



condensing *combi*



Installation & Service Instructions

GC No. 47 555 02
WRc No. 95 110 46

Serial Number:



Note to the Installer: **Natural gas Only**
Please leave these Instructions adjacent to the meter.



Technical Data

	Burner Pressure	INPUT	OUTPUT
Heating Max (60 – 80°C)	11.3 mbar	87000 Btu/h (25.5 kW)	74800 Btu/h (22.0kW)
Heating Min (60 – 80°C)	5.5 mbar	61075 Btu/h (17.9 kW)	50155 Btu/h (14.7kW)
Heating Max (40 – 60°C)	11.3 mbar	87000 Btu/h (25.5 kW)	80000 Btu/h (23.5kW)
Heating Min (40 – 60°C)	5.3 mbar	61075 Btu/h (17.9 kW)	54590 Btu/h (16.0kW)
Hot Water Max	11.3 mbar	87000 Btu/h (25.5 kW)	76560 Btu/h (22.3kW)
Hot Water Min	1.5 mbar	32620 Btu/h (9.56 kW)	26954 Btu/h (7.9kW)

Flue Type & Destination	C ₁₂ C ₃₂ C ₅₂ , U.K. & I.E.		
Minimum flue length	Concentric	100mm	Twin 200mm (Overall)
Maximum flue length	Concentric	2000mm	Twin 22m Horizontal (Overall) 30m Vertical (Overall)
Flue Diameter	Concentric	110mm	Twin 80mm
Terminal	Concentric	160mm High 160mm Wide 55mm Deep	Twin 260mm High 150mm Wide 100mm Deep

SEDBUK Rating	C
Central Heating Flow & Return	22 mm compression for 28mm pipework
Mains water In & Out	15 mm compression
Safety valve & drain	15 mm copper
Expansion vessel size	10 litres @ 0.8 bar

Main burner injector	4.1 mm
Gas inlet	½" BSP
Gas consumption after 10 mins (CV 1015)	2.4 m³/h (85.7 ft³/h)

Height	890mm
Width	500mm
Depth	340mm
Service clearance, LEFT & RIGHT	30mm
Service clearance ABOVE	30mm
Service clearance FRONT	450mm

Appliance water capacity	4.85 litres
Minimum static head	1.0m (0.15 bar)
Maximum static head	25 m (2.5 bar)
Flow rate for 35°C rise	2.1 gpm (9.6 l/m)
Safety valve setting	3 bar
Maximum flow temperature	82°C
Minimum CH flow	16 l/m
Maximum pump head	2.3 m
MIN DHW Inlet pressure for 95% rated output	2.5 bar *
MAX DHW temperature	61°C ± 2C°
MAX DHW Inlet pressure	10 bar

Maximum lift weight	52 kg
Shipping weight	60 kg
Electrical supply, Fused	230V ~ 50 Hz ,3A
Power Consumption	120W

* For applications requiring lower pressures, please contact the manufacturer.

Contents

Section	Page
Technical Data	1
Introduction	2
Boiler Location	3
Gas Supply	3
Flueing	3
Air Supply	4
Water Supply	4
Condensate Drain	4
Sealed Systems	5
Electricity Supply	5
Installation	5
<i>Removing Case</i>	6
<i>Boiler Mounting Box</i>	6
<i>Flue and Air Duct</i>	6
<i>Terminal</i>	6
<i>Twin Pipe Assembly</i>	6
<i>Plumbing</i>	7
<i>Gas Connection</i>	7
<i>Condensate</i>	7
System Design	8
Electrical Connections	8
Commissioning	9
Fault Finding	17
Servicing	21

List of Figures	Page
Fig 2. Installation Dimensions	11
Fig 3. Schematic Wiring	12
Fig 4. Physical Wiring	13
Fig 5. Fixing Positions	14
Fig 6. Boiler Panel Assembly	15
Fig 7. Concentric Flue & Air duct Positions	16
Fig 8. Twin Pipe Positions	16
Fig 9. Spares	26
Fig 10. Major Components	27
Fig 10a Waterside Spares	28
Fig 11. Example Condensate Disposal	29
Fig 12. Condensate Drain Trap	29

Introduction

These Instructions cover a lightweight, wall hung, gas fired, condensing combination boiler which is room sealed and fan assisted on the flue side. The flue systems available are Concentric, left, right, or rear, up to 2 metres and, Twin Pipe, horizontal total combined length of 22 metres or vertical, up to a total length of 30 metres. The ignition system is fully automatic and the boiler incorporates an electronic modulation gas control.

The boiler casing is of white enamelled mild steel.

The boiler is suitable for connection to sealed central heating systems. These systems must be pumped central heating and utilise the pump integral in the

appliance. Gravity circuits must NOT be used.

The boilers include a pump overrun device so it is essential that there is an open circuit for water to flow between the flow and return. In some system designs this may require the addition of a bypass, an automatic bypass is preferred.

There is no requirement for a scale reducer to be fitted to this appliance.

Priority is given to instantaneous domestic hot water, with the boiler input automatically varying between 9.6kW and 25.5kW according to demand.

Similarly, the output to heating is automatically controlled according to demand between 14.7kW and 23.5kW.

Adequate arrangements for completely draining the system, by provision of drain cocks MUST be provided.

Gas Safety (Installation and Use) Regulations.

It is the law that all gas appliances are installed by a competent person (e.g. a CORGI registered operative) in accordance with the above Regulations. Failure to install appliances correctly could lead to prosecution.

It is in your own interest, and that of safety, to ensure that the law is complied with. The installation of the boiler MUST also be in accordance with the current I.E.E.. Wiring Regulations, the Local Building Regulations, Building Standards (Scotland), the Bye Laws of the Local Water Undertaking, any relevant requirements of the Local Authority, and Health and Safety document No 635, "Electricity at Work Regulations".

Detailed recommendations are contained in the following British Standard Codes of Practice.

Codes of Practice.

BS.6798 Installation of gas fired hot water boilers of rated input not exceeding 60kW.

BS.5449:1 Forced circulation hot water systems (small bore and microbore domestic central heating systems).

BS.5546 Installation of gas hot water supplies for domestic purpose (2nd Family Gases).

BS.5440: Part1. Flues (for gas appliances of rated input not exceeding 60kW).

BS 6891 Specification for installation of low pressure gas pipework.

BS 7074:1 Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems.

IMPORTANT. It is important that no external control devices are directly connected to this appliance unless covered by these 'Installation and Servicing Instructions' or otherwise recommended by the manufacturer. If in doubt, please enquire.

Any direct connection of a control device not recommended by the manufacturer could infringe the Gas Safety (Installation & Use) Regulations, the above regulations and the normal appliance warranty.

Manufacturer's notes must NOT be taken, in any way, as overriding statutory obligations.

Location of Boiler

The boiler MUST be installed on a flat and vertical non-combustible wall, capable of adequately supporting the weight of the boiler and any ancillary equipment.

THE BOILER IS NOT SUITABLE FOR EXTERNAL INSTALLATION.

IMPORTANT NOTICE.

If the boiler is to be fitted in a timber framed building it should be fitted in accordance with the British Gas publication 'Guide for Gas Installations in Timber Frame Housing', reference DM2. If in doubt, advice must be sought from the Local Gas Region of British Gas.

The boiler may be installed in any room or internal space. Particular attention is drawn to the requirements of the current I.E.E Wiring regulations and, in Scotland, the electrical provisions of the Building Regulations applicable to Scotland with respect to the installation of the boiler in a room or internal space containing a bath or shower.

Where a room sealed appliance is installed in a room containing a bath or shower then the appliance and any electrical switch or appliance control, utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

Where installation will be in an unusual location then special procedures may be necessary and BS.6798 gives detailed guidance on this aspect.

A compartment used to enclose the boiler MUST be designed and constructed specially for this purpose. An existing cupboard, or compartment, may be used provided it is modified for the purpose. Details of essential features of cupboard compartment design, including airing cupboard installations are given in BS.6798.

In siting the boiler, the following limitations MUST be observed:

1. The position selected for installation MUST allow adequate space for servicing in front of the boiler and for air circulation around the boiler.
2. This position MUST also permit the provision of a satisfactory balanced flue termination.
3. This position MUST also permit the provision of a satisfactory connection to the condensate drain.

Gas Supply

The Local Gas Region should be consulted, at the installation planning stage, in order to establish the availability of an adequate supply of gas.

An existing service pipe must NOT be used without prior consultation with the Local Gas Region, or by a local Gas region contractor. An existing meter should be checked preferably by the Gas region, to ensure that the meter is adequate to deal with the rate of gas supply required.

Installation pipes should be fitted in accordance with BS.6891:

Do NOT use pipes of a smaller size than the boiler inlet gas connection.

Flueing

Detailed recommendations for flueing are given in BS.5440: 1. The following notes are intended for general guidance.

1. Be aware of the plume from the flue and the wetting effect it has to adjacent property.
2. The flue can be taken upwards, left, right or to the rear of the appliance.
3. The boiler is supplied separate to the chosen flue set. It can be supplied with Twin or Concentric flues. The flue components for the Twin Pipe application must be chosen from the separate Flue Application Guide. There are two lengths of Concentric Flue. Standard, that will reach 500mm, and Extended that will reach up to 2000mm. (Part No. M3838).
4. The boiler MUST be installed so that the terminal is exposed to external air.
5. It is important that the terminal allows the free passage of air across it at all times.
6. The acceptable spacing from the terminal to obstructions and ventilation openings are specified in Table 1.

7. Because the flue gases and terminal are at very low temperature it is not necessary to fit a Terminal guard to protect against burns. If a guard is required for any other reason, the following are recommended.

For the **Concentric** Terminal:
Model K3 6.5 x 11 (plastic coated) (GC No 393554)

For the **Twin Pipe** Terminal:
Model B (black plastic coated).

For the **Single Flue** Terminal:
Model H (black plastic coated).

All are available from:

Tower Flue Components Ltd.

*Tower House.
Vale Rise.
Tonbridge
KENT
TN9 1TB
01732 351555*

Terminal Position	Minimum
Below window or vent	300 mm
Below gutter or pipes	75 mm
Below eaves	200 mm
Below balcony or roof	200 mm
From a window	200 mm
From vertical pipe	75 mm
From corners	300 mm
Above ground, roof or balcony	300 mm
From facing surface	600 mm
From facing terminal	1200 mm
From opening under a car port	1200 mm
Vertically from a terminal	1500 mm
Horizontally from a terminal	300 mm

Table 1.

IMPORTANT.

It is absolutely ESSENTIAL to ensure, in practice, that products of combustion discharging from the terminal cannot re-enter the building, or any other adjacent building, through ventilators, windows, doors, other sources of natural air infiltration or forced ventilation/air conditioning.
If this should occur, the appliance MUST be turned OFF IMMEDIATELY and the Local Gas Region consulted.

Air Supply

It is NOT necessary to have a purpose provided air vent in the room or internal space in which the boiler is installed.

Where the boiler is installed in a cupboard or compartment no air vents are required. However the User may wish to ensure that is ventilated to provide air circulation.

Water Supply

The central heating system should be in accordance with the relevant recommendations given in BS.6798, BS 7593:1992 and, in addition, for smallbore and microbore systems - BS.5449:1.

The domestic hot water system should be in accordance with the relevant recommendations of BS.5546.

Copper tubing to BS 2871:1 is recommended for water carrying pipework.

The Mains Water supply should be clean and able to produce the required flow rate, see Technical Data. New pipework must be flushed through before connecting.

The appliance incorporates a strainer & flow regulator set at 8.5 l/min on the Cold Water mains inlet. The Inlet pressure should not exceed 10 bar, a reducer should be fitted if it does.

The ancillary pipework, not forming part of the useful heating surface should be lagged, to prevent heat loss and any possible freezing, particularly where pipes run through roof spaces and ventilated under-floor spaces.

Draining taps MUST be located in accessible positions, which permit the draining of the whole system. Draining taps should be at least ½ in. nominal size and be in accordance with BS.2879.

Condensate Drain

Refer to Fig. 2, and 12.

A condensate drain is provided on the boiler, this drain must be connected to the household drainage point, or soakaway on site. All pipework and fittings in the condensate drainage system MUST be made of plastic. Refer to British Gas publication "Guidance notes for installation of domestic condensing boilers"

No other materials may be used.

The drain outlet on the boiler is :

Polypipe, 21.5mm pushfit overflow pipe.

Sealed Systems

A sealed system should follow the guidelines given in the Code of Practice BS 7074 :1. The appliance includes a safety valve to BS 6750 Pt 1. in a position where it can be tested. It is preset to operate at 3 bar (45 lb/in²) and should be piped to discharge to a safe outlet.

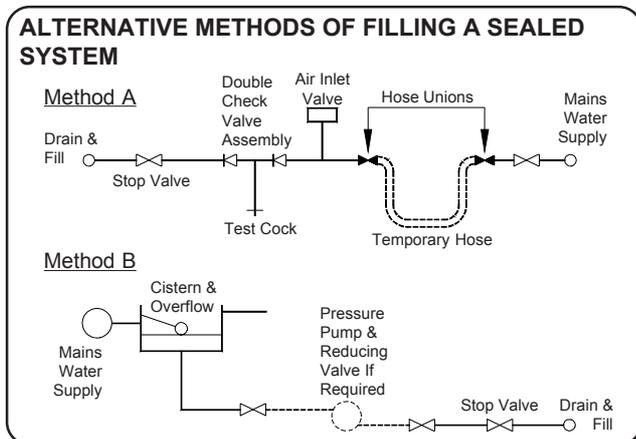
A 10l expansion vessel complying with BS 4814 is fitted in the appliance and dependant on its initial charge pressure can accommodate different system volumes. If the system volume exceeds this another pressure vessel can be fitted on the return to the boiler. Size the vessel by using the table below.

1. Choose a vessel pressure by taking the static head of the system, adding 0.3 bar, and taking the nearest larger size.
2. Select the Vessel Volume from the table below by finding the system volume and vessel pressure.
3. Choose that size or larger from the manufacturers' range.

Vessel Pressure Bar	System Volume Litres				
	50	60	70	100	150
0.5	4	4	8	8	12
1.0	8	8	8	12	18
1.5	8	12	12	18	24

A pressure gauge with a fill pressure indicator is fitted on the appliance front panel.

A design as detailed below should be used for the filling connection, it utilises a BS 1010 stop valve, a double non-return valve and filling loop fitted at low level and should be installed with the approval of the local Water Undertaking.



Electricity Supply

Refer to Figs. 3 and 4.

Wiring external to the appliance **MUST** be in accordance with the current I.E.E. Wiring Regulations and any Local Regulations that apply.

The boiler is supplied for 230V ~ 50Hz. Single phase. Fuse rating is 3A.

The method of connection to the mains electricity supply **MUST** facilitate complete electrical isolation of the boiler, preferably by the use of a fused double pole switch having a 3mm (1/8in.) contact separation in both poles and servicing only the boiler and system controls.

The point of connection to the mains should be readily accessible and adjacent to the boiler, except that, for bathroom installations, the point of connection to the mains **MUST** be situated outside the bathroom.

Note. Where a room sealed appliance is installed in a room containing a bath or shower, the appliance, any electrical switch or appliance control utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

Installation Of Boiler

Suggested procedure:

1. Site to suit system and terminal limitations.
2. Mark Boiler Mounting Box fixing position. (Fig. 5).
3. Mark & Drill Flue hole(s).
(see Fig. 7 for Concentric, Fig. 8 for Twin Pipe).
4. Fix Boiler Mounting Box to the wall.
5. Remove the Electrical tray and the Case from boiler module.
6. Plumb module for water and gas OFF the wall (access is much better).
7. Fix the Boiler to its Mounting Box.
8. Plumb tails to system and gas.
9. Test for leaks.
10. Replace the Case and Electrical tray.

Space Required for Installation and Service.

Right or Left	30mm	1 in.
Above	30mm	1 in.
Below	25mm	1 in.
In Front	450mm	18 in.

Removal of the Case

Refer to Fig. 6

1. Remove the front panel screw. Detach by pulling the cover towards you and carefully lowering. Care should be taken to prevent strain on the cables and connections.
2. Remove the case by unscrewing the two pozidrive screws located at the bottom and rear of the case, and lifting and pulling forward off the two pegs which are located at the top. The case should be kept vertical as it is removed. Examine the sealing strip for damage and replace if necessary.

IMPORTANT: FAILURE TO CORRECTLY LOCATE THE APPLIANCE CASE COULD RESULT IN LEAKAGE OF COMBUSTION PRODUCTS INTO THE ROOM.

Boiler Mounting Box

1. Site to suit system and terminal limitations.
2. For the Concentric Flue. Prepare the Boiler Mounting Box for the flue direction required by swapping one of the blanking discs for the flue grommet.
3. Using the template, ensure the Boiler Mounting Box is at the desired height for the top of the boiler. **See Fig. 5**
4. Mark the wall or ceiling for the flue exit points and core drill to give a 0 to 3 degree slope down towards the boiler. The recommended core drill for the Concentric Flue is 128mm and 90mm for the Twin Pipe.
5. Then screw the Boiler Mounting Box to the wall using a top hole on each side, and then any other two, using the four screws, washers and wallplugs supplied.

Assembly Of Flue Pipe & Air Duct Pipe To Boiler Mounting Box (Concentric Flue Only)

The following is based on the flue tube being supplied with the straight and elbow connectors being pre-assembled, the one NOT required to be cut off during installation.

Right or Left Outlet

1. Secure the 50mm flue tube with ELBOW connec-

tor on the saddle using the Velcro strap.

See Fig. 7

2. Measure carefully and saw off the 50mm tube to give required projection from wall. **See Fig. 7**
3. Measure carefully and saw off the 110mm Air duct tube to give required projection from wall. The flue pipe must project more than the outer air duct when assembled. **See Fig. 8**

Note:

It is acceptable to obtain this dimension by pulling the air duct away from the air duct stop, provided there is a minimum of 10mm (1/2 in.) insertion into the Boiler Mounting Box and that a satisfactory seal is achieved.

4. For extended flues, position the air duct support clips provided every 700mm.

Rear Outlet (Concentric Flue Only)

Install as above but using the STRAIGHT connector in the Boiler Mounting Box. Follow the instructions under Right or Left Outlet, points 1,2,3 and 4.

Terminals

Concentric

Fix to the outside wall with the screws provided. The top has no holes and is marked 'TOP'. If a guard is fitted, the terminal should be at its centre.

Twin Pipe

The terminal can be fixed vertical or horizontal. The flue pipe must always be connected to the extended outlet of the terminal. The spacing is 120mm and a core drill of 90mm is recommended. See Fig. 2.

Single Pipe

A core drill of 90mm is recommended. See Fig. 2.

Twin Pipe Assembly

All the Twin Pipe components for this appliance are lightweight plastic and utilise a push-fit system. Very few fasteners are required and their use is detailed on the instructions provided with the components.

Important:

All Twin Pipe Installations must comply with the following.

1. The Flue pipe must slope back to the boiler by three degrees (1 in 20) on all horizontal runs. The air pipe can be above or below horizontal.
2. Pipes must be clipped every 1000mm, minimum.

3. The condensate connection from the Boiler Mounting Box must be connected to the Boiler Condensate Drain Trap. (see Fig. 12)
4. All connections should be made with the Socket end furthest from the boiler.
5. Only CentraCerin or Silicone Grease should be used to ease the fitting of sections.
6. The combined length of Air and Flue should not exceed 22m horizontal, or 30m vertical and includes any terminal parts.
7. The straight equivalent lengths of bends in a horizontal design are as follows:
 - 45 degrees, 1.3m.
 - 90 degrees, 4m.
 For more complex designs please see the details provided with the components.
8. The Roof Terminal must not be altered and there should be at least 300mm from the terminal to any part of the building.

It is recommended that:

1. The Installation of the flues are completed before the boiler is hung on the Mounting Box. This will ensure that any debris that gets into the flues can be cleared.
2. That 45 degree bends are always used with vertical flues and where possible used in preference to 90 degree bends in horizontal installations.
3. Straight/square Flue pieces may be reduced in length by cutting. It will ease assembly if the cut edge is cleaned, chamfered and greased before insertion.

Plumbing

If the requirement for Heating exceeds 50,000 Btu/h (15kW), the Flow and Return pipework from the appliance must be 28mm until the heat load allows smaller bore pipework.

The appliance includes a pump overrun device and there must be a flow path in the heating system at all times. Where necessary an automatic bypass is preferred.

New pipework must be flushed through before connecting.

For Twin Pipe installations, remove the cap from the spare inlet on the condensate syphon trap, trim the silicone tube from the Boiler Mounting Box to suit

and fit to the spare position. **Note: The tube must not be kinked or obstructed.**

SECURING THE BOILER ON TO THE MOUNTING BOX

1. Remove the two M5 screws from the Mounting Box, and retain.
 2. Remove the boiler top trim by undoing the two screws, and retain. For Twin Pipe Installations, also remove the Left Hand Side Trim.
 3. With the bottom of the boiler away from the wall, hang the top of the back panel onto the Mounting Box. Now, by gently lowering the bottom of the boiler against the wall the fan spigot should engage in the flue connector. Observe the correct engagement of the fan spigot into the flue.
 4. For Twin Pipe Installations, Remove the cap from the spare inlet on the condensate trap. Offer up the silicone drain tube from the Mounting Box and shorten if necessary. If there is very little clearance on the left of the appliance it will be easier to connect the flue drain to the syphon by swinging the bottom of the boiler away from the wall to give more room.
- IMPORTANT:** Neither of the drain tubes should be kinked, they must run smoothly to the Condensate Trap.
5. Replace the two M5 screws around the fan that hold the Mounting Box to the back panel.
 6. Replace the Left Hand Side Trim and decorative top trim, if required.

Lower Boiler Fixing

The boiler is finally attached to the wall by two screws, washers and wallplugs. **See Fig. 5**

Gas Connection

The ½" BSP. gas connection point is shown in Fig. 1. A minimum of 20mb. (8in. w.g.) must be available at the boiler inlet, with the boiler and other connected appliances firing. Check for gas soundness (B.S. 6891: 1988) in pipework to boiler using a manometer. Open the gas cock. Gas soundness within the boiler should be checked using sense of smell and/or leak detection fluid. Check the burner bar pressure with a manometer connected to the control and adjust if required. (See SERVICING, 3. CVI Valve for details)

Condensate Connection

The position of the plastic condensate drain pipe is shown in Fig 2.

Where possible an internal termination of the Condensate discharge pipework should be used.

Installation pipework must be in plastic to a suitable drain location with a gradient of 2.5° (45mm/ meter run) minimum. If connected to another drainage a trap, an air break is required between the boiler drain and that trap. (see Fig.11). Internal runs may be in a minimum of 19mm pipe. External runs MUST be made in a minimum of 32mm pipe, starting inside the building, and if possible insulated to defer problems from freezing.

Whichever method is used it should be checked during commissioning to prove there is a leakfree working connection from the boiler to the drain. The simplest way to do this is to carefully pour some water into the boiler flue and check it emerges at the drain.

The British Gas booklet "Guidance for the installation of Domestic Condensing Boilers" should also be referred to.

System Design

General principals

Condensing Boilers give their best performance when the system water temperature is as low as possible and still achieve the desired room temperatures. Oversized radiators make this easier to achieve but are not essential as, even in a standard designed installation, most of the boilers' working hours are spent with the system producing much less than the designed output. This is because the outside temperature is often higher than the figure used for the design, typically -1 to -2° C.

The Manufacturer strongly recommends the use of a programmable room thermostat, alternatively a separate timeswitch and room thermostat can be used.

The boilers include a pump overrun device so it is essential that there is an open circuit for water to flow between the flow and return. In some system designs this may require the addition of a bypass, an automatic bypass is preferred.

Terminals 3 and 4 on the main wiring strip are provided for an external Frost Thermostat. It should be located in the coldest part of the house but in a position where it can respond to a rise in temperature as a result of switching on the appliance. The Manufacturer strongly recommends the wiring of a pipe thermostat in conjunction with the Frost Thermostat.

Thermostatic radiator valves can be used but it is essential to fit a bypass to maintain minimum flow

conditions. An automatic bypass is preferred.

The Installer can set the pump speed for Central Heating. The speed in DHW operation is controlled by the appliance.

The boiler waterside is completely copper so all good corrosion inhibitors are suitable.

Designs

The following designs are all acceptable:

1. Sealed system to BS.6798 and BS.5449:1
2. Combined Feed and Vent systems.
3. Separate Cold Feed and Vent systems.

The pump may be on the flow or return, but careful note of its position relative to the feed and vent MUST be made to avoid pumping over, or sucking in air. It should always be installed with isolating valves as close as possible on both its flow and return. The design temperature difference across the boiler for optimum operating efficiency is 20°C. If thermostatic valves or zone valves are used ensure the minimum flow shown in the **Technical Data on page 1** is possible.

Electrical Connections

WARNING: The appliance MUST be earthed.

All wiring for the boiler and system controls MUST conform to I.E.E. Wiring Regulations, and work should be tested using a suitable meter, for Earth Continuity, Polarity, Short Circuit and Resistance to Earth.

The supply must be through a common isolator, a double pole 3A fused isolating switch with a contact separation of 3mm minimum on both poles. The cable used should be no less than 0.75mm² to BS.6500 PVC, 3 core, and fixed ensuring the earth connection is longer than the Live and Neutral.

Access to the boiler connections is made by withdrawing the Electrical Tray then releasing the single screw retaining the cover over the push fit screw terminals. The boiler internal wiring is shown in Fig.3 and Fig.4.

Connections are as follows :-

4 Way Terminal

- ⊕
- L
- N
- 1.
- 2.
- 3.
- 4.

Supply Connection

- Earth
- Mains Live
- Mains Neutral
- External Timeswitch
- External Timeswitch
- Frost Thermostat
- Frost Thermostat

NOTE: Connections to 1,2,3 & 4 **MUST BE** voltage free.

The manufacturer recommends the use of a Clock Thermostat.

The electrical wiring of the external controls should follow the relevant control manufacturer's recommendations.

The boiler includes a temperature operated pump overrun.

Commissioning

General

The elimination of air from systems is essential to minimise the occurrence of heat exchanger and general system noise. It is particularly important for lightweight boilers.

Metal swarf and flux chemicals make a very aggressive mixture, the destructive nature of which can be drastically reduced by flushing. Consequently this is a mandatory step in the commissioning procedure.

Low water content, fabricated boilers are vulnerable to damage by air, particularly when the system water is 'hard'. (Contains a lot of dissolved calcium salts). The result of this damage is evident in noisy boilers and reduced service life.

Removal of air from a system mainly takes place when the water is stopping, starting or not moving at all. It is removed most easily when it is in large bubbles, but the action of the pump is to chop it up so that it becomes a foam, which is extremely difficult to remove.

Two or three second bursts on the pump at the initial stage will reduce the risk of foam formation.

Sloping the pipe runs towards the vent points will greatly aid air removal. Sloping pipes are not just a feature of gravity systems but can greatly aid the pumped system because air can move towards a vent when the pump stops.

Air is dissolved in water but is released when heated. Always run a system at maximum temperature for at least 15 minutes to enable this potential problem to be removed during commissioning.

Commissioning Procedure

The boiler is fitted with automatic ignition and will start when the gas cock is open, mains is connected to the boiler and the controls calling for heat. It is strongly suggested that the following stages of

commissioning are followed, and not an immediate connection of all services. This procedure prevents substantial amounts of air being dispersed through the system as small bubbles.

Carry out electrical tests as stated in Electrical Connections if not already done so.

With all radiator valves fully open, fill the system but do not start pump.

With the temporary hose connected, fill from the mains supply, then follow the procedure below.

Check for water soundness and rectify where necessary.

Check that there is a leakfree working connection from the boiler to the drain. The simplest way to do this is to carefully pour some water into the boiler flue and check it emerges at the drain.

DO NOT TURN ON GAS

Drain the system by opening all draincocks. This will flush the system of flux and swarf.

Pour in all the inhibitor, and fill to required pressure plus 0.3 bar to allow for venting.

Switch on the electrical supply to the boiler and switch the Thermostat/Timeswitch ON.

Switch off after about five seconds and vent all points again.

Repeat this for 5 minutes.

Re-pressurise if required.

Vent until no more air can be removed and air noises are no longer produced at the boiler. While the system is venting check again for water soundness.

TURN ON THE GAS

Check for gas soundness in pipework to boiler using a manometer.

Open the gas cock and after purging the system, the boiler will light automatically.

Run system at maximum thermostat setting.

Gas soundness within the boiler should be checked using sense of smell and/or leak detection fluid.

Continue running for 15 minutes, venting every 5 minutes.

The Pilot is not adjustable

IMPORTANT. With the front panel switch set to HOT WATER check the Inlet Pressure is at least 20 mbar.

The pressure will slowly reduce as the temperature rises to maximum and stabilises. To check the minimum burner pressure it will be necessary to reduce the flow from the tap.

The Maximum Hot Water temperature is factory set at its highest position. If required it can be altered using the potentiometer inside the Electrical Tray, marked HOT WATER TEMPERATURE.

The DHW Burner Pressure is factory set, if it has to be altered use the FULL PRESSURE SETUP steps in the CVI Valve section of SERVICING.

Set the pump speed for Central Heating. (It is controlled by the boiler on HW)

Re-pressurise the system to 1 bar if necessary.

With system hot, check again for water soundness.

Where a bypass is fitted check its operation with the system hot, the minimum flow rate through the boiler should be as shown in the **Technical Data on Page1.**

Refit the case to the boiler.

Balance the system in the normal way to obtain even heating of all radiators.

Complete the Logbook and pass to the user when explaining and demonstrating the operation of the system.

Note: The boiler is fitted with a syphon trap that includes a blocked drain device. This is to safeguard the boiler and help defer the effects from the possible freezing of the condensate pipework in extreme weather.

The user should be made aware of this feature and, that in the event of blocked condensate pipework, for example frozen condensate pipework, the boiler will automatically stop functioning. It will start again as soon as the blockage has cleared.

Commission Check List (hydraulic)

The key points which must be observed closely, are shown below.

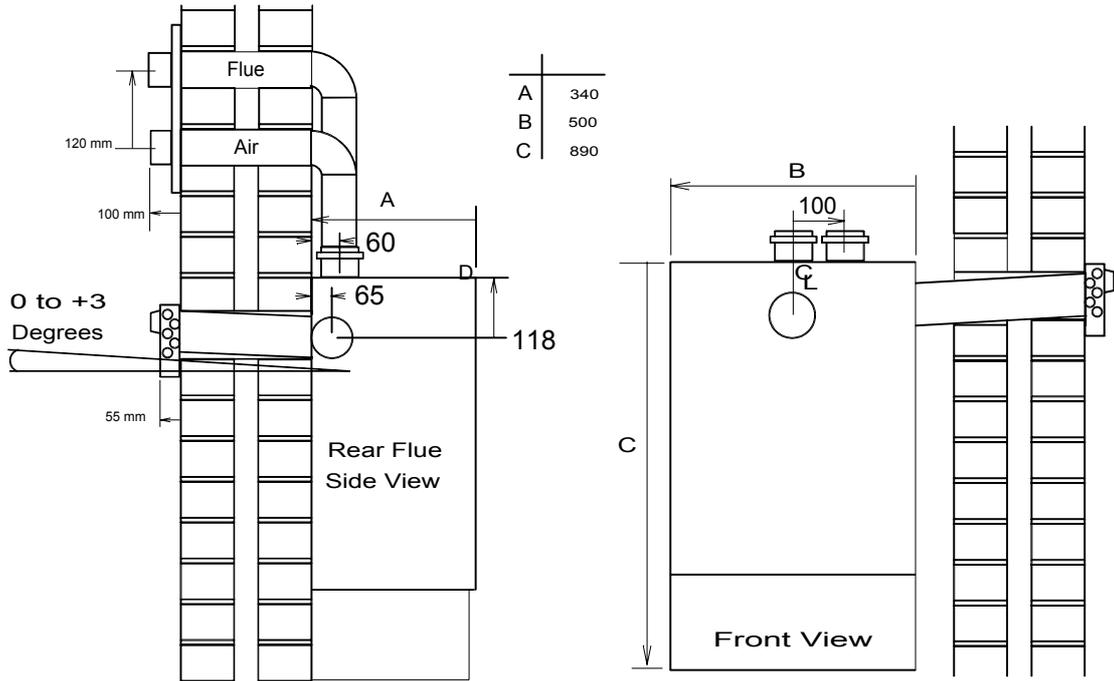
- ✓ With radiator valves and vents open fill the system.
- ✓ **Do not use pump. Do not light gas**
- ✓ Check for and rectify leaks.
- ✓ Drain to flush system.
- ✓ Refill system, adding the inhibitor.
- ✓ **Do not light boiler.**
- ✓ Vent all radiator and air release points.
- ✓ Run pump for 5-10 second bursts and revent.
- ✓ **Do not light boiler.**
- ✓ Run pump for at least 30 minutes.
- ✓ Stop at 5 minute intervals to vent.
- ✓ Continue venting until no more air noise can be heard.
- ✓ Light boiler and run at max thermostat setting. Continue for 15 minutes, venting every 5 minutes.

Rating Table (1040 Btu/ft³) (38.8 MJ/m³)

<i>kW</i>	<i>Btu/h</i>	<i>sec /ft³</i>	<i>m³/2 mins</i>
22	75064	49.9	0.0680
24	81888	45.7	0.0742
26	88712	42.2	0.0804

Installation Dimensions

Service Access



Twin pipe
 Suggested core drill 90mm
 Equivelant lengths: Minimum 200mm
 Maximum 22m horizontal
 Maximum 30m vertical
 90° bend = 4.0m 45° bend = 1.3m

Concentric Flues
 Suggested core drill 128mm
 Flue 100 to 2000mm
 Left, right or rear

Service Access
 Front 450mm Above 30mm
 Sides 30mm Below 25mm

Pipe Connections & Locations

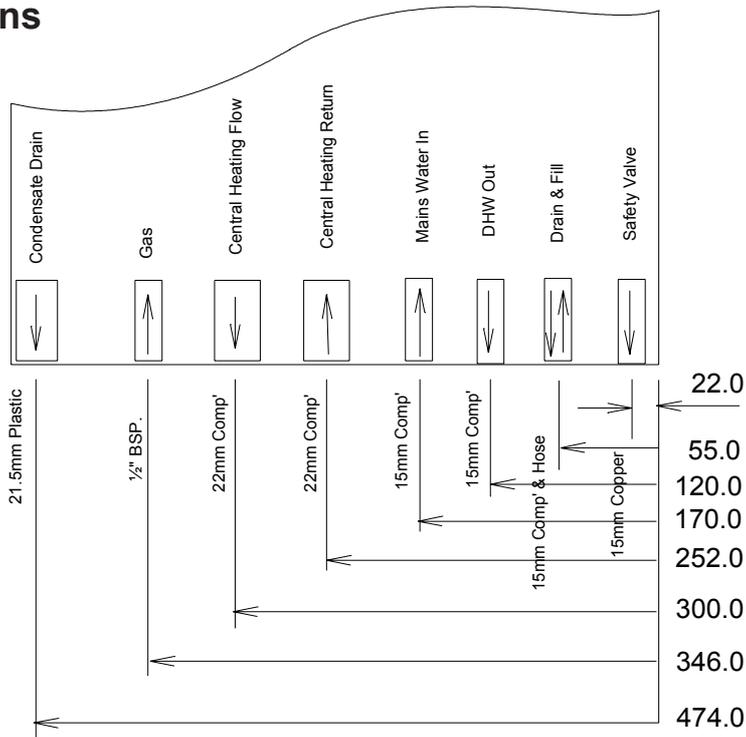
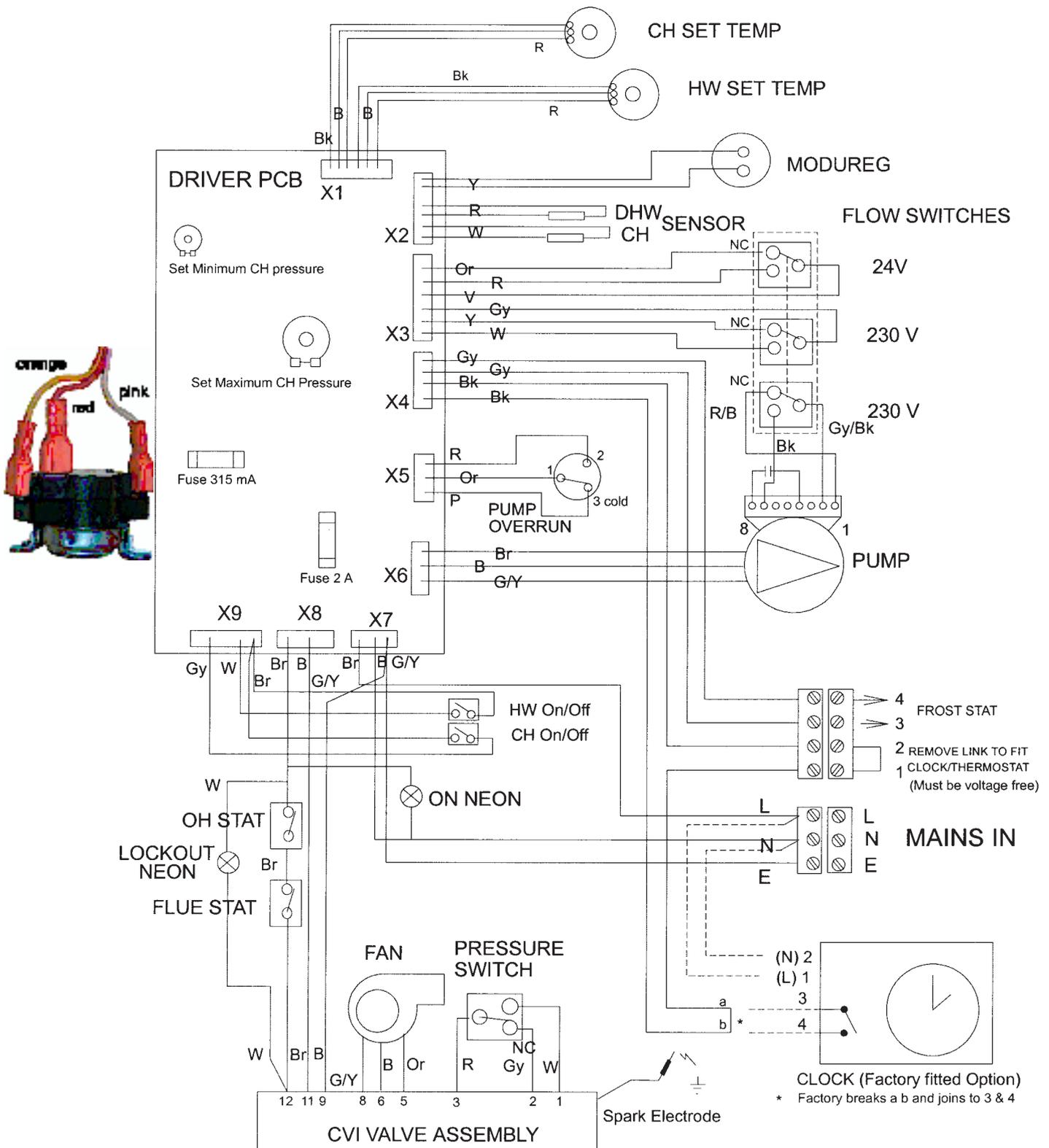


Fig.2

Schematic Wiring



G/Y	Green & Yellow	Bk	Black
B	Blue	Or	Orange
Br	Brown	Y	Yellow
R	Red	P	Pink
W	White	R/B	Red & Blue
Gy	Grey		

Fig.3

Physical Wiring Diagram

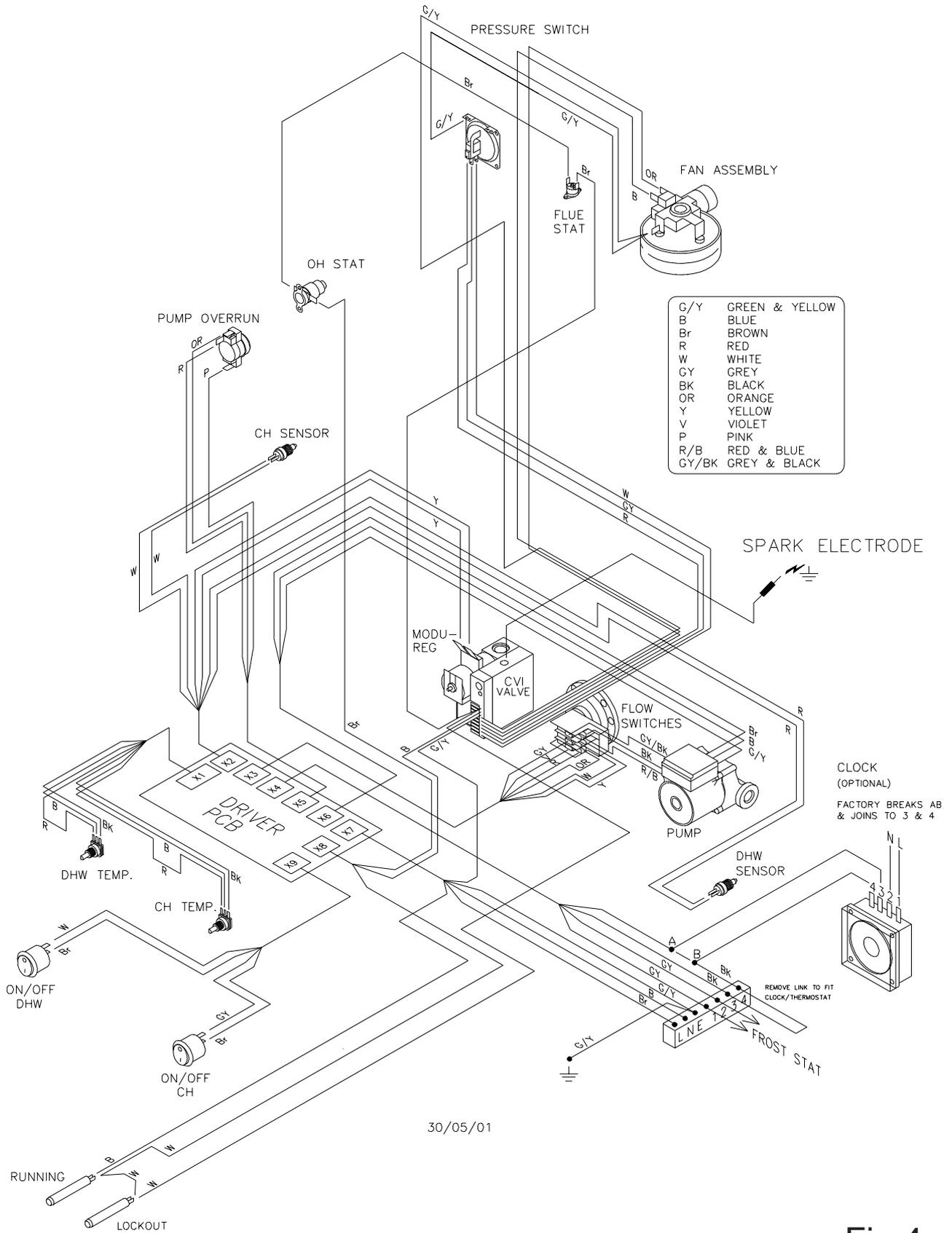


Fig.4

Fixing Positions

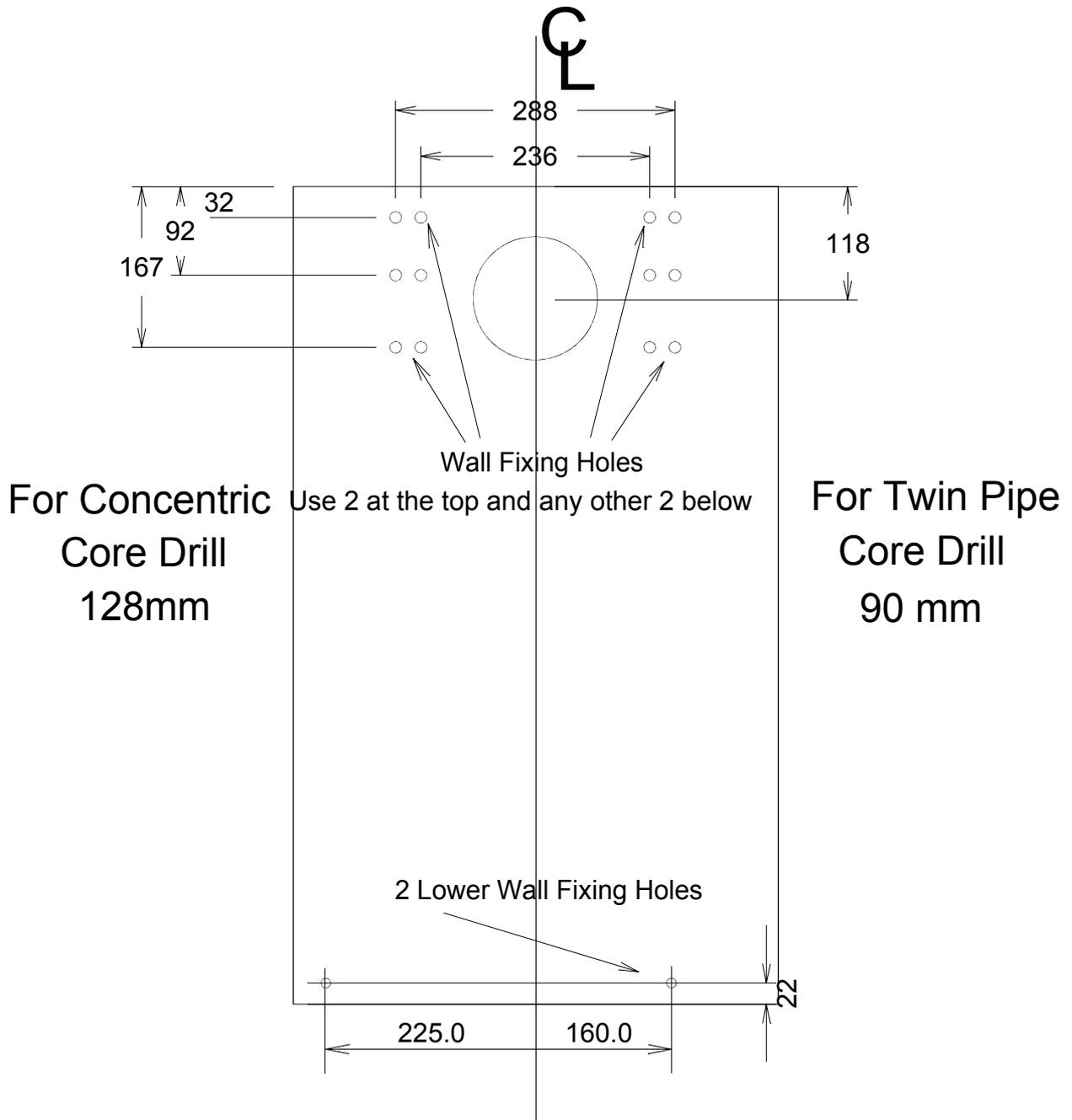


Fig.5

Boiler Panel Assembly

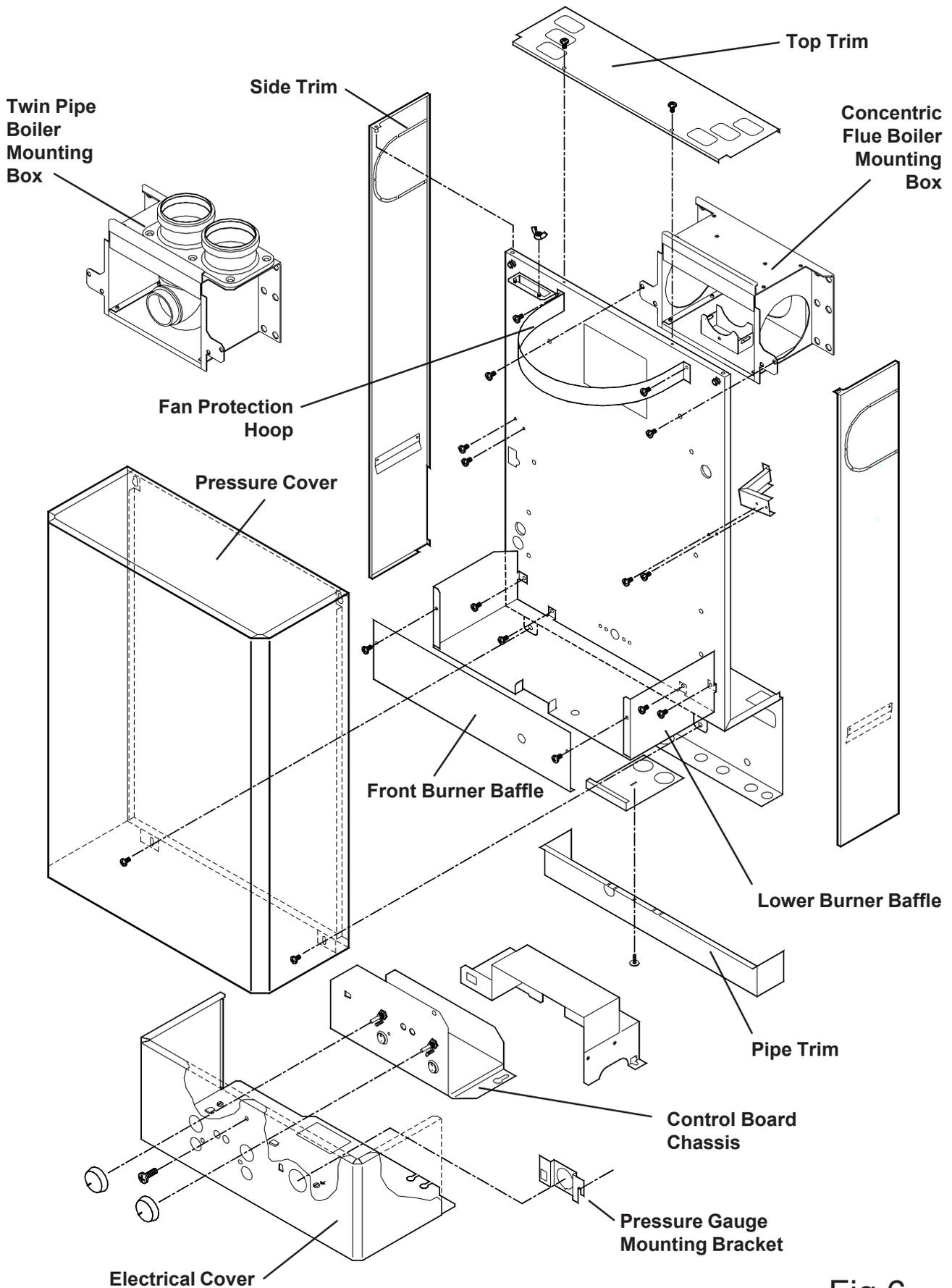


Fig.6

Concentric Flue, positions

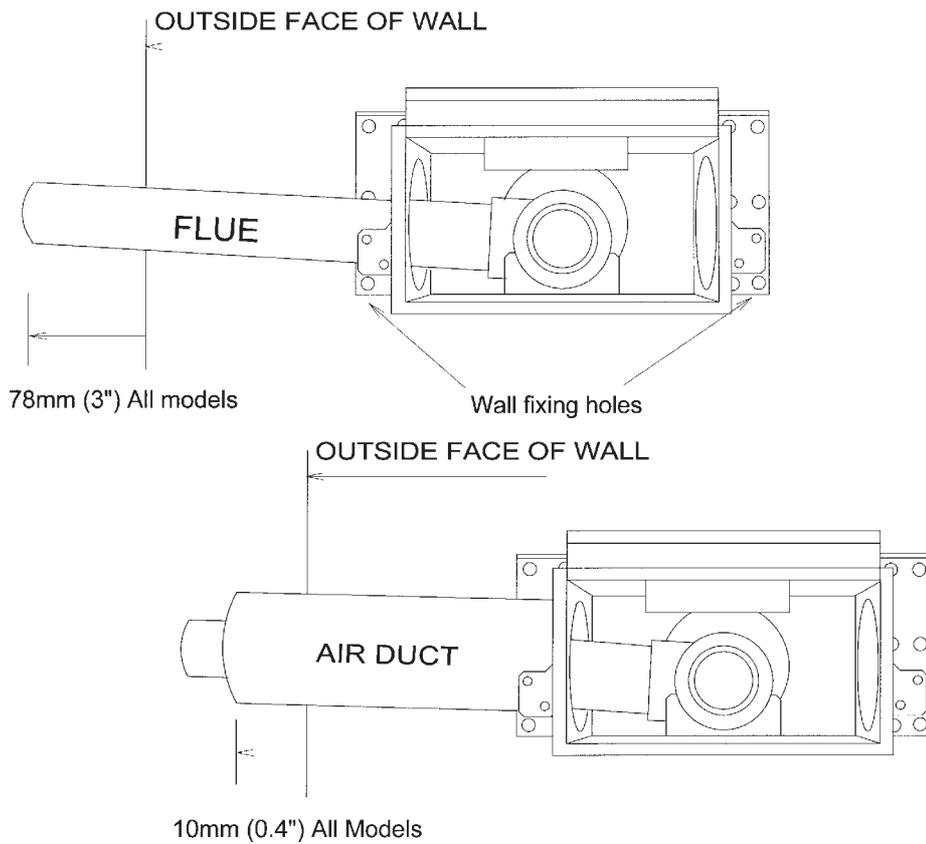


Fig.7

Twin Pipe Positions

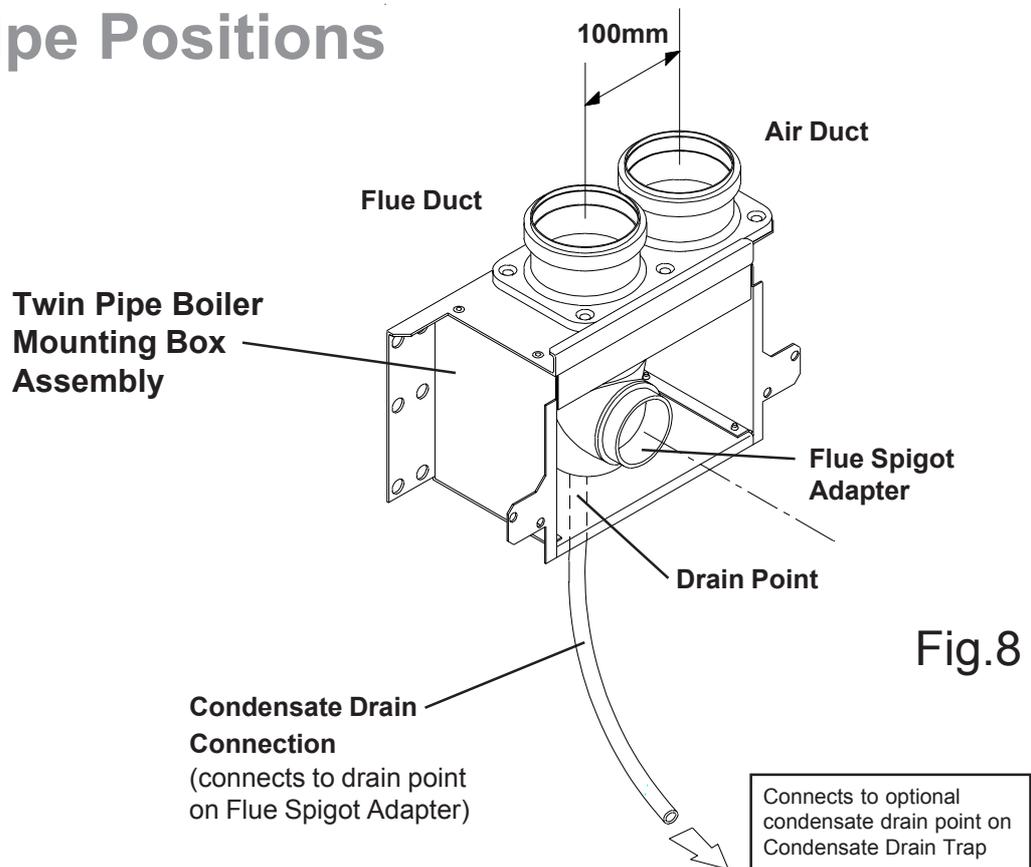


Fig.8

FAULT FINDING

Operation Sequence

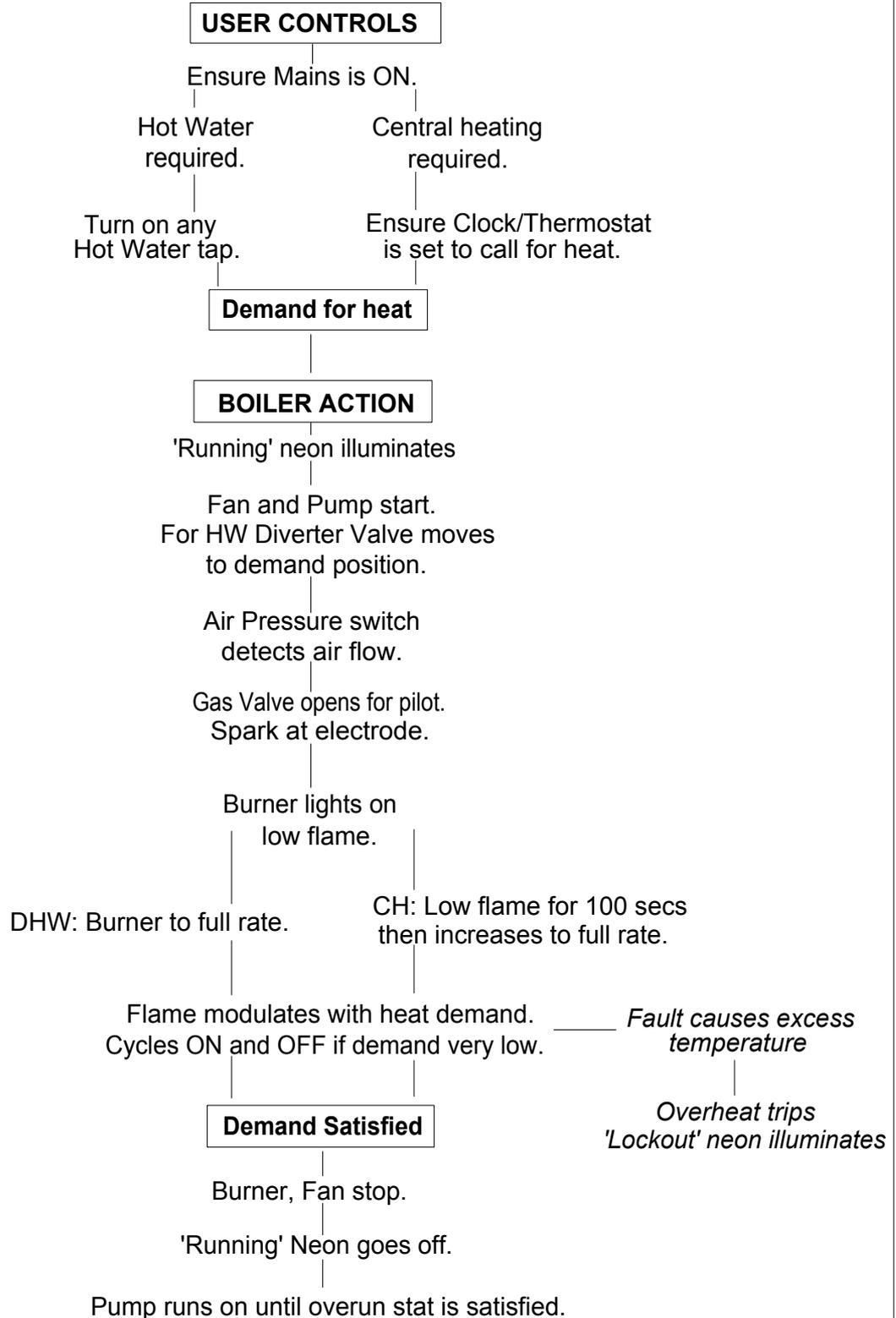
By using the flow charts basic problems can be identified.

If the particular fault cannot be immediately identified, follow the charts from beginning to end

Before commencing, always check that the Mains is ON and the system controls are calling for heat, the gas cock is open.

If the system is pressurised, it is at normal pressure, and all valves are open.

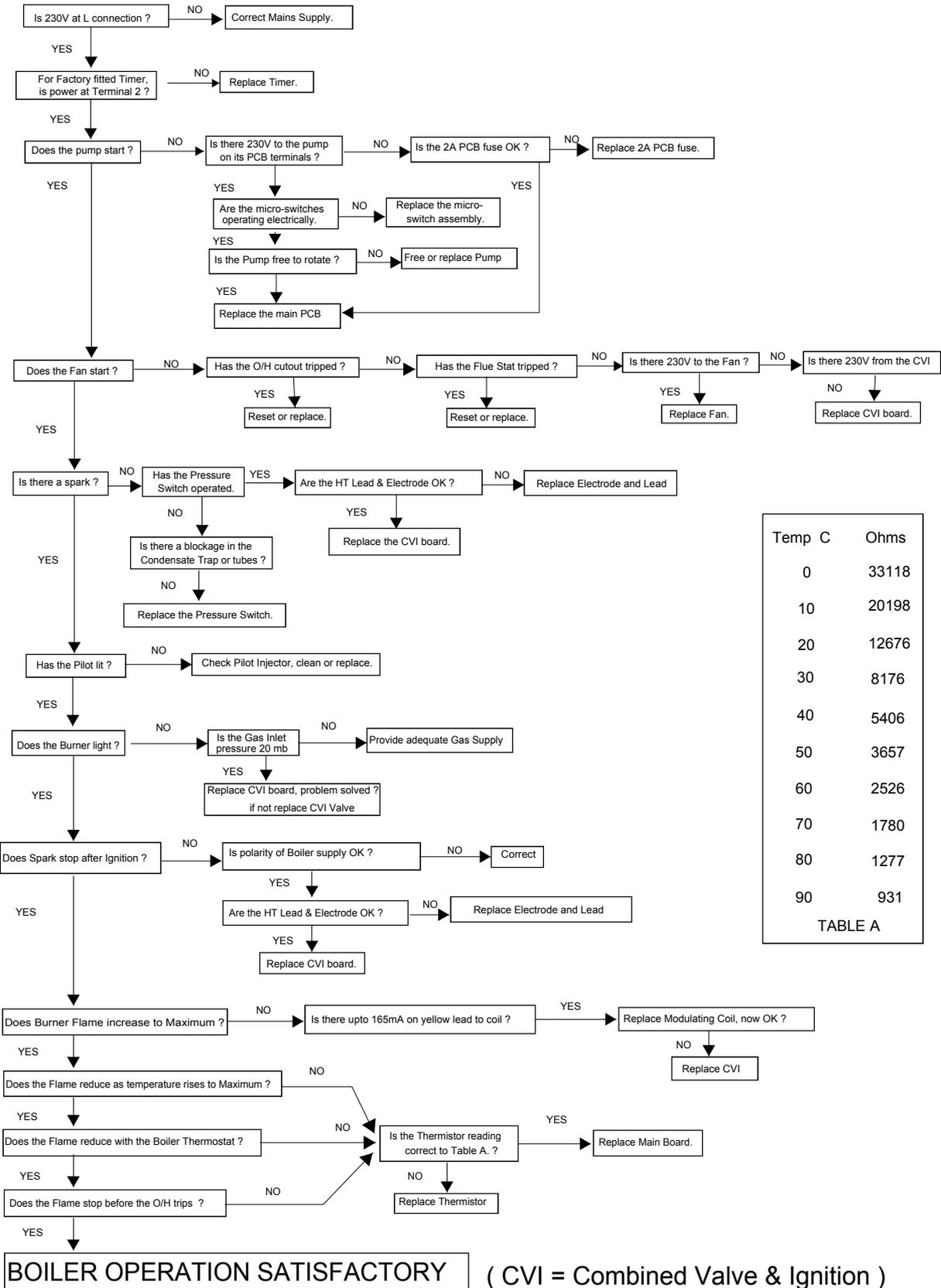
Test the electrical system for short circuit, polarity, and resistance before attempting any electrical fault finding.



FAULT FINDING Central Heating Operation

Start with system and boiler cold, with the power ON and no Hot Water taps open.

Set the Boiler Thermostat to Maximum, and set system controls to call for heat.

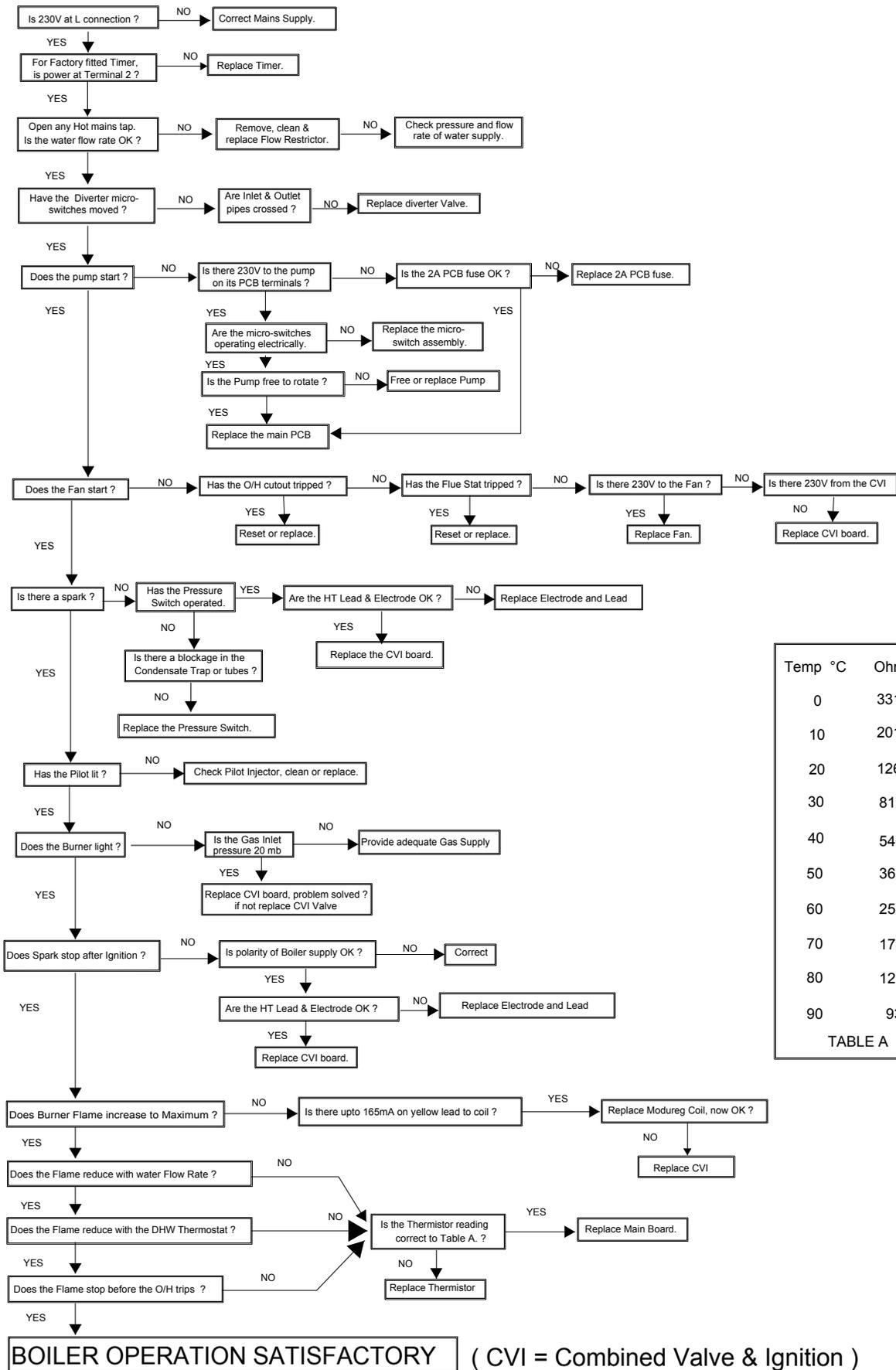


Temp C	Ohms
0	33118
10	20198
20	12676
30	8176
40	5406
50	3657
60	2526
70	1780
80	1277
90	931

TABLE A

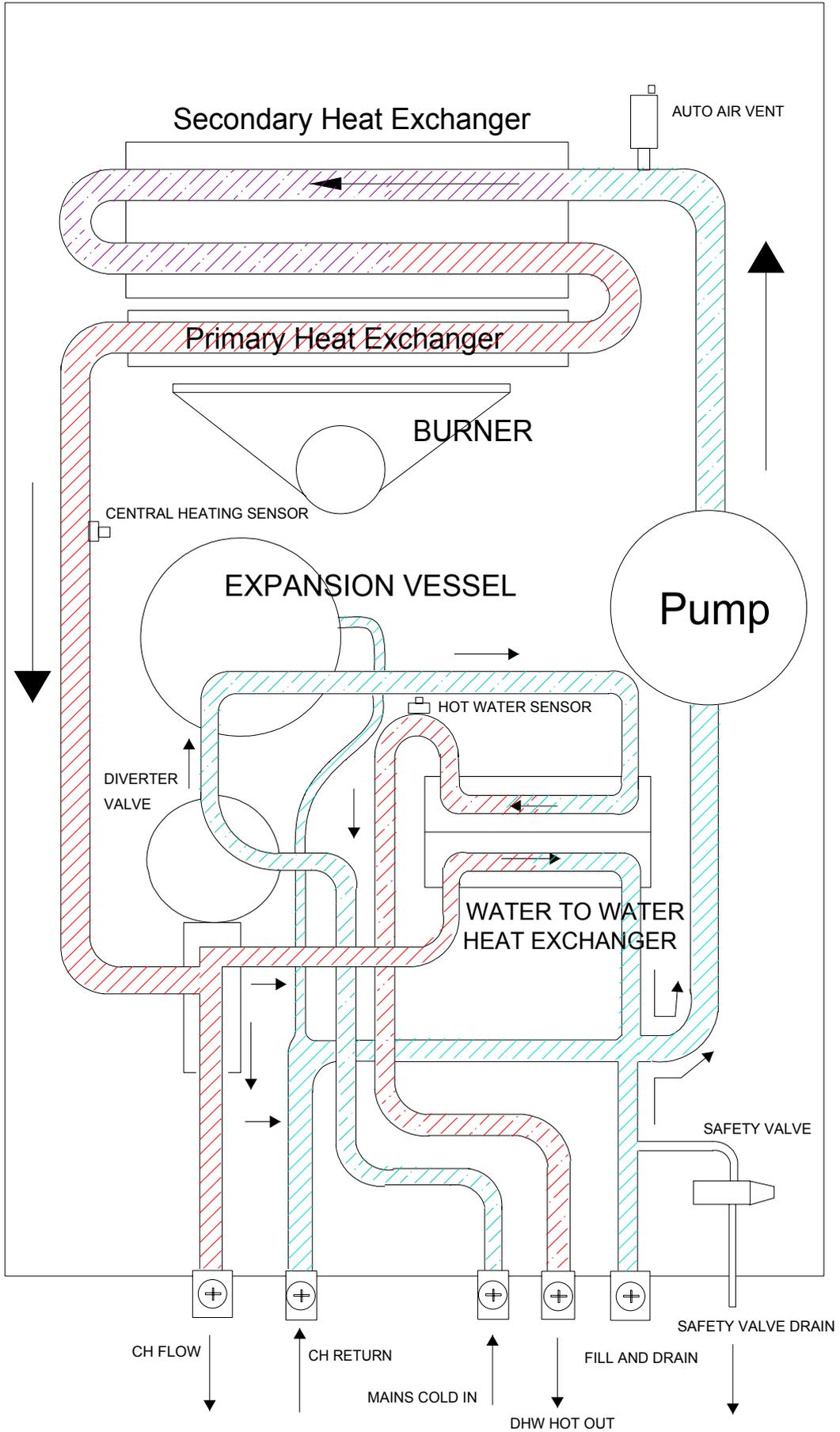
FAULT FINDING Hot Water Operation

Start with system and boiler cold, with the power ON and no Hot Water taps open. Then Use a hot tap to operate the boiler.



Temp °C	Ohms
0	33118
10	20198
20	12676
30	8176
40	5406
50	3657
60	2526
70	1780
80	1277
90	931

TABLE A



Servicing

Health and Safety Statement:

This product contains no asbestos.

Routine

To ensure continued efficient operation of the appliance it is recommended that it is checked and serviced at regular intervals. The frequency of servicing will depend upon the particular installation and usage but in general once per year should be adequate. It is law that any service work should be carried out by Corgi registered personnel.

1. Clean burner and combustion chamber.
2. Check pilot and burner gas supply.
3. Check condition of sensing probe.
4. Check boiler pipework joints for leaks.
5. Check condensate pipework for leaks.
6. Check heat exchangers, flue and air duct are clear of any obstruction, and not leaking.
7. Check and clear the condensate exit on the secondary heat exchanger by removing the Condensate Outlet and the Inspection Cover. (Fig. 10)
8. Check and clear the condensate syphon.
9. Expansion vessel pressure.

Follow the procedures given in *Changing Components* for parts removal in addition to the following notes.

1. Heat Exchangers

Remove the panel in front of the secondary heat exchanger to gain access to inner inspection panels on the secondary and to view the primary (the lowest inspection panel also gives a view of the primary). Also view from beneath the primary. Clean as required. If in doubt, drain the system and remove for inspection.

2. Condensate Syphon

With a suitable bowl to catch the water, unscrew the two drain-caps on the underside of the Syphon trap and drain the water. Remove any solids and replace caps. (Fig. 12)

CHANGING COMPONENTS

THERE ARE NO REPAIRABLE ITEMS, IF NOT WORKING AN ITEM MUST BE REPLACED.

The boiler is in two major sections, the Case, and the Electrical Tray, The Major Components Diagram shows where the items are to be found. (page 26-28)

Behind the Electrical Tray

1. Sequence Controller.
2. Main Driver Board.
3. CVI Valve.
4. Time switch (if fitted)
5. Pressure gauge
6. Pump.
7. Diverter Valve.
8. Safety Valve.
9. Water to water heat exchanger.
10. Cold water inlet flow regulator and trainer.
11. DHW Temperature Sensor.

Behind the Case

12. Fan.
13. Air Pressure Switch.
14. Flue Thermostat.
15. Pump Over-run Thermostat.
16. Overheat Cut-off Device.
17. HT Lead.
18. Pilot Assembly.
19. Burner.
20. Main Injector.
21. Combustion Chamber Insulation.
22. Primary Heat Exchanger.
23. Secondary Heat Exchanger.
24. CH Temperature Sensor.

Servicing behind the Electrical Tray

To Remove the Electrical tray

- Disconnect the electrical supply from the boiler and system.
- Undo the screw on the Electrical Tray front.
- Slide the Electrical Tray forward a short way, then lower on to the hanging bracket if support required.
- For complete removal; Separate the two plugs on the pump & boiler looms. Pull off the pump & mains connectors. Loosen the Plastic Nut that holds the Pressure Gauge Retainer and slide out from location.

DO NOT STRAIN THE CABLES, USE THE SUPPORT PROVIDED.

1. Sequence Controller

- Remove the Electrical Tray.
- Identify the CVI valve, the red pod beside it contains the Sequence Controller.

- Prise off the multiway connectors from the CVI Sequence Controller pod.
- Pull off the HT Lead from the Controller.
- Pull the pod away, and replace.
- Re-assembly is the reverse.

2. Main Driver Board

- Remove the Electrical Tray.
- Loosen the R/H screw that retains the inner chassis cover, then slide out cover.
- Prise off the nine multiway connectors, they only go back in their own position.
- Squeeze the pcb supports whilst lifting the pcb. Lift away.
- Re-assembly is the reverse.
- Adjust the burner pressures. See **FULL PRESSURE SETUP** in CVI Valve section below.

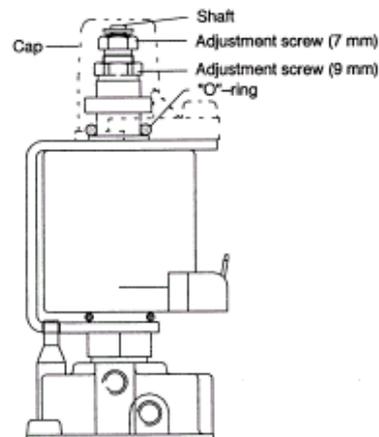
3. CVI Valve

- Remove the Electrical Tray.
- Turn the Gas Cock off.
- Pull off the red pod.
- Pull off the two leads from the Modureg solenoid.
- Release the pilot feed tube (8mm AF).
- Undo the two screws holding the valve lower retainer.
- Undo the gas cock.
- Undo the four shoulder bolts and remove the flange to the gas cock.
- Release the CVI outlet connector, and withdraw valve.
- Re-assembly is the reverse.

FULL PRESSURE SETUP

- Check Inlet pressure is at least 20 mbar when operating and the DHW potentiometer is set at maximum.
- Remove one of the yellow leads from the Modureg and its grey plastic cover.
- Attach a manometer to the outlet pressure tapping.
- Set to Hot Water Only, turn on a tap and check burner gas pressure is 1.8 mbar. Adjust the 9mm brass nut on the Modureg to correct.
- Replace the yellow lead and the boiler will go to high fire, 11.3 mbar. Adjust with the nylon 7mm nut on the Modureg whilst pressing down on its shaft.
- Replace the grey cover.
- Ensure the system controls are calling for CH then switch to DHW & CH the boiler will fire at low rate for 100 seconds. Adjust the small potentiometer on the Driver board to 5 mbar.
- After 100 seconds the boiler will go to high fire, adjust the large potentiometer on the driver

board to the desired maximum CH output, factory setting 5.5 mbar.



4. Time Switch (when factory fitted)

- Remove the Electrical Tray.
 - Tip the Electrical Tray forward to allow access to the clock's four push-on connectors.
 - Note the colour positions then disconnect.
 - Remove clear plastic cover.
 - Turn the two slotted screws one quarter turn anticlockwise.
 - Pull out Time Switch and replace.
 - Re-assembly is the reverse.
- (Make certain the engagement plate fits the slot in the programmer before securing it with the two M5 screws.)

5. Pressure Gauge

- Remove the Electrical Tray.
- Loosen the Plastic Nut that holds Gauge retainer.
- Squeeze the top and bottom latches on the gauge, and push out of its retainer.
- Valve off the Flow and Return connections.
- Release the pressure in the boiler.
- Unscrew the pressure sensor, it may need a temporary plug to avoid leaks.
- Re-assembly is the reverse.

6. Pump

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Disconnect the cable at the Pump including those in the terminal strip opposite the capacitor.
- Remove the terminal strip from the old pump.
- Undo the Pump nuts and remove the Pump.
- Re-assembly is the reverse,
- Note a brown and blue have a black sleeve and these go to terminal 1 and 2 respectively. The black goes to 7.
- Ensure the fibre washers are in place.

7. Diverter Valve

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Close the DHW Cold In valve and open a Hot tap to drain the pipework.
- Drain the boiler through the Fill and Drain Valve.
- Remove the circlip on the Diverter Valve to release the switching head.
- Undo the five water connections to the valve and remove.
- Replace unit with new or factory exchange unit.
- Re-assembly is the reverse, ensure the fibre washers are in place.

8. Safety Valve

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Remove the Pressure Gauge from the Safety Valve.
- Undo the water connections to the Safety Valve and remove.
- Re-assembly is the reverse, ensure the fibre washer is in place.

9. Water to Water Heat Exchanger

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Close the DHW Cold In valve and open a Hot tap to drain the pipework.
- Drain the boiler through the Fill and Drain Valve.
- Remove pump and pipes for easy access.
- Undo the four water connections to the heat exchanger and pull clear.
- Re-assembly is the reverse, ensure the fibre washer is in place.

10. Flow Regulator and Strainer

- Remove the Electrical Tray.
- Close the Cold Water In valve.
- Open a Hot tap to drain the pipework.
- Remove the Mains Cold In Valve.
- Carefully prise out the Flow Regulator and Strainer (boiler side).
- Clean Strainer and restrictor.
- Re-assembly is the reverse.

11. DHW Temperature Sensor

- Remove the Electrical Tray.
- Remove the electrical connection from the DHW Temperature Sensor and unclip from pipe.
- Re-assembly is the reverse.

Removing the Case

- Remove the Electrical Tray but not the inner cover, hang the tray on the support.
- Undo the two M5 screws at the base of the Case.
- Lift the Case straight up about half an inch (12mm).
- Gently pull the Case straight forward off the hidden studs at the top of the boiler. (The cover hangs on two studs in keyhole slots)
- Examine the sealing strip for damage and replace if necessary.
- Place the Case somewhere safe from damage.
- Refitting in the reverse order.

IMPORTANT: FAILURE TO CORRECTLY LOCATE THE APPLIANCE CASE COULD RESULT IN LEAKAGE OF COMBUSTION PRODUCTS INTO THE ROOM.

12. Fan Assembly

- Remove the Electrical Tray.
- Remove the Case.
- Undo the two self-tapping screws holding the Fan Protection Hoop and remove.
- Note the wire colours and positions.
- Pull the electrical connectors off the Fan.
- Gently pull the pressure tubing off the tapping on the Flue Hood.
- Remove Flue Stat.
- Undo the two screws holding the Flue Hood and lift away.
- Re-assembly is the reverse.

13. Air Pressure Switch

- Remove the Electrical Tray.
- Remove the Case.
- Pull the electrical connectors off the Air Pressure Switch.
- Gently pull the pressure tubing off the both tappings on the switch.
- Undo the M4 nut & M4 Wing nut holding the Air Pressure Switch to its bracket on the Back Panel and lift away.
- Re-assembly is the reverse.

14. Flue Thermostat

- Remove the Electrical Tray.
- Remove the Case.
- Pull the electrical connectors off the Flue Thermostat.
- Re-assembly using Heat Sink Compound is in the reverse order.

15. Pump Overrun Thermostat

- Remove the Electrical Tray.
- Remove the Case.
- Note the three wire colours and positions.
- Pull the electrical connectors off the Pump Overrun Thermostat.
- Undo the two M4 screws holding the Thermostat.
- Re-assembly using Heat Sink Compound is in the reverse order.

16. Overheat Cutoff Device

- Remove the Electrical Tray.
- Remove the Case.
- Pull the two electrical connections of the Overheat Cutoff Device.
- Undo the two M4 screws holding the Thermostat.
- Re-assembly is the reverse.

17. Electrode and HT Lead

- Remove the Electrical Tray.
- Remove the Case.
- Undo the left and right screws holding the Front Burner Baffle.
- Remove the front baffle.
- Push the electrode towards the burner and pull down and clear.
- Pull off the HT Lead from the CVI valve.
- Re-assembly is the reverse.

18. Pilot Assembly

- Remove the Electrical Tray.
- Remove the Case.
- Undo the left and right screws holding the Front Burner Baffle and remove. If access is restricted also remove the lower baffle.
- Undo the Pilot gas tube from the Pilot Assembly and gently lever downwards away from the Pilot.
- Undo the two screws retaining the Pilot Assembly.
- Re-assembly is the reverse.

NB The pilot is not adjustable.

19. Burner

- Remove the Electrical Tray.
- Remove the Case.
- Undo the left and right screws holding the Front Burner Baffle and remove.
- Undo the Pilot Assembly and gently lever downwards.
- Remove the Combustion Chamber front by releasing the four M5 screws.
- Pull the Burner forward off the two studs at the rear.
- Re-assembly is the reverse.

20. Main Injector

- Remove the Electrical Tray.
- Remove the Case.
- Remove the Burner.
- Undo the Main Injector from the manifold.
- Re-assembly is the reverse.

21. Combustion Chamber Insulation

- Remove the Electrical Tray.
- Remove the Case.
- Remove the Front & Lower Burner baffles.
- Remove the Burner.
- Undo the four M5 screws in the front Insulation Panel.
- Undo the four M5 screws holding the Chamber to the Back Panel and lower downwards and away.
- Replace the Insulation Panels in the Chamber.
- Re-assembly is the reverse.

22. Primary Heat Exchanger

- Remove the Electrical Tray.
- Remove the Case.
- Remove the Front baffle.
- Remove or cover the Burner.
- Remove the Combustion Chamber.
- Remove the Overheat and Pump Overrun Thermostat.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Undo the Flow and Return connections to the Heat Exchanger and lower away.
- Re-assembly is the reverse.

23. Secondary Heat Exchanger

- Remove the Electrical Tray.
- Remove the Case.
- Remove the Flue Thermostat.
- Remove the Fan Assembly.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Undo the Flow and Return connections to the secondary Heat Exchanger.
- Release the Condensate connection clamping plate.
- Undo the four M5 screws holding the Secondary Heat Exchanger to the Back Panel and lift away.
- Re-assembly is the reverse.

24. CH Temperature Sensor

- Remove the Electrical Tray.
- Remove the Case
- Remove the electrical connection from the CH Temperature Sensor and unclip from pipe.
- Re-assembly is the reverse.

Spares

1st Line Spares:

Item	Part No	GC Number	Key
Burner with frame	M3728	173065	1
Ceramic Board Set	M1089	106434	2
Flue Hood Gasket	M3128	106381	3
Fan Assembly	M0910	106435	4
Sequence Controller	M0672	173066	5
Pilot Injector	M0663	381656	6
Gas Valve	M0671	173067	7
DHW Clip-on Sensor (Temperature) 15mm	M3337		16
CH Clip-on Sensor (Temperature) 22mm	M3338		8
Air Pressure Switch	M4176		9
Main Injector (4.1 mm)	M0919	173112	10
Overheat Thermostat	M0868	173068	11
Pilot Assembly	M0662	106437	12
Flue Thermostat	7717	379308	13
Pump Overrun Thermostat	M0888	379308	14
HT Lead / Electrode	M0666	173076	15
Running Neon	M1093		20
Lockout Neon	M1093		21
CH Potentiometer	M0900	379187	23
DHW Potentiometer	M0900	173075	24
Modureg Control Board	M0614	173072	25
Safety Valve	M0480	379831	34
Three Way Valve	M0608	173071	30
Pressure Gauge	M4240		31
Plate Heat Exchanger	M0612	106436	32
Pump Grundfos 15/60	M0623	383722	33
CH Switch	M4237(black) M4238(white)		22
DHW Switch	M4237(black) M4238(white)		35
Primary Heat Exchanger	M0593		36
Secondary Heat Exchanger	M0797		37
Condensate Trap	M3805		38

Electrical Components

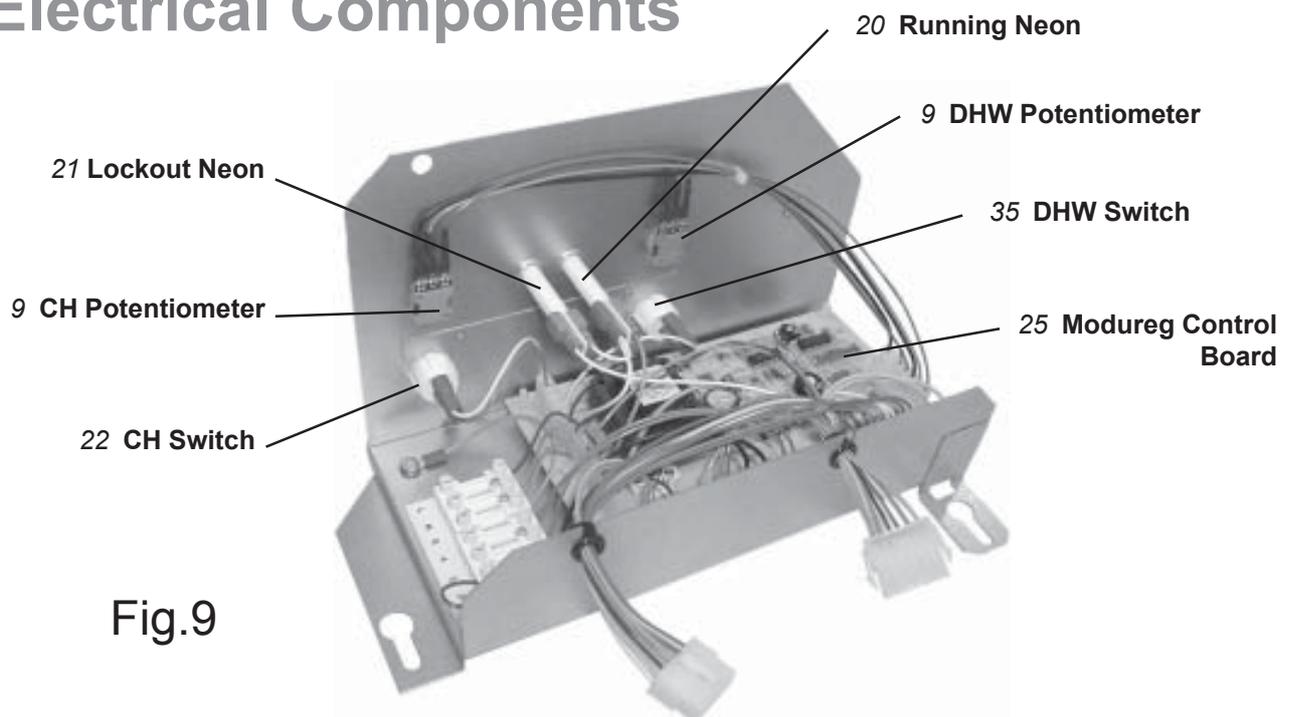


Fig.9

Major Components

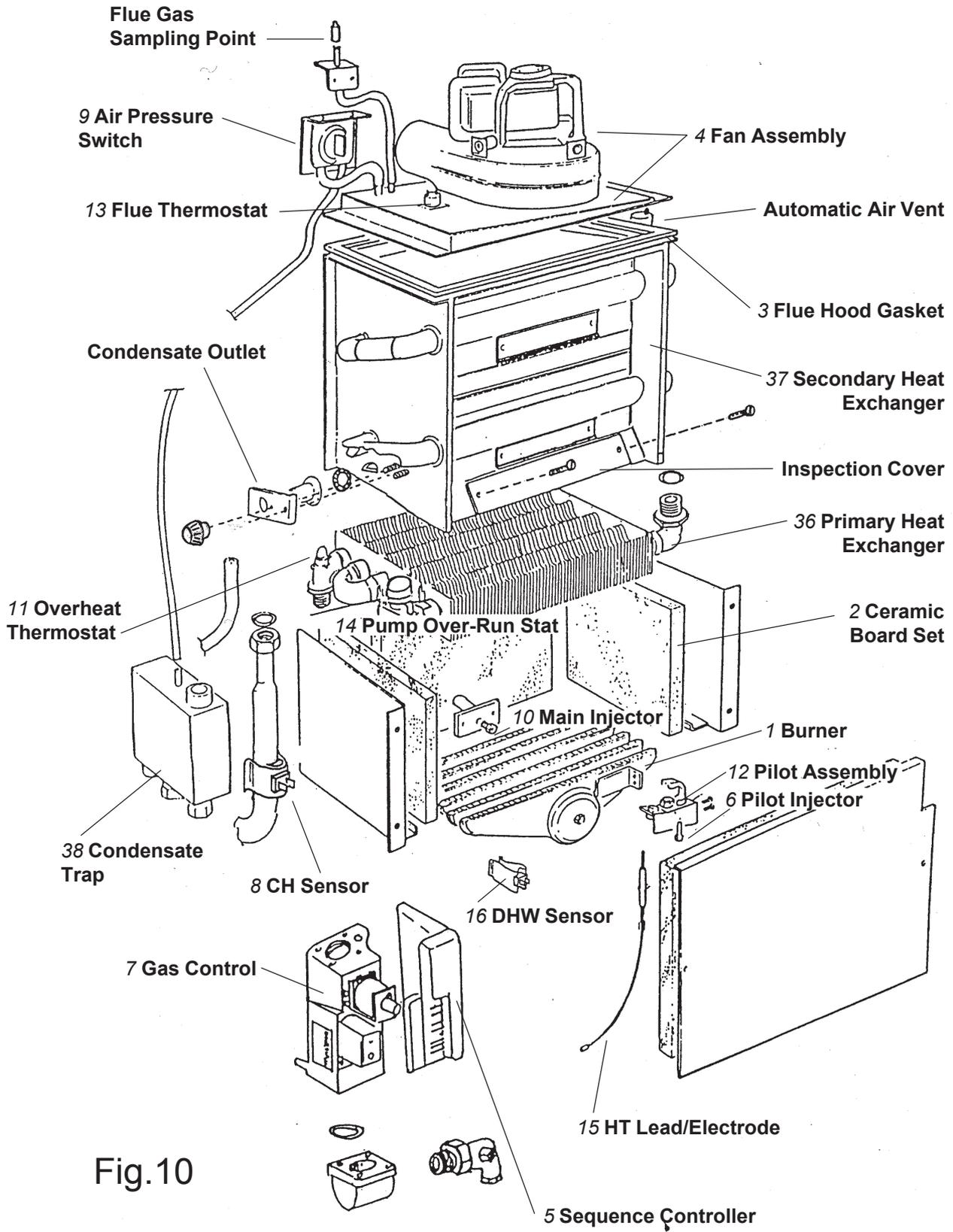


Fig.10

Waterside Spares

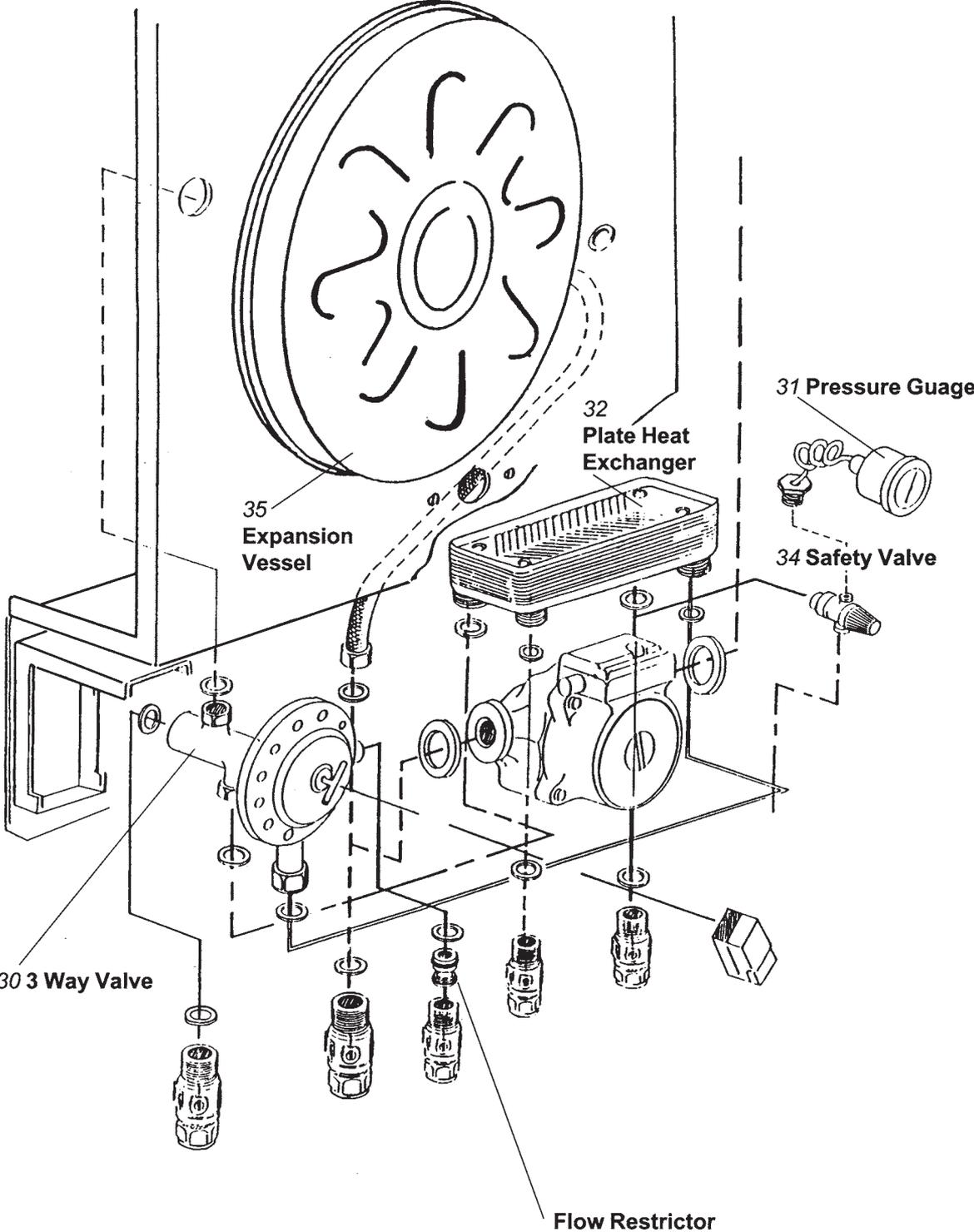
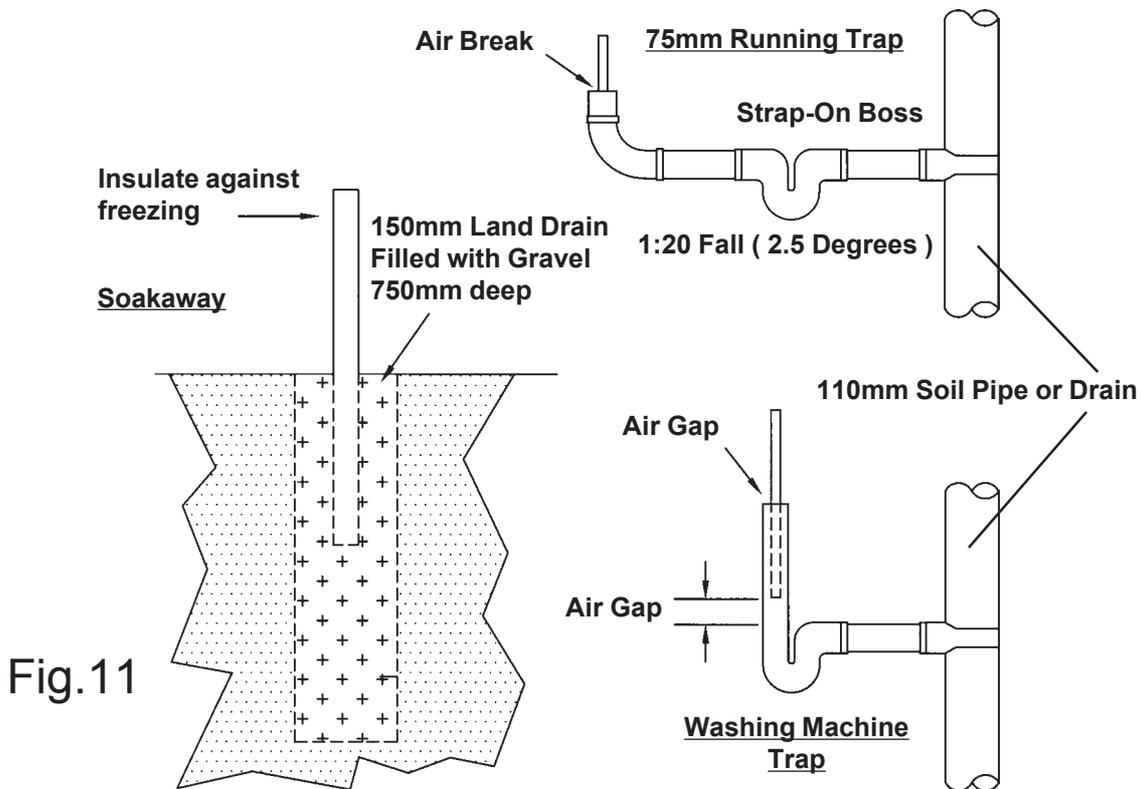


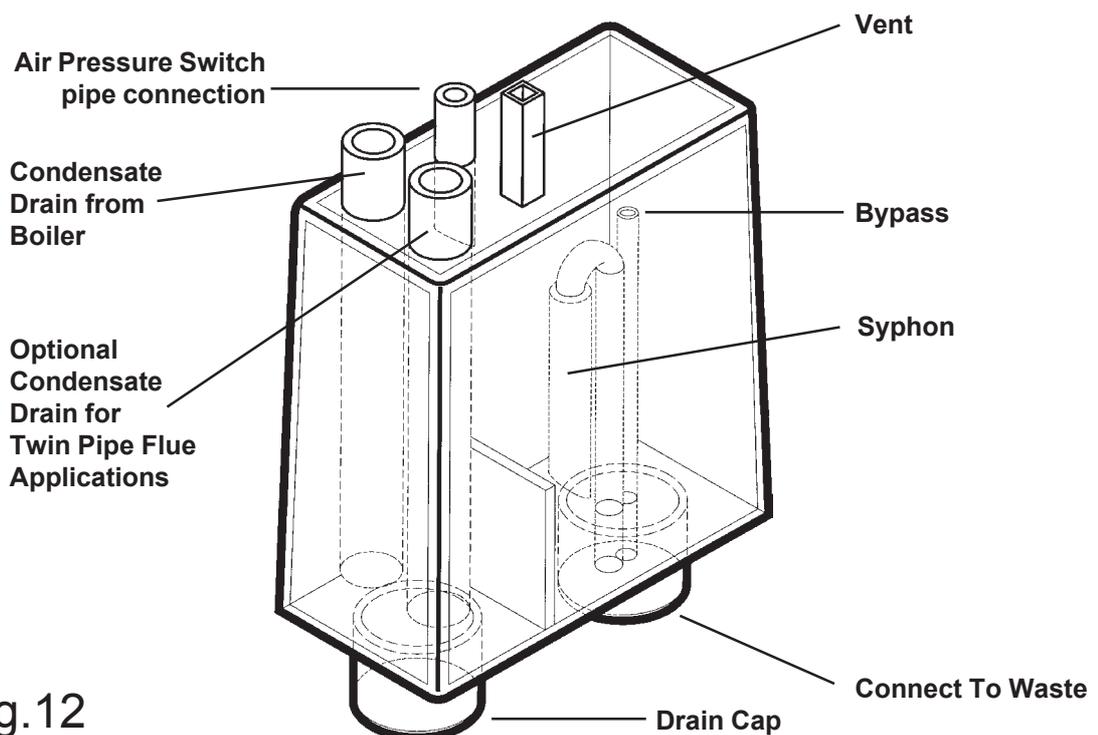
Fig.10a

Example Condensate Disposal Methods

Note: **Internal** - minimum 19mm pipe
External - minimum 32mm pipe



Condensate Drain Trap



System Notes

Installation & Service Record

Installers Name and Address:		
Telephone No.		
Corgi Registration No.		
Installation Date		
Boiler Serial No.		
Service Date	Action taken	Service Engineer & Contact Tel No.



The Company reserves the right to change specification without notice.
Your statutory rights are not affected.

Malvern Boilers Ltd, Spring Lane North, Malvern, WORCS, WR14 1BW.
Telephone: 01684 893777 Fax: 01684 893776
www.malvernboilers.co.uk www.combi_boiler.com Email: service@malvernboilers.co.uk
