

Mikrofill Ethos Condensing combination boiler



Installation Instructions 24cc



British Gas Service Listing
G.C.No: 47-157-01

Mikrofill gas appliances comply with the requirements contained in CE Mark documents contained with European directives applicable to them. In particular, these appliances comply with the CE directives and technical specifications contained within them :

- ? Gas Appliances directive 90/396
- ? Efficiencies directive 92/42
- ? Low tension directive 73/23 (modified from 93/68)
- ? Electromagnetic Compatibility directive 89/396 (modified from 93/68)

IMPORTANT !

The manual must be read thoroughly, so that you will be able to use the boiler in a safe way. And it must be kept for reference in the future.

Installation and first lighting must be carried out by a competent person.

Repairs must be carried out only by a competent person, using genuine spare parts. Do no more than switching off the boiler yourself.

The boiler allows heating up of water to a temperature less than the boiling point.

The boiler can be used only for those purposes for which it has been specially designed.

The boiler must not be touched by children or by an unfamiliar person to its operation.

The manufacturer disclaim all liability for any translations of the present manual from which incorrect interpretation may occur.

The manufacturer accepts no responsibility for unsatisfactory performance of the appliance and flue due to failure to comply the instructions.

This appliance complies with the EN 483 and EN 625 Standards.

The appliance is build to comply with the regulation now in force regarding gas appliance's safety and the European regulation now in force relative to safety of household and similar electrical appliances.

The manufacturer, in the continuous process to improve his products, reserves the right to modify the data expressed in the present documentation at any time and without prior notice.

The present documentation is an informative support and it cannot be considered as a contract towards third parties.

CONTENTS - COMMISSIONING

1. GENERAL DESCRIPTION	4
1.1. DESCRIPTIONS AND OPERATION PRINCIPLES OF COMPONENTS / PARTS	
2. TECHNICAL AND DIMENSIONAL CHARACTERISTICS	5
2.1. Dimensions (Diagram 1).....	5
2.2. Boiler Schematic.....	6
2.3. Boiler Connection Dimensions.....	7
2.4. Technical Data.....	7
2.5. Boiler Flow Diagrams.....	8
2.6. Hydroblock Diagrams.....	9
2.7. Pump Characteristics.....	10
2.8. Heating System Design.....	11
2.9. Domestic Hot Water System Design.....	11
3. INSTALLATION	12
3.1. Piping System Installation.....	12
3.2. Boiler Location.....	13
3.3. Boiler Installation.....	14
3.4. Flue Installation.....	14
3.5. Electrical Connection.....	16
4. COMMISSIONING.....	17
4.1. Filling.....	17
4.2. Gas connection.....	17
4.3. Lighting the boiler.....	20
4.4. On board adjustments: potentiometers and trimmers.....	20
4.5. On board adjustments: jumpers.....	20
4.6. Setting the maximum heating temperature.....	21
4.7. Setting the heating output.....	21
4.8. Safety Devices.....	22
5. SETTINGS	23

1. GENERAL DESCRIPTION

The fan flued hermetic type combination boiler is an appliance that fires Natural gas in its combustion chamber for either heating a place or obtaining domestic hot water. It combines two different functions at same appliance. For this two different function it has two independent circuit. One of them is heating circuit and the other is domestic hot water circuit. It is sealed from the heating place. So well ventilation conditions is not a necessity in place where the appliance mounted .

1.1. DESCRIPTIONS AND OPERATION PRINCIPLES OF COMPONENTS / PARTS

Burner : Gas that comes from gas valve fires in burner and produces heat.

Ignition electrodes : sparks occurs between the two electrodes for igniting the burner.

Gas valve : it opens or closes the gas channel and regulates the burner pressure.

Ignition module : it works with gas valve together and ignite the burner by means of producing high voltage. It starts the fan and evaluates signals coming from air pressure switch and flame sense electrode.

Injectors : They guide gas to the burner.

Fan : it gets the fresh air for combustion and blow the combustion products out of hermetic chamber.

Gas manifold : the injectors are mounted on gas manifold.

Combustion chamber : The heat isolated combustion chamber guides the burner flame to the heat exchanger.

Primary Heat exchanger : It transfers the heat energy in flame to the water.

Automatic air vent : it purges the air in heating circuit automatically.

Air pressure switch : It checks the pressure difference between the hermetic chamber and the outer space and sends signal to the ignition module about the fan operation.

Overheat safety thermostat : It sends signal to the control card about the water temperature which exceeds 110 °C. It interrupts the boiler if the water temperature exceed 110 °C. It has a manual reset button at rear side.

Hydraulic block : It has several connections for components, pipes and inlets, outlets to the boiler. (For example water pressure sensor, safety valve, expansion vessel etc.) It has an automatic bypass valve inside. It consists of two independent parts which are connected together by means of pipes.

Three way valve : it is one part of the hydraulic block. It guides the hot water to heating circuit or domestic hot water exchanger.

Domestic hot water heat exchanger : It transfers the heat energy in hot water of heating circuit to the domestic water. It is integrated with primary heat exchanger.

Fan hood : it collects combustion products and guides to the fan.

Flue connection kit : It connects the outer space and combustion chamber for getting fresh air and blow the combustion products out of boiler.

Hermetic chamber : The combustion chamber, burner, heat exchanger, fan and fan hood is placed inside the hermetic chamber.

Safety valve : It prevents the heating circuit against the water pressure increment excessively. (The water pressure can not exceed 3 bar.)

Control card : The control card evaluates the signals which come from sensors and thermostats. And it makes modulation for control the gas valve. It controls all systems of boiler. It is central control unit of the boiler.

Water flow sensor : it senses the domestic hot water demands and sends signal to the control card.

1.1.1. Instructions and Regulations

Assembly, Installation, First ignition and maintenance must be carried out by a competent person, in accordance with all-current technical regulations and directives.

1.1.2. C.O.S.H.H.

Materials used in the manufacture of this appliance are non-hazardous and no special precautions are required when servicing or maintenance is undertaken.

1.1.3. Related Documents

This appliance must be installed strictly in accordance with these instructions.

- ? The Gas Safety Regulations (Installations & Use) 1996
- ? The Building Regulations
- ? The Local Building Regulations
- ? The Buildings Standards (Scotland - consolidated) Regulations
- ? Model Water By laws
- ? British Standards code of practice:

B.S. 7593 1992 Treatment of water in domestic hot water central heating systems

B.S. 5546 1990 Installation of hot water supplies for domestic purposes

B.S. 5540 Part 1 2000 Flues

B.S. 5540 Part 2 1989 Air supply

B.S. 5449 1990 Forced circulation hot water systems

B.S. 6798 1987 Installation of gas fired hot water boilers

B.S. 7671 1992 IEE wiring regulations

B.S. 4814 1990 Specification for expansion vessels

B.S. 5482 1994 Installation of L.P.G

For Northern Ireland the current rules in force apply

2. TECHNICAL AND DIMENSIONAL CHARACTERISTICS

2.1. DIMENSIONS

The Combination boiler is delivered in two separate packages;

- the boiler itself
- the flue system

Weight: 42 kg

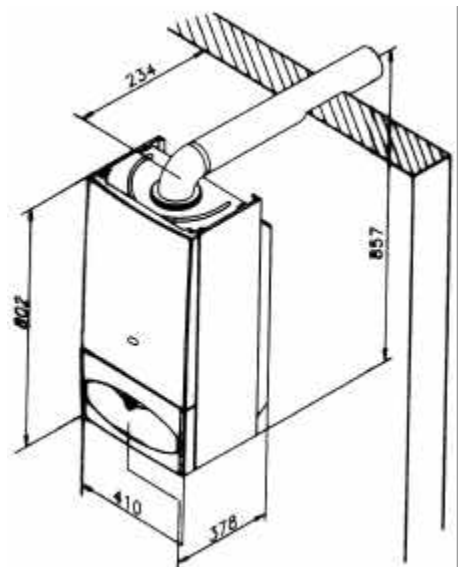


Diagram 1

2.2. BOILER SCHEMATIC

- 1 - Domestic thermistor
- 2 - Hydroblock
- 3 - Gas valve
- 4 - Gas valve ignition module
- 5 - Fan hood
- 6 - Burner
- 7 - Ignition electrodes
- 8 - Combustion chamber
- 9 - Integrated heat exchanger
- 10 - Air pressure switch
- 11 - Heating safety valve (3 bar)
- 12 - PCB (in protective case)
- 13 - Domestic water flow switch
- 14 - Bypass valve (in hydroblock)
- 15 - Pump
- 16 - Expansion vessel (at rear)
- 17 - Heating thermistor
- 18 - Overheat safety thermostat
- 19 - Flame sense electrode
- 20 - Fan
- 21 - Loss of water sensor
- 22 - Automatic air vent (top of exp. vessel)

- A - Heating outlet (3/4" male)
- B - Domestic hot water outlet (1/2" male)
- C - Gas (3/4" male)
- D - Cold water inlet (1/2" male)
- E - Heating return (3/4" male)

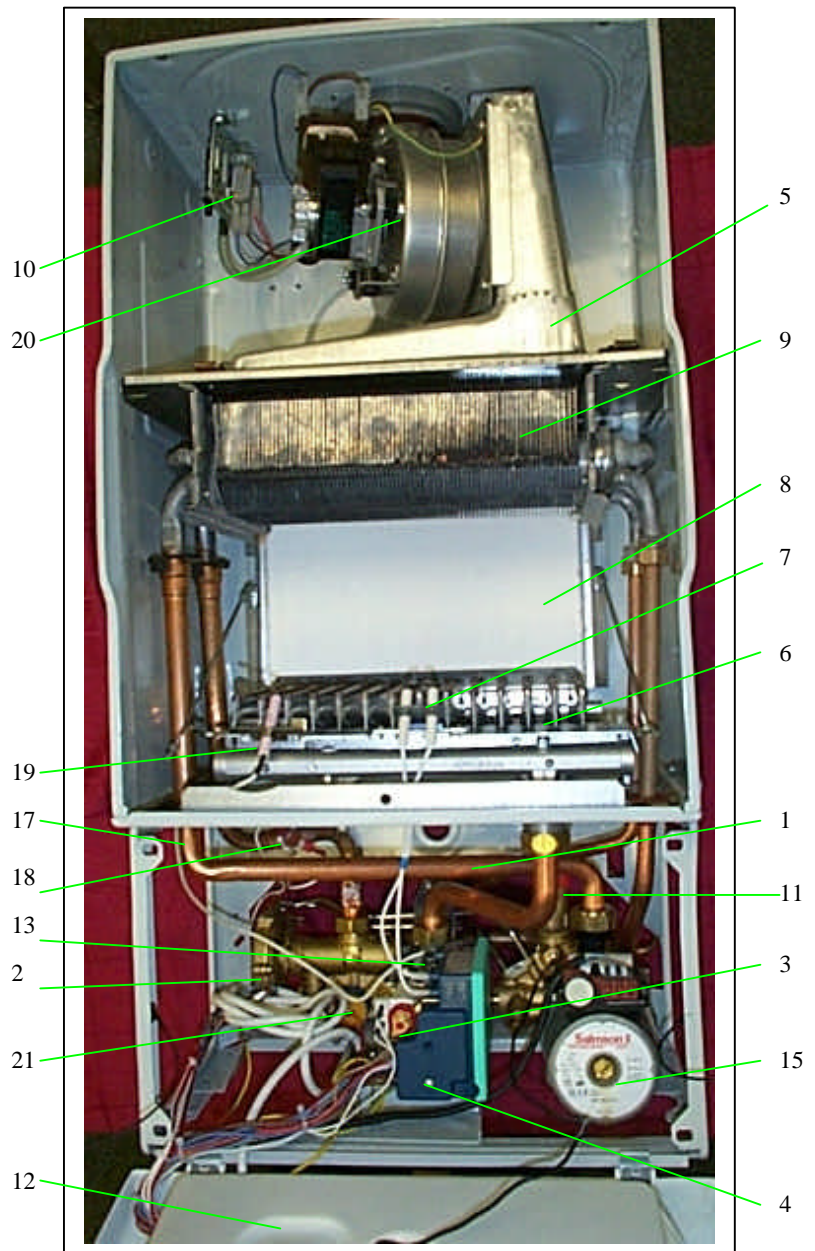


Diagram 2



2.3. BOILER CONNECTION DIMENSIONS

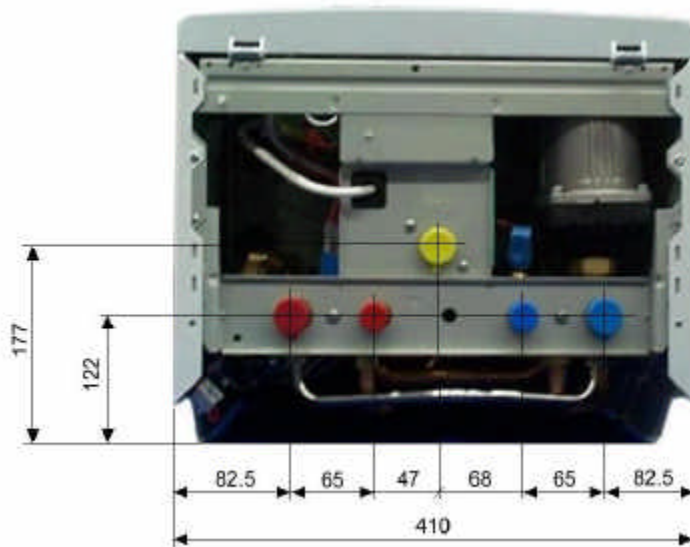


Diagram 3

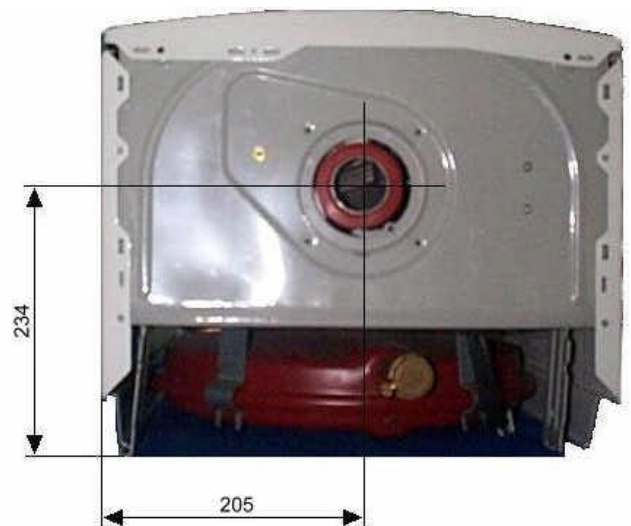


Diagram 4

2.4. TECHNICAL DATA

Heating

Heating output adjustable	from ...	(kW)	8.9
	to ...	(kW)	23.3
	from ...	(Btu/h)	30368
	to ...	(Btu/h)	79502
Efficiency		(%)	91
Maximum heating temperature		(°C)	90
Expansion vessel effective capacity		(l)	8
Expansion vessel charge pressure		(bar)	0.5
Maximum system capacity at 75°C		(l)	150
Safety valve, max. Service pressure		(bar)	3
Products outlet diameter		(mm)	60
Fresh air inlet diameter		(mm)	100

Electrical supply	(V)	230
Maximum absorbed power	(W)	170
Level of protection		IP44

Hot water

Hot water output automatically variable	from ...	(kW)	8.9
	to ...	(kW)	23.3
	from...	(Btu/h)	30368
	to ...	(Btu/h)	79502
Maximum hot water temperature		(°C)	90
Specific flow rate (for 30°C temp rise)			
		(l/min.)	11.0
Threshold flow rate		(l/min.)	2.3
Water flow rate (for 35°C temp rise)		(l/min.)	9
Maximum supply pressure		(bar)	8
Minimum operating pressure		(bar)	0.3

Natural Gas (G20)

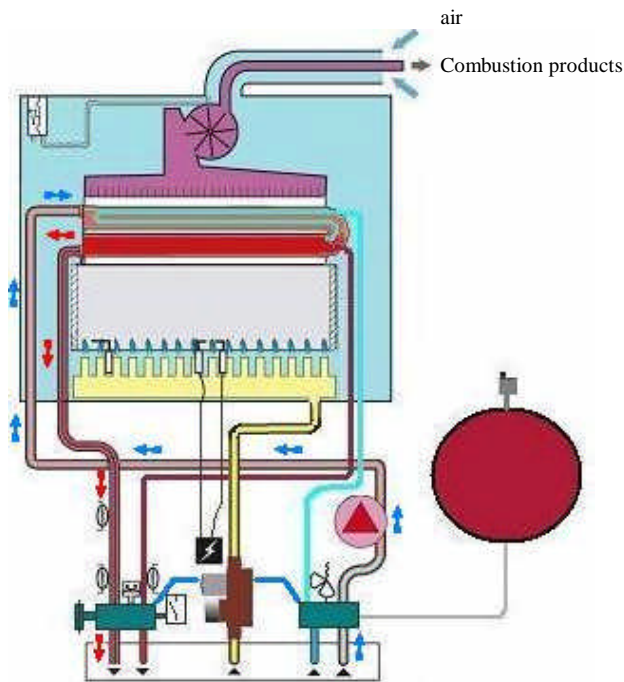
? Burner injector	(mm)	1,2
Inlet pressure	(mbar)	20
Burner pressure	(mbar)	13
Gas rate maximum	(m³/h)	2.88
Gas rate minimum	(m³/h)	1.06

Net calorific value at 15 C and 1013.25 mbar

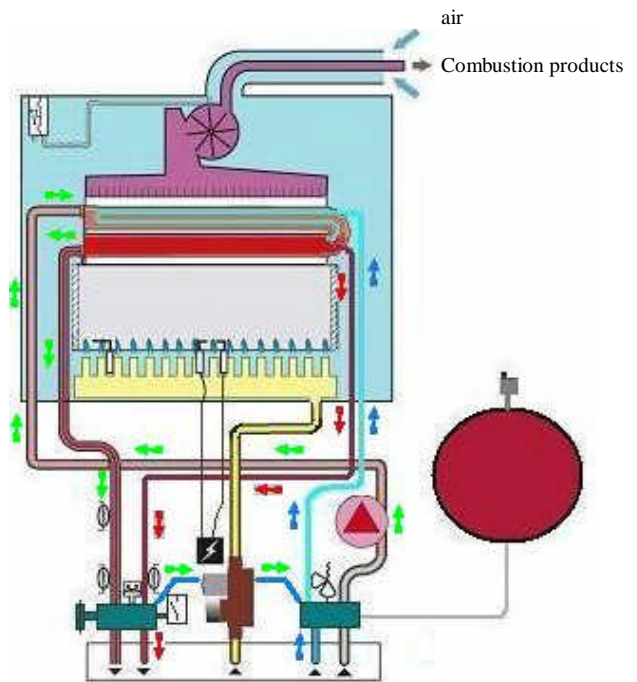
G20 34.04 MJ/m³

1 mbar approximately equals 10 mm H₂O

2.5. BOILER FLOW DIAGRAMS



Central heating mode
Diagram 5



Sanitary water mode
Diagram 6

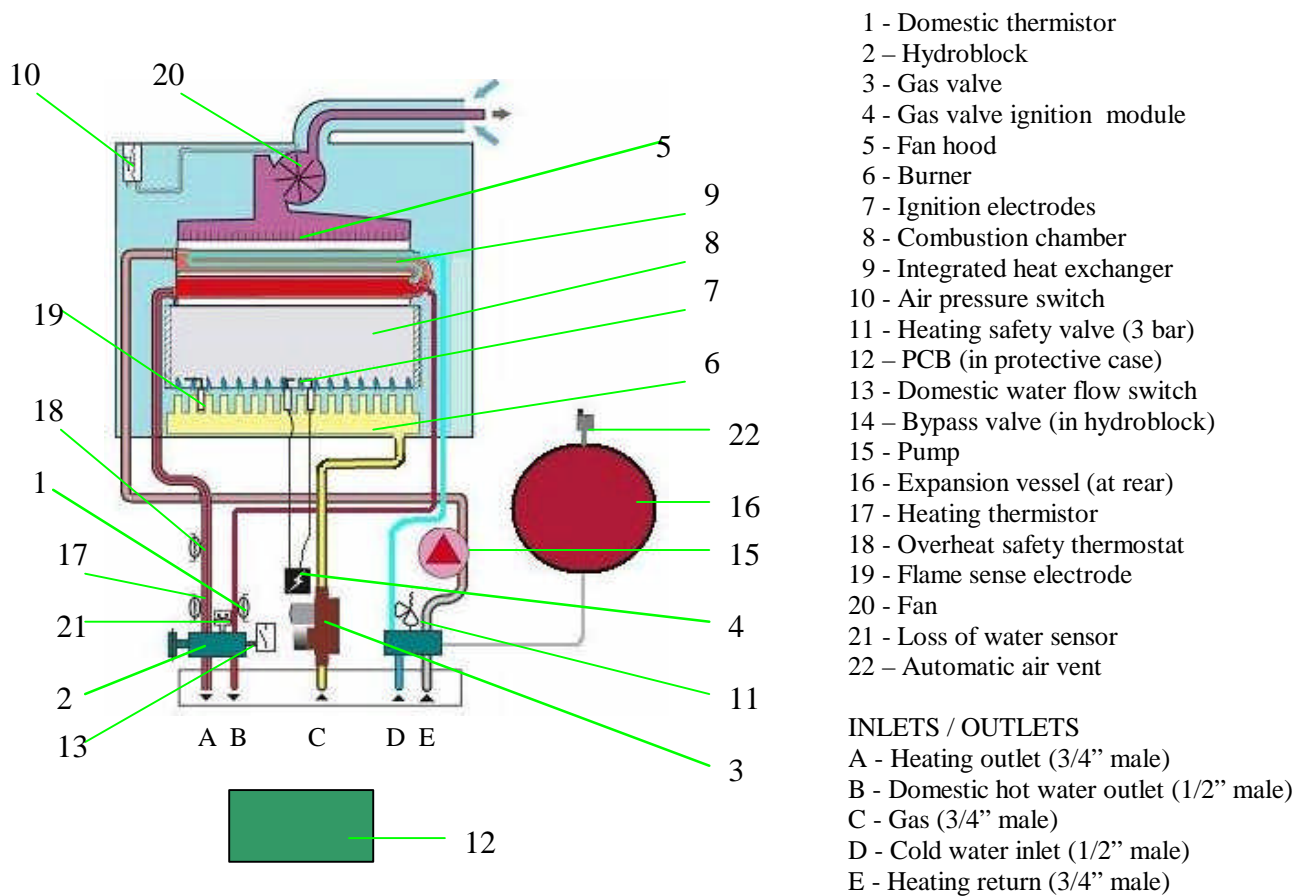
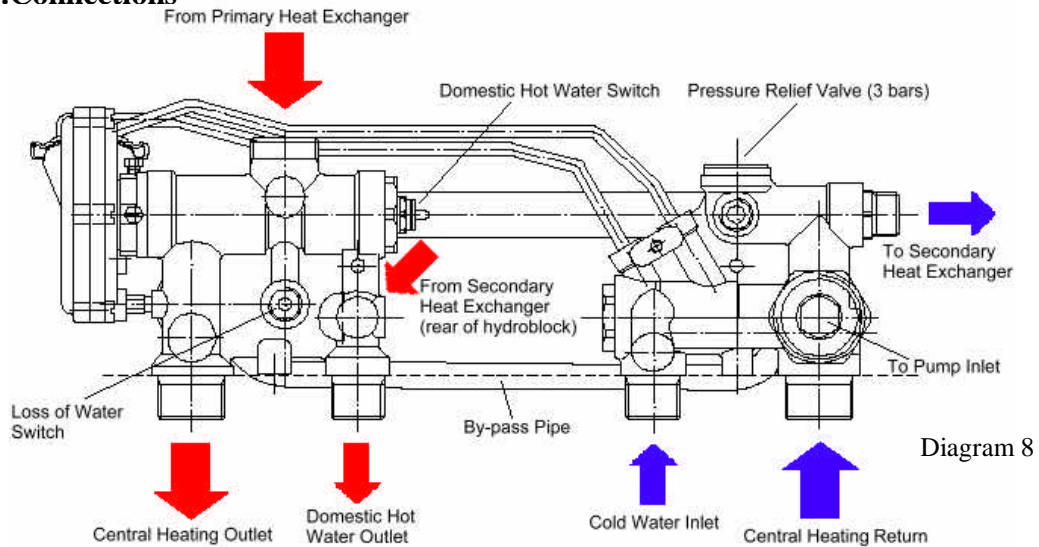


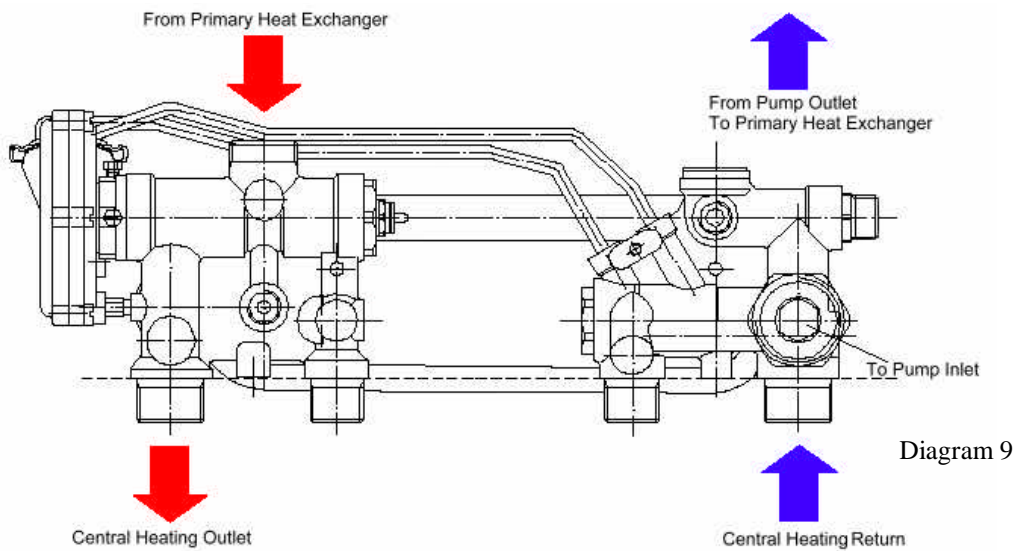
Diagram 7

2.6. HYDROBLOCK DIAGRAMS

2.6.1.Connections

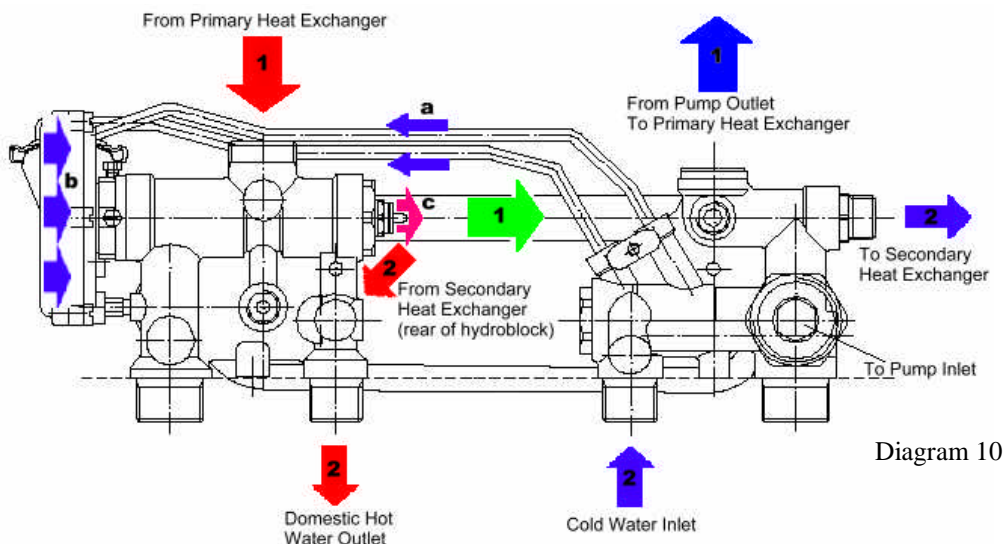


2.6.2. Central Heating Mode



? When the system is operating in Central Heating Mode, cold water which comes from Central Heating Return pipe is directed to pump inlet. Water reaches to inlet of primary heat exchanger from outlet of pump. With heat transfer in primary heat exchanger, hot water is supplied. Hot water that comes from primary heat exchanger is directed to Central heating outlet.

2.6.3.Domestic Hot Water Mode



- ? Switching to Domestic Hot Water System: When a tap is opened, cold water reaches to hydroblock from Cold Water Inlet. The pressure is sensed by the diaphragm by means of pressure connection pipes (shown as “a”). The diaphragm (b) moves with the difference in pressures. The pin which is connected to diaphragm moves to right (as shown with arrow “c”) and operates the domestic water flow switch. This switch gives signals to control card and lets the system control the domestic hot water system.
- ? For Domestic Hot Water system (shown as “2”): Cold water which is supplied from Cold Water Inlet reaches to secondary heat exchanger inlet. The heat is transferred between primary and secondary heat exchangers. (The secondary heat exchanger is installed inside primary heat exchanger.) The hot water which is supplied from Secondary heat exchanger outlet is directed to Domestic Hot Water Outlet.
- ? For Central Heating system (shown as “1”): There is no flow in whole system, the flow is only inside the boiler. Cold central heating water is pumped to primary heat exchanger. In primary heat exchanger, heat is transferred from primary heat exchanger to secondary heat exchanger. The water that comes from primary heat exchanger outlet, is directed to pump inlet by a connection pipe (shown by green arrow).

2.7. PUMP CHARACTERISTICS

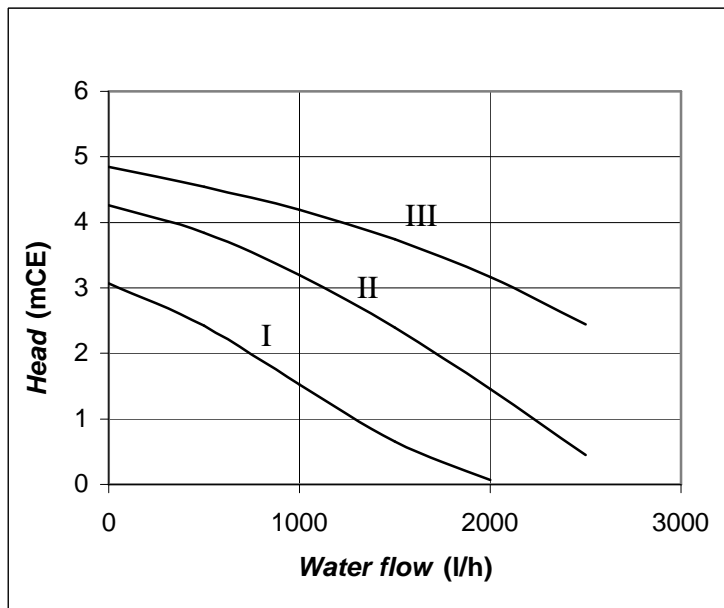


Diagram 11

The pump has 3 different speeds. According to these speeds pump performance curve is given at the diagram on the left.

I : first speed
II : second speed
III : third speed

The factory speed setting of the pump is III. The pump is a SALMSON NBL 53/15 O series.

2.8. HEATING SYSTEM DESIGN

- ? The combination boiler is compatible with any type of installation.
- ? Heating surfaces may consist of radiators, convectors or fan assisted convectors.
- ? The combination boiler can be piped directly to an underfloor heating system without the need for a mixing bottle. The maximum central heating flow temperature can be set to 40°C on the boiler printed circuit board during commissioning.
- ? Pipe sectional areas shall be determined in accordance with normal practices, using the output/pressure curve (diagram 11). The distribution system shall be calculated in accordance with the output requirements of the actual system, not the maximum output of the boiler. However, provision shall be made to ensure sufficient flow so that the temperature difference between the flow and return pipes be less than or equal to 20°C. The minimum flow is 500 l/h.
- ? The piping system shall be routed so as to avoid any air pockets and facilitate permanent venting of the installation. Bleed fittings must be provided at every high point of the system and on all radiators.
- ? The total volume of water permitted for the heating system depends, amongst other things, on the static head in the cold condition. The expansion vessel on the boiler is pressurised at 0,5 bar (corresponding to a static head of 5 m w.g.) and allows a maximum system volume of 150 litres for an average temperature of 75°C and a maximum service pressure of 3 bar. An additional expansion vessel can be fitted to the system if required, see diagram 12.
- ? Provision shall be made for a drain valve at the lowest point of the system.
- ? Where thermostatic radiator valves are fitted, not all radiators must be fitted with this type of valve, and in particular, where the room thermostat is installed.
- ? In the case of an existing installation, it is **ESSENTIAL** that the system is thoroughly flushed prior to installing the new boiler.

Filling the system

The system is filled by using a filling device.

2.9. DOMESTIC HOT WATER SYSTEM DESIGN

- ? Copper tubing may be used for the domestic hot water system. Unnecessary pressure losses should be avoided.
- ? The boiler will operate with a minimum supply pressure of 0,3 bar, but under reduced flow rate. Best operating comfort will be obtained from a supply pressure of 1 bar.

'Hard Water Areas'

In areas where the water is 'hard', more than 200mg/litre, it is recommended that a proprietary scale reducer is fitted in the cold water supply to the boiler.

Sheet metal parts

WARNING: When installing or servicing this boiler, care should be taken when handling the edges of sheet metal parts to avoid the possibility of personal injury.

Installing the boiler

Prior to starting work, the system must be thoroughly flushed using a propriety cleanser such as **Sentinel X300** to eliminate any foreign matter and contamination e.g. metal filings, solder particles, oil, grease etc.

Note. Solvent products could cause damage to the system.

- ? Engage boiler upper part onto the hanging bracket.
- Fit the washers between the boiler pipes and the inlet and outlet fittings and connect the boiler.

3. INSTALLATION

3.1. PIPING SYSTEM INSTALLATION

- ? Heating system connections - Pipe diam. 22 mm
- ? Hot water system connections - Pipe diam. 15mm
- ? Gas connection - Pipe diam. 22mm
- ? Heating safety valve connection - Pipe diam. 15mm

3.1.1. Water connection

Connect the system pipework to the boiler observing the correct flow and return format as shown in diagram 12.

3.1.2. Safety valve discharge

The heating safety valve outlet pipe should be extended horizontally to the outside wall.

WARNING: It must not discharge above an entrance or window or any type of public access area.

Connect the safety valve discharge pipe to the outlet of the heating safety valve, the discharge must be extended using not less than 13 mm o.d. pipe, to discharge in a visible position outside the building, facing downward preferably over a drain.

The pipe must have a continuous fall and be routed to a position so that any discharge of water, possibly boiling or steam, cannot create any danger to persons, damage to property or external electrical components and wiring. Tighten all pipe connection joints.

3.1.3. Gas connection

? The supply from the governed gas meter must be of adequate size to provide a constant inlet working pressure which is convenient of gas supplied.

To avoid low gas pressure problems, it is recommended that the gas supply is connected using 18 mm pipe.

? On completion, the gas installation must be tested using the pressure drop method and purged in accordance with the current issue of BS6891.

3.1.4. Gas Safety (Installation and use) Regulations

In your interests and that of gas safety, it is the law that ALL gas appliances are installed and serviced by a competent person in accordance with the above regulations.

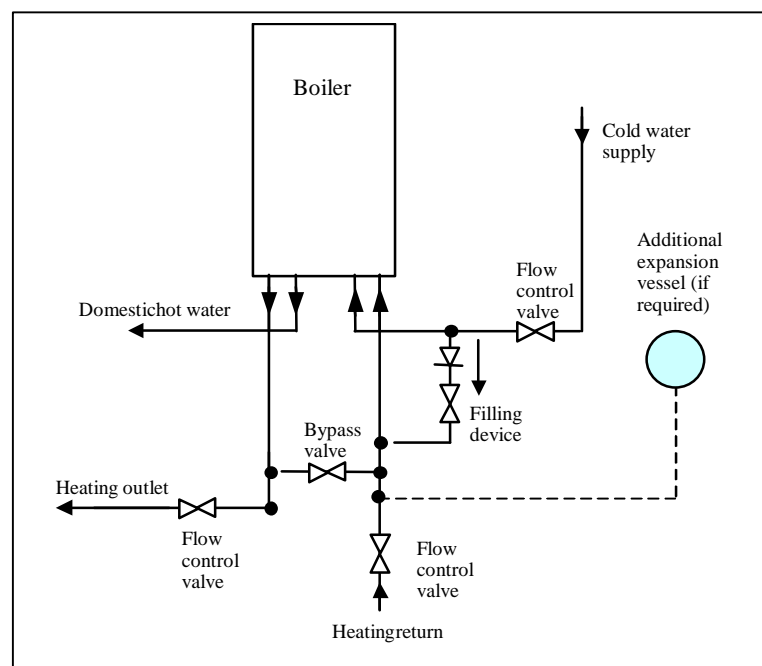


Diagram 12

3.2. BOILER LOCATION

3.2.1. Clearances

The boiler must be at least 1 m. far away from flammable materials. Heat sensitive walls must be protected by suitable insulation.

The position of the boiler must be such that there is adequate space for servicing. The recommended clearances are:

- 50 mm, either side of the boiler,
- 600 mm at the front of the boiler,
- 300 mm below the boiler,
- 200 mm top of the boiler.

? Place template on wall in required position, making allowances for the necessary clearances etc.

Note: It is permissible to install the boiler with smaller clearances than those quoted above PROVIDING that adequate consideration is given for Servicing/ Repairs at a later date. If any doubt exists, contact the **Service Company**.

? Mark the position of the holes for the hanging bracket.

? Drill, plug and fix the hanging bracket to the wall using suitable screws.

? Check that the hanging bracket is level.

? For horizontal flue system, mark the position for the flue hole as follows:

3.2.2. Flue to rear of boiler

? Mark correct position of hole from template.

3.2.3. Flue to side of boiler

? Mark the horizontal centre line for the hole on the rear wall. Extend the horizontal centre line to the side wall and mark the vertical centre line of flue hole.

3.2.4. Cutting the flue hole

? Making allowance for the slope of the flue, cut hole in external wall, preferably using a core drill. For installations with internal and external access use a 105 mm diameter core drill.

For installations with internal access only use a 125 mm diameter core drill.

Important

When cutting the flue hole and when extending the flue centre line to a side wall, remember that the flue system must have a fall of about 35 mm per metre of flue DOWNWARD towards the terminal. There must NEVER be a downward incline towards the boiler.

3.2.5. Terminal position

The minimum acceptable spacings from the terminal to obstructions and ventilation openings are shown in diagram 12.

The boiler must be installed so that the terminal is exposed to the external air.

Should any doubt exist as to the permissible position of the terminal, contact the **Service Company**.

3.2.5.1. Terminal guard

If a terminal guard is required, a suitably approved terminal guard should be fitted (in accordance with B.S.5440 Part 1), where the flue terminates less than 2m from the outside floor.

3.2.6. Cupboard or compartment ventilation

The boiler can be fitted in a cupboard or compartment without the need for permanent ventilation.

A - Under a window	300
B - Under an air vent	300
C - Under a gutter	75
D - Under a balcony	300
E - From an adjacent window	300
F - From an adjacent air vent	300
G - From vertical or horizontal air pipes	300
H - From an external corner of the building	300
I - From an internal corner of the building	300
L - From the ground or from another floor	300
M - Between two terminals vertically	1500
N - Between two terminals horizontally	600

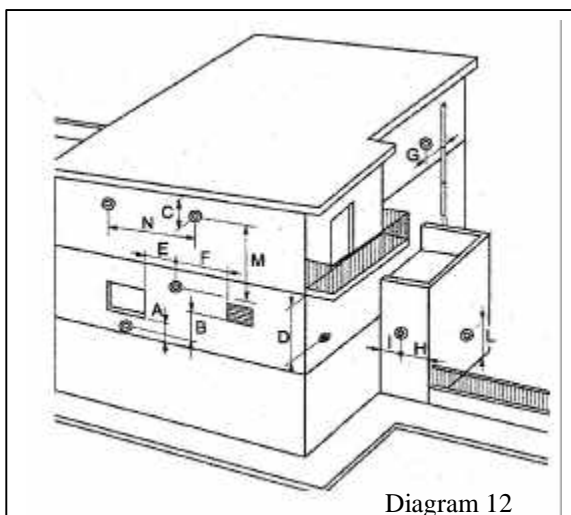


Diagram 12

3.3. BOILER INSTALLATION

3.3.1. Statutory requirements

The installation of this boiler must be carried out by a competent person in accordance with the relevant requirements of the current issue of;

The Gas Safety (Installation and Use) Regulations

The Building Regulations

The local water company Byelaws

The Health and Safety at Work Act

3.3.2. Sheet metal parts

WARNING: When installing or servicing this boiler, care should be taken when handling the edges of sheet metal parts to avoid the possibility of personal injury.

3.3.3. Installing the boiler

Prior to starting work, the system must be thoroughly flushed using a propriety cleanser such as **Sentinel X300** to eliminate any foreign matter and contamination e.g. metal filings, solder particles, oil, grease etc.

Note. Solvent products could cause damage to the system.

? Engage boiler upper part onto the hanging bracket.

Fit the washers between the boiler pipes and the inlet and outlet fittings and connect the boiler.

3.4. FLUE INSTALLATION

Top outlet flue - kit 85089

The boiler is only suitable for top outlet flue connection.

Calculation of flue cutting lengths

? Measure wall thickness e (mm), see diagram 13.

? For side flues, measure distance from inside face of side wall to centre line of boiler and subtract 210 to get dimension a (mm).

? Refer to table 2 for cutting lengths of both inner and outer flue pipes for each of the various flue options available.

Important: All flue cutting lengths must be measured from the terminal end of the flue pipes, see diagram 14. When the dimension X measured on site is greater than that given in table 2, a flue extension kit will be required, refer to table 3 for details.

3.4.1. Extended flue

The horizontal flue is extended by using one or more of the 1000 mm extension pipes, available from Mikrofill. These are connected together by push fit type joints, clamps and seals.

3.4.1.1. Calculation of flue cutting lengths for extended flue

? Using the correct number of extension kits as table 3, measure dimensions a and e , see diagram 15. Cut both the inner and outer pipes to the dimensions given in table 4.

Important: All cutting lengths should be measured from the push fit joint end of the extension pipe, Do not leave any burrs or sharp edges on the cut ends of the pipes.

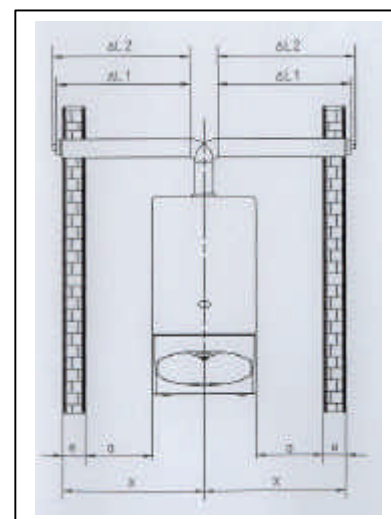


Diagram 13

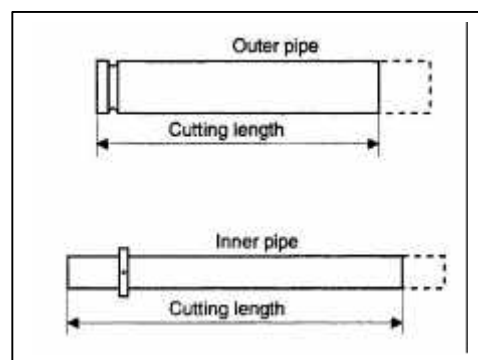


Diagram 14

Table 3

Number of extension kits required

Flue option	Dimension 'X'	No. of extension kits
Side flue (left or right)	991 to 1991 mm	1

Note: Maximum flue length is 3 meters.
(No curves)

Table 2

Flue cutting lengths

Flue option	Cutting length (mm)		Comments
	Outer pipe	Inner pipe	
Rear flue	$e+160$	$e+244$	max. wall thickness 'e' without ext. 756mm
Side flue (left or right)	$e+a+145$	$e+a+229$	max. distance 'x' without ext. 990mm

Table 4

Flue cutting lengths

Flue option	Cutting length (mm)		Comments
	Outer pipe	Inner pipe	
Side flue (left or right)	e+a-755	e+a-755	max. dimension 'x' without ext. 990mm

Installation of flue assembly

? Fit rubber sealing collar (**A**), see diagram 16, into groove at the outer end of pipe (**B**).

? Fit outer pipe (**B**) into wall with groove to the outside.

? Pull pipe inwards to bring rubber sealing collar hard up against external wall, see diagram 16.

? Fit internal plastic flange (**C**) onto outer pipe. Push along the pipe until engaged against internal wall.

? From inside, insert inner pipe (**D**) into outer pipe.

? Fit both 'O' rings (**E**) into the flue elbow (**F**), one at the inlet, one at the outlet. By necessity, they are a loose fit, apply a small amount of silicone grease to each 'O' ring when fitting.

? Slacken the two screws and fit the clamp and seal (**G**) onto the elbow.

? Take hold of the inner flue and push gently onto the elbow outlet taking care not to tear the 'O' ring.

Important: If the flue has been cut, ensure that there are no burrs that could damage the 'O' ring.

? Push the elbow clamp and seal over the outer flue.

? Remove the backing from the self adhesive gasket (**H**) and carefully fit gasket to base of flue elbow.

? Fit elbow onto boiler and secure with the four screws (**I**).

The standard flue kit , see diag.11, comprises :

- External rubber sealing collar **A**
- Outer pipe **B**
- Plastic flange **C**
- Inner pipe **D**
- 2 'O' rings **E**
- Elbow **F**
- Clamp and seal **G**
- Gasket **H**
- Four screws **I**

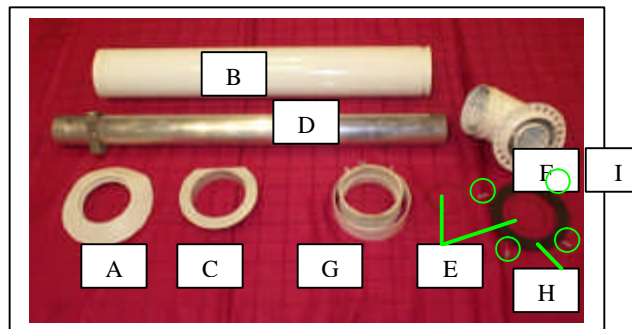


Diagram 15



Diagram 16

3.4.2. Concentric flue system

The maximum permissible length (**L**) for the concentric flue system is 2 m.

For each 90° flue elbow used, (or two 45° elbows) the maximum permissible length (**L**) must be reduced by 1 meter.

3.5. ELECTRICAL CONNECTION

Warning. This boiler must be earthed. The phase and the neutral line connections of power cable must be correct.

All system components must be of an approved type.

Connection of the whole electrical system and any heating system controls to the electrical supply must be through a common isolator.

Isolation should preferably be by a double pole switched fused spur box having a minimum contact separation of 3 mm on each pole. The fused spur box should be readily accessible and preferably adjacent to the boiler. It should be identified as to its use.

A fused three pin plug and shuttered socket outlet may be used instead of a fused spur box provided that;

a) They are not used in a room containing a fixed bath or shower.

b) Both the plug and socket comply with the current issue of BS1363.

The mains electrical supply must be maintained at all times in order to provide domestic hot water. Do not interrupt the mains supply with a time switch or programmer.

WARNING: ON NO ACCOUNT MUST ANY EXTERNAL VOLTAGE BE APPLIED TO ANY OF THE TERMINALS ON THE HEATING CONTROLS CONNECTION PLUG.

Warning: This appliance must be wired in accordance with these instructions. Any fault arising from incorrect wiring cannot be put right under the terms of the Mikrofill guarantee.

3.5.1. External controls

The combination boiler is designed to operate at maximum efficiency at all times, but will be most efficient and economical when connected to a room thermostat.

A suitable room thermostat is available as an accessory.

The boiler will work for heating without a room thermostat being connected provided that the wire link fitted between the two terminals of the connector (A) is left in place, see diagram 18.

Warning : Maximum Clock (Timer) load is 12 Vdc, 10 mA

ON NO ACCOUNT must any electrical voltage be applied to any of the terminals of the external controls plug.

Note: For further information, see the building regulations 1991- Conservation of Fuel and Power -1995 edition - appendix G, Table 4b.

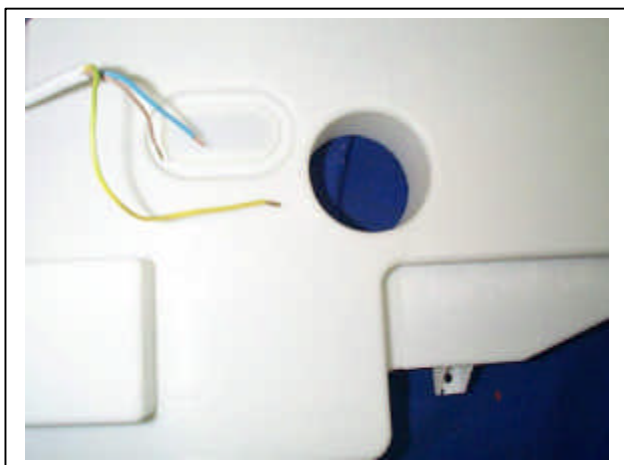


Diagram 17

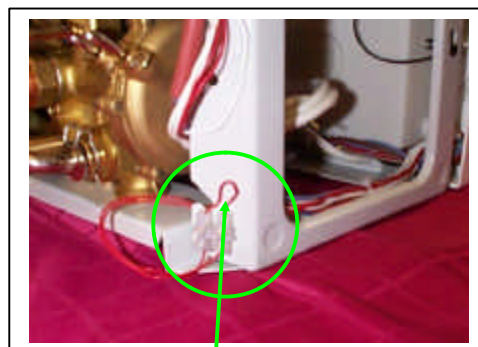


Diagram 18

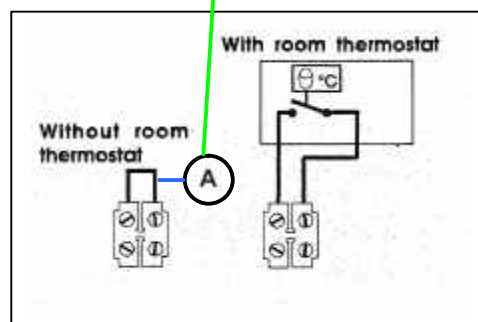


Diagram 19

4. COMMISSIONING

4.1. Filling

When cold, system pressure should be about 1 bar. If while running venting off of air dissolved in the water causes the pressure of the central heating system to drop below the minimum level described above, the user must utilise a filling loop to bring it back to the original value. During operation, water pressure in the boiler when hot should be about 1 - 2 bars. After filling, always close and disconnect the filling loop.

Note - If there is a possibility of air pockets forming in certain points of the central heating system flow and return pipes, you are recommended to fit an air vent valve at these points.

4.2. Gas connection

Gas connection should be carried out using a rigid pipe.

The flow at the gas meter should be sufficient for the simultaneous use of all appliances connected to it. Connect the gas supply to the boiler according to current regulations. The diameter of the gas tube leaving the boiler is not the determining factor in choosing the diameter of the pipe between the appliance and the meter. This must be selected in relation to length and pressure drop and in any instance should not be less than 22mm.

The whole of the gas installation including the meter should be inspected and tested for soundness and purged in accordance with B56891-1988.

N.B. - The filling loop will be fitted by the installer in accordance with water by laws, at the time of installing the system. It is NOT a part of the boiler.

COMMISSIONING

The commissioning and first firing of the boiler must only be done by a competent person.

Gas installation

It is recommended that any air is purged from the supply at the gas inlet test point on the gas valve, see diagram 20.

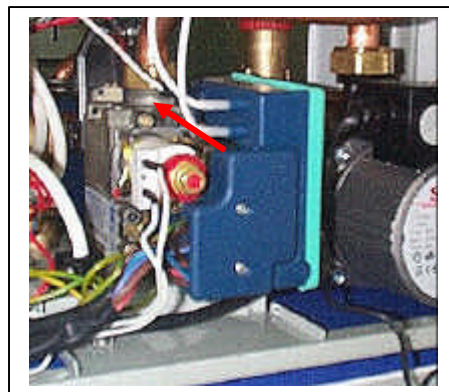


Diagram 20

Filling the system

Open the boiler isolating valves. (Slot of the screw corresponds to flow direction) Fill the system by using a filling device.

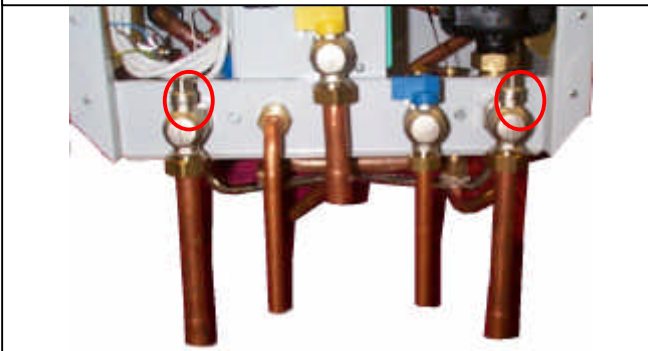
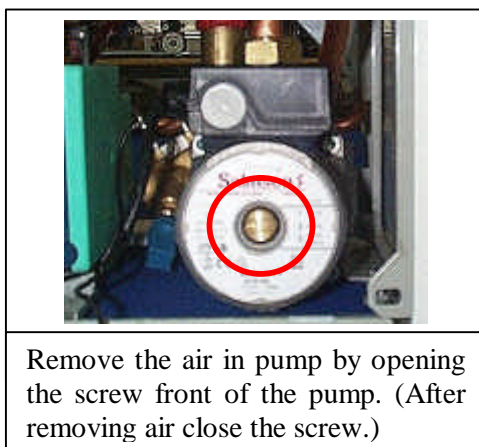


Diagram 21

Undo the cap of automatic air vent on the expansion vessel open and leave it open.



Diagram 22



Remove the air in pump by opening the screw front of the pump. (After removing air close the screw.)

Diagram 23

COMMISSIONING

Bleed each radiator to remove the air, re-tighten bleed screws



Diagram 24

Leave the cap of automatic air vent on the expansion vessel open.



Diagram 25

Open various hot water taps to bleed system.



Diagram 26

Make sure the pressure gauge on control panel indicates a system pressure of 1 and 2 bar. Refill the system as necessary.

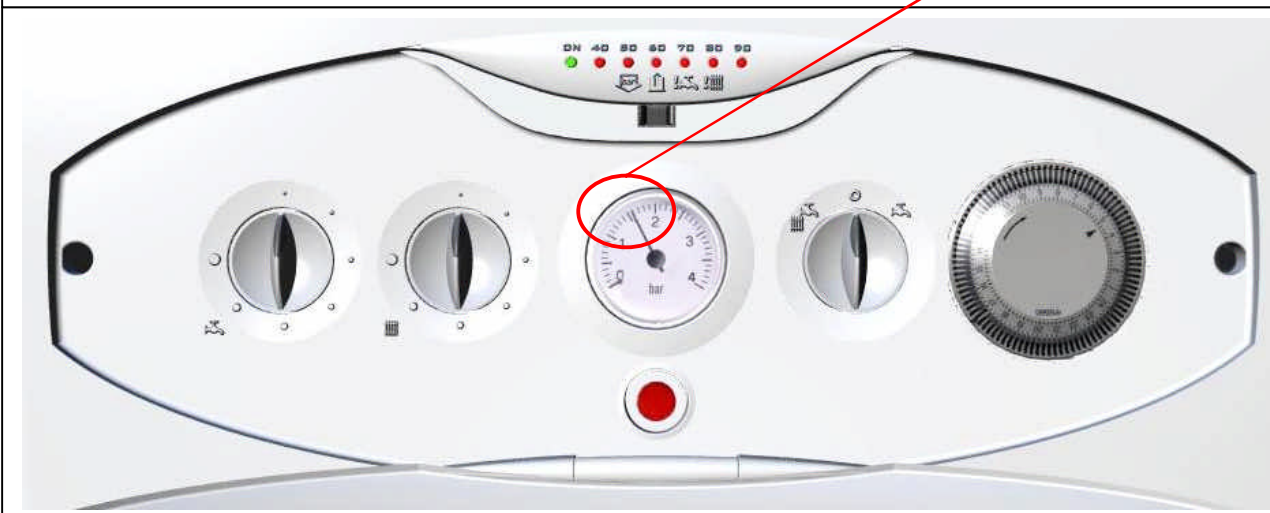


Diagram 27

COMMISSIONING

4.3. Lighting the boiler

Make sure that:

- ? The boiler is connected to the electrical supply.
- ? The gas service cock is open.

Then follow the instructions below :

Turn on the mode selector knob

The pressure must be between 1 and 2 bar. If not, the system must be filled by a competent person.



To stop boiler turn the selector knob off.

Diagram 28



Diagram 29



Diagram 30

- ? Adjust heating temperature to maximum.
 - ? Check that any external controls, if fitted, are calling for heat (set room thermostat to maximum).
 - ? Allow the temperature to rise to the maximum value, with all radiator valves open. The temperature rise will cause release of the gases contained in the water of the central heating system.
 - ? Gases driven towards the boiler will be automatically released through the automatic air vent.
 - ? The gases trapped at the highest point of the system must be released by bleeding the radiators. On reaching maximum temperature, the boiler should be turned off and the system drained as rapidly as possible whilst still hot.
 - ? Refill system to a pressure of between 1 and 2 bar and vent as before.
- Restart boiler and operate until a maximum temperature is reached. Shut down boiler and vent heating system. If necessary, top up heating system and make sure that a pressure of 1 bar is indicated when system is COLD.

4.4. On board adjustments: potentiometers and trimmers.

MAX RISC: maximum heating mode trimmer, 0 -100 %.

0 % corresponds to the minimum value mechanically set on the MFC: 30 mA with NG, 50 mA with LPG.

RLA: step opening level trimmer, 0 -100 %.

When the MAX RISC trimmer is put to the very minimum, the step opening duration is forced to 20 s. in order to help the setting operation. The 3 minute delay is cancelled. Factory setting is 100%. Do not change its setting.

4.5. On board adjustments: jumpers.

JP 1: DO NOT TOUCH this jumper.

JP 2: when fit in, the pump is not powered when working in Heating mode. This feature addresses to systems with external pumps.

JP 3: when fit in, the heating temperature range changes to 30 – 40 °C, for underfloor systems.

JP 4: when fit in, the three minute delay on restarting after a cut-out due to the primary water temperature set being exceeded, is excluded.

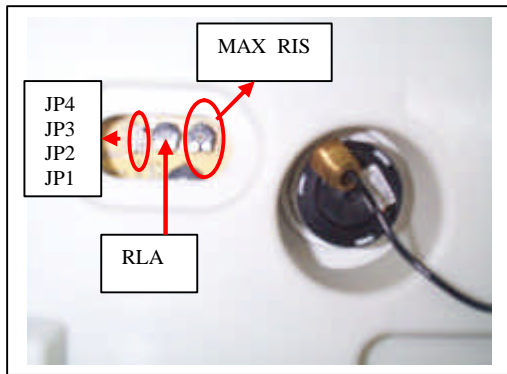


Diagram 31

4.6. Setting the maximum heating temperature

The maximum heating temperature can be preset at commissioning stage to suit the type of heating system. For example, for use with underfloor heating, the maximum heating temperature can be set to 40°C. To adjust the maximum temperature, proceed as follows:

? Remove the jumper cap from the rear of the control panel to gain access to jumper JP3 (see diagram 31).

Note: To adjust the maximum heating temperature it is only necessary to fit JP3. DO NOT touch any other jumpers.

? Refit the jumper cap.

JP 3 is fitted ? 40°C. Maximum.

JP 3 is not fitted ? 90°C. Maximum.

Factory setting 90°C. Maximum.

4.7. Setting the heating output

The heating output can be set with the use of the trimmer potentiometer; proceed as follows:

Open the lower front panel. Then remove the jumpers cover behind the PCB card box cover. Adjust the maximum heat desired from MAX RISC potentiometer.

?

? Adjust the heating output by turning the potentiometer clockwise to increase, anti-clockwise to decrease.

? Refit the jumper cap and close the lower control panel.

Note: Adjustment of the heating output does not affect the domestic hot water output.

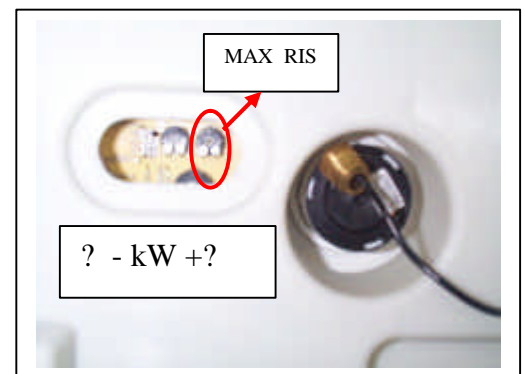


Diagram 32

Burner Pressure	Nominal Output	
1.2 mbar	8,9 kW	30400 Btu/h
3.7 mbar	12.98 kW	40980 Btu/h
6.9 mbar	13.75 kW	44400 Btu/h
12.1 mbar	23.2 kW	78530 Btu/h
12.3 mbar	23.3 kW	79555 Btu/h

Table 1



Diagram 33

Rotate the domestic hot water adjustment knob left or right to adjust the maximum temperature of the sanitary water (35°C to 65°C). For increasing rotate the knob in clockwise and for decreasing rotate in anti-clockwise.



Diagram 34

Rotate the central heating adjustment knob left or right to adjust the maximum temperature of the heating (30°C to 85°C). For increasing rotate the knob in clockwise and for decreasing rotate in anti-clockwise.

4.8. Safety Devices

The combination boiler incorporates a visual led display that indicates fault conditions, should they occur. In the event of a fault, the display will indicate, by means of leds, exactly in which area the fault lies. Should the boiler fail to operate during Commissioning, the most likely fault is that the gas supply to the boiler has not been turned on or purged sufficiently or that there is no pressure in the heating system. These are indicated as follows :

No gas supply

? This will be indicated by illuminating light of the reset button

To rectify this, proceed as follows:

? Rectify the gas supply problem.

? Restart the boiler by turning the selector knob and then press the reset button.

Insufficient system pressure

This will be indicated on the led display as blinking warning led 3. pressure is low.

To rectify this the system must be re-filled, refer to 'Commissioning'.

Other faults

These are indicated on the led display by a blinking led. Further information on the fault codes can be found in the 'Servicing Instructions'.

General safety devices

Air flow rate safety device

If an obstruction, even partial, of the flue occurs, for any reason whatsoever, the built in safety system of the boiler will turn the boiler OFF and the fan will continue to run.

The boiler will be ready to operate when the fault has been cleared.

Overheat safety

In case of boiler overheating, the overheat thermostat will turn the boiler off. The thermostat, located on the heat exchanger outlet pipe, will need to be manually reset.

In case of power supply failure

The boiler no longer operates.

As soon as power supply is restored, the boiler will be automatically restarted.

Frost protection

The combination boiler has a built in frost protection device that protects the boiler from freezing. If the boiler is to be left and there is a risk of frost, ensure that the gas and electrical supplies are left connected. The frost protection device will light the boiler when the temperature of the boiler water falls below 5°C When the temperature reaches 30°C, the boiler stops.

Note : This device works irrespective of any room thermostat setting and will protect only the boiler.

5. SETTINGS

Gas valve setting

All boilers are tested and factory set during manufacture. Should it be necessary to reset a gas valve, for example, after replacement, proceed as follows:

? Shut down boiler.

Minimum setting (See values on table A)

? Remove electrical connectors from the modulating gas valve coil, see diagram 35.

? Connect a suitable pressure gauge to the pressure outlet on valve, see diagram 36.

? Turn the OFF/Summer/Winter switch to the 'Winter' position.

? Turn the central heating temperature adjuster to maximum setting.

? Remove the protective cover from the gas valve adjuster.

? Connect the gas valve adjustment tool to adjustment nut and screw, see diagram 37.

? Turn inner part, see diagram 38:

CLOCKWISE: To increase the pressure.

ANTICLOCKWISE: To decrease the pressure.

After adjustment, connect electrical connector, protective cover.

Maximum setting (See values on table A)

? Remove the protective cover from the gas valve adjuster.

? Push the grey rod on tool.

? Turn outer part, see diagram 39:

CLOCKWISE: To increase the pressure.

ANTICLOCKWISE: To decrease the pressure. After adjustment, refit the cover to the gas valve adjuster.

By-pass

The combination boiler has a built-in automatic bypass.



Diagram 35

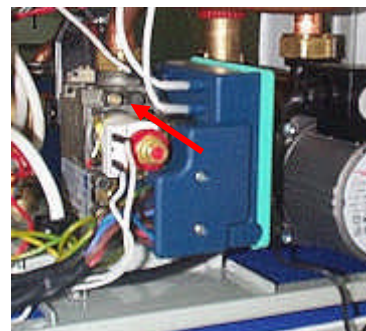


Diagram 36



Diagram 37



Diagram 38

Gas pressure adjustment values

Gas	Gas inlet pressure (mbar)	Burner pressure		Diam. of injector nozzle mm.
		Min.	Max.	
NG (G20)	20	1.2	12.3	1.2

Table 5



Diagram 39

Mikrofill Ethos Condensing combination boiler



Maintenance Instructions
24cc

IMPORTANT

“Benchmark” Installation, Commissioning and Service Record Log Book is enclosed in your customer information pack.

“This record must be completed and left with the end user”

CE Mark

Mikrofill gas appliances comply with the requirements contained in CE Mark documents contained with European directives applicable to them. In particular, these appliances comply with the CE directives and technical specifications contained within them :

- ? Gas Appliances directive 90/396
- ? Efficiencies directive 92/42
- ? Low tension directive 73/23 (modified from 93/68)
- ? Electromagnetic Compatibility directive 89/396 (modified from 93/68)

IMPORTANT !

The manual must be read thoroughly, so that you will be able to use the boiler in a safe way. And it must be kept for reference in the future.

Installation and first lighting must be carried out by a competent person.

Repairs must be carried out only by a competent person, using genuine spare parts. Do no more than switching off the boiler yourself.

The boiler allows heating up of water to a temperature less than the boiling point.

The boiler can be used only for those purposes for which it has been specially designed.

The boiler must not be touched by children or by an unfamiliar person to its operation.

The manufacturer disclaim all liability for any translations of the present manual from which incorrect interpretation may occur.

The manufacturer accepts no responsibility for unsatisfactory performance of the appliance and flue due to failure to comply the instructions.

This appliance complies with the EN 483 and EN 625 Standards.

The appliance is build to comply with the regulation now in force regarding gas appliance's safety and the European regulation now in force relative to safety of household and similar electrical appliances.

The manufacturer, in the continuous process to improve his products, reserves the right to modify the data expressed in the present documentation at any time and without prior notice.

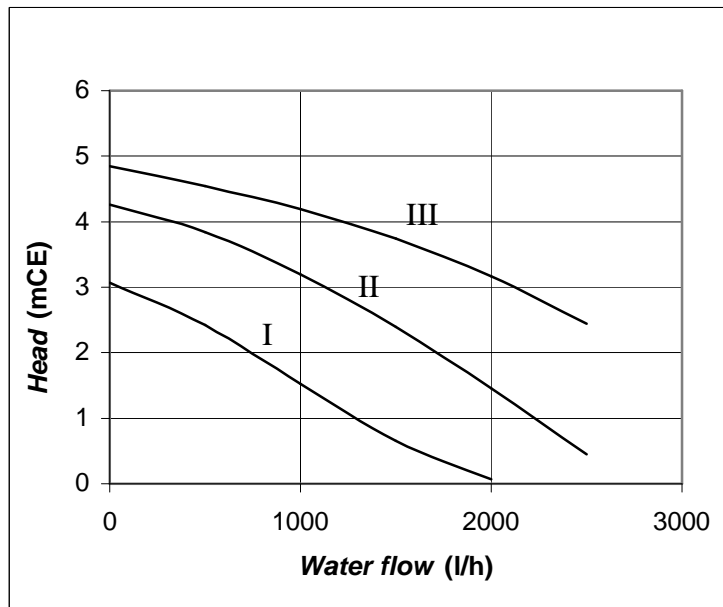
The present documentation is an informative support and it cannot be considered as a contract towards third parties.

CONTENTS

1. TECHNICAL AND DIMENSIONAL CHARACTERISTICS	4
1.1. Pump Characteristics.....	4
1.2. Burner Pressure Adjustment.....	4
1.3. Hydroblock diagrams.....	5
2. SAFETY DEVICES.....	7
3. SETTINGS.....	8
4. ROUTINE CLEANING and INSPECTION.....	10
5. REPLACEMENT OF PARTS	13
6. FAULT FINDING	21
6.1. Fault codes on LED display diagnostic panel.....	21
6.2. Fault Finding Charts.....	22
7. SERVICE PROCEDURE.....	26
7.1. Appliance Checks.....	26
7.2. Service Operation.....	26
7.3. Recommission System.....	26
7.4. Soundness Test.....	26
8. WIRING DIAGRAM.....	27
9. SHORT PARTS LIST	28

1. TECHNICAL AND DIMENSIONAL CHARACTERISTICS

1.1. Pump Characteristics



The pump has 3 different speeds. According to these speeds pump performance curve is given at the diagram on the left.

I : first speed
II : second speed
III : third speed

The factory speed setting of the pump is III. The pump is a SALMSON NBL 53/15 O series.

Diagram 1

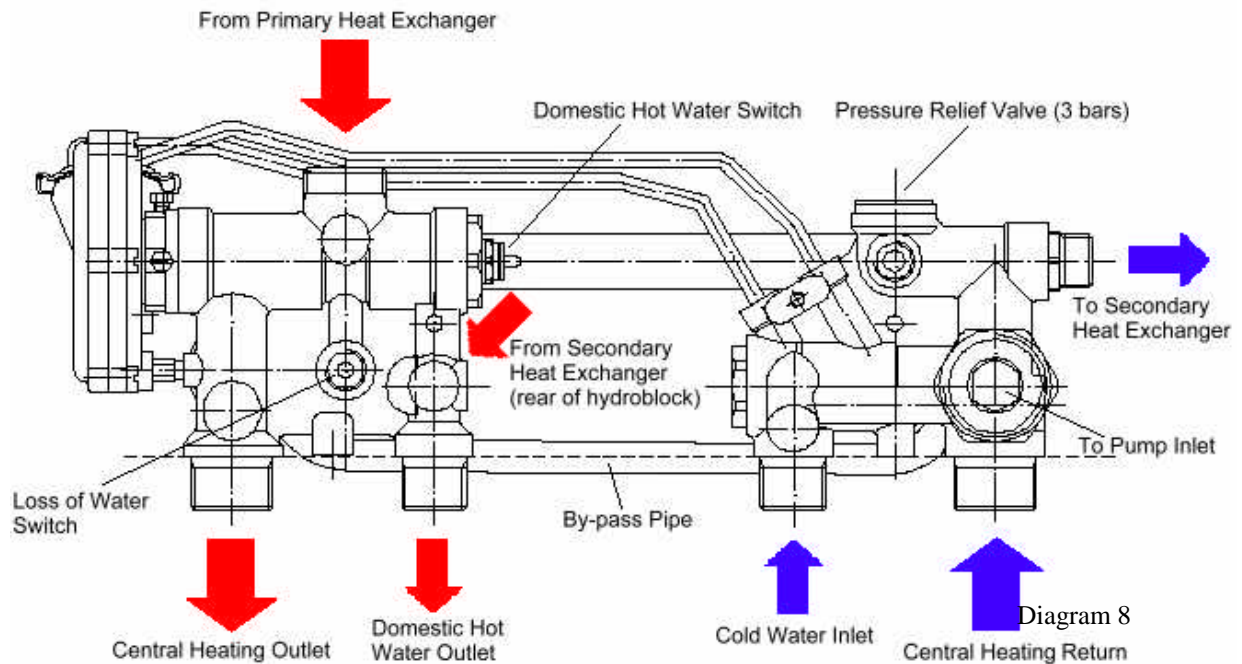
1.2. Burner Pressure Adjustment

Burner Pressure	Nominal Output	
1.2 mbar	8,9 kW	30400 Btu/h
3.7 mbar	12.98 kW	40980 Btu/h
6.9 mbar	13.75 kW	44400 Btu/h
12.1 mbar	23.2 kW	78530 Btu/h
12.3 mbar	23.3 kW	79555 Btu/h

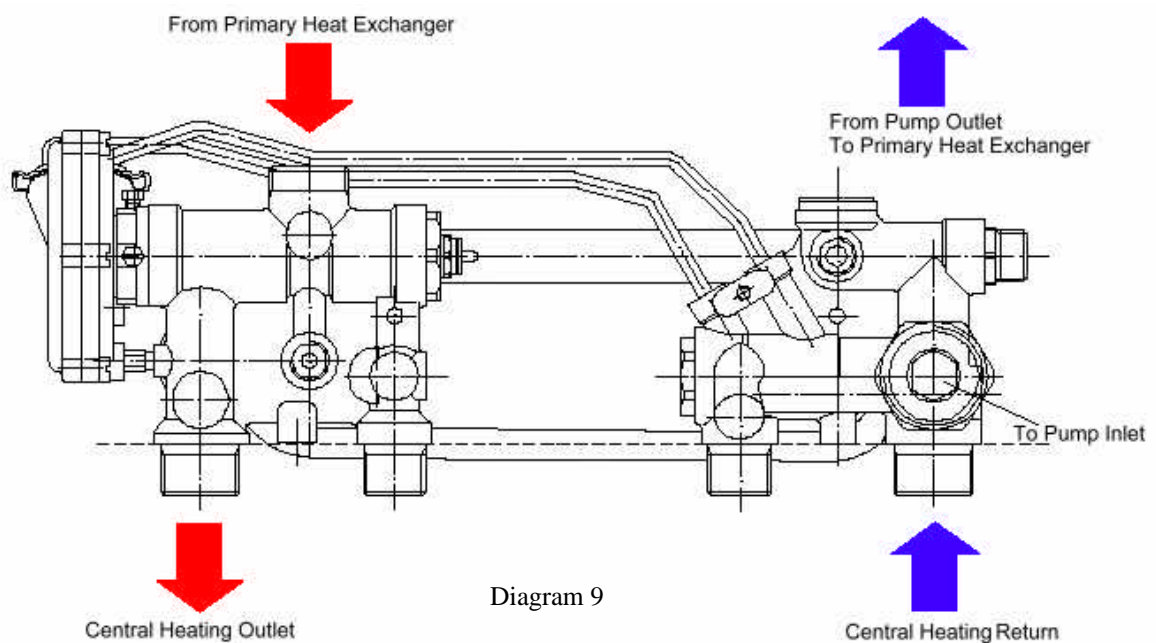
Table 1

1.3. HYDROBLOCK DIAGRAMS

1.3.1.Connections

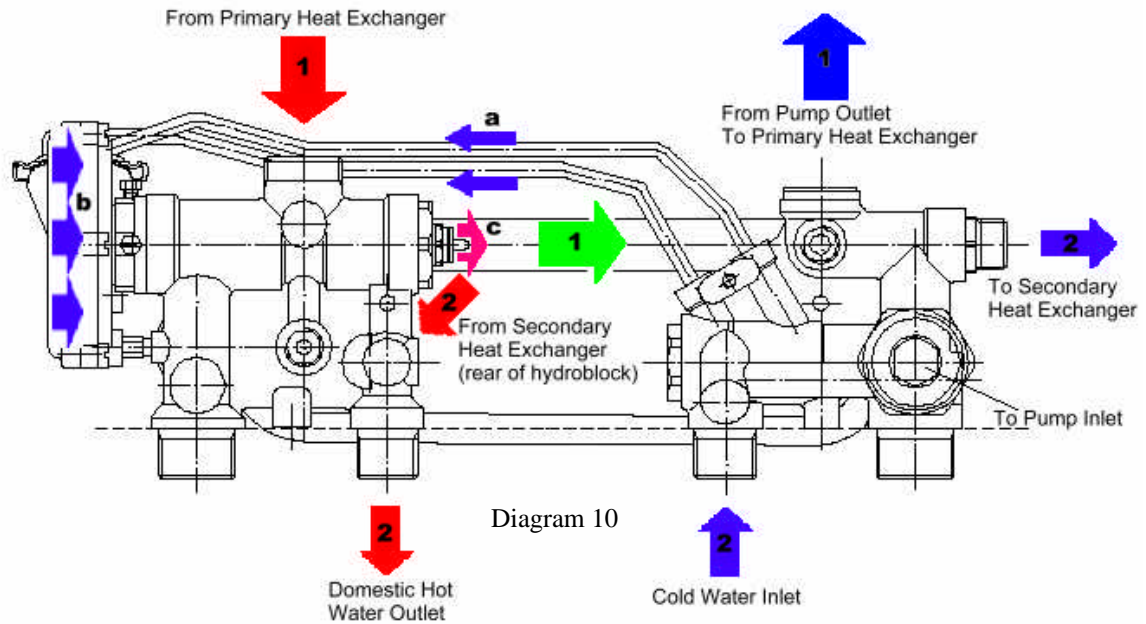


1.3.2.Central Heating Mode



? When the system is operating in Central Heating Mode, cold water which comes from Central Heating Return pipe is directed to pump inlet. Water reaches to inlet of primary heat exchanger from outlet of pump. With heat transfer in primary heat exchanger, hot water is supplied. Hot water that comes from primary heat exchanger is directed to Central heating outlet.

1.3.3.Domestic Hot Water Mode



- ? Switching to Domestic Hot Water System: When a tap is opened, cold water reaches to hydroblock from Cold Water Inlet. The pressure is sensed by the diaphragm by means of pressure connection pipes (shown as “a”). The diaphragm (b) moves with the difference in pressures. The pin which is connected to diaphragm moves to right (as shown with arrow “c”) and operates the domestic water flow switch. This switch gives signals to control card and lets the system control the domestic hot water system.
- ? For Domestic Hot Water system (shown as “2”): Cold water which is supplied from Cold Water Inlet reaches to secondary heat exchanger inlet. The heat is transferred between primary and secondary heat exchangers. (The secondary heat exchanger is installed inside primary heat exchanger.) The hot water which is supplied from Secondary heat exchanger outlet is directed to Domestic Hot Water Outlet.
- ? For Central Heating system (shown as “1”): There is no flow in whole system, the flow is only inside the boiler. Cold central heating water is pumped to primary heat exchanger. In primary heat exchanger, heat is transferred from primary heat exchanger to secondary heat exchanger. The water that comes from primary heat exchanger outlet, is directed to pump inlet by a connection pipe (shown by green arrow).

2. SAFETY DEVICES

The combination boiler incorporates a visual led display that indicates fault conditions, should they occur. In the event of a fault, the display will indicate, by means of leds, exactly in which area the fault lies. Should the boiler fail to operate during Commissioning, the most likely fault is that the gas supply to the boiler has not been turned on or purged sufficiently or that there is no pressure in the heating system. These are indicated as follows :

No gas supply

? This will be indicated by illuminating light of the reset button

To rectify this, proceed as follows:

? Rectify the gas supply problem.

? Restart the boiler by turning the selector knob and then press the reset button.

Insufficient system pressure

This will be indicated on the led display as blinking warning **led 3**. pressure is low.

To rectify this the system must be re-filled, refer to 'Commissioning'.

Other faults

These are indicated on the led display by a blinking led. Further information on the fault codes can be found in the 'Servicing Instructions'.

General safety devices

Air flow rate safety device

If an obstruction, even partial, of the flue occurs, for any reason whatsoever, the built in safety system of the boiler will turn the boiler OFF and the fan will continue to run.

The boiler will be ready to operate when the fault has been cleared.

Overheat safety

In case of boiler overheating, the overheat thermostat will turn the boiler off. The thermostat, located on the heat exchanger outlet pipe, will need to be manually reset.

In case of power supply failure

The boiler no longer operates.

As soon as power supply is restored, the boiler will be automatically restarted.

Frost protection

The combination boiler has a built in frost protection device that protects the boiler from freezing. If the boiler is to be left and there is a risk of frost, ensure that the gas and electrical supplies are left connected. The frost protection device will light the boiler when the temperature of the boiler water falls below 5°C When the temperature reaches 30°C, the boiler stops.

Note : This device works irrespective of any room thermostat setting and will protect the complete heating system.

3. SETTINGS

Gas valve setting

All boilers are tested and factory set during manufacture. Should it be necessary to reset a gas valve, for example, after replacement, proceed as follows:

? Shut down boiler.

Minimum setting (See values on table A)

? Remove electrical connectors from the modulating gas valve coil, see diagram 32.

? Connect a suitable pressure gauge to the pressure outlet on valve, see diagram 33.

? Turn the OFF/Summer/Winter switch to the 'Winter' position.

? Turn the central heating temperature adjuster to maximum setting.

? Remove the protective cover from the gas valve adjuster.

? Connect the gas valve adjustment tool to adjustment nut and screw, see diagram 34.

? Turn inner part, see diagram 35:

CLOCKWISE: To increase the pressure.

ANTICLOCKWISE: To decrease the pressure.

After adjustment, connect electrical connector, protective cover.

Maximum setting (See values on table A)

? Remove the protective cover from the gas valve adjuster.

? Push the grey rod on tool.

? Turn outer part, see diagram 36:

CLOCKWISE: To increase the pressure.

ANTICLOCKWISE: To decrease the pressure. After adjustment, refit the cover to the gas valve adjuster.

By-pass

The combination boiler has a built-in automatic bypass.



Diagram 2

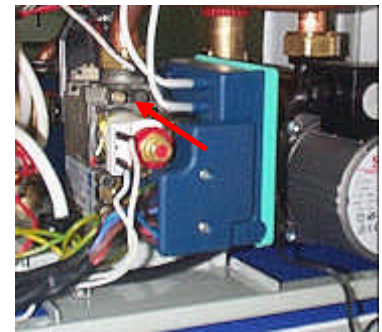


Diagram 3



Diagram 4



Diagram 5



Diagram 6

Gas pressure adjustment values

Gas	Gas inlet pressure (mbar)	Burner pressure		Diam. of injector nozzle mm.
		Min.	Max.	
NG (G20)	20	1.2	12.3	1.2

Table 2

On board adjustments: potentiometers and trimmers.

MAX RISC: maximum heating mode trimmer, 0 -100 %.

0 % corresponds to the minimum value mechanically set on the MFC: 30 mA with NG, 50 mA with LPG. To set MAX RISC to minimum, turn it counter-clockwise. To increase the maximum heating value, turn it clockwise.

RLA: step opening level trimmer, 0 -100 %.

When the RLA trimmer is put to the very minimum by turning counter-clockwise, the step opening duration is forced to 20 s. in order to help the setting operation. The 3 minute delay is cancelled. By turning clockwise, step opening duration is increased. Factory setting is 100%. Do not change its setting.

On board adjustments: jumpers.

JP 1: NG/LPG. When fit in, the modulating current range varies from 30 – 230 mA (NG) to 50 -310 mA (LPG)

JP 2: when fit in, the pump is not powered when working in Heating mode. This feature addresses to systems with external pumps.

JP 3: when fit in, the heating temperature range changes to 30 – 40 °C, for underfloor systems.

JP 4: when fit in, the three minute delay on restarting after a cut-out due to the primary water temperature set being exceeded, is excluded.

Setting the maximum heating temperature

The maximum heating temperature can be preset at commissioning stage to suit the type of heating system.

For example, for use with underfloor heating, the maximum heating temperature can be set to 40°C. To adjust the maximum temperature, proceed as follows:

? Remove the jumper cap from the rear of the control panel to gain access to jumper JP3 (see diagram A).

Note: To adjust the maximum heating temperature it is only necessary to fit JP3. DO NOT touch any other jumpers.

? Refit the jumper cap.

JP 3 is fitted ? 40°C. Maximum.

JP 3 is not fitted ? 90°C. Maximum.

Factory setting 90°C. Maximum.

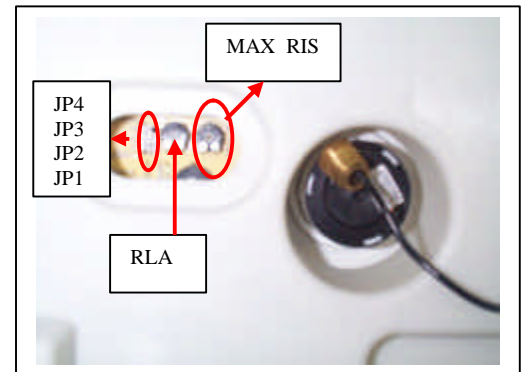


Diagram A

Temperature (°C)	Resistance (k?)
0.....	27.21
5.....	22.02
10.....	17.92
15.....	14.67
20.....	12.08
25.....	10.00
30.....	8.315
35.....	6.948
40.....	5.834
45.....	4.917
50.....	4.161
55.....	3.565
60.....	3.014
65.....	2.586
70.....	2.228
75.....	1.925
80.....	1.699
85.....	1.452
90.....	1.268
95.....	1.110
100.....	0.974

4. ROUTINE CLEANING AND INSPECTION

To ensure the continued efficient and safe operation of the boiler it is recommended that it is checked and serviced at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but in general once a year should be enough.

It is the law that any servicing is carried out by a competent person.

4.1. Service Check and Preparation.

? Operate boiler and check for any faults that need to be put right.

? Isolate boiler from the gas and electrical supplies.

? On completion check all gas carrying parts for soundness with leak detection fluid.

? Remove boiler casing as follows:

Side panels

? Unscrew and remove the two screws of side panels from bottom side of the boiler, see diagram 7.

? Lift each side panel up and remove.

4.2. Front control panel

? Open the cover of control panel by pressing the push catch.

? Turn the screws at two sides of panel in correct direction for gain access to lower part of boiler, see diagram 8.

Upper front panel

? Turn the plastic clips at two lower sides of panel in correct direction at 90° angle for gain access to combustion chamber of boiler, see diagram 9.

? Remove panel by lifting up and forward.

WARNING: Because risk of burning, **DO NOT TOUCH** flame inspection window or its immediate surroundings.

Combustion chamber cover

? Unclip two toggle clips and loose two nut securing combustion chamber cover to combustion chamber, see diagram 10.

? Remove combustion chamber cover from boiler.

? Undo, but do not remove, two cover support pins at two sides.

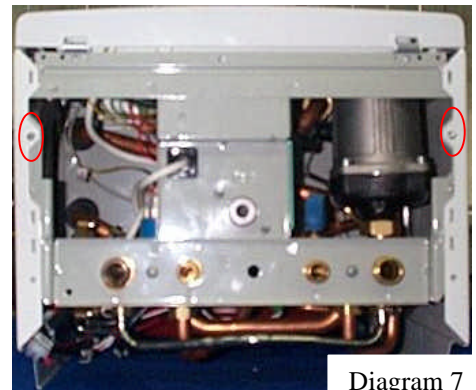


Diagram 7



Diagram 8



Diagram 9

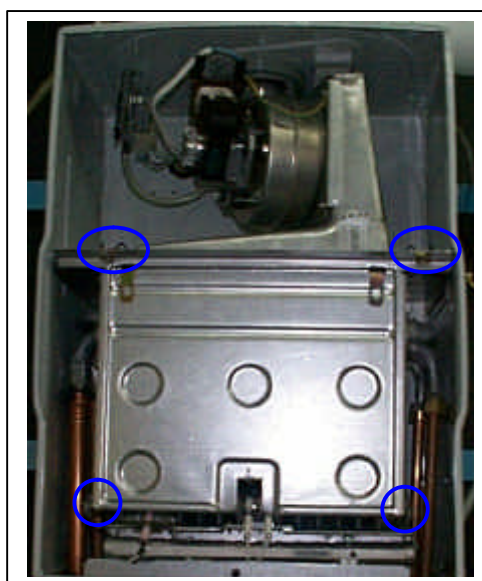


Diagram 10



Diagram 11

4.3. Heat exchanger

? Disconnect power supply leads and earth lead from fan.

? Remove combustion chamber cover as described in 6.3.

? **To empty only heating system by turning central heating safety valve's tap (red) to the left.**

? Remove pipe clips on the left pipes of heat exchanger, see diagram 12.

? Unscrew nuts on the right pipes of heat exchanger, see diagram 13. The washers must be kept for reassembly.

? To remove heat exchanger easily, undo pipes from hydraulic kit and pump, see diagrams 14 and 15.

? Pull the heat exchanger as shown in diagram 16.

? Examine heat exchanger for any blockages or build up of deposits.

? Clean heat exchanger with soft brush or vacuum cleaner.
Do not use any tool likely to damage painted finish of heat exchanger.

Reassembly of parts removed for servicing

All parts are replaced in reverse order to removal.



Diagram 12

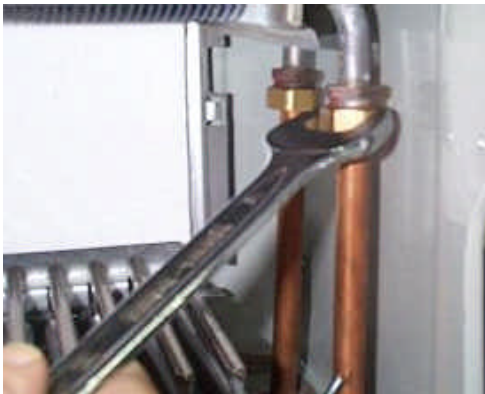


Diagram 13

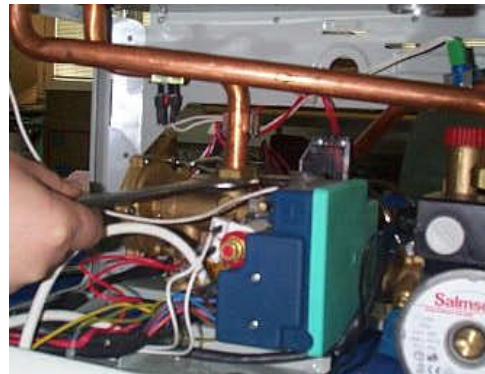


Diagram 14



Diagram 15



Diagram 16

4.4. Burner

? Undo main gas supply nut and pressure check point screw and nut from burner, see diagram 17.

Note: The washers between burner and the chamber lower part and between burner and the gas valve must be kept for use on reassembly.

? Undo gas supply pipe between gas valve and burner, see diagram 18.

? Pull off the ignition and flame sense leads from the gas valve remove burner from boiler by lifting up and pulling forwards from keyhole slots.

Note: The washer between main burner and main burner gas supply must be kept for use on reassembly.

? Remove ignition and flame sense electrodes from burner.

? Unscrew and remove injector bar retaining screws and separate injector bar from burner.

? Examine and clean injectors as necessary.

Note: DO NOT use a wire or sharp instrument on the holes.

Clean burner by washing in soapy water. Dry thoroughly before re-fitting.



Diagram 17



Diagram 18



Diagram 19



Diagram 20

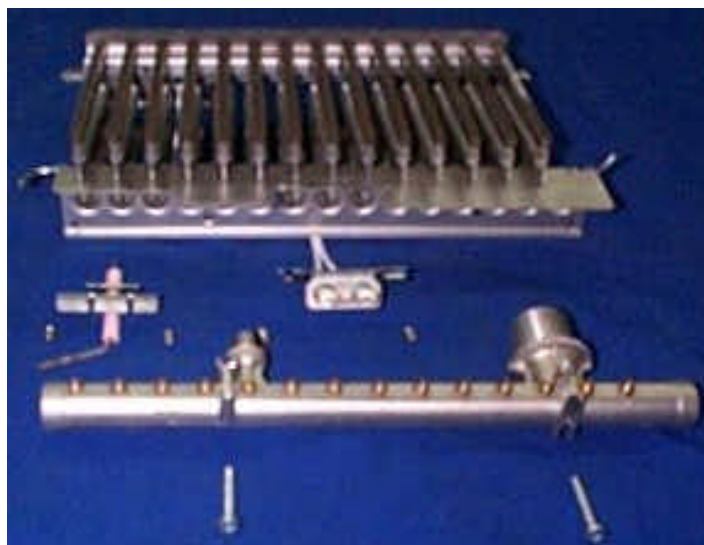


Diagram 21

ROUTINE CLEANING AND INSPECTION

4.5. Flue system

- ? Check externally to make sure that flue is not blocked
- ? Inspect flue system to make sure that all fittings are secure.

4.6. Operation of fan

- ? Switch on electrical supply and turn on gas.
- ? Light burner by opening a hot water tap.
- ? Without upper cover in place, burner should be automatically prevented from lighting by air flow detection system.
- ? Refit upper cover.

Check that fan operates when burner lights and stops when it goes out.

5. REPLACEMENT OF PARTS

5.1. Before replacement of any part

Make sure that electric connection is disconnected and gas service cock is closed.

For replacement of the following components it will be necessary to remove boiler casing panels as described in '**Routine Cleaning and Inspection**'.

WARNING: Before commencing the replacement of any component, isolate appliance from electrical supply and turn off gas at service cock.

To empty entire central heating system:

- ? Turn the red tap of central heating safety valve to the left when all isolation valves are open.

To empty only heating system of boiler:

- ? Close all isolation valves and turn the red tap of central heating safety valve to the left.

To empty domestic hot water system:

- ? Close all isolation valves except domestic hot water outlet. Open one or more hot water tap.

5.2. To replace domestic hot water thermistor

- ? Locate domestic hot water thermistor on hot water flow pipe on left hand side of boiler. (Diagram 22)
- ? Unclip thermostat from pipe, see diagram 23.
- ? Disconnect leads from thermistor.
- ? Fit replacement thermistor.
- ? Fit leads to replacement thermistor, the polarity is not important.

5.3. To replace central heating thermistor

- ? Locate central heating thermistor on heating pipe on left hand side of boiler. (Diagram 25)
- ? Unclip thermostat from pipe.
- ? Disconnect leads from thermistor.
- ? Fit replacement thermistor.
- ? Fit leads to replacement thermistor, the polarity is not important.



Diagram 22



Diagram 23



Diagram 24

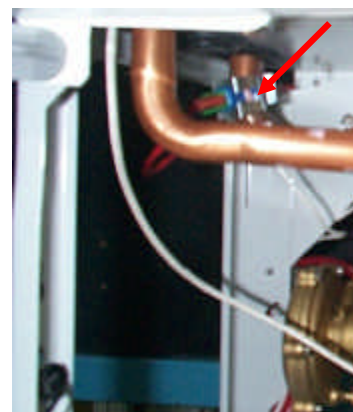


Diagram 25

5.4. To replace fan

- ? Remove electrical leads of fan.
- ? Unscrew the screws of fan as shown on diagram 26.
- ? Remove the fan, see diagram 27.
- ? Fit replacement fan in reverse order to removal.
- ? Reconnect electrical leads.

WARNING: Earth cable must be connected.

5.5. To replace air pressure switch

- ? Locate air pressure switch situated inside sealed chamber on top left hand side.
- ? Remove air pressure switch tube from air pressure switch.
- ? Disconnect air pressure switch electrical connections.
- ? Undo screws on top of boiler securing air pressure switch to boiler and remove switch.
- ? Fit replacement switch to boiler in reverse order to removal, noting that pressure sensing tube fits to left hand connection on switch.

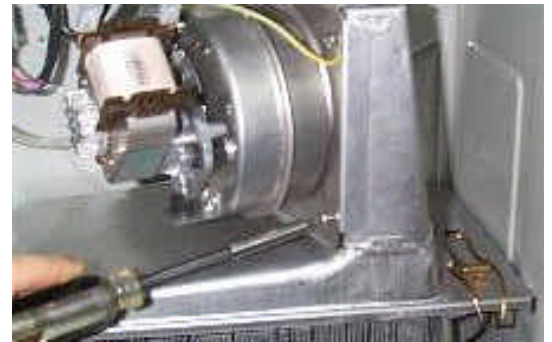


Diagram 26



Diagram 27



Diagram 28



Diagram 29

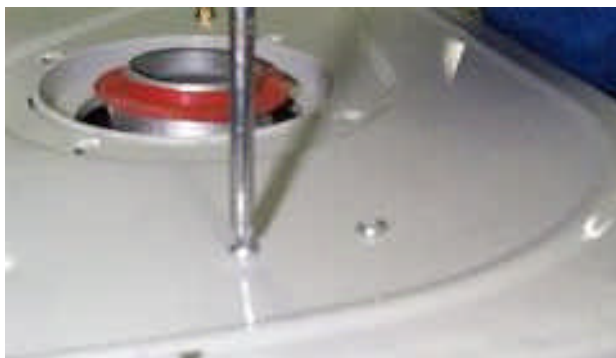


Diagram 30

5.6. To replace printed circuit board (PCB)

- ? Gain access to rear of control panel.
- ? Unscrew and remove external controls/mains connection access cover.
- ? Unscrew the screws around the PCB plastic cover to gain access to PCB, see diagram 31.
- ? Carefully pull off electrical connections to PCB.
- ? Unscrew the screws fit the PCB to the control panel and lift out PCB.
- ? Fit replacement PCB in reverse order to removal.

Note: 1) Make sure that PCB connections are fully pushed onto replacement PCB.

2) Set the heating temperature option to the same value as the old PCB, refer to '**Installation and User**' instructions.



Diagram 31

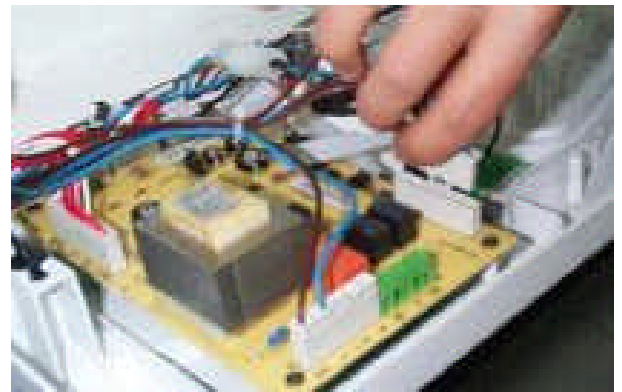


Diagram 32

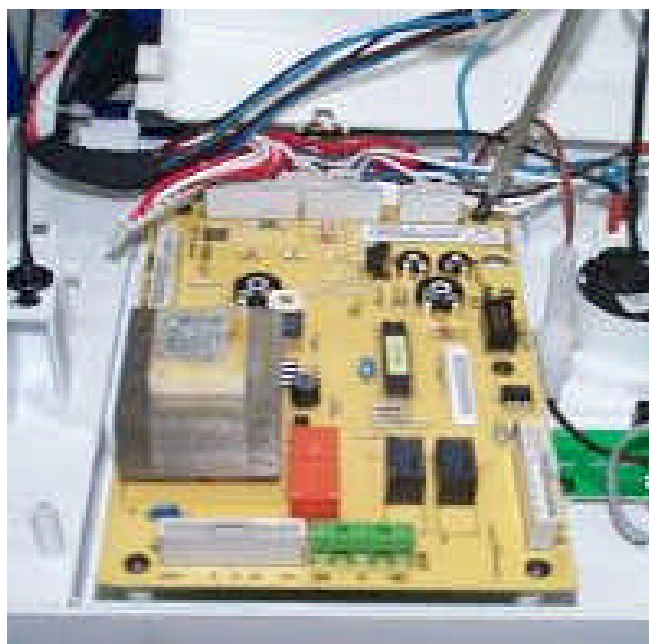


Diagram 33

5.7. To replace pump

? Drain down heating circuit of the boiler only, as described previously.

Note : It is not necessary to drain down entire heating system to carry out this work.

? Undo the two fixing nut at rearside and upside of the pump.

? Disconnect electrical connection from cable box of pump, see diagram 36.

? Re-connect electrical connection by take care of cable phase, neutral and earth line to cable box of new pump.

? Fit replacement pump in reverse order to removal.

Note : all washers must be fitted.

? Open isolating valves on flow and return connections; refill, vent and pressurise boiler.

? Check for leaks.

5.8. To replace loss of water sensor

? Drain down heating circuit of boiler only as described previously.

Note : It is not necessary to drain down entire heating system to carry out this work.

? Locate system pressure sensor at front left handside of boiler, see diagram 9.

? Remove electrical connections from sensor, see diagram 37.

? Remove the sensor by turning it in anticlockwise.

? Fit replacement sensor in reverse order of removal.



Diagram 34



Diagram 35



Diagram

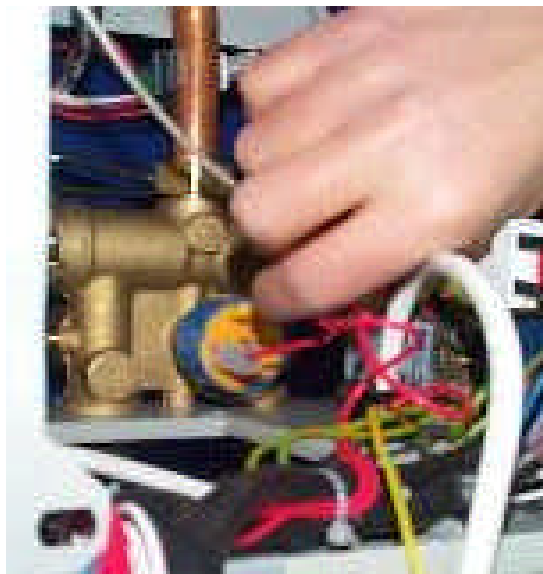


Diagram 37

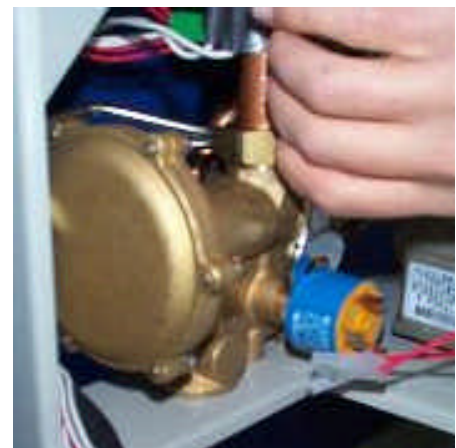


Diagram 38

5.9. To replace gas valve ignition module

- ? Locate ignition module attached to side of gas valve.
- ? Remove screws securing cover onto ignition module, see diagram 39.
- ? Disconnect ignition and flame sense leads from module.
- ? Remove cover and disconnect 12 pin and 2 pin multi-plug from module.
- ? Withdraw module from gas valve, see diagram 41.
- ? Fit replacement module, ensuring it is of the correct type for the boiler, in reverse order removal.
- ? Re-connect ignition and flame sense leads, the connections are uniquely sized to ensure correct replacement.
- ? Re-connect 2 pin and 12 pin multi-plug onto module.
- ? Refit cover ensuring all sealing grommets are correctly located in module body.
- ? Tighten screws securing cover onto ignition module.

5.10. To replace gas valve

- ? Ensure that gas supply to boiler is turned off at gas cock.
- ? Remove ignition module as described previously.

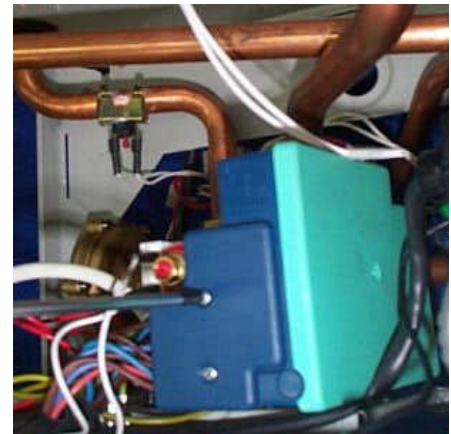


Diagram 39



Diagram 40

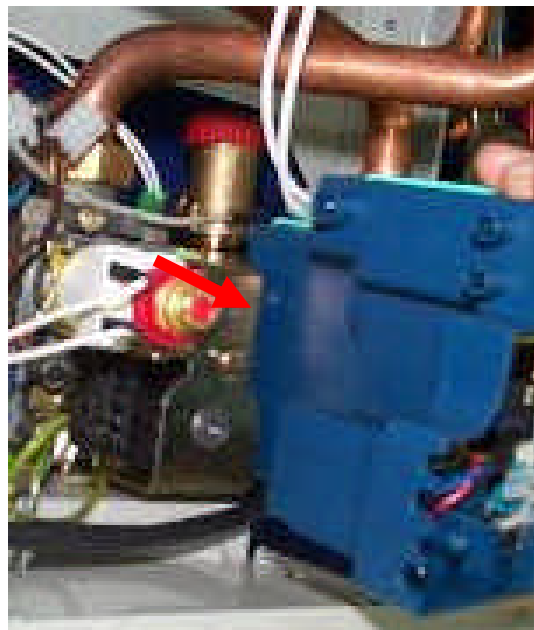


Diagram 41

? Disconnect electrical connections to gas valve modulating coil.

? Undo main gas supply tube nut from gas valve, see diagram 43.

Note : The washer must be kept for use on reassembly.

? Undo main gas connection nut between gas valve supply tube and gas inlet valve.

Note : The washer must be kept for use on reassembly.

? Remove the two fitting screw and washers of gas valve from the bottom side of boiler.

? Withdraw gas valve assembly.

? Using the old gas valve as a guide, transfer old connections to replacement gas valve.

? Refit electrical connections in reverse order to removal, the polarity of the wires to the modulating coil is not important. See diagram 11.

5.11. To replace central heating safety valve

If safety valve seating is damaged, it will be necessary to replace safety valve as a complete unit, repair is not possible.

? Drain down heating circuit of boiler only, as described previously.

? Disconnect discharge pipe from safety valve.

? To reach the valve easier, remove the right side panel as shown in diagram 7.

? Remove safety valve, see diagram 45.

? Fit replacement safety valve in reverse order to removal.

Note : The washer must not be forgotten for use on reassembly.

5.12. To replace heat exchanger

? Drain down heating circuit of boiler only, as described previously.

Note : It is not necessary to drain down entire heating system to carry out this work.

? Replace the heat exchanger as described in '**Routine Cleaning and Inspection**'

Note : The washer must not be forgotten for use on reassembly.

? Open isolating valves on flow and return connections: refill, vent and pressurise boiler.

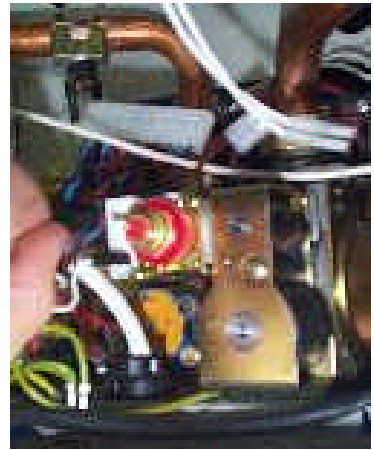


Diagram 42



Diagram 43

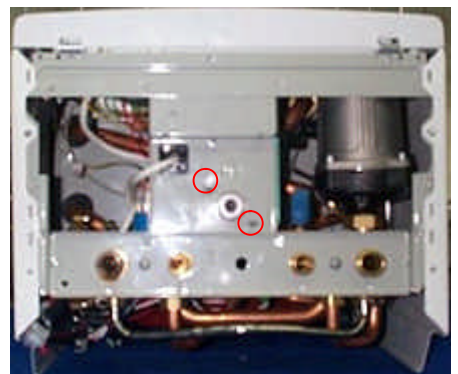


Diagram 44



Diagram 45

5.13. To replace central heating expansion vessel

? Replacement of the expansion vessel is not possible with the boiler on the wall.

? Drain down heating and hot water circuit of boiler, as follows:

? Close all isolating valves.

Note : All valves are closed when slots or lever are at the right angles to direction of flow.

? Open one or more hot water taps to drain boiler circuit.

? Disconnect the flue system.

? Disconnect all the pipes between the boiler and the system.

? Disconnect mains cable and any external control cables.

? Remove boiler from the wall.

? Undo pipe coupling on expansion vessel, see diagram 46.

? Supporting expansion vessel, undo and remove nut securing expansion vessel to boiler.

? Lift vessel out of boiler.

? Fit replacement vessel to boiler in reverse order to removal, ensuring that sealing washer is fitted to pipe connection before tightening.

? Ensure that expansion vessel charge pressure is 0.5 bar (7.5psi) using a pressure gauge.

? Refit boiler, tighten all connections ensuring that all sealing washers are fitted before tightening.

? Reconnect flue making sure that all joints are properly connected.

? Open isolating valves on flow and return connections, refill, vent and pressurise boiler.

? Check for leaks.

? Reconnect all electrical connections and restore electrical supply.

? Open gas cock, operate boiler and recheck all joints for soundness.

5.14. To replace overheat safety thermostat

? Locate overheat safety thermostat on heating flow pipe on left handside of boiler, see diagram 48.

? Disconnect electrical connection from thermostat.

? Unclip thermostat from heating flow pipe.

? Fit replacement thermostat in reverse order to removal.

? Refit connection to thermostat.



Diagram 46

Securing
nut



Diagram 47



Diagram 48

5.15. To replace combustion chamber insulation

- ? Remove upper front panel as described in '**Routine Cleaning and Inspection**'.
- ? Remove heat exchanger as described previously.

5.16. Front panel of the combustion chamber:

Lift front insulation panel free from retaining lugs on combustion chamber cover. Loosen the two nuts at the two lower sides of the combustion chamber front panel.

- ? Remove front panel of the combustion chamber by pulling forward.
- ? Fit replacement insulation panels in reverse order to removal.
- ? Refit upper front panel.

5.17. To replace burner:

- ? Remove burner as described in '**Routine Cleaning an inspection**'.

Assemble replacement burner, supplied in parts, as follows:

- ? Fit burner injectors to burner injector bar and tighten.

Note: Make sure that injector size, marked on each injector, is the same as that given in '**Technical Data**' for the type of gas being used.

- ? Fit injector bar into burner, secure with retaining rods.
- ? Fit replacement burner into boiler in reverse order to removal.

5.18. To replace burner injectors

- ? Remove burner as described in '**Routine Cleaning an inspection**'.
- ? Pull out injector bar retaining rods and separate injector bar from burner.
- ? Unscrew and remove injectors from injector bar
- ? Fit replacement injector to injector bar and tighten

Note: Make sure that injector size, marked on each injector, is the same as that given in '**Technical Data**' for the type of gas being used.

- ? Reassemble burner and fit into boiler in reverse order to removal.

5.19. To replace ignition electrode (See dia. 13)

- ? Remove burner as described in '**Routine Cleaning an inspection**'.
- ? Undo and remove screw securing electrode onto burner.
- ? Fit replacement electrode onto burner in reverse order to removal.
- ? Refit burner into boiler in reverse order to removal.

5.20. To replace flame sense electrode (See dia. 13)

- ? Remove burner as described in '**Routine Cleaning an inspection**'.
- ? Undo and remove screw securing electrode onto burner.
- ? Fit replacement electrode onto burner in reverse order to removal.

Refit burner into boiler in reverse order to removal.

5.21. To replace manometer

- ? Remove the connection of manometer tube from the hydroblock as shown in diagram 49.
- ? Remove the manometer from control panel as shown in diagram 52.
- ? Replace manometer in reverse order.

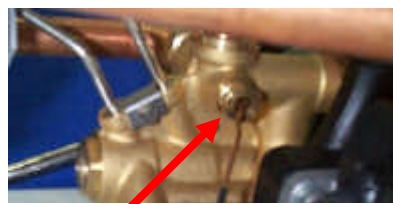


Diagram 49



Diagram 50

5.22. To replace hydroblock

- ? Remove gas valve as described in section 5.10.
- ? Remove pump as described in section 5.7.
- ? Remove central heating and domestic hot water pipe connections as described in '**Routine Cleaning an inspection**'.
- ? Remove expansion vessel pipe as shown in diagram 46 and 52.
- ? Remove two screws that connects hydroblock to combination boiler as shown in diagram 51
- ? Reassemble hydroblock and fit into boiler in reverse order to removal.

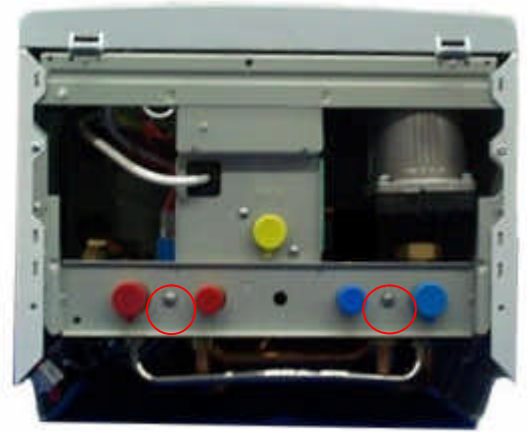


Diagram 51

5.23. To replace filter

- ? Remove the filter assembly as shown in diagram 53.
- ? Replace the filter assembly (diagram 54) and reassemble in reverse order.



Diagram 52

5.24. To replace diaphragm

- ? To remove the pressure connection tubes, remove the two clips (diagram 55) and the screw (diagram 56).
- ? Remove the diaphragm assembly from the hydroblock by unscrewing two connection screws (diagram 57).
- ? Remove six screws (diagram 58) and open the diaphragm assembly (diagram 59).
- ? Replace the diaphragm or diaphragm cone if necessary and reassembly in reverse order.

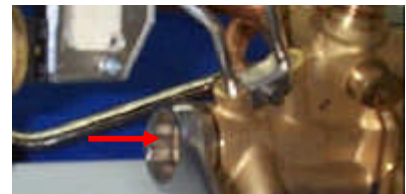


Diagram 53



Diagram 54

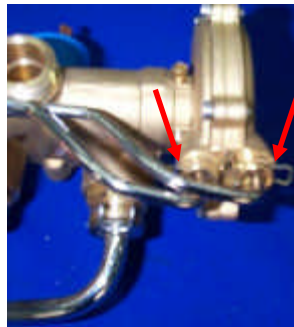


Diagram 55



Diagram 56

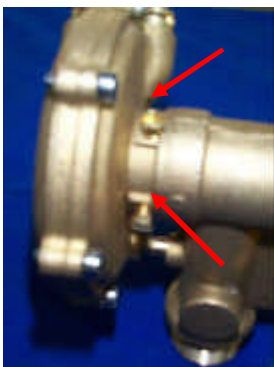


Diagram 57



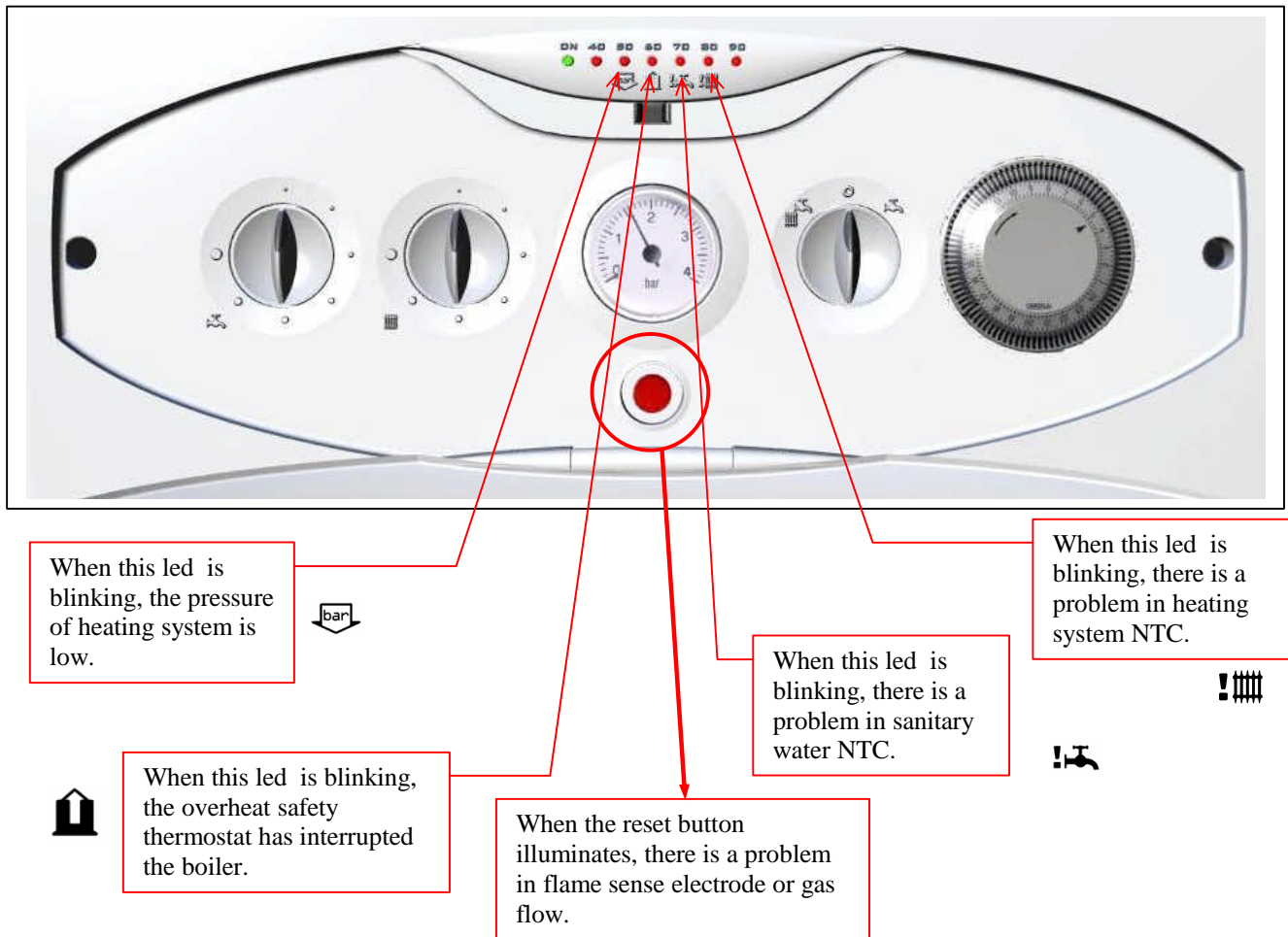
Diagram 58



Diagram 59

6. FAULT FINDING

6.1. FAULT CODES ON LED DISPLAY DIAGNOSTIC PANEL

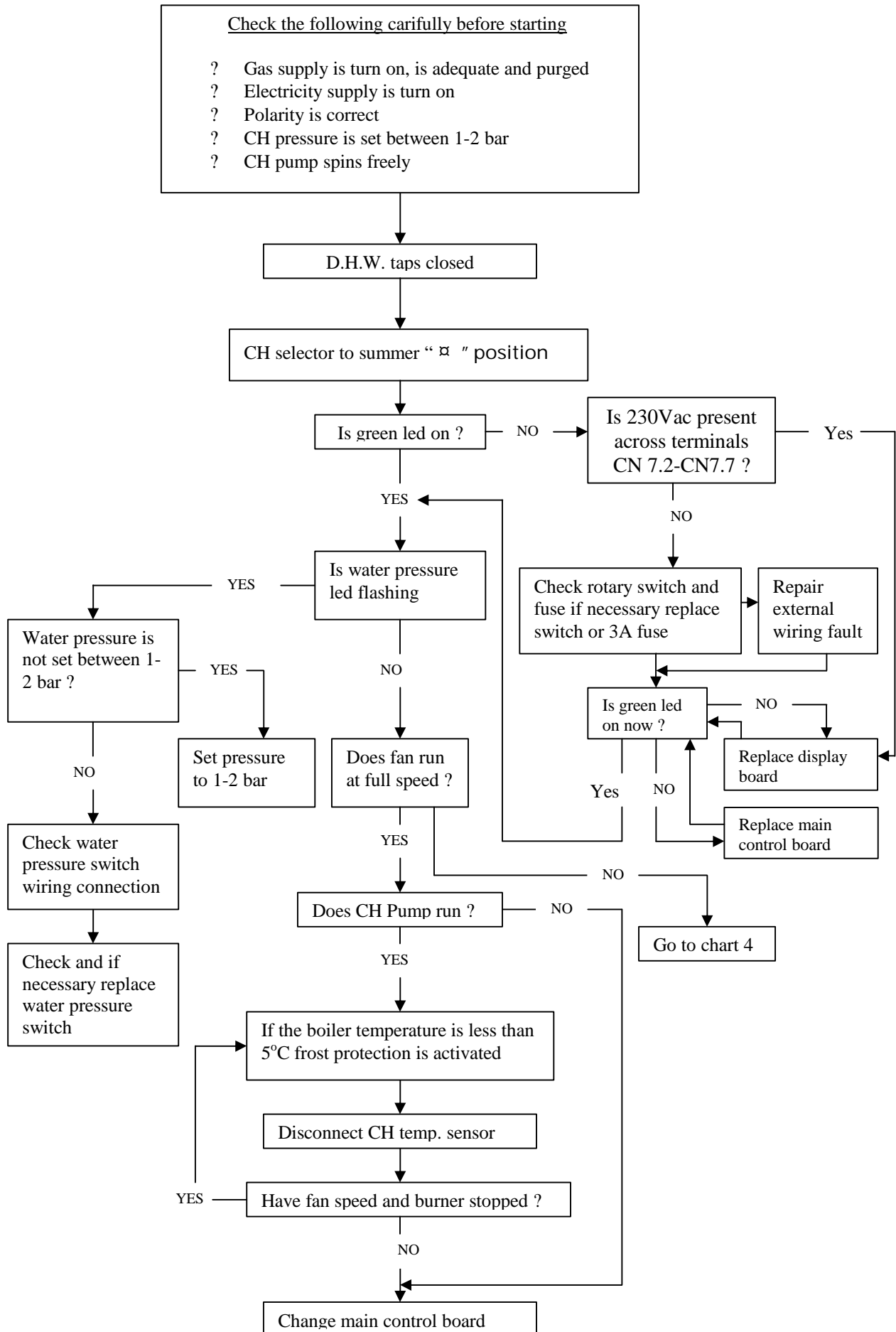


NOTE : If many faults occur, the highest priority one is displayed. Priority in display increases from right to left. Low pressure in heating system has the highest and the heating NTC problem has the lowest priority.

6.2. FAULT FINDING CHARTS

Chart 1

Check electrical supply – C. H. water pressure and frost protection



FAULT FINDING

Chart 2
Check Domestic Hot Water Operation

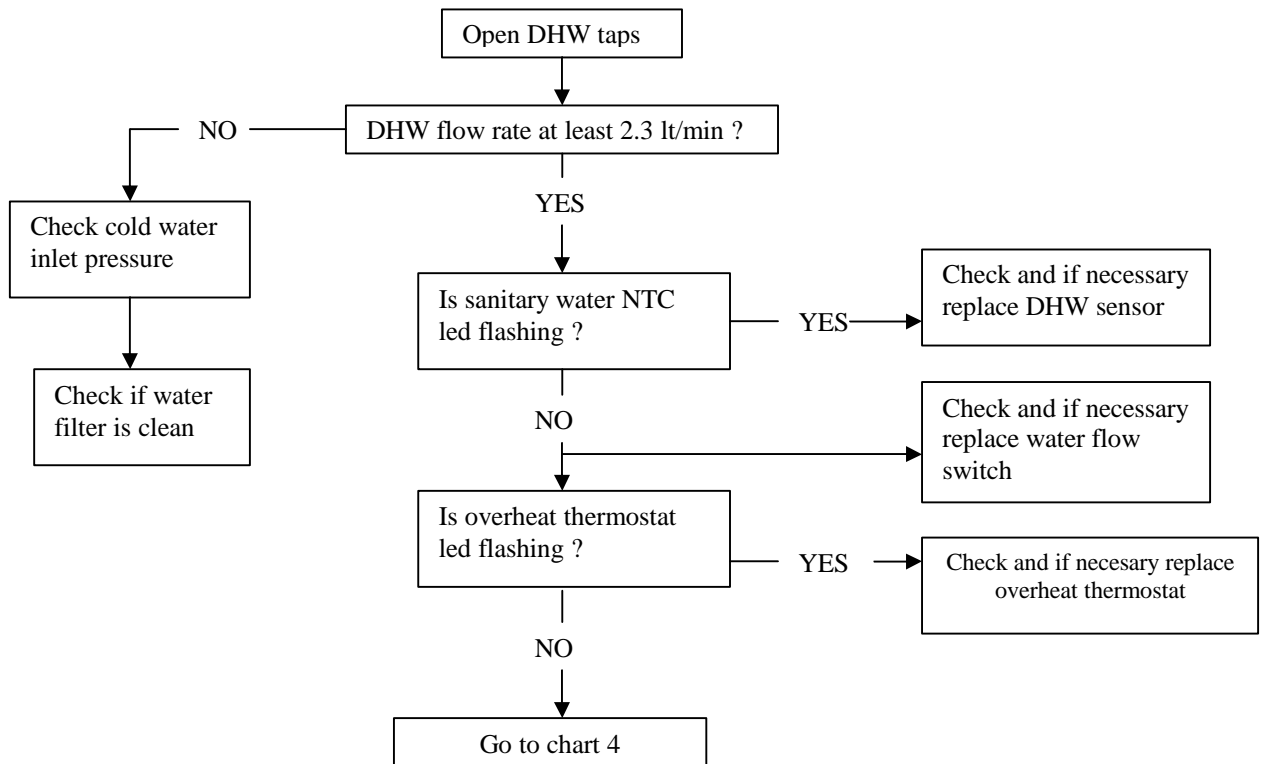
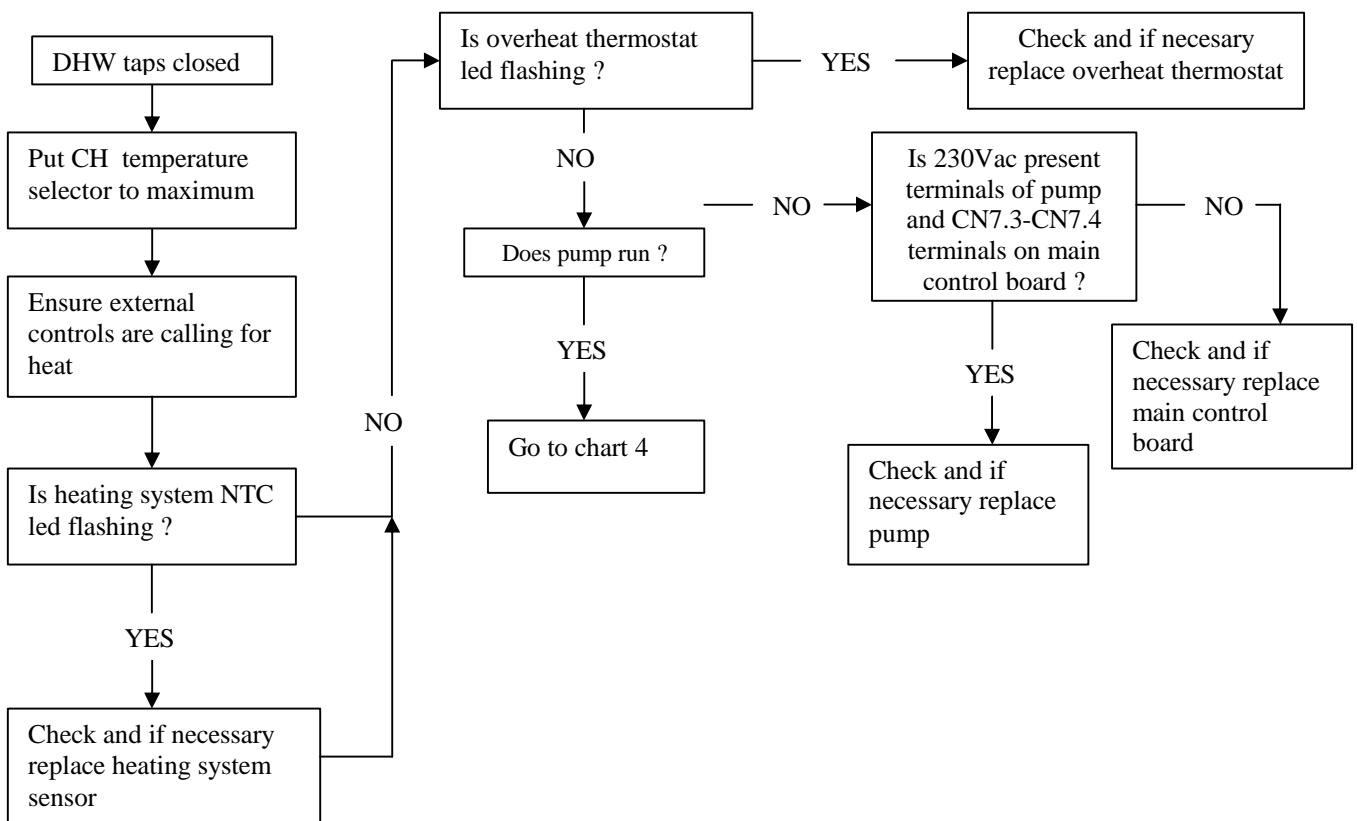


Chart 3
Check Central Heating Operation



FAULT FINDING

Chart 4
Check fan/flue gas system

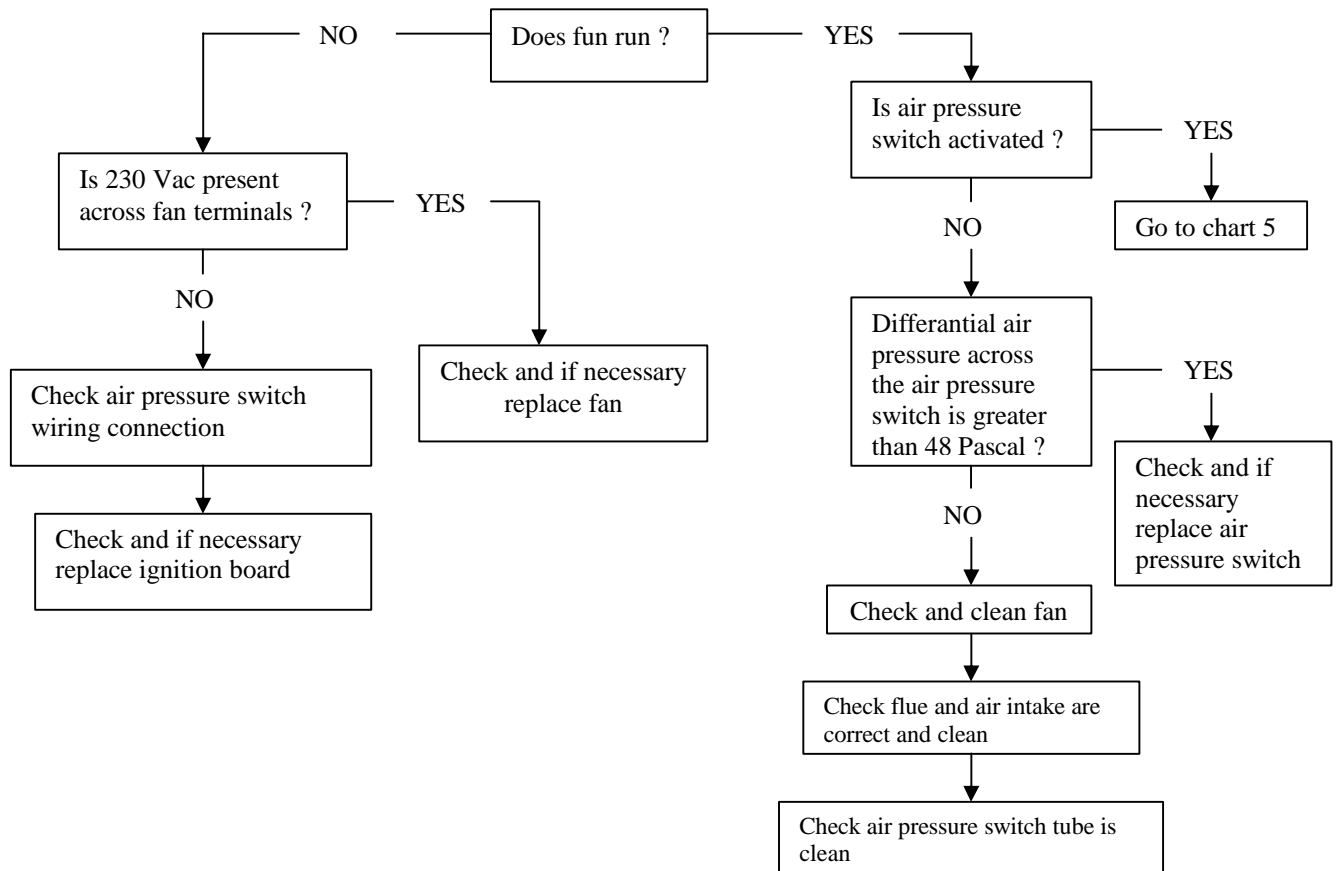
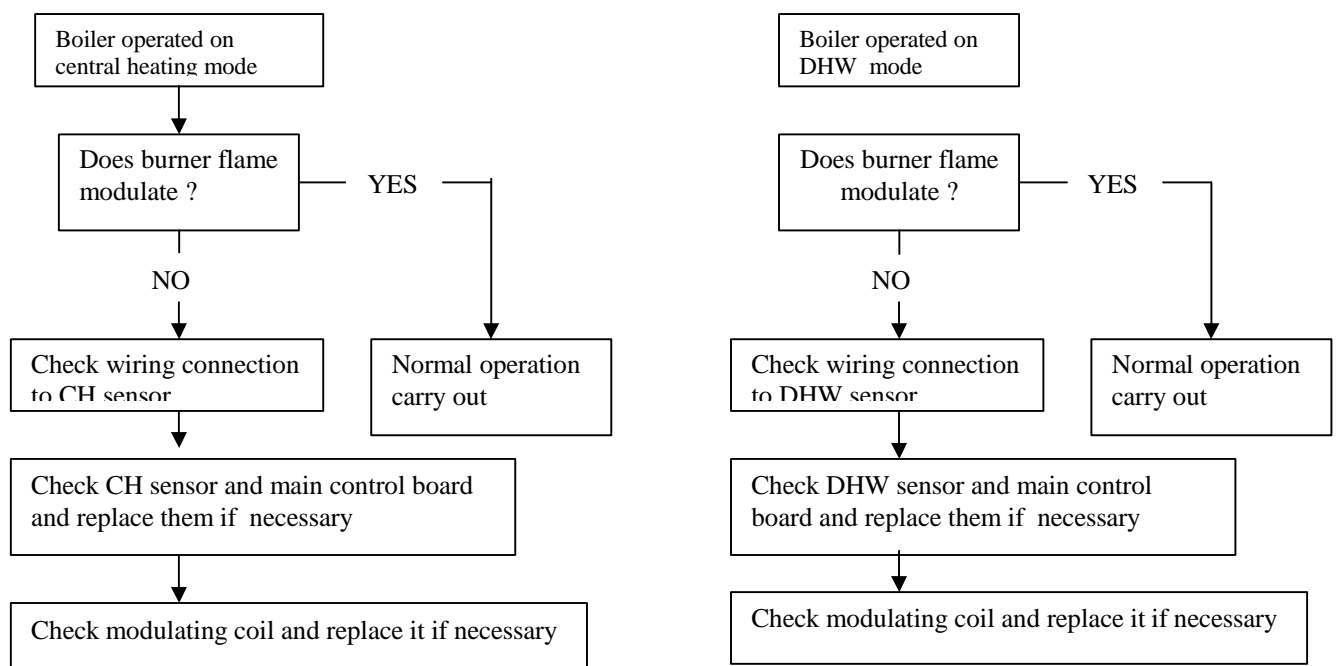
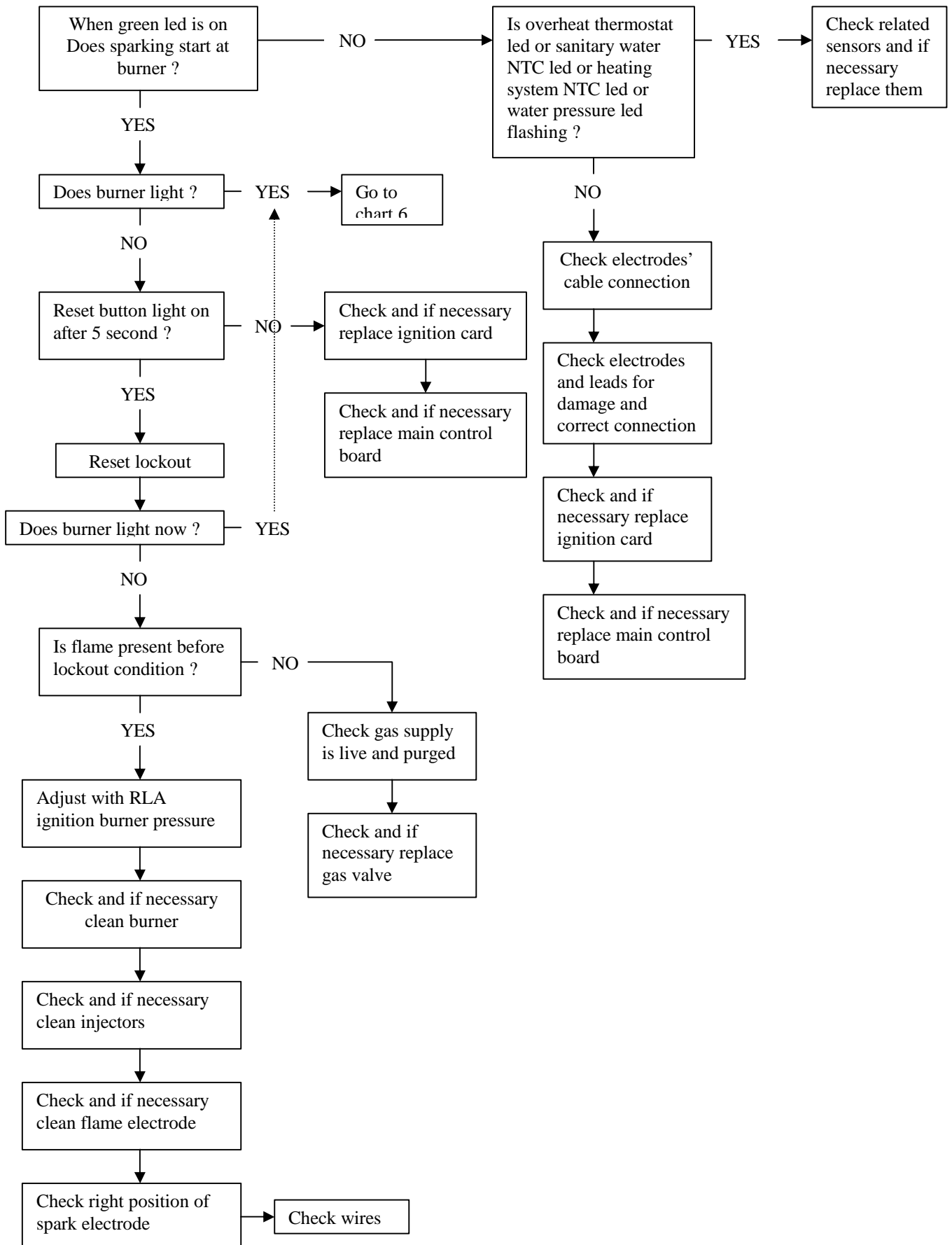


Chart 5
Check D.H.W. and C.H. modulation



FAULT FINDING

Chart 6
Check Ignition Systems



7. SERVICE PROCEDURE

7.1. Appliance Checks

- ? Carry out gas soundness test.
- ? Check appliance is fitted correctly and location is satisfactory.
- ? Check room air ventilation requirements as necessary and check compartment air ventilation requirements necessary.
- ? Check that flue, flue joints and terminations are satisfactory and free from spillage.
- ? Check heat exchanger for any blockage or evidence of scale where applicable.
- ? Check burner top and tray for deposits where applicable.
- ? Check ignition operates satisfactory.
- ? Check flame picture is satisfactory, stable and without distortion.
- ? Check flame failure device operates satisfactory.
- ? Check burner pressure and adjust if necessary to correct appliance rating.
- ? Check that all appliance controls operate correctly.
- ? Check appliance for gas or water leaks.
- ? Check correct operation of flue fans where applicable.
- ? Check system water pressure and pumps are satisfactory.
- ? Check water draw off and temperature is satisfactory.
- ? Carry out performance test (subject to the approval of the Contract Administrator).

7.2. Service Operation

- ? Isolate gas and electrical supplies
- ? Remove boiler case, clean and remove dust and deposits.
- ? Check for signs of damage to electrical connections, cables or components.
- ? Clean burner, injector, ports and combustion chamber.
- ? Clean flue ways including draught diverter and heat exchanger.
- ? Clear and adjust ignition components.
- ? Clean flame failure components.
- ? Operate safety discharge valve and check external discharge outlet.
- ? Re-pressurise system where necessary.
- ? Make sound any gas or water leaks.
- ? Ease and grease any control taps and check operation as necessary.
- ? Check all case and sight glass seals and gaskets are satisfactory.
- ? Clean flue and fan and airways as necessary.
- ? Adjust pump as necessary.
- ? Re-assemble boiler components and case.
- ? Restore gas and electricity supplies complete with 3 amp fuse.
- ? Test all gas joints and connections for soundness.
- ? Carry out repeat performance test (where appropriate).

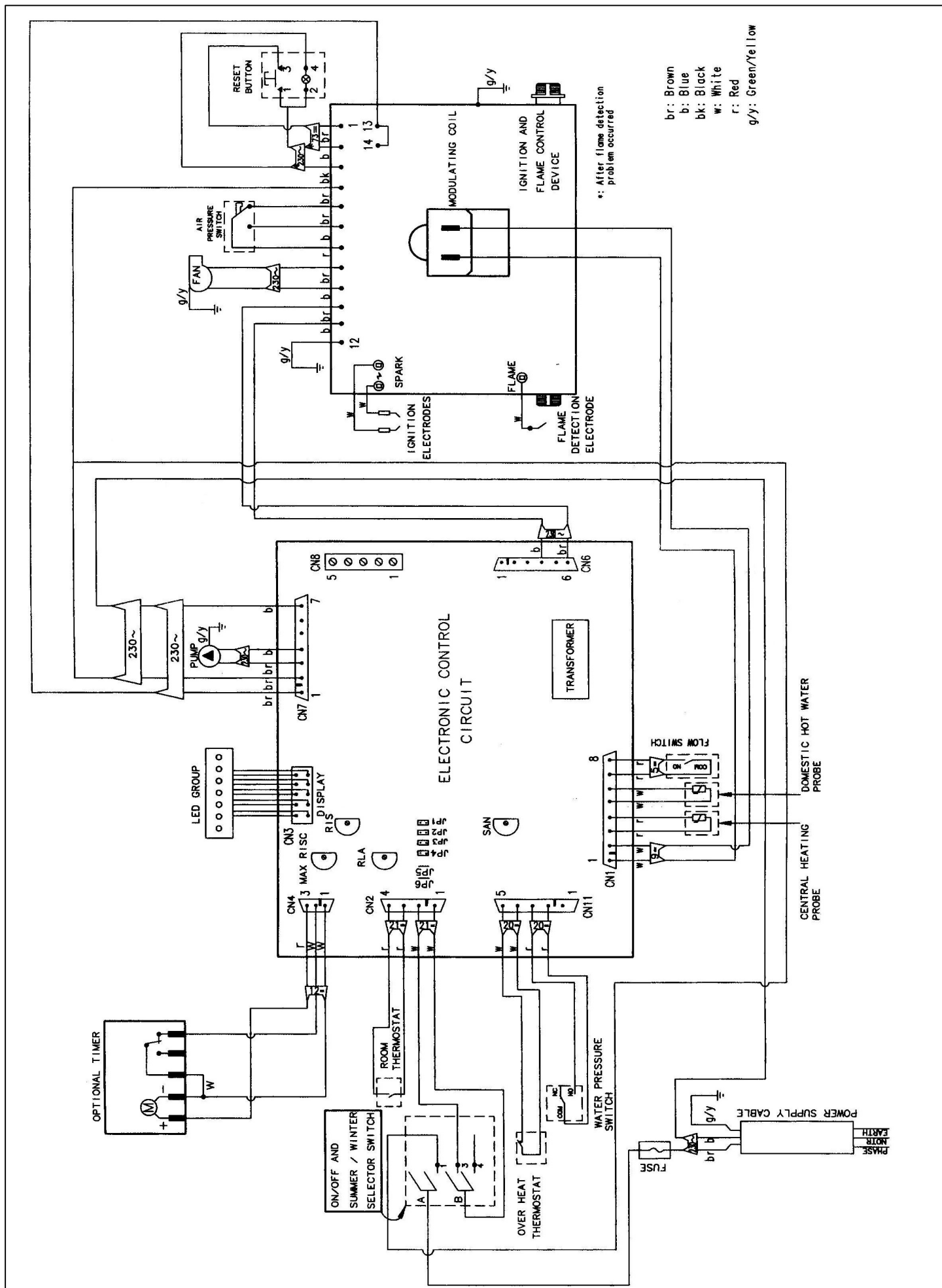
7.3. Recommission System

- ? Test run boiler and set system to customer's requirements. Ensure working pressures and heat inputs are correct (adjust where necessary).
- ? Clear work area and leave appliance in satisfactory working order.
- ? Complete service report records and leave customer satisfaction card.
- ? Fix service label to appliance.

7.4. Soundness Test

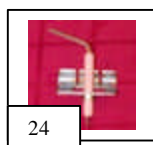
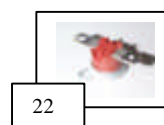
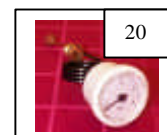
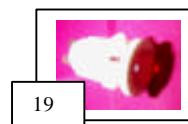
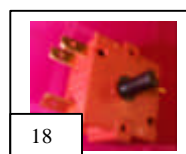
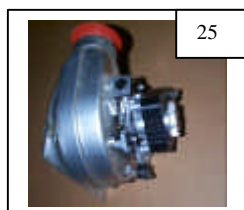
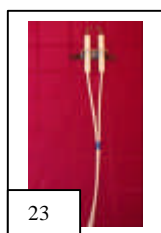
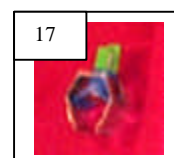
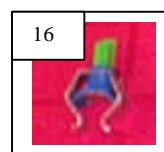
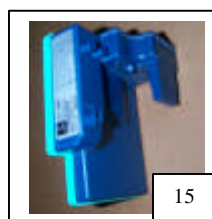
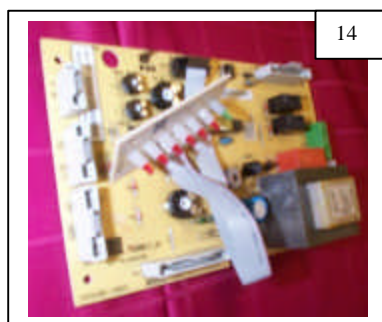
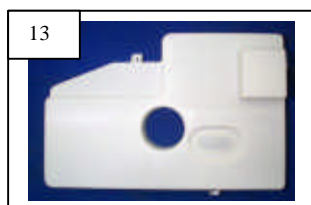
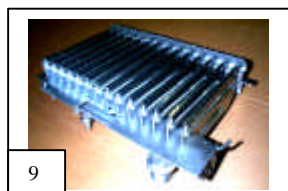
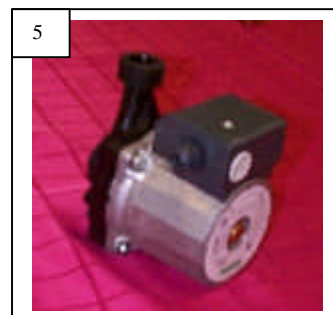
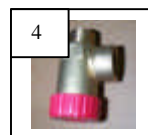
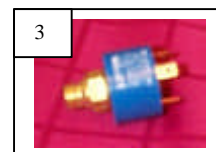
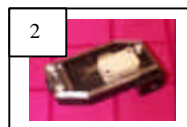
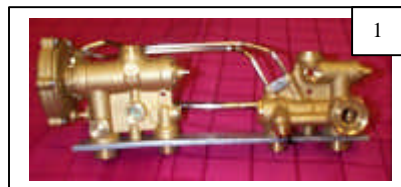
On completion of service and prior to re-commissioning of heating unit, carry out soundness test at the supply meter position on the complete gas installation.

8. WIRING DIAGRAM



9. SHORT PARTS LIST

PART NUMBER	DESCRIPTION	ORDER CODE
1	HYDROBLOCK	3002194576
2	MICROSWITCH	3004090525
3	LOSS OF WATER SENSOR	3002194470
4	SAFETY VALVE	3002192756
5	PUMP	3004090672
6	EXPANSION VESSEL	3002209450
7	AUTOMATIC AIR VENT	3002189946
8	GAS VALVE	3002194930
9	BURNER	3000000250
10	EXCHANGER	3000000251
11	CONTROL PANEL	3002194491
12	COVER	3002194492
13	PCB COVER	3002194493
14	ELECTRONIC CONTROL CARD	3004092615
15	IGNITION MODULE	3004092613
16	DOMESTIC THERMISTOR (NTC)	3002185060
17	HEATING THERMISTOR (NTC)	3002185065
18	WINTER / ON / SUMMER SWITCH	3004090601
19	RESET BUTTON	3004090671
20	WATER PRESSURE GAUGE	3004090673
21	CABLE GROUP	3004004605
22	OVERHEAT SAFETY VALVE	3002185050
23	IGNITION ELECTRODES	3004090120
24	FLAME SENSE ELECTRODE	3004090125
25	FAN	3007005615
26	AIR PRESSURE SWITCH	3002194465
27	FRONT PANEL	3002194439



Mikrofill Ethos Condensing combination boiler



User Instructions
24cc

CE Mark

Mikrofill gas appliances comply with the requirements contained in CE Mark documents contained with European directives applicable to them. In particular, these appliances comply with the CE directives and technical specifications contained within them :

- ? Gas Appliances directive 90/396
- ? Efficiencies directive 92/42
- ? Low tension directive 73/23 (modified from 93/68)
- ? Electromagnetic Compatibility directive 89/396 (modified from 93/68)

IMPORTANT !

The manual must be read thoroughly, so that you will be able to use the boiler in a safe way. And it must be kept for reference in the future.

Installation and first lighting must be carried out by a competent person.

Repairs must be carried out only by a competent person, using genuine spare parts. Do no more than switching off the boiler yourself.

The boiler allows heating up of water to a temperature less than the boiling point.

The boiler can be used only for those purposes for which it has been specially designed.

The boiler must not be touched by children or by an unfamiliar person to its operation.

The manufacturer disclaim all liability for any translations of the present manual from which incorrect interpretation may occur.

The manufacturer accepts no responsibility for unsatisfactory performance of the appliance and flue due to failure to comply the instructions.

This appliance complies with the EN 483 and EN 625 Standards.

The appliance is built to comply with the regulation now in force regarding gas appliance's safety and the European regulation now in force relative to safety of household and similar electrical appliances.

The manufacturer, in the continuous process to improve his products, reserves the right to modify the data expressed in the present documentation at any time and without prior notice.

The present documentation is an informative support and it cannot be considered as a contract towards third parties.

CONTENTS

1. GENERAL DESCRIPTION	4
1.1. DESCRIPTIONS AND OPERATION PRINCIPLES OF COMPONENTS / PARTS	
2. TECHNICAL AND DIMENSIONAL CHARACTERISTICS	4
2.1. Dimensions (Diagram 1).....	4
2.2. Boiler Schematic.....	5
2.3. Technical Data.....	6
2.4. Boiler Flow Diagrams.....	7
2.5. Heating System Design.....	8
2.6. Domestic Hot Water Design.....	8
2.7. Electrical Connection.....	9
3. SAFETY DEVICES.....	10
4. FAULT CODES ON LED DISPLAY.....	11
5. STARTING AND ADJUSTING THE BOILER.....	11
5.1. Clock instructions for use.....	13
5.2. Draining.....	13
5.3. Servicing/Maintenance.....	14

1. GENERAL DESCRIPTION

The fan flued hermetic type combination boiler is an appliance that fires Natural gas in its combustion chamber for either heating or obtaining domestic hot water. It combines two different functions in the same appliance. For this it has two independent circuits. Heating circuit and the domestic hot water circuit.

1.1. DESCRIPTIONS AND OPERATION PRINCIPLES OF COMPONENTS / PARTS

Burner : Gas that comes from gas valve fires in burner and produces heat.

Ignition electrodes : Sparks occur between the two electrodes for igniting the burner.

Gas valve : It opens or closes the gas channel and regulates the burner pressure.

Ignition module : It works with gas valve together and ignites the burner by means of producing high voltage. It starts the fan and evaluates signals coming from air pressure switch and flame sense electrode.

Injectors : They guide gas to the burner.

Fan : Provides fresh air for combustion and blows the combustion products out of the hermetic chamber.

Gas manifold : The injectors are mounted on a gas manifold.

Combustion chamber : The heat isolated combustion chamber guides the burner flame to the heat exchanger.

Primary Heat exchanger : It transfers the heat energy to the water.

Automatic air vent : It purges the air in the heating circuit automatically.

Air pressure switch : It checks the pressure difference between the hermetic chamber and the outer space and sends a signal to the ignition module about the fan operation.

Overheat safety thermostat : It sends a signal to the control card about the water temperature which exceeds 110 °C. It interrupts the boiler if the water temperature exceeds 110 °C. It has a manual reset button at rear side.

Hydraulic block : It has several connections for components, pipes and inlets, outlets to the boiler. (For example water pressure sensor, safety valve, expansion vessel etc.) It has an automatic by-pass valve inside. It consists of two independent parts which are connected together by means of pipes.

Three way valve : It is one part of the hydraulic block. It guides the hot water to heating circuit or domestic hot water exchanger.

Domestic hot water heat exchanger : It transfers the heat energy in hot water of heating circuit to the domestic water. It is integrated with primary heat exchanger.

Fan hood : It collects combustion products and guides to the fan.

Flue connection kit : It connects the outer space and combustion chamber for getting fresh air and blow the combustion products out of boiler.

Hermetic chamber : The combustion chamber, burner, heat exchanger, fan and fan hood is placed inside the hermetic chamber.

Safety valve : It prevents the heating circuit against the water pressure increment excessively. (The water pressure can not exceed 3 bar.)

Control card : The control card evaluates the signals which come from sensors and thermostats. And it makes modulation for control the gas valve. It controls all systems of boiler. It is central control unit of the boiler.

Water flow sensor : It senses the domestic hot water demands and sends a signal to the control card.

1.1.1. Instructions and Regulations

Assembly, Installation, First ignition and maintenance must be carried out by a competent person, in accordance with all-current technical regulations and directives.

1.1.2. C.O.S.H.H.

Materials used in the manufacture of this appliance are non-hazardous and no special precautions are required when servicing or maintenance is undertaken.

1.1.3. Related Documents

This appliance must be installed strictly in accordance with these instructions.

- ? The Gas Safety Regulations (Installations & Use) 1996
- ? The Building Regulations
- ? The Local Building Regulations
- ? The Buildings Standards (Scotland - consolidated) Regulations
- ? Model Water By laws
- ? British Standards code of practice:

B.S. 7593 1992 Treatment of water in domestic hot water central heating systems

B.S. 5546 1990 Installation of hot water supplies for domestic purposes

B.S. 5540 Part 1 2000 Flues

B.S. 5540 Part 2 1989 Air supply

B.S. 5449 1990 Forced circulation hot water systems

B.S. 6798 1987 Installation of gas fired hot water boilers

B.S. 7671 1992 IEE wiring regulations

B.S. 4814 1990 Specification for expansion vessels

B.S. 5482 1994 Installation of L.P.G

For Northern Ireland the current rules in force apply

2. TECHNICAL AND DIMENSIONAL CHARACTERISTICS

2.1. DIMENSIONS

The Combination boiler is delivered in two separate packages;

- the boiler itself
- the flue system

Weight: 42 kg

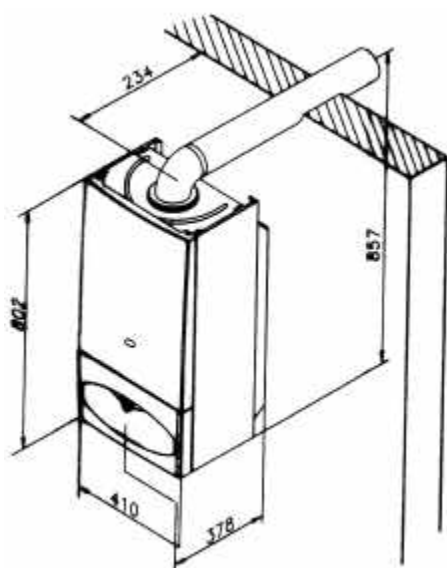


Diagram 1

2.2. BOILER SCHEMATIC

- 1 - Domestic thermistor
- 2 - Hydroblock
- 3 - Gas valve
- 4 - Gas valve ignition module
- 5 - Fan hood
- 6 - Burner
- 7 - Ignition electrodes
- 8 - Combustion chamber
- 9 - Integrated heat exchanger
- 10 - Air pressure switch
- 11 - Heating safety valve (3 bar)
- 12 - PCB (in protective case)
- 13 - Domestic water flow switch
- 14 - Bypass valve (in hydroblock)
- 15 - Pump
- 16 - Expansion vessel (at rear)
- 17 - Heating thermistor
- 18 - Overheat safety thermostat
- 19 - Flame sense electrode
- 20 - Fan
- 21 - Loss of water sensor
- 22 - Automatic air vent (top of exp. vessel)

- A - Heating outlet (3/4" male)
- B - Domestic hot water outlet (1/2" male)
- C - Gas (3/4" male)
- D - Cold water inlet (1/2" male)
- E - Heating return (3/4" male)

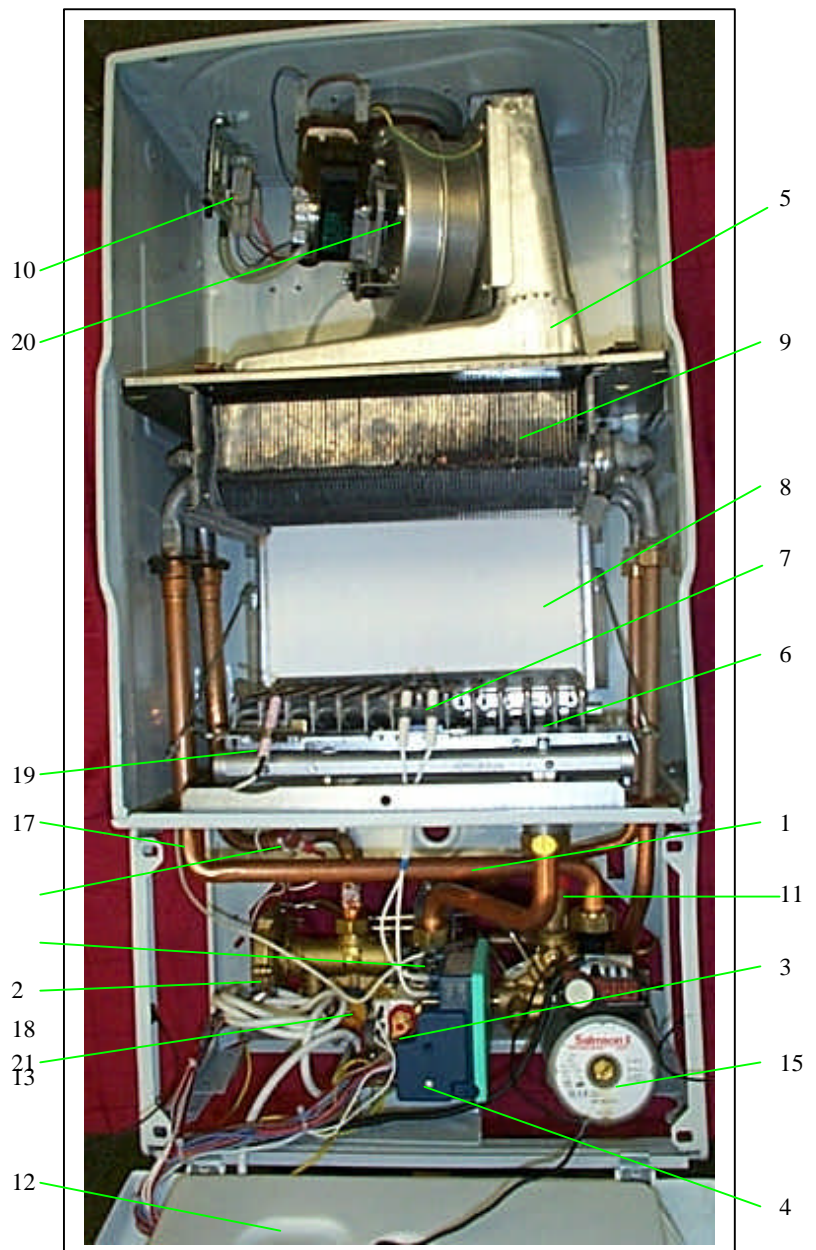
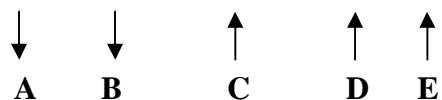


Diagram 2



2.3. TECHNICAL DATA

Heating

Heating output adjustable	from ...	(kW)	8.9
	to ...	(kW)	23.3
	from ...	(Btu/h)	30368
	to ...	(Btu/h)	79502
Efficiency		(%)	91
Maximum heating temperature		(°C)	90
Expansion vessel effective capacity		(l)	8
Expansion vessel charge pressure		(bar)	0.5
Maximum system capacity at 75°C		(l)	150
Safety valve, max. Service pressure		(bar)	3
Products outlet diameter		(mm)	60
Fresh air inlet diameter		(mm)	100

Electrical supply	(V)	230
Maximum absorbed power	(W)	170
Level of protection		IP44

Hot water

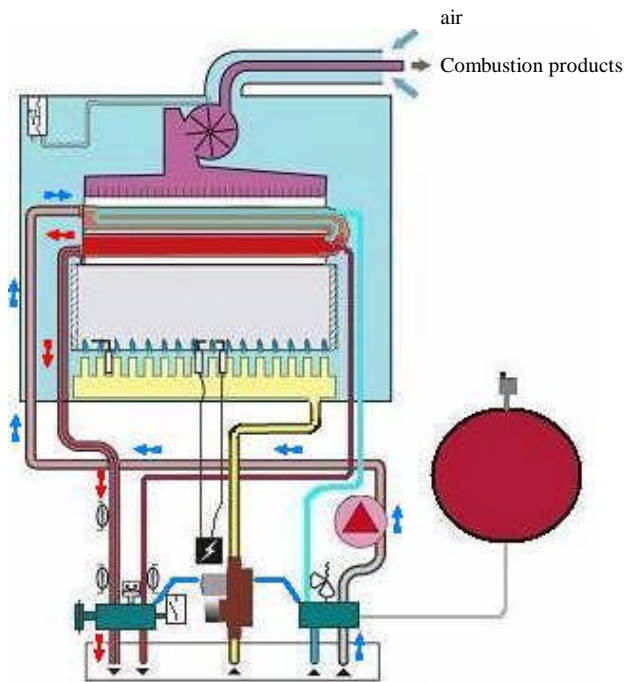
Hot water output automatically variable	from ...	(kW)	8.9
	to ...	(kW)	23.3
	from...	(Btu/h)	30368
	to ...	(Btu/h)	79502
Maximum hot water temperature		(°C)	90
Specific flow rate (for 30°C temp rise)			
		(l/min.)	11.0
Threshold flow rate		(l/min.)	2.3
Water flow rate (for 35°C temp rise)		(l/min.)	9
Maximum supply pressure		(bar)	8
Minimum operating pressure		(bar)	0.3

Natural Gas (G20)

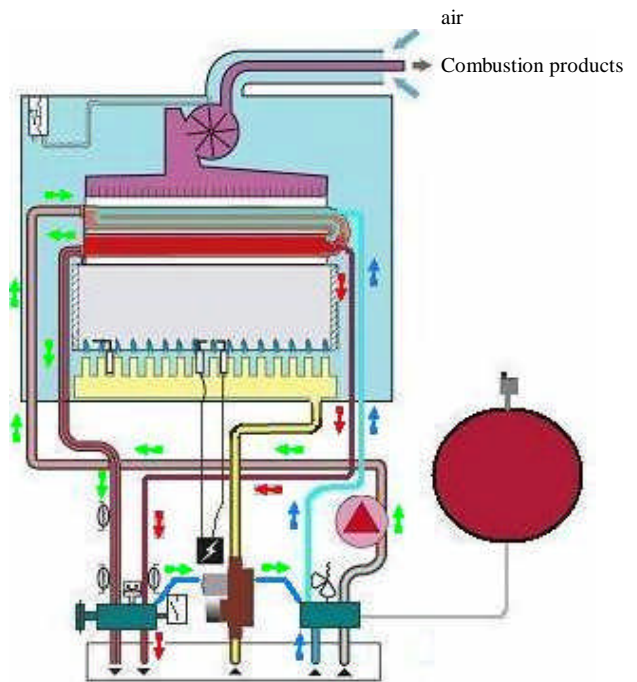
? Burner injector	(mm)	1,2
Inlet pressure	(mbar)	20
Burner pressure	(mbar)	13
Gas rate maximum	(m³/h)	2.88
Gas rate minimum	(m³/h)	1.06

Net calorific value at 15 C and 1013.25 mbar
G20 34.04 MJ/m³
1 mbar approximately equals 10 mm H₂O

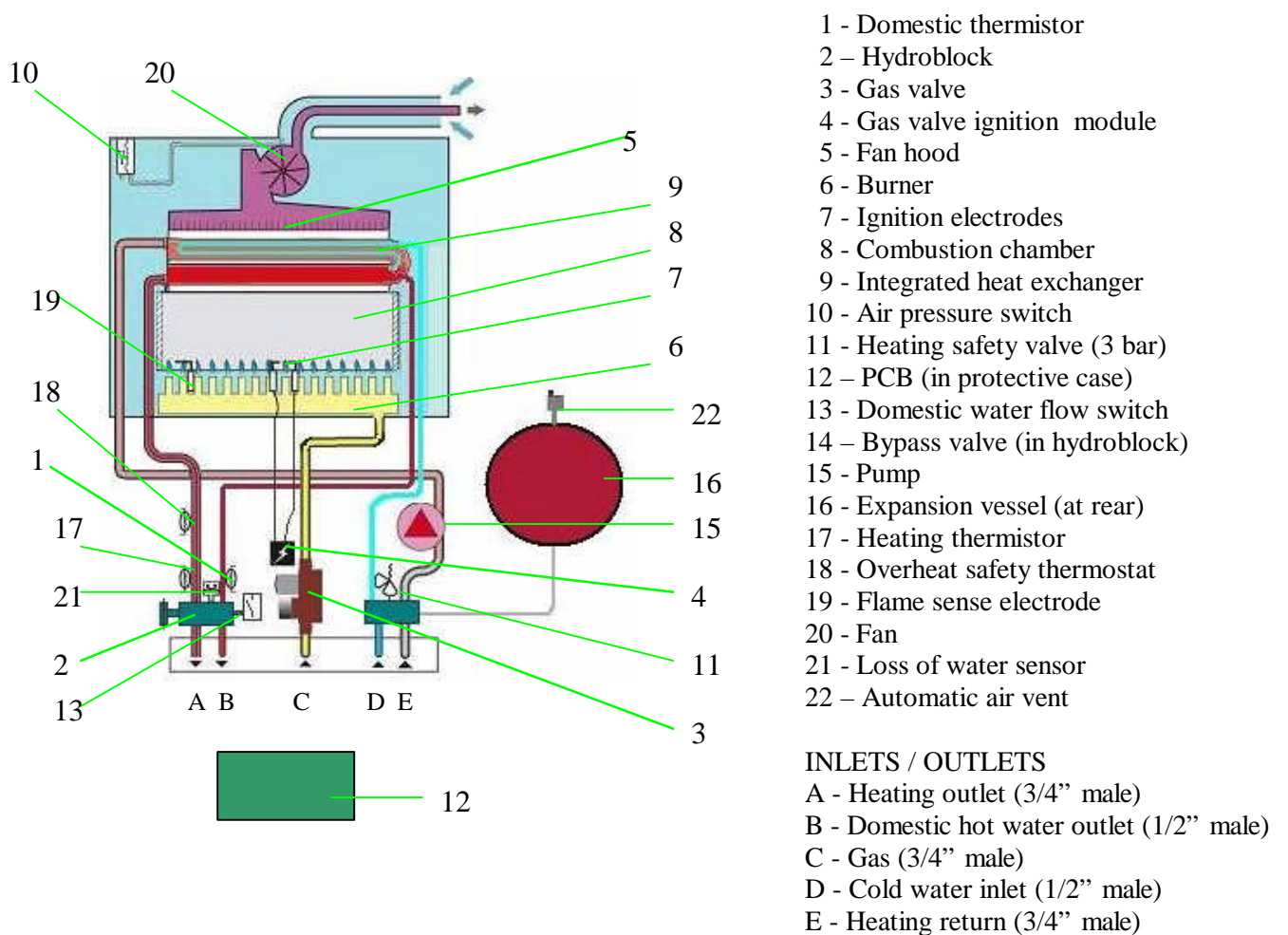
2.4. Boiler Flow Diagrams



Central heating mode



Domestic hot water mode



2.5. HEATING SYSTEM DESIGN

- ? The combination boiler is compatible with any type of installation.
- ? Heating surfaces may consist of radiators, convectors or fan assisted convectors.
- ? The combination boiler can be piped directly to an underfloor heating system without the need for a mixing bottle. The maximum central heating flow temperature can be set to 40°C on the boiler printed circuit board during commissioning.
- ? Pipe sectional areas shall be determined in accordance with normal practices, using the output/pressure curve. The distribution system shall be calculated in accordance with the output requirements of the actual system, not the maximum output of the boiler. However, provision shall be made to ensure sufficient flow so that the temperature difference between the flow and return pipes be less than or equal to 20°C. The minimum flow is 500 l/h.
- ? The piping system shall be routed so as to avoid any air pockets and facilitate permanent venting of the installation. Bleed fittings must be provided at every high point of the system and on all radiators.
- ? The total volume of water permitted for the heating system depends, amongst other things, on the static head in the cold condition. The expansion vessel on the boiler is pressurised at 0,5 bar (corresponding to a static head of 5 m w.g.) and allows a maximum system volume of 150 litres for an average temperature of 75°C and a maximum service pressure of 3 bar. An additional expansion vessel can be fitted to the system if required, see diagram 3.
- ? Provision shall be made for a drain valve at the lowest point of the system.
- ? Where thermostatic radiator valves are fitted, not all radiators must be fitted with this type of valve, and in particular, where the room thermostat is installed.
- ? In the case of an existing installation, it is **ESSENTIAL** that the system is thoroughly flushed prior to installing the new boiler.

Filling the system

The system is filled by using a filling device.

2.6. DOMESTIC HOT WATER SYSTEM DESIGN

- ? Copper tubing may be used for the domestic hot water system. Unnecessary pressure losses should be avoided.
- ? The boiler will operate with a minimum supply pressure of 0,3 bar, but under reduced flow rate. Best operating comfort will be obtained from a supply pressure of 1 bar.

'Hard Water Areas'

In areas where the water is 'hard', more than 200mg/litre, it is recommended that a proprietary scale reducer is fitted in the cold water supply to the boiler.

Sheet metal parts

WARNING: When installing or servicing this boiler, care should be taken when handling the edges of sheet metal parts to avoid the possibility of personal injury.

Installing the boiler

Prior to starting work, the system must be thoroughly flushed using a propriety cleanser such as **Sentinel X300** to eliminate any foreign matter and contamination e.g. metal filings, solder particles, oil, grease etc.

Note. Solvent products could cause damage to the system.

- ? Engage boiler upper part onto the hanging bracket.
- Fit the washers between the boiler pipes and the inlet and outlet fittings and connect the boiler.

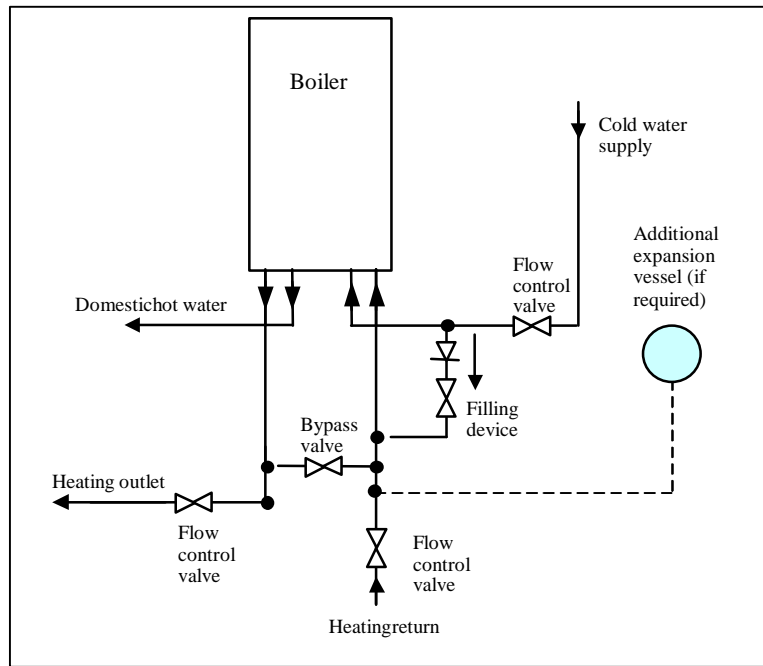


Diagram 3

2.7. ELECTRICAL CONNECTION

Warning. This boiler must be earthed. The phase and the neutral line connections of power cable must be correct.

All system components must be of an approved type.

Connection of the whole electrical system and any heating system controls to the electrical supply must be through a common isolator.

Isolation should preferably be by a double pole switched fused spur box having a minimum contact separation of 3 mm on each pole. The fused spur box should be readily accessible and preferably adjacent to the boiler. It should be identified as to its use.

A fused three pin plug and shuttered socket outlet may be used instead of a fused spur box provided that;

- a) They are not used in a room containing a fixed bath or shower.
- b) Both the plug and socket comply with the current issue of BS1363.

The mains electrical supply must be maintained at all times in order to provide domestic hot water. Do not interrupt the mains supply with a time switch or programmer.

WARNING: ON NO ACCOUNT MUST ANY EXTERNAL VOLTAGE BE APPLIED TO ANY OF THE TERMINALS ON THE HEATING CONTROLS CONNECTION PLUG.

Warning: This appliance must be wired in accordance with these instructions. Any fault arising from incorrect wiring cannot be put right under the terms of the HEATLINE guarantee.

2.7.1. External controls

The combination boiler is designed to operate at maximum efficiency at all times, but will be most efficient and economical when connected to a room thermostat.

A suitable room thermostat is available as an accessory.

The boiler will work for heating without a room thermostat being connected provided that the wire link fitted between the two terminals of the connector (A) is left in place, see diagram 15.

Warning : Maximum Clock (Timer) load is 12 Vdc, 10 mA

ON NO ACCOUNT must any electrical voltage be applied to any of the terminals of the external controls plug.

Note: For further information, see the building regulations 1991- Conservation of Fuel and Power -1995 edition - appendix G, Table 4b.



Rotate the domestic hot water adjustment knob left or right to adjust the maximum temperature of the domestic hot water (35°C to 65°C). For increasing rotate the knob in clockwise and for decreasing rotate in anti-clockwise.



Rotate the central heating adjustment knob left or right to adjust the maximum temperature of the heating (30°C to 85°C). For increasing rotate the knob in clockwise and for decreasing rotate in anti-clockwise.

3. SAFETY DEVICES

The combination boiler incorporates a visual led display that indicates fault conditions, should they occur. In the event of a fault, the display will indicate, by means of leds, exactly in which area the fault lies.

Should the boiler fail to operate during Commissioning, the most likely fault is that the gas supply to the boiler has not been turned on or purged sufficiently or that there is no pressure in the heating system. These are indicated as follows :

No gas supply

? This will be indicated by illuminating light of the reset button

To rectify this, proceed as follows:

? Rectify the gas supply problem.

? Restart the boiler by turning the selector knob and then press the reset button.

Insufficient system pressure

This will be indicated on the led display as blinking

warning **led 3**. pressure is low.

To rectify this the system must be re-filled, refer to '**Installation Instructions**'.

Other faults

These are indicated on the led display by a blinking led. Further information on the fault codes can be found in next chapter.

General safety devices

Air flow rate safety device

If an obstruction, even partial, of the flue occurs, for any reason whatsoever, the built in safety system of the boiler will turn the boiler OFF and the fan will continue to run.

The boiler will be ready to operate when the fault has been cleared.

Overheat safety

In case of boiler overheating, the overheat thermostat will turn the boiler off. The thermostat, located on the heat exchanger outlet pipe, will need to be manually reset.

In case of power supply failure

The boiler no longer operates.

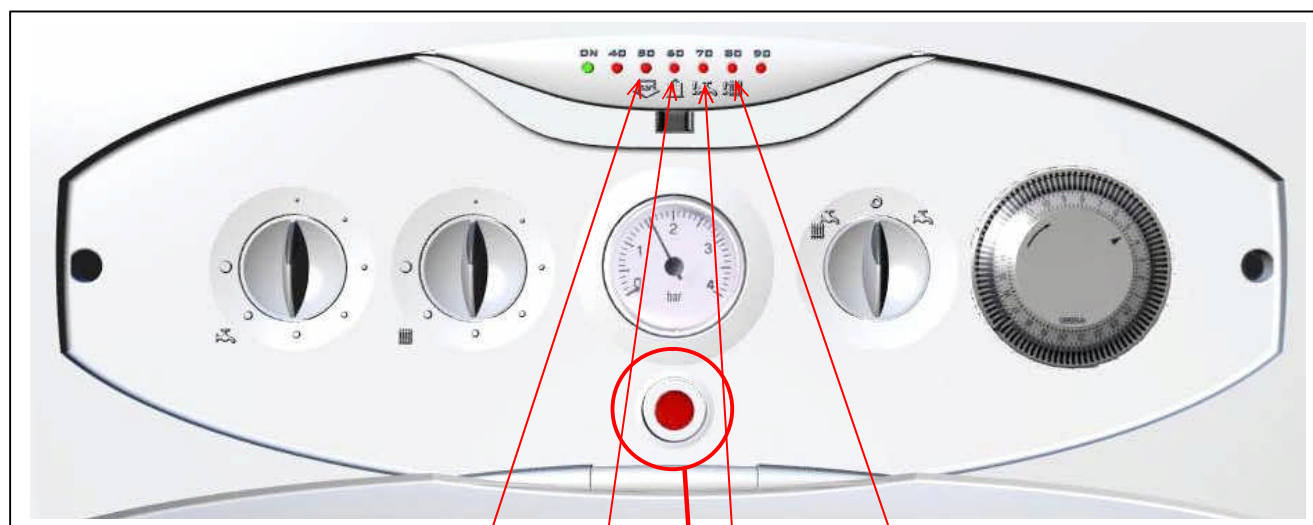
As soon as power supply is restored, the boiler will be automatically restarted.

Frost protection

The combination boiler has a built in frost protection device that protects the boiler from freezing. If the boiler is to be left and there is a risk of frost, ensure that the gas and electrical supplies are left connected. The frost protection device will light the boiler when the temperature of the boiler water falls below 5°C. When the temperature reaches 30°C, the boiler stops.

Note : This device works irrespective of any room thermostat setting and will protect the complete heating system.

4. FAULT CODES ON LED DISPLAY DIAGNOSTIC



When this led is blinking, the pressure of heating system is low.



When this led is blinking, there is a problem in heating system NTC.



When this led is blinking, there is a problem in domestic hot water NTC.



When this led is blinking, the overheat safety thermostat has interrupted the boiler.



When the reset button illuminates, there is a problem in flame sense electrode or gas flow.

NOTE : If many faults occur, the highest priority one is displayed. Priority in display increases from right to left. Low pressure in heating system has the highest and the heating NTC problem has the lowest priority.

5. STARTING AND ADJUSTING THE BOILER

- 1- Function switch (Summer/Off/Winter)
- 2- Timer (Optional)
- 3- Pressure gauge (Central heating)
- 4- Reset button
- 5- Heating temperature adj. knob
- 6- Domestic hot water temp. adjustment knob
- 7- Led display

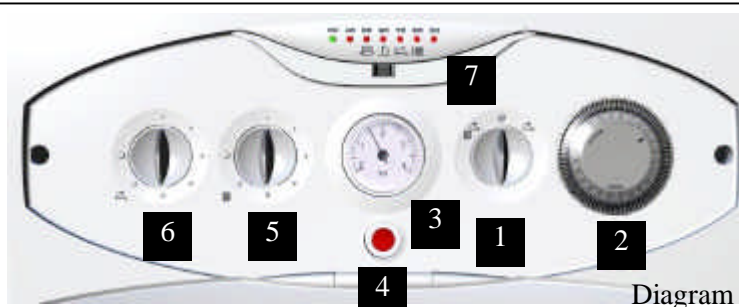


Diagram 6

The Combination boiler is a wall mounted modulating combination boiler with electronic ignition providing central heating and instantaneous hot water.

The boiler is of the I 2H category for use with Natural Gas (G20) as distributed in the United Kingdom.

The boiler has a fan assisted balanced flue which both discharges the products of combustion to and draws the combustion air from the outside of the room.

The boiler is suitable for top outlet flue connection only but, can be fitted with horizontal flue or vertical flue. Refer to flue catalogue for further details.

Both the central heating and domestic hot water temperature are user adjustable from the boiler control panel.

Domestic hot water demand always has priority over heating demand.

The boiler is designed for use as part of a sealed water central heating system with fully pumped circulation. The pump, expansion vessel and associated safety devices are all fitted within the boiler.

The boiler can be installed against either on external wall or on an adjacent inside wall, that is, the

flue system will pass directly to the rear or to either side to the terminal fitted on the outside wall face.

The installation must be carried out by a competent person in accordance with the relevant requirements of The Building Regulations, The Water Byelaws, The Building Standards Regulations and any applicable local regulations.

These instructions should be carefully followed for the safe and economical use of your boiler.

Ancillary equipment

A range of flue accessories are available including vertical flues, bends etc. For further information contact your supplier.

Substances Hazardous to Health

The adhesives and sealants used in this appliance are cured and give no known hazard in this state.

INSULATION PADS/CERAMIC FIBRE, GLASSYARN, MINERAL WOOL

These can cause irritation to skin, eyes and the respiratory tract. If you have a history skin complaint you may be susceptible to irritation. High dust levels are usual only if the material is broken.

Normal handling should not cause discomfort, but follow normal good hygiene and wash your hands before eating, drinking or going to the toilet. If you do suffer irritation to the eyes or severe irritation to the skin, seek medical attention.

Lighting the boiler :

Make sure that:

- ? The boiler is connected to the electrical supply.
- ? The gas service cock is open.

Then follow the instructions below :

Turn on the selector knob (left for winter mode , right for summer mode)



The pressure must be between 1 and 2 bar. If not , the system must be filled by a competent person

To stop the boiler turn the selector knob off.



Rotate the domestic hot water adjustment knob left or right to adjust the maximum temperature of the domestic hot water (35°C to 65°C). For increasing rotate the knob in clockwise and for decreasing rotate in anti-clockwise.



Rotate the central heating adjustment knob left or right to adjust the maximum temperature of the heating (30°C to 85°C). For increasing rotate the knob in clockwise and for decreasing rotate in anti-clockwise.

5.1. CLOCK – INSTRUCTIONS FOR USE

The boiler must be connected to the electrical supply and switched on.

Setting the time

Rotate the clock actuator mechanism clockwise, by hand, until the current time is indicated by the arrow, see diagram 2.

Note: The time is set in 24 hour format, for example, 1300 for 1 p.m.

Setting the program "On" and "Off" times

? Select the "On" times by pushing the black tappets to the outside, see diagram 10.

? Select the "Off" times by pushing the black tappets to the inside, see diagram 10.

The clock shown in diagram 2 is set as follows:

ON ? 07.00am to 09.00am (7-9)

OFF ? 09.00am to 4.00pm (9-16)

ON ? 4.00pm to 10.00pm (16-22)

OFF ? 10.00pm to 07.00am (22-7)

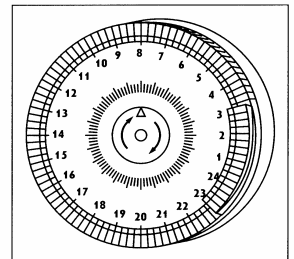


Diagram 10

5.2. DRAINING

Protection against freezing

If the boiler is to be out of use for any long periods during severe weather conditions, it is recommended that the whole system, including the boiler, be drained to avoid the risk of freezing.

If in doubt, consult your servicing company.

The combination boiler has a built in frost protection device that protects the boiler from freezing. If the boiler is to be left and there is a risk of frost, ensure that the gas and electrical supplies are left connected. The frost protection device will light the boiler when the temperature of the boiler water falls below 5°C.

When the temperature reaches 30°C, the boiler stops.

Note: This device works irrespective of any room thermostat setting and will protect the complete heating system.

Draining and filling

Caution: The boiler is installed as part of a sealed system which must only be drained and filled by a competent person.

Heating safety valve

CAUTION: A heating safety valve with a discharge pipe must be fitted to this boiler. Meanwhile safety valve is used as draining valve.

The valve **MUST NOT BE TOUCHED** except by a competent person. If the valve discharges at any time, switch the boiler off and isolate it from the electrical supply. Contact your installation/service company.

5.3. SERVICING/MAINTENANCE

To ensure the continued efficient and safe operation of the boiler, it is recommended that it is checked and serviced at regular intervals by competent person.

The frequency of servicing will depend upon the installation conditions and usage but, in general, once a year should be enough.

Cleaning

The boiler casing can be cleaned with a damp cloth followed by a dry cloth to polish. Do not use abrasive or solvent cleaners.

Boiler casing

CAUTION: Do not remove or adjust the casing in any way, as incorrect fitting may result in faulty operation. If in doubt, consult your installation/service company.

Repeated faults

If some fault persist call your service company.