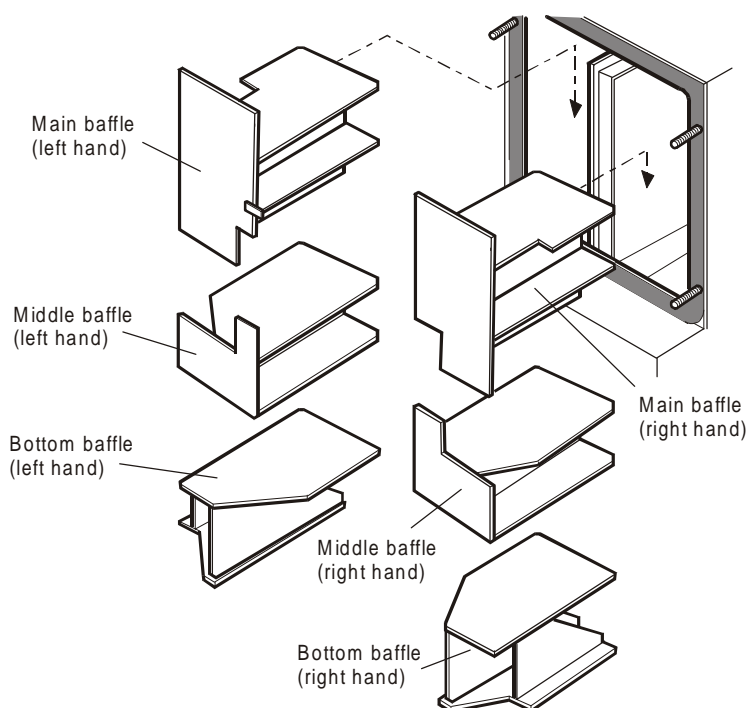


Fig. 20 - Baffle positions



8 - BOILER SERVICING

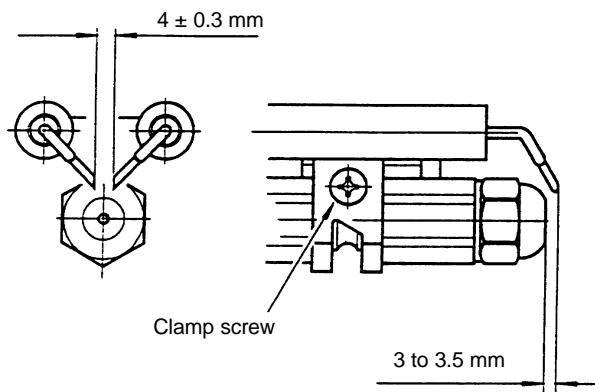


Fig. 21

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

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

- 5 **Fan** - With the air intake spigot removed, remove the screws securing the fan housing cover (R/H side of burner) and remove the cover. Inspect the fan and housing and clean as necessary. Replace the cover.
- 6 **Pump filter** - With the burner cover removed, remove the four screws securing the pump end cover. Remove the filter and wash in kerosene. Replace the filter and end cover, ensure the 'O' ring is in position.

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

Refer to the Commissioning instructions starting on page 28.

9 - REPLACEMENT OF BOILER COMPONENTS

Flow and return isolation valves are factory fitted to the boiler allowing the boiler to be dismantled without the need to drain down the heating system.

Warning: Before replacing any boiler components, set the boiler On/Off switch to Off, **isolate the electrical supply to the boiler**, and close the fuel supply valve. Allow the boiler to cool.

Refer to Figs. 22 and 23 for the position of the boiler components.

9.1 Circulating pump

- 1 Manually operate the safety valve on top of the boiler heat exchanger, to de-pressurise the boiler. It is not necessary to drain down the heating system.
- 2 Close the return isolating valve, the heating flow valve and the pump isolating valve. Refer to Fig. 23.
- 3 **To replace pump head only** - Using an Allen key, remove both screws securing pump head (motor) to the pump body.

Note: Place an absorbent cloth below the pump before removing the head to catch the water, and avoid placing any strain on the electrical cable.

- 4 Undo the single screw, remove the cover from the electrical terminal box and disconnect the pump head from the electrical cable.
- 5 Fit the replacement pump using the reverse of the above procedure, ensuring that the new gasket is correctly fitted between the pump head and body.
- 6 **To replace complete pump** - Undo both upper and lower pump unions, noting the correct direction of flow (downwards).
- 7 Undo the single screw, remove the cover from the electrical terminal box and disconnect the pump from the electrical cable.
- 8 Fit a replacement pump using the reverse of the above procedure, ensuring the sealing washers are correctly fitted in the pump unions, and that pump flow direction (as indicated by arrow on pump body) is correct. Set the pump speed selector switch to maximum.
- 9 Open the pump isolating valve, heating flow valve and the return valve, then refill the central heating system as described in Section 5.2, checking for leaks.

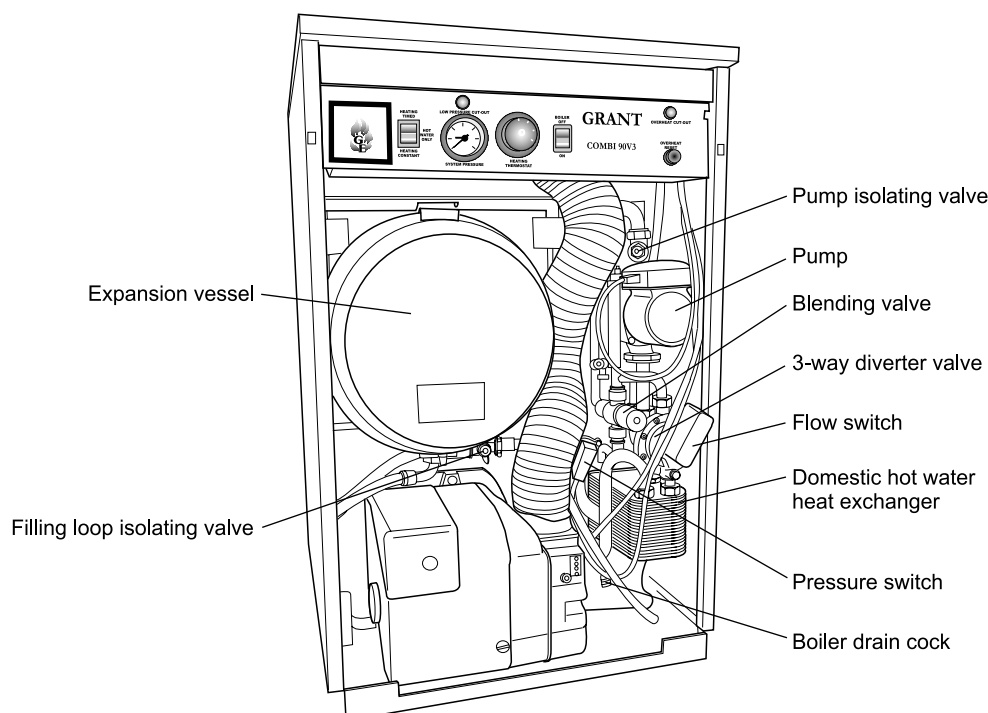


Fig. 22 - Boiler components

9.2 Plate heat exchanger & diverter valve

- 1 Unhook the expansion vessel from the front of the boiler and lay it to one side.
- 2 Unscrew and remove the single burner fixing nut (located above the burner, in the middle of the mounting flange) and withdraw the burner from the boiler and lay it to one side.
- 3 Close the cold water inlet isolating valve. Refer to Fig. 23.
- 4 Manually operate the safety valve on top of the boiler heat exchanger to de-pressurise the boiler. It is not necessary to drain down the heating system.
- 5 Close the return isolating valve, the heating flow valve and the pump isolating valve. Refer to Fig. 23.
- 6 Remove the spring circlip holding the microswitch assembly to the diverter valve, and separate the microswitch assembly from the valve.
- 7 Unscrew and disconnect pipe unions. See Fig. 23. Unscrew the union and remove the plate heat exchanger.
- 8 Re-assemble and refit using the reverse procedure, ensuring all sealing washers are correctly fitted.
- 9 Open the cold water inlet valve and primary return isolating valve, the heating flow valve and pump isolating valve. Refill the central heating system as described in Section 5.2, checking for leaks.
- 10 Open a hot tap and check that the diverter valve is activated and operates both microswitches.

9.3 Diverter valve diaphragm

- 1 Follow steps 1 to 4 of Section 9.2.
- 2 Unscrew and disconnect pipe unions. See Fig. 23. Remove the vertical 15 mm pipe from the boiler.
- 3 Unscrew and remove all eight screws from the diaphragm housing. Unscrew union nut 7 and carefully remove the front of the diaphragm housing.
- 4 Remove the large spring and then the complete push rod/diaphragm assembly from the valve housing, carefully pulling on the push rod to disengage it if necessary.



9 - REPLACEMENT OF BOILER COMPONENTS

- 5 Refit the diaphragm and re-assemble the diverter valve using the reverse of the above procedure. Ensure that the beaded edge of the diaphragm is correctly seated into the corresponding groove in the diverter valve body, and that the spring is fitted, before replacing the diaphragm housing and screws.
- 6 Open the cold water inlet valve. Refill the central heating system as described in Section 5.2, checking for leaks.
- 7 Open a hot tap and check that the diverter valve is activated and operates both microswitches.

9.4 Thermostatic mixing valve

- 1 Unhook the expansion vessel from the front of the boiler and lay to one side.
- 2 Close the cold water inlet isolating valve. Refer to Fig. 23.
- 3 Unscrew and disconnect pipe unions. See Fig. 23. Remove the vertical 15 mm pipe from the boiler.
- 4 Unscrew the two other unions on the mixing valve, and remove valve from the boiler.
- 5 **Dismantling of the main body of the valve** for inspection and/or cleaning should be carried out as follows:
 - a) Remove the control knob fixing screw.
 - b) Pull off the control knob and carefully lever off the plastic housing under the knob, having noted the correct positions.
 - c) Unscrew the brass top assembly from valve body.
 - d) Remove the lower assembly and spring.
 - e) Carefully remove any scale deposits or other particles from the valve seat and other components. Vinegar can be used to remove calcium, but take care not to scratch metallic surfaces. **Do not use any other solvents.**
 - f) Re-assemble the valve using reverse of the above procedure, ensuring that the large diameter of the spring is at the bottom of the valve.
- 6 Replace the mixing valve using the reverse of the above procedure.

Important: Ensure that the mixing valve is correctly connected, i.e. with the Hot (H) inlet at the bottom and the Cold (C) inlet at the top.

- 7 Set the control knob to setting 4, i.e. the 4 on the knob lines up with the white index mark on the valve. Check temperature calibration, and adjust if necessary (see paragraph 8).

- 8 **Re-calibration of the valve**, after dismantling, should be carried out as follows:
 - a) Set the boiler On/Off switch to On and allow the hot water store to reach temperature, i.e. wait until the burner stops. Open a hot tap and draw off hot water at a medium flow of about 10-12 litres per minute.
 - b) Adjust the control knob to give an outlet water temperature of 40°C, measured using a thermometer in the flow from the tap.
 - c) Close the hot tap. Without disturbing the valve position, remove the knob fixing screw and pull off the control knob.
 - d) Replace the control knob such that the number 2 lines up with the white index mark.
 - e) Refit and tighten the knob fixing screw. Reset the control knob to setting 4.
 - f) Once correctly set, the control knob can be locked in position to prevent tampering by tightening the small grub screw in the side of the knob using an Allen key.

9.5 Expansion vessel

- 1 Isolate the central heating system by shutting off the flow and return isolating valves in the boiler. Use the drain cock on the boiler to drain the water jacket.
- 2 Unscrew the flexible hose union nut on the expansion vessel and disconnect the hose.

Note: Ensure the sealing washer inside the union is kept for re-assembly.

- 3 Slacken the two cross head screws and remove the mounting bracket from the expansion vessel.
- 4 Fit the bracket onto the replacement vessel and tighten both screws evenly.
- 5 Reconnect the flexible hose, ensuring that the sealing washer is correctly fitted in the union before tightening.
- 6 **Before filling and re-pressurising the heating system** - Check the charge pressure in the expansion vessel is 1 bar using a suitable pressure gauge. See Section 5.1.
- 7 Open the flow and return isolating valves.
- 8 Refill the central heating system as described in Section 5.2.



9.6 Check valve

- 1 The check valve is located in the 22 mm heating return pipe.
- 2 Isolate the central heating system by shutting off the flow and return isolating valves in the boiler. Use the drain cock on the boiler to drain the water jacket.
- 3 Unscrew and disconnect the compression connection on the check valve and withdraw the pipe and valve from the boiler.
- 4 Fit a replacement check valve using the reverse of the above procedure.

Important: Ensure that the check valve is fitted the correct way round, i.e. with the arrow indicating direction of flow pointing **DOWNWARDS**.

- 5 Open the flow and return isolating valves.
- 6 Refill the central heating system as described in Section 5.2, checking for leaks.

9.7 Pressure relief (safety) valve

- 1 From above the boiler, remove the front top casing panel by pulling it up on one side to disengage the four push-in fasteners. If under a fixed worktop loosed the four screws securing the control panel and hinge down the panel.
- 2 Isolate the central heating system by shutting off the flow and return isolating valves in the boiler. Use the drain cock on the boiler to drain the water jacket.
- 3 Unscrew the capillary tube nut and disconnect it from the valve.
- 4 Unscrew the discharge pipe compression nut and disconnect it from the valve.
- 5 Unscrew the valve union and remove the valve from the boiler.
- 6 Fit a replacement valve using the reverse of the above procedure, ensuring that the 'O' ring seal provided is correctly fitted in the valve union before tightening.
- 7 Open the flow and return isolating valves.
- 8 Refill the central heating system as described in Section 5.2, checking for leaks.
- 9 Manually operate the relief valve to check it's operation, then refill as above.

9.8 Automatic air vent

- 1 Isolate the central heating system by shutting off the flow and return isolating valves in the boiler. Use the drain cock on the boiler to drain the water jacket.
- 2 Slacken the four control panel fixing screws, carefully disengage the control panel from both casing side panels and hinge it down, to gain access to the automatic air vent.
- 3 If a conventional flue is fitted to the boiler, unhook the flexible air inlet tube from the hook bracket on the crossmember, and remove the hook bracket from the boiler crossmember.
- 4 Using an adjustable spanner or grips, unscrew and remove the air vent.
- 5 Fit a replacement air vent using reverse of above procedure.
- 6 Open the flow and return isolating valves.
- 7 Refill the central heating system as described in Section 5.2, checking for leaks.

9.9 Pressure switch

- 1 Isolate the central heating system by shutting off the flow and return isolating valves in the boiler. Use the drain cock on the boiler to drain the water jacket.
- 2 Lift off the expansion vessel and place to one side in front of the boiler.
- 3 Undo the air intake tube clamp at the burner air inlet and push the air intake tube up out of the way.
- 4 Carefully remove the securing pin holding the pressure switch in position. Withdraw the pressure switch.
- 5 Undo the cable clamp on the pressure switch and remove the wires.
- 6 Fit a replacement pressure switch using reverse of the above procedure.
- 7 Open the flow and return isolating valves.
- 8 Refill the central heating system as described in Section 5.2, checking for leaks.



9 - REPLACEMENT OF BOILER COMPONENTS

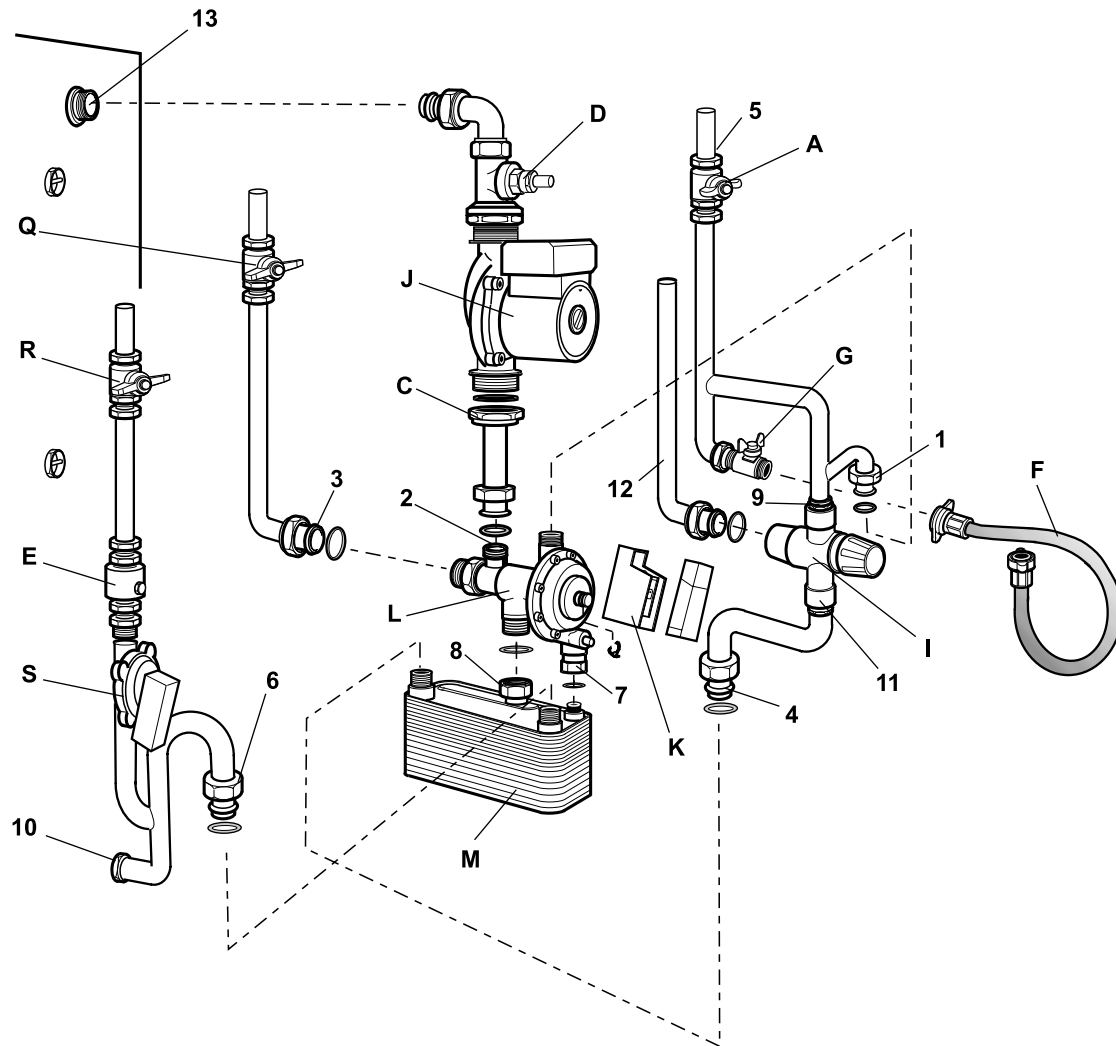


Fig. 23 - Components/connections

Major Components

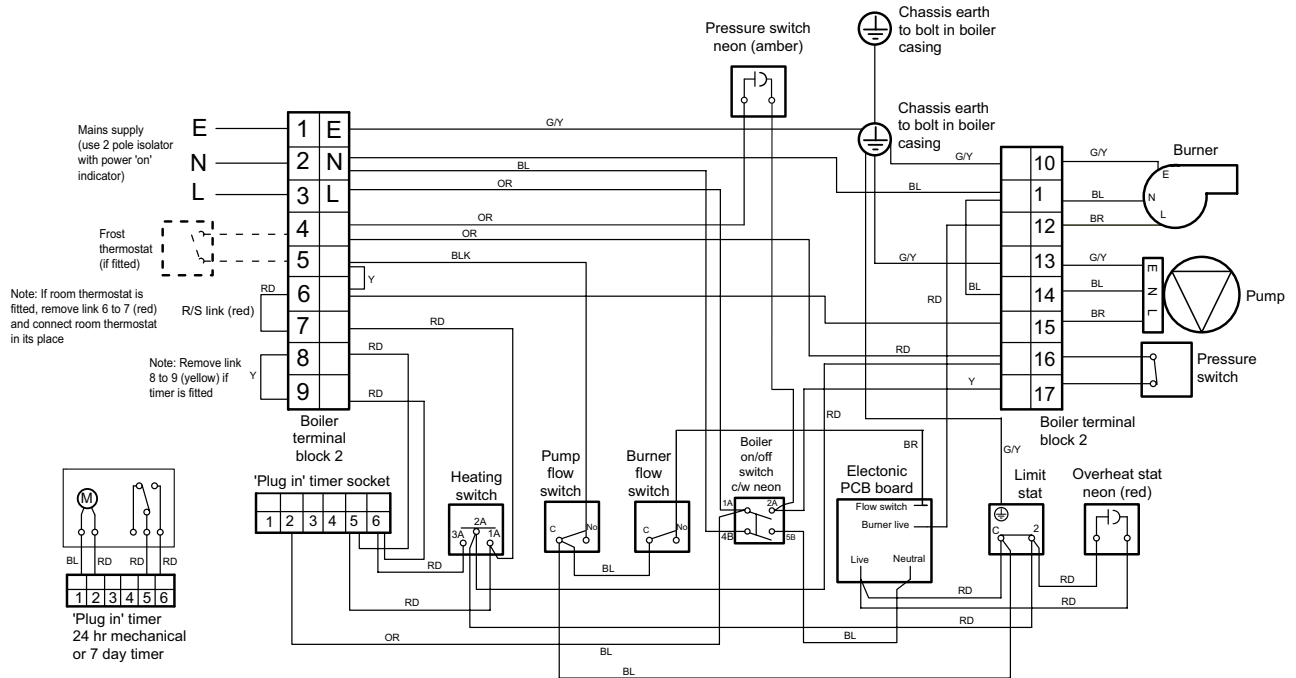
A	Cold water inlet isolating valve
B	N/A
C	Lower pump union
D	Upper pump union - isolating valve
E	Heating check valve
F	Filling hose
G	Filling loop - cold inlet isolating valve
H	N/A
I	Thermostatic mixing valve
J	Circulating pump
K	Microswitch assembly
L	Diverter valve
M	Plate heat exchanger
N	N/A
P	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

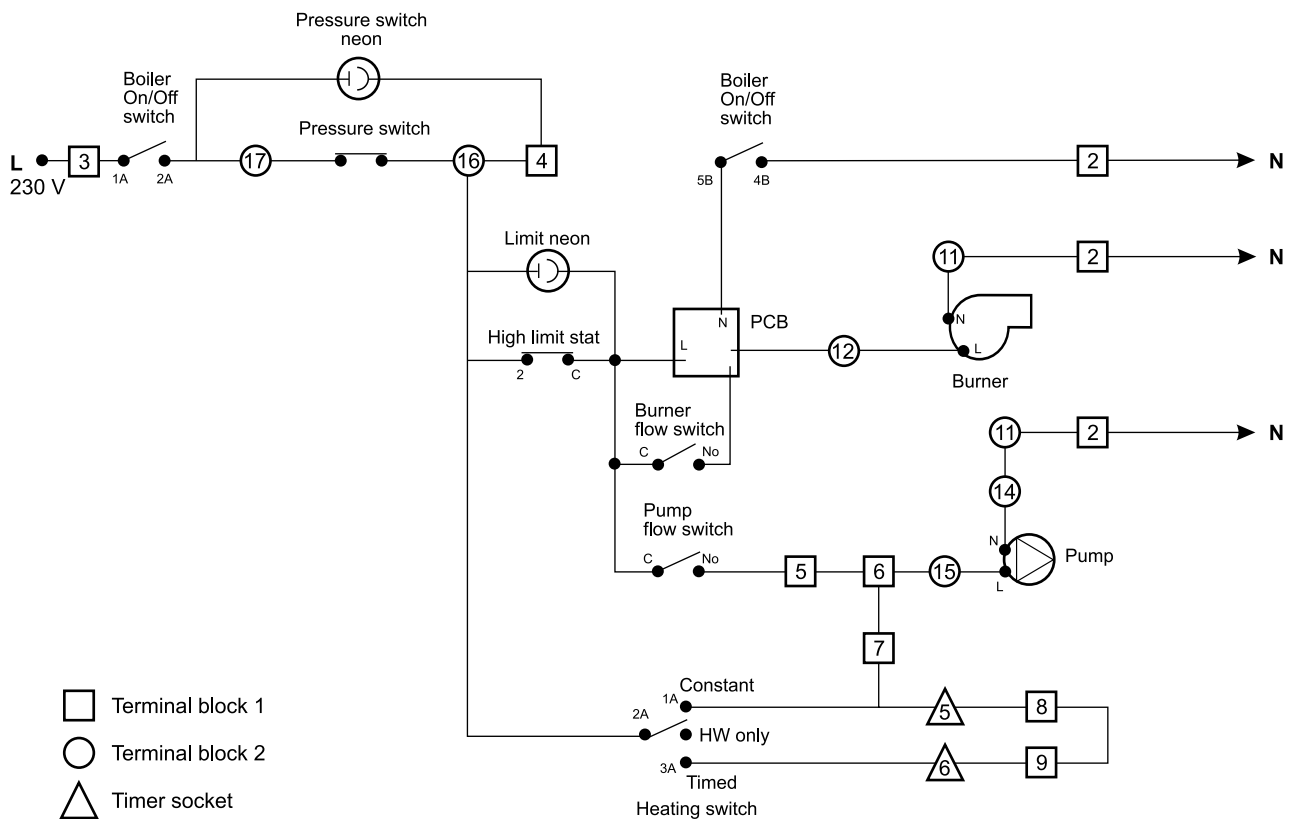


10.1 Control panel wiring diagram



Colour code: Bk Black, BL Blue, BR Brown, RD Red, Y Yellow G/Y Green/Yellow, OR Orange

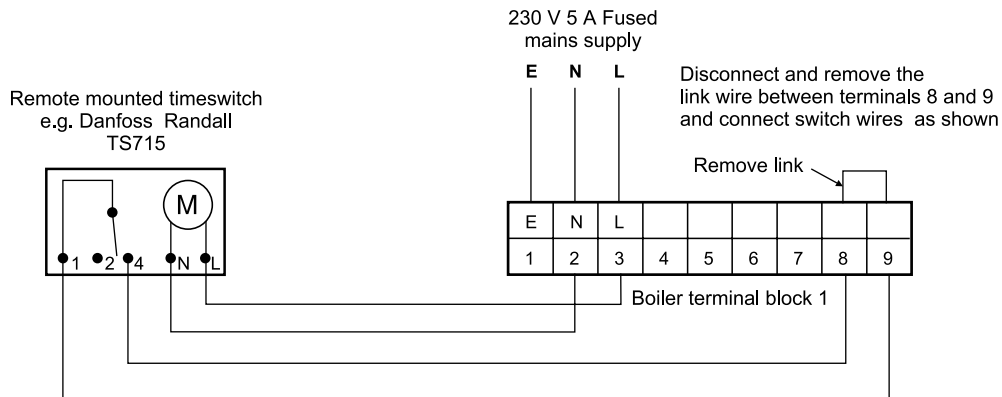
10.2 Functional flow wiring diagram





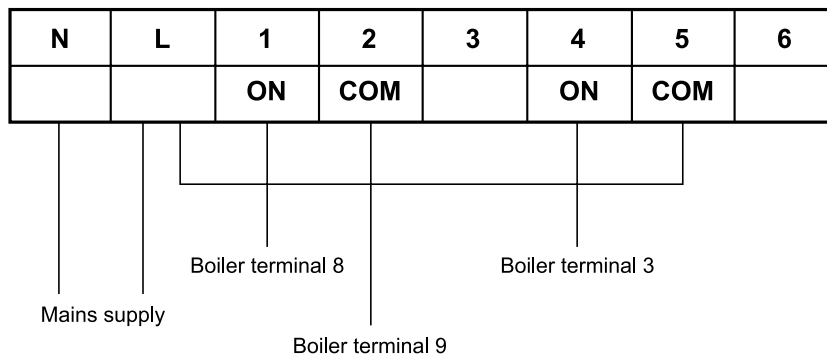
10 - WIRING DIAGRAMS

10.3 Typical connection of external timer



Important: If a remote timer is used, it must be a single channel 240V unit incorporating voltage free output contacts.

10.4 Connection of Grant remote wall mounted mini programmer

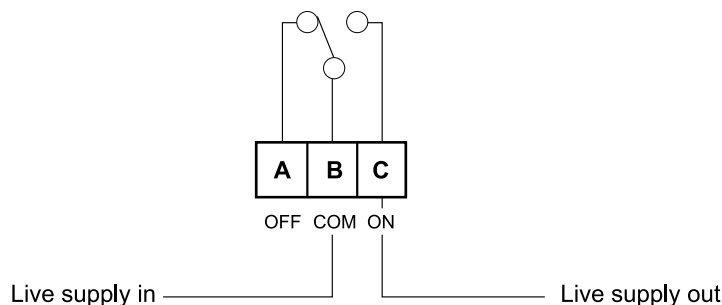


Ensure a link is fitted between Live and 5

Remove the link between terminals 8 and 9 on the boiler terminal block

10.5 Grant programmable room thermostat

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



11.1 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 (situated below plate heat exchanger).
Check and rectify as necessary.

No hot water operation
(no response when 3 litres/min or more is drawn off at hot tap).

Low pressure cut-out activated.
Hot tap is not connected to hot water outlet of boiler.
Insufficient flow of water through boiler.
Boiler cold water and hot water connections reversed.
Thermostatic mixing valve incorrectly fitted.
Pump is not operating in hot water mode.

Charge heating system to 1 bar.
Check and rectify as necessary.
Open tap to increase flow.
Check and rectify as necessary.
Check hot and cold inlets are connected correctly.
Check operation of diverter valve.
Check pump is free to rotate and is vented.
Check power is present at pump terminals.
Check electrical continuity of pump microswitch.
Check wiring continuity from pump to microswitch.
Check switch continuity, replace if faulty.
Check diverter valve diaphragm.
Remove, dismantle and clean.
Replace diaphragm or complete diverter valve.

Low water temperature at tap

Boiler thermostat incorrectly set
Thermostatic mixing valve incorrectly set.
Faulty thermostat.
Pump speed setting too low.
Pump is incorrectly fitted.

Set boiler thermostat to maximum.
Set mixing valve to setting '4'.
Check continuity and replace if necessary.
Set pump speed switch to maximum (top position).
Check and rectify as necessary.

Hot water for short period only

Burner not firing for hot water.

Check operation of burner on central heating.
If burner faulty, refer to burner fault finding chart.
Check electrical continuity of burner microswitch.
Check electrical continuity of thermostat.
Check operation of diverter valve.
Check wiring continuity from burner to microswitch.
Set oil pressure to correct value (see Section 2.2, 2.3).
Fit correct nozzle (see Section 2.2, 2.3)

Burner oil pressure set too low at oil pump.
Incorrect oil nozzle fitted to burner.



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

Low pressure cut-out activated.
 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 set to 'HOT WATER ONLY'.
 Room thermostat not calling for heat.
 Faulty room thermostat.
 No room thermostat or external timeswitch connected to boiler.

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.

ACTION

Charge heating system to 1 bar.
 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 switch to 'Constant' to test.
 Set thermostat to call and check boiler operates.
 Check continuity of thermostat, replace if necessary.
 Check link fitted between 8 & 9 on boiler terminal block.

 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.



11.3 Boiler faults on central heating and hot water

FAULT

POSSIBLE CAUSE

Boiler will not start

Low pressure cut-out activated.

No fuel supply

Isolating valve(s) in fuel supply line closed.

Fire valve closed.

Fuel line filter is blocked.

Oil supply line is air locked.

Oil tank empty.

No electrical supply to burner

No electrical supply to boiler.

Controls are not switched on and calling for heat.

Burner lights but goes to lock-out

Overheat thermostat has tripped.
Boiler thermostat and/or overheat thermostat faulty.

Burner not lighting

Oil & electricity present at burner

Fault with burner.

Excessive combustion air.

Fault with burner.

Insufficient combustion air supply to burner.

Burner fires but smoke visible from flue or high smoke number

Incorrect or faulty nozzle fitted.

Fuel pressure too high.

Insufficient combustion air supply to burner.

Burner pulsates

Contaminated combustion air (balanced flue).

Insufficient oil flow to burner due to restriction in supply line.

Excessive combustion air.

Burner cycles On and Off

Check position of flue terminal.

Fit vacuum gauge to pump and check pump vacuum.

Check for blockage in filter, valve or pipe and rectify.

Reset burner air inlet damper and check combustion.

ACTION

Charge heating system to 1 bar.

Open and check for adequate supply at burner.

Check and reset as necessary.

Check and clean as necessary.

Vent oil supply line at pump.

Check tank and refill as necessary.

Check for 240 V at boiler terminal block.

Check On/Off switch is set to 'ON'.

Set boiler thermostat to maximum.

Set 3-position switch to 'Heating Constant'.

Check and reset thermostat as necessary.

Check continuity of thermostats and replace as necessary.

Press reset button.

Refer to burner fault finding flow chart.

Reset burner air inlet damper and check combustion.

Refer to burner fault finding flow chart.

Check air damper setting on burner.

Check condition of burner fan.

Check flue terminal is clear (balanced flue).

Check room ventilation is adequate (conventional flue).

Check nozzle size and type and replace if necessary.

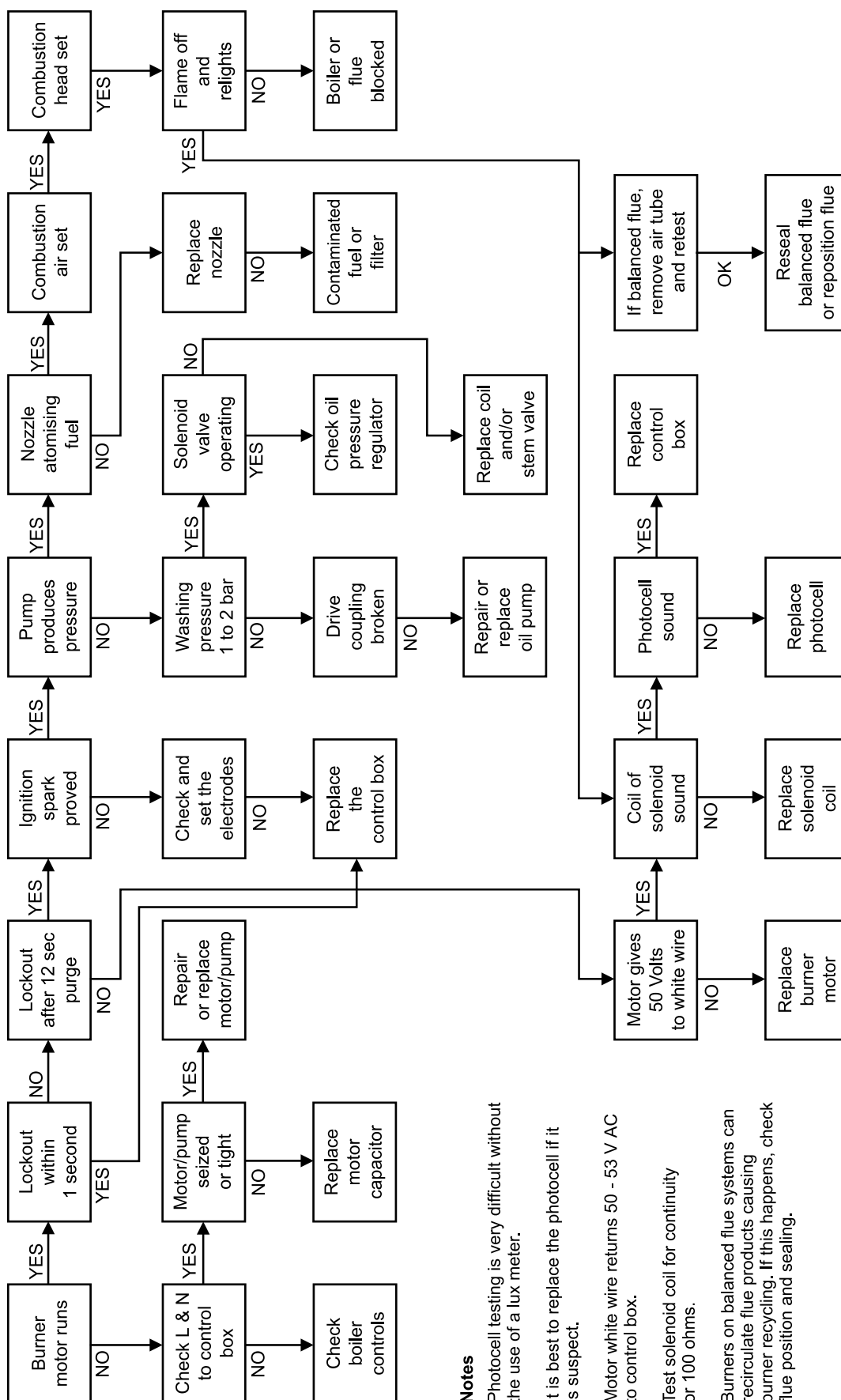
Check fuel pressure and adjust as necessary.

Check as for high smoke number (above).



FAULT	POSSIBLE CAUSE	ACTION
Fumes and puffing on starting (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. 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 a kitchen fan is not drawing products from burner.
Flame slow to stabilise on starting	Insufficient combustion air supply to burner.	Check air damper setting on burner. Check condition of burner fan. Check flue terminal is clear (balanced flue). Check room ventilation is adequate (conventional flue). Check nozzle size and type and replace if necessary. Check fuel pressure and adjust as necessary.
Oil smells	Oil leak in supply line or burner.	Check all joints for leaks and rectify as necessary.
Combustion fume smells	Leak around boiler cleaning door. Burner not correctly fitted on mounting flange. Leakage around flue connection.	Check, re-tighten nuts or replace gasket as necessary. Remove and re-fit burner ensuring correct fitting. Check and re-seal flue as necessary.
Overheat thermostat operating	Faulty boiler thermostat.	Check and replace as necessary.

11.4 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.

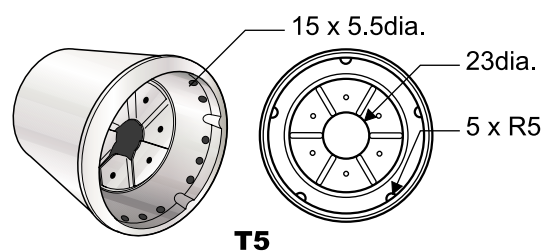


12 - BOILER SPARE PARTS

12.1 Boiler spare parts

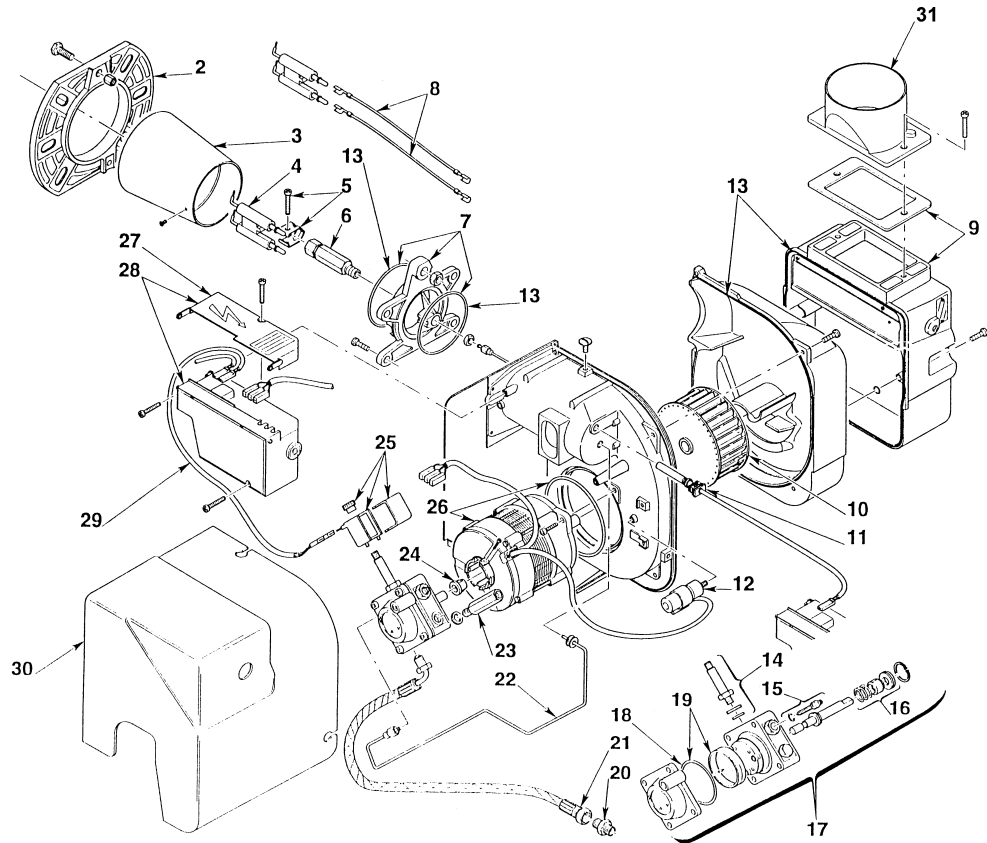
Description	Part No.
Thermostat pocket	EFBS10
Cleaning door nut and washer set	EFBS14
Double pole switch	EFBS19
Timed/constant switch	EFBS22
Baffle set	MPCBS52
Diverter valve	MPCBS20
Plate heat exchanger	MPCBS53
Thermostatic mixing valve	MPCBS22
Circulating pump	MPCBS23
Water pressure gauge	MPCBS24
Non-return check valve	MPCBS26
2.5 bar pressure relief valve	MPCBS50
Automatic air vent	MPCBS29
Filling loop kit with valves	MPCBS30
Expansion vessel flexible hose	MPCBS31
Diaphragm kit	MPCBS33
Washer set (fibre)	MPCBS34 SET
Pump valve isolation set	MPCBS36
Flow restrictor	MPCBS39
Microswitch assembly	MPCBS41
12 litre expansion vessel and bracket	MPSS01
Access door gasket	TPBS23
High limit thermostat	TPBS33
Mechanical timer	MTKIT
Electronic timer	ETKIT
Remote timer	TCRKIT
Electronic programmable room thermostat	RSKIT
Pressure switch	MPCBS49
Electronic thermostat control	PCB01

Burner Head





13.1 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	-	-	17	Pump	3008654	RBS101
2	Flange	3005786	RBS28	18	'O' ring	3007162	RBS08
3	Combustion head T5	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	3005788	RBS151	26	Motor	3002836	RBS102
11	Photocell	3008646	RBS115	27	Cover	3008649	RBS118
12	Capacitor 4.5 μ F	3002837	RBS149	28	Control box assembly	3008652	RBS103
13	Seal kit	3008878	RBS140	29	Solenoid lead	3008851	RBS139
14	Needle valve	3007582	RBS109	30	Cover	3008879	RBS141
15	Regulator	3008651	RBS120	31	Air tube spigot	3062774	RBS143
16	Pump seal	3000439	RBS14				



14 - HEALTH AND SAFETY INFORMATION

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

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

The following other materials are present in the product:

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.



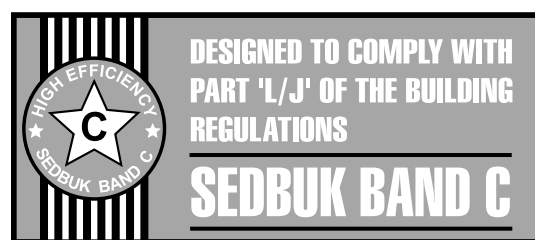
We declare that the Combi 70 and Combi 90 Oil Boilers equipped with Riello RDB burner approved to EN 267: 1991 satisfy the requirements of the following European Directives:-

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)

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



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



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

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

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