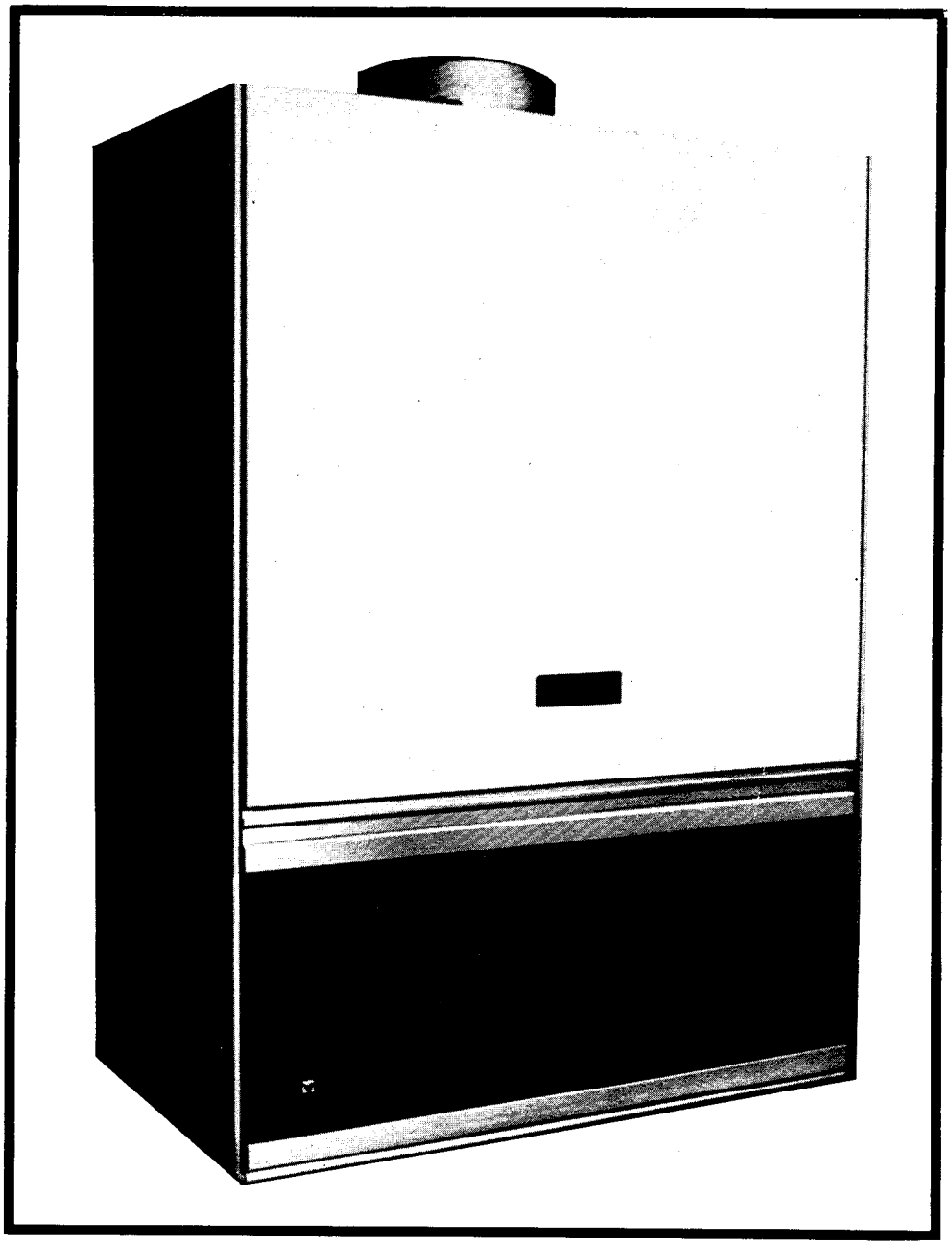
Flexiflame 140

OPEN FLUE BOILER

GAS SAFETY (INSTALLATION AND USE) REGULATIONS

It is the law that all gas appliances are installed by a competant person
in accordance with the above regulations
(For use on natural gas only. G20)
G.C. No 41 980 64
FROM SERIAL Nº



Installation and Servicing Instructions

(Leave these instructions with the user)

Chaffoteaux et Maury

CONTENTS

CONTROL OF SUBSTANCES HARMFUL TO HEALTH

Important

To comply with the Control of Substances Harmful to Health Regulation 1988 we are required to provide information on the following substance that is contained in this appliance.

Description

Combustion Chamber Lining.

Material

Alumino Silicone Fibre.

Precautions

During servicing, keep the dust generation to a minimum and avoid inhaling any dust and contact with the skin and eyes. Normal handling and use will not present any discomfort, although some people with a history of skin complaints may be susceptible to irritation.

When disposing of the lining ensure that it is securely wrapped and wash hands after contact.

1 Introduction

The FLEXIFLAME 140 is a wall mounted, low water content open flued boiler. The boiler is rated between 20.5 kW 70,000 Btu/h) and 41 kW (140,000 Btu/h) outputs.

The boiler is designed for use with Natural Gas only.

The FLEXIFLAME 140 is intended for the larger domestic installations, swimming pools and for commercial or industrial applications. The boiler is suitable for open vented or sealed water systems.

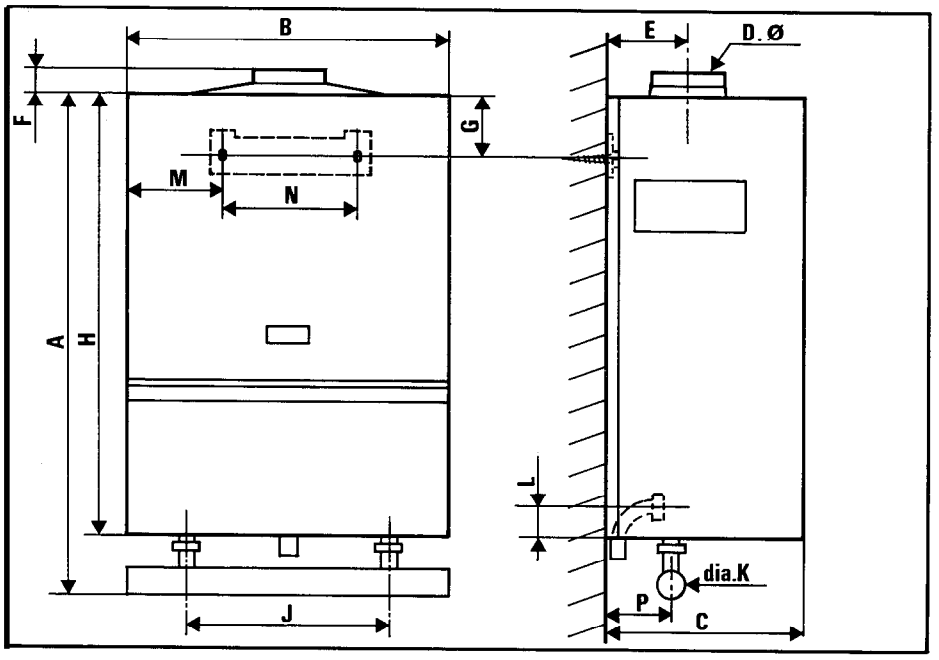
A pump must be installed in the water circulation system irrespective of whether the system is of the open or sealed type. The pump incorporated in the boiler is sufficient only to overcome the resistance of the boiler, the boiler has a fully adjustable electric thermostat which operates the boiler pump.

The FLEXIFLAME 140 is supplied in one carton, it is essential that the monotube is fitted (the monotube is the 54 mm horizontal tube at the base of the appliance).

Guarantee

The manufactures guarantee on this appliance is for 12 months from this date of purchase. The guarantee is void if the appliance is not installed in accordance with the recommendations made herein.

1.1 Dimensions



	mm	(ins)
A	925	(36.4)
B	600	(24.0)
C	365	(14.3)
D	174	(6.9)
E	150	(6.0)
F	65	(2.5)
G	95	(3.75)
H	820	(32.25)
J	390	(15.3)
K	54	(2.0)
L	45	(2.0)
M	165	(6.5)
N	260	(10.6)
P	95	(3.75)

2. Technical data

2.1

Heat Output		Heat Input		Burner setting Pressure		Gas Rate	
kW	(Btu/h)	kW	(Btu/h)	mbar	(ins. w.g.)	m^3/h	(ft^3/h)
20.5	(70 000)	27.0	(91 100)	3.4	(1.4)	2.5	(89,43)
41.00	(140 000)	51.9	(177 200)	12.8	(5.1)	4.65	(164,25)

2.2 Clearance for installation and servicing

Side ..... 150 mm (6 ins)
Top ..... 100 mm (4 ins)
Bottom ..... 150 mm (6 ins)
Front ..... 1000 mm (3ft. 3 ins)

2.3 Flue connection

A nominal 150 mm (6 ins) lightweight flue is required. The draught diverter is integral. It is not necessary to fit a split collar.

2.4 Gas connection ..... R 3/4 ..... (3/4" BSP male)

2.5 Water connection

Flow ..... 54 mm copper (socket)
Return ..... 54 mm copper (socket)

2.6 Water flow rates

Minimum flow rate ..... 2209 l/h (8.1 g.p.m.)
Maximum flow rate ..... 3183 l/h (11.66 g.p.m.)
Minimum static head ..... 3 m (10 ft)
Maximum static head ..... 30 m (100 ft)

2.7 Electrical connections

240 V single phase 50 hz supply fused 1 amp

2.8 Weight ..... 52 kg (114 lb)
2.9 Water capacity ..... 1 litre (0.22 gals)
2.10 Injector ..... Burner 1.18 mm (.046 in)
Pilot 0.30 mm (.011 in)
2.11 Piezo ignitor ..... Vernitron 60065
2.12 Electrode ..... Spark Gap 5 mm (.196 in)

2.13 Pressure test points

Gas inlet and left hand burner manifold

2.14 Boiler thermostat ..... Sopac AE 350 A

2.15 Thermocouple and thermoelectric valve (Chaffoteaux et Maury)

The 24 blade stainless steel Chaffoteaux burner is fitted with 1.18 mm injectors. The non-adjustable permanent pilot is manually ignited by a piezo igniter. The boiler is controlled by an adjustable thermostat which is fitted into the return side of the monotube. The flow temperature measured on the flow side of the monotube will vary relative to the mass flow rate through the monotube but within the range 82° C ∓ 4° C (180°F ∓ 7° F) with a temperature differential between 11°C min and 20°C max.

3. Installation requirements

3.1 General

The installation of the boiler must be in accordance with the Gas Safety installation and use Regulations, relevant Building Regulations, the Byelaws of the Local Water Undertaking, the Safety Document 635, the Electricity at work Regulations BS 7671. It should also be in accordance with the following British Standard Codes of Practice - BS 6891, BS 7953, BS 7074 : 1 : 2, BS 5449 : 1, BS 5440 : 1 : 2.

3.2 Location

The position chosen for the boiler must permit the provision of a satisfactory flue termination and also provide adequate space for servicing and air circulation around the boiler.

The boiler must not be installed in a room or internal space containing a bath or a shower. In a bedroom area, a bed-sitting room, or a private garage.

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

A cupboard or compartment used to enclose the boiler must be designed and constructed specifically for this purpose. An existing cupboard or compartment may be used provided that it is modified for the purpose.

Details of essential features of cupboard/compartment design, including airing cupboard installations are given in BS 6798.

3.3 Gas supply

The gas installation should be in accordance with BS 6891.

The meter to be used must be of adequate capacity to meet the total gas load, i.e. boiler plus other gas appliances.

Ensure that the pipework from the meter to the boiler is of adequate size. Do not use pipes of a smaller size than the boiler gas connection.

The complete installation must be tested for soundness as described in the above standard.

3.4 Flueing

Detailed recommendations for flueing are given in BS 5440 : Part 1.

The following notes are for general guidance only : –

3.4.1 The boiler should be sited such that the maximum possible length of the flue system can be contained within the building and that the route of the flue rises continuously to the terminal and is as direct as practicable.

The first 600 mm (2 ft) of flue pipe should rise vertically from the draught diverter connection before the use of any bends or elbows.

Horizontal or shallow angle runs, right angled bends and mitred elbows should be avoided.

Where an existing brick chimney is to be used it should be swept thoroughly before connection of the new boiler, and the chimney should be lined. The boiler can be used with fanned or fan diluted flues.

An approved British Gas terminal must be fitted and the terminal sited at not less than 600 mm (2 ft) above the roof edge, and, where possible, above the ridge line. The flue must not be terminated at or adjacent to a wall face (except for fan diluted flues).

3.5 Air supply

Detailed recommendations for air supply are given in BS 5440 : 2.

The following notes are intended to give general guidance.

3.5.1 Room or internal space air supply

Where the boiler is to be installed in a room or internal space, the boiler requires the room or internal space containing it to have a permanent air vent. This vent must be either direct to outside air or to an adjacent room or internal space which must itself have a permanent air vent of at least the same size direct to outside air.

The minimum effective area of the permanent air vent(s) related to the maximum rated input of the boiler and shou be 202 cm^2 (30.5 in^2).

3.5.2 Cupboard or compartment air supply

Where the boiler is to be installed in a cupboard or compartment permanent air vents are required (for combustion, flue dilution and cooling purposes) in the cupboard or compartment at high and low level. These air vents must either communicate with a room or internal space or be direct to outside air.

The minimum effective areas of the permanent air vents required in the cupboard or compartment are specified below and are related to the maximum rated heat input of thc boiler.

POSITION OF AIR VENTS	AIR VENT AREAS	
	Air from room or internal space	Air direct from outside
High Level	468 cm^2 (72.5 in^2)	234 cm^2 (36 in^2)
Low Level	936 cm^2 (145 in^2)	468 cm^2 (72.5 ir

Note : Both air vents must communicate with the same room or internal space or must both be on the same wall to outside air.

Where cupboard or compartment air vents communicate with a room or internal space, the room or internal space must itself have a permanent air vent(s) as specified above (3.5.1).

3.5.3 Effect of an extract fan

If there is any type of extract fan fitted in the premises, there is a possibility that if adequate air inlet area from outside is not provided, spillage of the products from the boiler flue could occur, when the extract fan is in operation. Where such installations occur, a spillage test as detailed in BS 5440 : 1 : must be carried out and ventilation requirement to BS 5440 : 2.

3.6 Water circulation systems

Open or sealed type central heating systems should be in accordance with the relevant recommendations given in BS 5376 : 2, BS 5449 : 1 (for small bore or microbore systems)

Hot water systems should be in accordance with the relev. recommendations given in BS 5449 and BS 5546.

3.7 Electrical supply

This appliance must be earthed. All wiring must conform to the BS 7671. The Flexiflame 140 requires a 240 V, single phase, 50 Hz supply. The boiler should be connected to the mains via a fused double pole switch or via a 13 amp. socket outlet in conjunction with a fused plug. The fuse rating should be 3 amp.

The point of connection to the mains should be readily accessible and adjacent to the boiler.

The supply chord must be 0.75 mm^2 three core heat resisting cable.

4. Installation of boiler

4.1 General

The wall on which the boiler is sited must be capable of adequately supporting the weight of the boiler and any ancillary equipment and should be non-combustible.

A vertical flat area is required for the boiler as follows :

Wide	900 mm	36 ins
High	1185 mm	47 ins.

Above dimensions include the necessary clearances around the boiler for case removal and for air movement.

4.2 Control schemes

Most normal pumped primary control schemes can be used, including non-electrical heating and hot water controls.

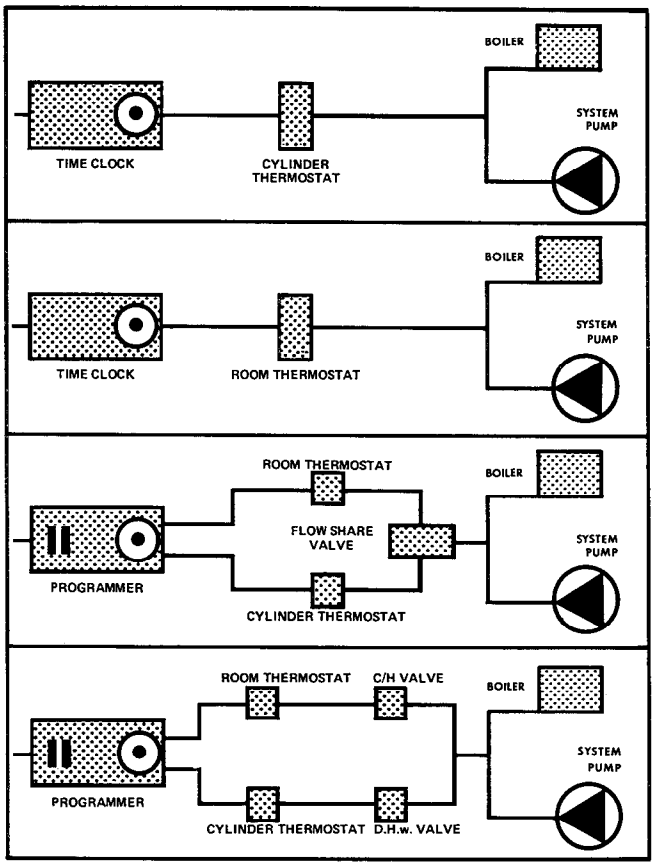
The following diagrams show typical control schemes using electrical controls only.

Hot Water Only, Pump, Time Clock and Cylinder, Thermostat **Fig. 1**

Heating Only, Pump, Time clock and Room Thermostat **Fig. 2**

Hot Water and Heating, Pump, Programmer, Room/Cylinder Thermostat and Flow Share Valve. **Fig. 3**

Hot Water and Heating, Pump, Programmer, Room/Cylinders and two motorised valves. **Fig. 4**

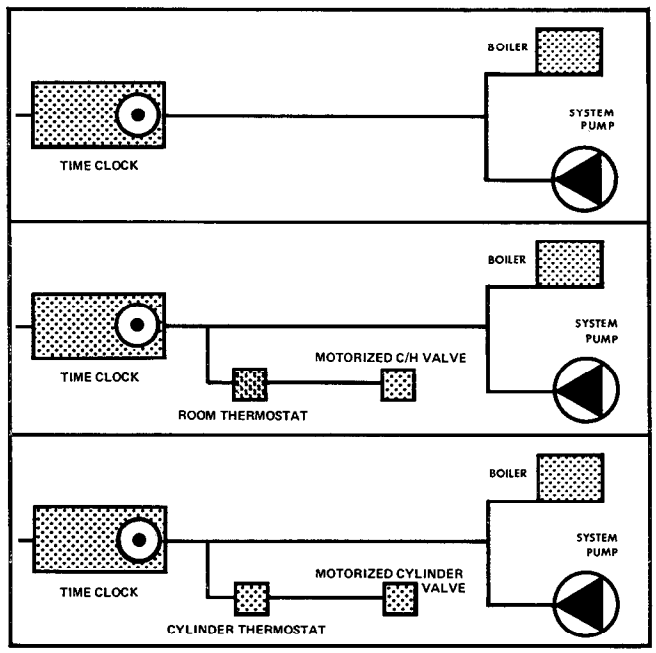


The following diagrams show typical control schemes using electrical/non-electrical controls.

Hot Water and Heating, Pump, Time Clock and Non-Electrical Hot Water and Heating Controls. **Fig. 5**

Hot Water and Heating, Pump, Time Clock, Non-Electrical Hot Water Control and Electrical Heating Control. **Fig. 6**

Hot Water and Heating, Pump, Time Clock, Non-Electrical Heating Control and Electrical Hot Water Control. **Fig. 7**



It is not normally possible to use full programming facilities when using a mixture of electrical and non-electrical controls, but some non-electrical hot water controls are now available with an external micro-switch which would allow the scheme as in fig. 6 to be fully programmed.

Where a mechanical type cylinder thermostat is considered the three port type with by pass must be used.

Where thermostatic radiator valves are used a system by pass will be necessary to maintain a flow rate in the monotube of not less than 8.1 g.p. m. required to prevent recirculation in the monotube due to the action of the boiler pump.

4.3 Boiler packaging

Each boiler is delivered in a protective carton.

Remove packing pieces before lifting out boiler.

Remove boiler from carton. **DO NOT stand or support the boiler on the draught diverter or the bottom chassis carrying the isolating valves.**

4.4 Mounting the boiler

- Using dimensions shown on Page 2 fit the wall mounting plate to the wall using the screws provided.
- Hang boiler on the plate.
- Fit monotube to flow and return connections on boiler with thermostat phial to the left of the boiler.
- Remove thermostat phial from rear of electrical control module and insert phial in pocket, to the left of the monotube and secure with retaining pin.

4.5 Water connections

- Flow and return connections are made to the monotube at the base of the boiler. The return connection is on the left –the flow on the right (54 mm copper tube) viewed from front.

4.6 Gas connections

- The gas service tap is fitted to the appliance.
- Fit gas inlet bend and filter-washer to inlet of gas service tap.
- Gas connection is R 3/4 (3/4 in. BSP male) thread.
- The gas supply pipe should not be less than 22 mm and should be connected direct on to meter. The pipe run should not exceed 9 meters. If the gas run is greater than 9 meters (29.5 ft) in length consult the following table.

GAS PIPE SIZES IN MM

	Equivalent length of pipe including fittings									
Metres . . .	3	6	9	12	15	20	25	30	40	50
Diameter .	22	22	22	28	28	28	28	28	35	35

- The gas supply pipe size should be sufficient to ensure that there is 20 mbar (8 in.w.g.) pressure at the gas service tap when the boiler is working.

4.7 Electrical connections (figs. 8, 9 and 10)

- Withdraw fuses.
- Remove two screws on left hand side of electrical control module cover and open left hand section.
- Enter 0.75 mm² flexible heat resisting cable from rear of module. Pass under clamp and secure to their respective terminal connections.

Note: The length of the earth wire between the cord anchorage and the terminal must be such that the live and neutral wires become taut before the earth wire if the supply cord is pulled.

- For connection see wiring diagram.
- Tighten cable clamp.
- Secure door with two screws and replace fuses.
- Switch ON/OFF switch to OFF position.

5. Water circulating system

5.1 General

The Flexiflame 140 is a low water content boiler designed **only** for use with fully pumped systems. It may be used with open (vented) or sealed systems, all safety controls other than the safety valve, being incorporated in the boiler. The thermostat is adjustable and on its maximum setting gives a nominal 82° C (180° F) flow ± 4° C (7° F) depending on flow through monotube.

Thermostatic control should be fitted to the cylinder and heating circuits.

Under normal circumstances the boiler should not be operated other than with the monotube supplied.

5.1.1 Strainers

Where the Flexiflame 140 is used as a replacement for a boiler on an existing system, the system should be flushed and cleaned using a suitable chemical cleaner following the manufacturer's recommendations and fitted with a strainer in the return before the boiler.

5.2 Control schemes

The boiler is electrically controlled. The firing of the boiler is initiated by the pump incorporated in the boiler. This pump is for the boiler only and is not intented to act as a system pump which must be supplied, correctly sized for the system design, by the installer.

Most normal pumped primary control schemes can be used including thermostatic radiator and cylinder valves. When using motorised valves the controls should be so arranged to switch off the boiler when circuits are satisfied.

For details of control schemes see 4.2. Chaffoteaux can be consulted where technical assistance is required.

5.3 Isolating valves

Two isolating valves are fitted to the boiler to allow for complete isolation of the boiler for servicing.

5.3.1 Electrical components

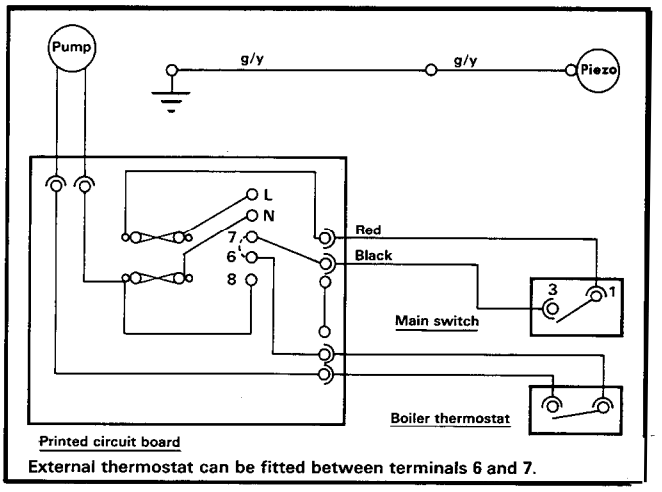


Fig. 8

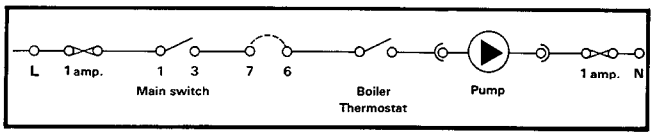


Fig. 9

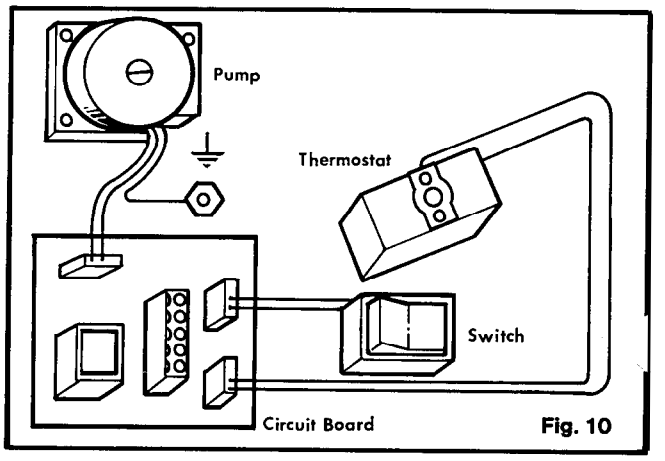


Fig. 10

5.3.2 Pump positions

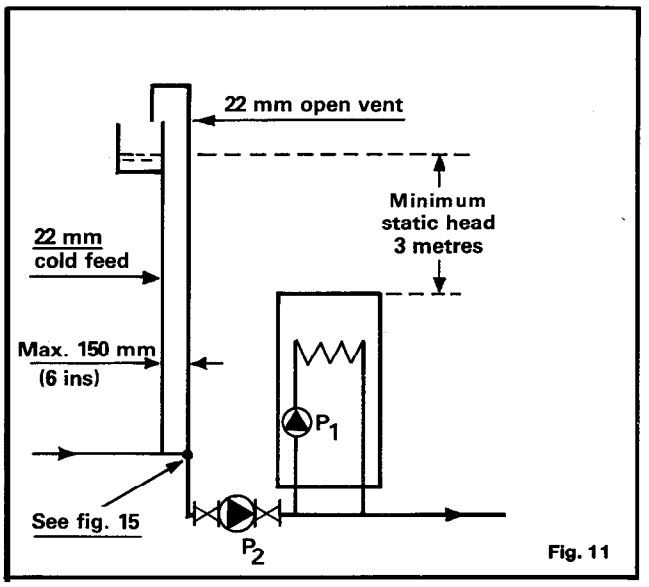


Fig. 11

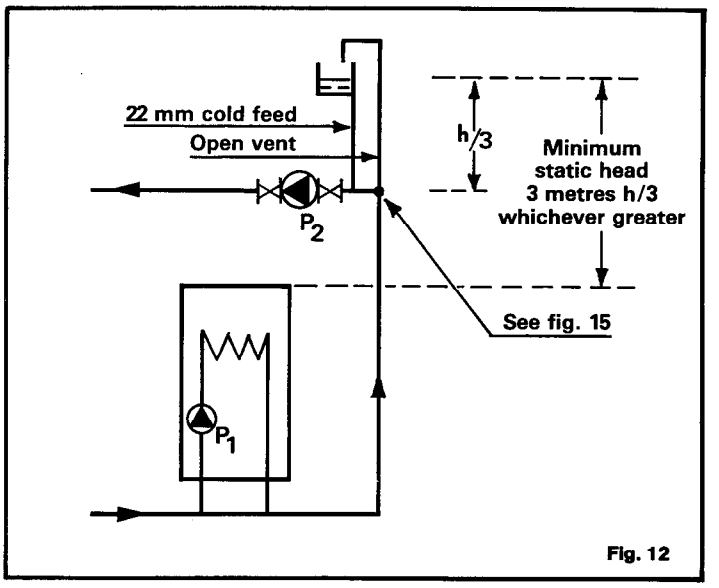


Fig. 12

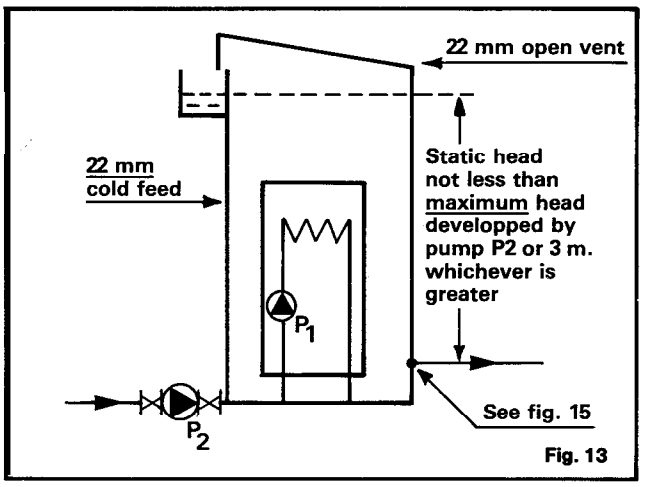


Fig. 13

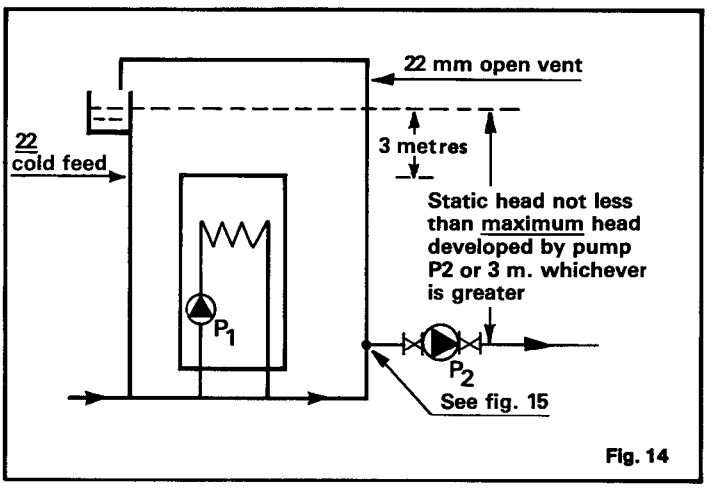


Fig. 14

N.B. h = maximum head developed by pump P2

5.3.3 Air separator

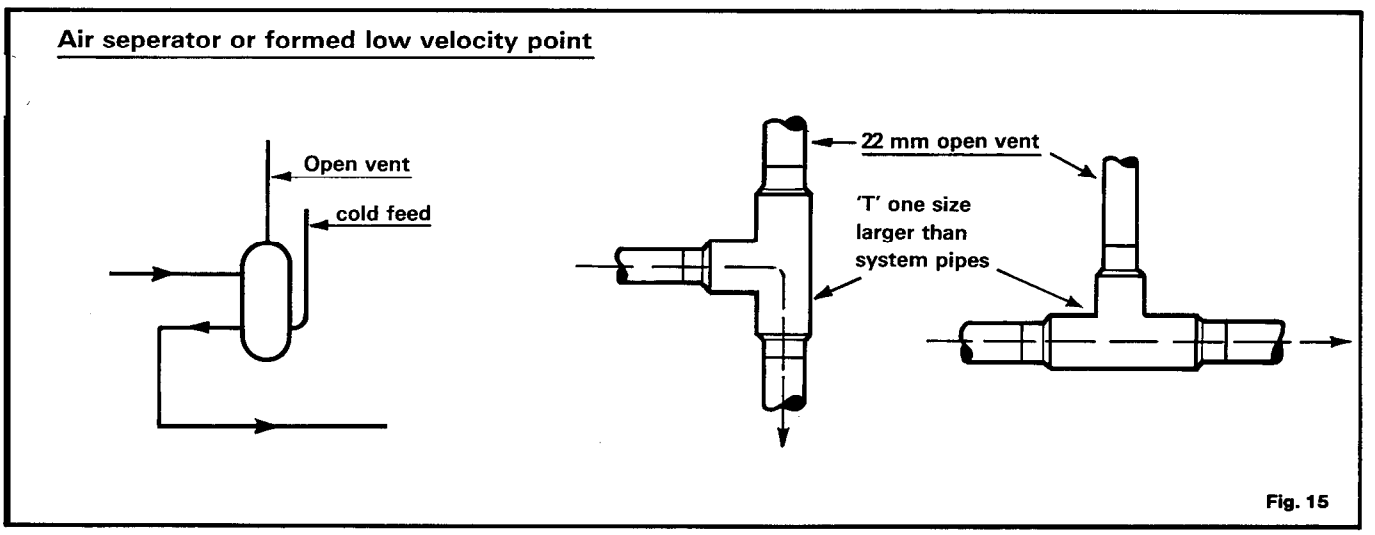


Fig. 15

5.4 Circulation pump

The system circulating pump should be sized relative to the resistance of the connected load and the system design Δt selected. The mass flow rate through the manifold should not be less than 8.1 g.p.m. (2209 litres/hour) and the temperature difference across the manifold should not be greater than 18 °C. The boiler requires a minimum static head of 3 m. (10 ft) irrespective of whether the pump is fitted on the flow or the return.

Most pump manufacturers require a minimum static head on the pump inlet to prevent cavitation. The boilers are designed for a system temperature drop of 18° C on full load but the monotube arrangement provides a built in by pass feature for temperature differences of less than 18° C.

5.5 Inhibitors

Chaffoteaux Limited, generally, recommend the inclusion of an inhibitor with heating and hot water systems utilising FLEXIFLAME boilers.

The following are the appliance manufacturer recommendations.

1) Use only a British Gas or similar approved inhibitor from the Fernox range manufactured by Industrial (Anti Corrosion) Services, Britannia House, Waltham Cross, Herts. Telephone : 0799-085811 or Grace Dearbon Limited, Widnes, Cheshire WA8 8UD - Telephone : 051-424-5351.
2) Use only the quantities specified by the inhibitor manufacturer.
3) Cleanse the system, as may be required by the inhibitor manufacturer.
4) Add inhibitor only after flushing when finally refilling system.

5.6 Automatic air separator

Chaffoteaux Limited strongly recommend the inclusion of a British Gas accepted automatic air separator in the system as shown in fig. 15

The open vent pipe should rise continuously from the system pipework.

It should not be entered horizontally into the system pipework. The use of an enlarged T to create a low velocity point is recommended. The preferred arrangement is shown in fig. 15

5.7 Open systems only

5.7.1 Cold feeds and open vents

The cold feed and open vent should be so positioned that pumping over and sub-atmospheric pressures are avoiled.

Chaffoteaux recommend that a 22 mm cold feed is fitted on the left and a 22 mm open vent on the flow to the right of the boiler. The connection should be so arranged that there is a low velocity point at the open vent junction with the system.

5.7.2 Hot water storage cylinder

The domestic hot water cylinder used with a Flexiflame 140 must be of the indirect coil and high recovery type BS 1566 Pt. 1. Single feed cylinders are not suitable for u with this appliance. Flow and return pipework to the cylinder should be in 22 mm pipe.

5.7.3 Feed and expansion tank

The feed and expansion tank should be adequately sized to accept the **system** water expansion, it should not be mounted closer than 9 in. to a ceiling to allow access to the ball valve.

5.8 Sealed system only

5.8.1 Safety valve

A safety valve shall be fitted close to the appliance on the flow pipe by a horizontal or a vertically upward connection. Only safety valves set to operate at 3 bar (45 lbf/in^2) shall be used ; they shall be so positioned, or any discharge pipe so arranged. that discharge of water or steam from the valve cannot create a hazard to occupants of the premises or cause damage to electrical components and wiring.

5.8.2 Pressure gauge

A pressure gauge covering at least the range 0-4 bar (0-60 lb/in^2) shall be fitted to the system adjacent to, and visible from, the filling point. A temperature gauge should be fitted.

5.8.3 Hot water storage cylinder

The hot water cylinder shall be the indirect coil type which is suitable for the system pressure.

5.8.4 Make-up system

Provision shall be made for replacing water lost from the system either :

(i) From a make-up vessel or tank mounted in a position higher than the top point of the system, and connected through a non-return valve to the system on the return side of the hot water cylinder or the return side of all heat emitters, or,

(ii) Where access to a make-up vessel would be difficult, by prepressurisation of the system (see also 5.8.6 Filling point).

5.8.5 Mains connection

There shall be no connection to the mains water supply or to the water storage tank supplying domestic water, even through a non-return valve without the approval of the local water authority.

5.8.6 Filling point

The sytem should be fitted with a filling point at low level. Methods of filling and marking up sealed systems ? described in BS 5376 : 2

Diagrams showing sealed system layout

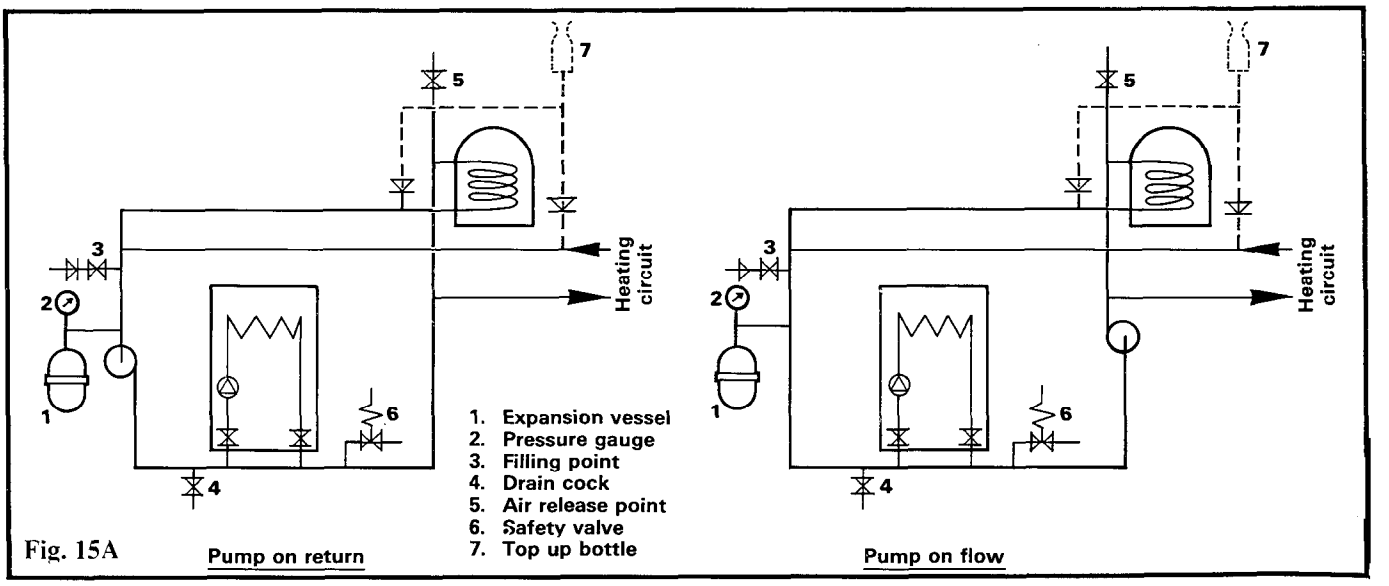


Fig. 15A

5.8.7 Pipework

Pipework should be of copper ; small bore or microbore with capillary or compression jointing to a high standard. Leak sealant shall not be used in the system.

6. Commissioning and testing

6.1 Electrical installation

Checks to ensure electrical safety should be carried out by a competent person i.e. earth continuity, polarity and resistance to earth. In the event of an electrical fault after installation of the appliance preliminary electrical system checks shall be carried out.

6.2 Gas installation

The whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of BS 6891

6.3 Water circulation system

6.3.1 Open system only

The whole of the system should be thoroughly flushed out with cold water without the system circulating pump in position. Ensure that all valves are open.

With the pump fitted, the system should be filled and air locks cleared. The boiler water section can be vented if necessary by unscrewing the drain valve (see A fig. 16). Vent all radiators and check for water soundness.

Light the boiler as detailed in 6.4

6.3.2 Sealed system only

The whole of the system should be filled and thoroughly flushed out with cold water without the circulating pump in position. Ensure that all valves are open. (The system must be filled with water either from a sealed system filler pump with a break tank, or by any other method approved by the local Water Undertaking).

With the circulating pump fitted, the system should be filled and air locks cleared until the pressure gauge registers 1.5 bar (21.5 p.s.i.). (The boiler water section can be vented if necessary by unscrewing the drain valve, see A fig. 16). Vent all radiators and check for water soundness.

Manually raise the water pressure to ensure that the safety valve lifts. This should occur at ± 0.5 bar (± 7.2 p.s.i.) on the max working pressure i.e. 3 bar (43.5 p.s.i. should operate at 3.5 bar (50.75 p.s.i.).

Release water from the system until the initial system design Pressure is attained, taking into account any difference in height between the pressure gauge and the point at which the pressure vessel is connected.

Light the boiler as detailed in 6.4 and thoroughly full the system again after the design temperature has been achievied.

6.4 Lighting the boiler

The following procedure should be followed :

a) Check that fuses have been replaced (see 4.7).

b) Open gas service tap by turning to ♦ (see B fig. 16).

c) Press in pilot valve knob and light pilot using the ignition button, continue to hold in the pilot valve knob for 30 seconds and release (n.b. the pilot should remain alight, it may be necessary to wait a few moments for gas to reach the pilot) (see C fig. 16).

d) If the pilot extinguishes for any reason wait 3 minutes before relighting.

e) The boiler is now ready to operate and will light when switched on at ON/OFF switch and thermostat is turned to + which starts the pump (D and E fig. 19).

f) Test for gas soundness.

g) Check, and if necessary, adjust the gas rate as detailed in 6.5 ten minutes after lighting from cold.

6.5 Gas rate adjustment

Switch off the boiler at the electrical control box. Set the system circulation pump in operation and open all system control valves.

Remove the pressure test point screw from the left hand end of the burner manifold and connect pressure gauge suitable for measurement in the range 0-20 mbar (0-8 in.w.g). Remove the hexagonal cap from the front of the gas volume governor to expose the adjusting screw (D fig. 16).

Turn on the boiler at the electrical control box and, after running the boiler for ten minutes from cold adjust the burner pressure to that shown in graph (fig. 17). The pressure will be reduced for clockwise movement of the screw, increased for anti-clockwise movement.

Turn off the boiler at the electrical control box, remove the gauge and re-fit the pressure test point screw and gas volume governor cap. Test for gas soundness.

Mark the data badge against output to which the boiler has been adjusted.

The data badge is situated at the bottom right hand side of the chassis (fig. 16).

6.6 Flushing

The water system should then be heated to maximum working temperature and examined for water soundness. Gas electricity and water should then be turned off and the water system rapidly drained whilst still hot.

The system should again be filled and cleared of air locks sealed systems should be adjusted to the initial system design pressure, any set pointer on the pressure gauge should be set to coincide with the indicating pointer. Re-adjust controls to appropriate setting. Examine for water soundness.

Add inhibitor to the system if required in the specification (see 5.5).

6.7 To fit casing

- Fit side panels by hooking over pegs at top and securing with screw bottom rear.
- Fit control module cover, secure with five screws two each side and one in centre (F fig. 19).
- Fit front panel by hooking on pegs at top of boiler and secure with three screws G along bottom (fig. 19).

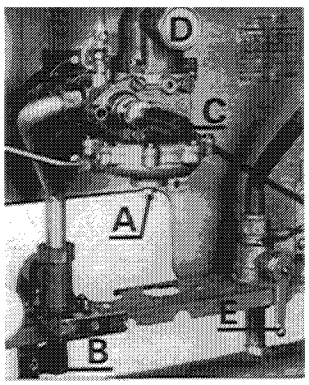


Fig. 16

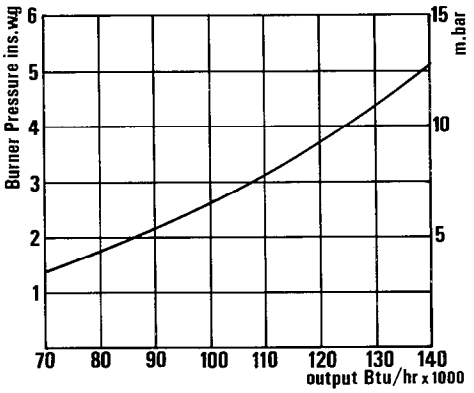


Fig. 17

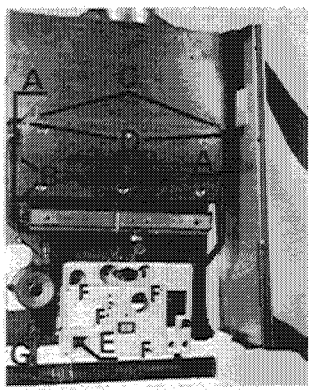


Fig. 18

- Fit control knob.
- Remove glass panel from carton.
- The hinges are held in position by a metal strap (fig. 19).
- Remove the screws securing the strap and set aside for re-use both the strap and the screws.
- Slide the left hand side hinge from glass panel and slot into left hand side vertical trim.
- Locate glass panel on to left hand side hinge with the panel in a vertical position.
- Locate right hand side hinge into the right hand side vertical trim.
- Using the screws removed re-fit the transit strap beneath the glass panel.
- Finally secure hinges with screw from front of each hinge.

6.8 Adjust thermostat to system design requirements.

Set the boiler in operation and balance the system adjusting thermostats, time clocks and other controls.

6.9 To drain boiler

Close the isolating valves on the boiler by turning in a clockwise direction. Drain the boiler by unscrewing the drain valve (A fig. 16).

6.10 Users instructions

Hand the user's instructions to the user for retention and instruct in the safe operation of the boiler.
Advise the user of the precautions necessary to prevent damage to the system and to the building in the event of the system remaining inoperative during frost conditions.
Finally advise the user that, for continued efficient and safe operation of the boiler, it is important that adequate servicing is carried out at regular intervals recommended by the local gas region, your local Chaffoteaux et Maury Service Centre or other C.O.R.G.I. registered personnel in accordance with the gas safety (installation and use) regulations.

7. Routine Servicing

To ensure continued afficient and safe operation of the appliance it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation condition and usage, but in general once a year should be adequate.
It is the law that any service work must be carried out by a competent person, such as British Gas, other C.O.R.G.I. registered personnel or your local Chaffoteaux Service Centre, in accordance with the Gas Safety (Installation and Use) Regulations. This routine service will normally be cerfied to :

1) Cleaning the burner.
2) Cleaning the heat exchanger.
3) Cleaning the gas control.
4) Cleaning and greasing bearing pilot spindle.
5) Cleaning the diaphagm.

The following schedules are recommended.

a) Check the function of the appliance, burner pressure, gas flow rate and soundness.
b) Observe flame picture and undertake combution test.
c) Check, clean or replace components as necessary.

N.B. : Before commencing any work turn off gas at the gas inlet tap, and ensure that the electricity supply is disconnected. Inhale the flow and return, and train appliance if required.

7.1 Remove casing

- Remove thermostat knob by pulling off.
- Remove two screws at bottom rear of side panels.
- Remove screw from centre of controls panel.
- Ease whole case forward and guide over piezo and pilot operating plunger.
- Lift off turret fixings at top of appliance.

7.2 Annual service

7.2.1 To clean the burner (fig. 21)

- Unscrew the pilot tube clamping screw A.
- Remove the pilot tube by lifting out of bracket.
- Remove six screws B which retain the burner manifold (screws are different lengths).
- Remove manifold gasket and pilot support bracket and disconnect thermocouple at thermoelectric valve, pull off connection on high limit thermostat, disconnect piezo ignitor.
- Remove two screws C at ends of rear of burner.
- Unscrew nut D which secures manifold bend to gas section
- Remove burner by moving to the left **taking care to reta... gasket.**
- Invert the burner head and clean by brushing.
- Replace in reverse order, ensuring that the gasket between the burner manifold and the gas section is in place.

7.2.2 To clean heating body. Remove case as described in 7.1 and the burner (7.2.1).

- Remove six screws and remove the front of the combustion chamber.
- Clean the heat exchanger by brushing from below and through the draught divertor openings. Do not attempt to clean the internal waterways without consulting the manufacturer.
- Replace in reverse order.

7.2.3 Clean the pilot assembly

- Remove pilot clamp screw (A fig. 21)
- Remove pilot tube. Blow through tube to remove dust.
- Carefully unscrew the nut retaining the pilot injector (F fig. 21) taking care not to lose the injector which is in t form of a small washer using a 8 mm or adjustable spanné Clean the injector by blowing also clean pilot filter.

  Do not attempt to clean pilot injector by pushing wire through the orifice.

7.2.4 Remove gas section

- With burner removed as described in 7.2.1
- Remove control panel as described in 7.3.2.
- Release two screws securing gas section to water section (A fig. 22).
- Ease gas section forward and up.

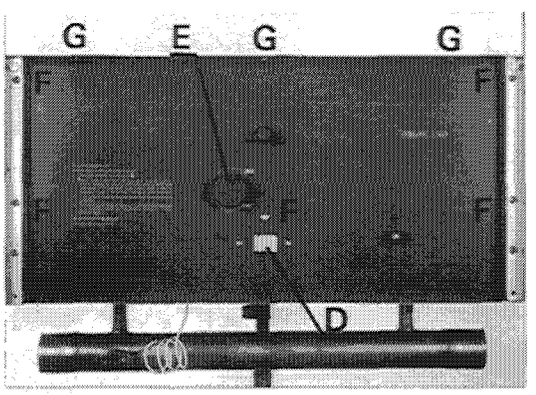


Fig. 19

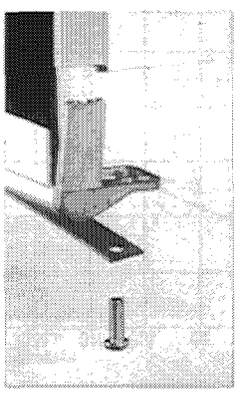


Fig. 20

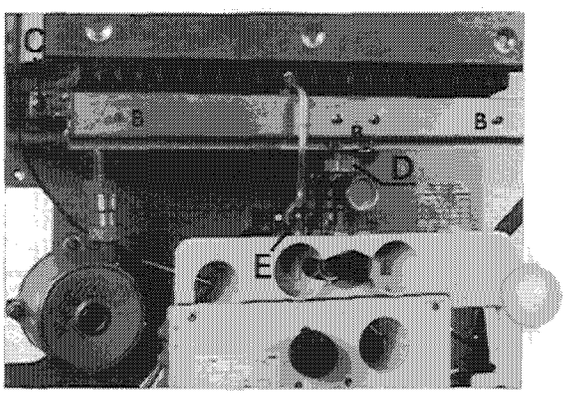


Fig. 21

7.2.5 Clean diaphragm spindle

With gas section removed (see fig. 23) start pump. The bearing plate spindle A will rise. Whilst in this position clean and apply coat of silicone grease.

Re-assemble in reverse order.

7.2.6. To clean thermocouple and electrode

- Remove manifold as in 7.2.1
- Release thermocouple from thermoelectric valve (A fig. 24).
- Pull off tab connectors from overheat thermostat.
- Pull off electrode cable from piezo ignitor.
- Slide thermocouple support bracket from slot in burner.
- Clean by brushing.
- Re-assemble in reverse order.

7.3 General service

7.3.1 Clean burner, heating body, pilot assembly and thermocouple as detailed in 7.2.1. and 7.2.6.

7.3.2 To remove electrical control module (fig. 10)

- Isolate electrical supply.
- Withdraw fuses.
- Remove two screws left hand front of module and open the left hand side front by pulling forward.
- Unplug pump from printed circuit board.
- Disconnect and remove mains input cable.
- Remove split pin and withdraw thermostat phial.
- Remove two screws on bracket at base.
- Pull off electrode lead from piezo unit.
- Remove two screws B either side of pilot valve knob.
- Remove nut from rear control box/control box bracket.
- Remove electrical control box by pulling forward.

7.3.3 To replace diaghragm

- Isolate boiler by turning off isolating valves.
- Slacken valve B in base of water section.
- Drain boiler.
- Remove control module as in 7.3.2.
- Disconnect high and low pressure tubes C from water section.
- Slacken two screws between gas section and water section. (Screw at front and at right hand side).
- Release nuts securing water section to chassis.
- Remove water section complete with diaphragm.
- Separate the top and bottom halves of the water section by removing screws E. Note the relative positions of the two halves for correct re-assembly.
- Remove diaphragm and discard. Wash out water section.
- Replace diaphragm and reposition bearing plate on top of diaphragm.
- Re-assemble in reverse order taking care to relocate upper and lower sections in original position.

7.3.4 To clean the gas valve (fig. 22)

- Remove the burner as in 7.2.1
- Remove the four screws B fastening the top of the gas section to the base.
  n.b. it may be found easier if the combustion chamber front cover is removed.
- Lift the gas section top off the base taking care not to lose springs and valves (C).
- Lift off gas valves.
- Do not attempt to further dismantle the valve assembly.
- Clean the valve seating and replace the gas valve facing if necessary.
- Replace in reverse order.

8. Replacing components

8.1 To replace the thermoelectric valve.

- Remove thermocouple nut.
- Unscrew valve (A fig. 24) from rear of gas section using a 35 mm or adjustable spanner.
- Withdraw thermoelectric valve.
- Replace in reverse order.

8.2 To replace the overheat thermostat

- Remove the two tab connections on the thermocouple leads to the overheat assembly.
- Remove two screws retaining overheat thermostat.
- Replace thermostat – use heat sink grease for better contact.
- Re-assembly in reverse order.

8.3 To replace piezo unit

- Remove earth tab from piezo. Pull off electrode lead.
- Unscrew plastic retainer from rear of control module.
- Withdraw piezo.
- Replace in reverse order.

8.4 To replace pump (fig. 24)

- Isolate electrical supply.
- Remove fuses and then the two screws securing the left hand door of the electrical control box.
- Withdraw plug from printed circuit board and earth tag.
- Remove four bolts B retaining pump head.
- Remove electrical cover from pump and remove lead n.b. The motor/impellor can be replaced with a Grundfos UPS 18/60 motor/impellor and should be set on setting 2. Should it be necessary to replace the pump during the guarantee period it can be exchanged at any builder's merchants stocking Grundfos pumps.
- Replace in reverse order.

8.5 To remove pump and volute (fig. 24)

- Isolate boiler and drain water, see 7.3.3 disconnect electrical supply (see 8.4).

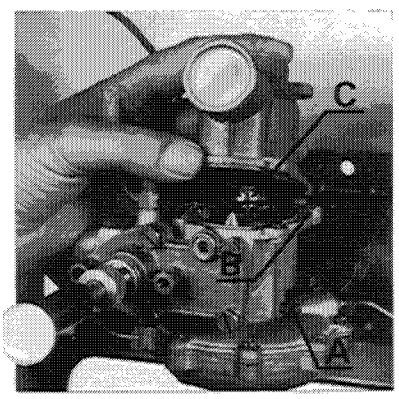


Fig. 22

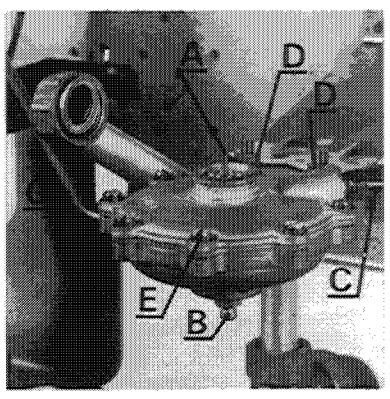


Fig. 23

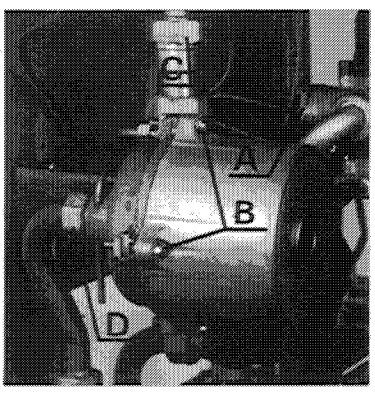


Fig. 24

- Release nut C securing volute to leg from heating body.
- Release nut D from appliance side of isolating valve.
- Replace in reverse order.

8.6 To replace heat exchanger matrix (fig. 18)

- Disconnect electrical supply.
- Isolate boiler and drain water (see 8.3.3).
- Remove six screws and remove the front of the combustion chamber.
- Release nuts A connecting heat exchanger matrix to appliance internal pipework.
- Remove four screws B securing combustion chamber to chassis (two on each side).
- Remove the combustion chamber complete with matrix.
- Unscrew the union nut and remove the left hand body leg.
- Remove two screws D at rear and two screws at front of heat exchanger matrix.
- Remove heat exchanger matrix.
- Replace in reverse order. Taking care to ensure that the flat locating bracket is in contact with heat exchanger skirt. In this position the upper union can be tightened.

8.7 To replace boiler thermostat

- Isolate electrical supply.
- Remove casing (7.1).
- Remove fuses (E fig. 18).
- Remove five screws (F fig. 18) securing control box cover.
- Remove thermostat phial (G fig. 18) from monotube after removing split pin.
- Remove thermostat with mounting plate from control box (A fig. 10).
- Detach thermostat from plate.
- Replace in reverse order.

9. Fault finding chart

Fault	Possible cause	Remedy
Pilot will not light	1) Gas supply not turned on.	Turn on.
	2) Gas supply pipes not purged of air.	Purge.
	3) Blocked pilot filter or injector.	Clean or replace (7.2.3).
Pilot goes out when gas knob is released	1) Gas control knob not fully held in before releasing.	Press firmly before releasing.
	2) Thermocouple not in tip of pilot flame.	Adjust (12 milli-volts min. required measured at high limit thermostat).
	3) Pilot flame too soft.	Tighten pilot injector securing nut (7.2.3).
	4) Faulty thermocouple or union loose.	Replace or tighten.
	5) Main gas valve not purged.	Repeat ignition sequence.
	6) Faulty thermoelectric valve.	Replace (8.1).
	7) Overheat failing.	Replace (8.2).
	8) Loose connection on overheat thermostat.	Tighten.
Main burner will not light or lights at low flame	1) Electricity not switched on to boiler.	Switch on.
	2) Fuses missing or blown in control box.	Replace 1 amp.
	3) Boiler thermostat at low setting.	Turn up fully.
	4) Boiler thermostat faulty or not plugged into control box.	Replace or check connection (8.7).
	5) Gas supply insufficient.	Check working pressure-8 in w.g. required at inlet.
	6) Lack of water in system.	Fill.
	7) Air in system.	Purge.
	8) Boiler pump faulty.	Check or replace (8.4).
	9) Water filter in return pipe blocked or high presure and balancing tubes blocked.	Remove and clean.
	10) Bearing plate spindle bent or dry.	Replace or grease (7.2.5).
	11) Diaphragm split or stretched.	Replace (7.3.3).
	12) Heat exchanger blocked.	Descale or replace (8.6).
Complaints of noise	1) Over-gassed.	Check gas rate and adjust (6.5).
	2) Air in system.	Purge.
	3) Boiler thermostat wrongly set or faulty.	Check flow temperature.
	4) Water section sticking open.	Check operation and grease (7.2.5).
	5) Gas valve sticking open.	Clean or grease (7.3.4).
	6) Dirt/swarf on gas valve facing.	Clean and reassemble (7.3.4).
	7) Resistance to water flow.	Open valves.
	8) Pump noise or vibrating.	Replace or refit (8.4).
	9) Heat exchanger partially blocked.	Clean heat exchanger and check system (8.6).
Excessively noisy burner	1) Over-gassed.	Check gas rate (see 6.5).
	2) Dirty burner bars.	Clean (7.2.1).
	3) Burr on injectors.	Remove or replace.
Frequent sooting of heat exchanger and burners	1) Linting.	Clean burner (7.2.1).
	2) Insufficient combustion air to room or compartment.	Check requirements (3.5.2).
	3) Heat exchanger fins blocked.	Remove and wash throughly (7.2.2).
	4) Restriction in flue.	Check flue.
	5) Wrong injectors fitted.	Check and replace (2.10)
Gas staying on after pump is switched off	1) High pressure or balancing tubes blocked.	Remove and clean.
	2) Gas valve sticking open.	Clean and grease (7.3.4).
	3) Water section sticking open.	Clean and grease (7.2.5).

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Chaffoteaux et Maury

Flexiflame 280 & 420 MK I

Installation, Maintenance and Operating Instructions

The installation of these boilers must be carried out by a competent person

INTRODUCTION

The Flexiflame 280 and 420 are developments of the widely used Flexiflame 140 and comprise two or three standard boiler assemblies connected together in one casing. The boiler assemblies (modules), each with an output of 41 kW (140,000 Btu/h), are mounted vertically above each other providing high output to floor space and high output to weight ratios.

The Flexiflame 280 and 420 are supplied with flanged water and gas connections to allow the simple connection of second or subsequent boilers. Each boiler has an integral common flue and is contained in a pre-assembled case that permits easy access for installation and maintenance.

DESCRIPTION

1. Steel chassis.

2. Aluminium flue duct.

3. Copper finned tube heat exchanger.

4. Steel, dry wall, lined, combustion chamber.

5. Gas section. ON/OFF with two stage gas valve for quiet and stable ignition.

6. Water section. Differential pressure, water section assures gas valve cannot open until pump (10) is operating.

7. Flame spillage overheat thermostat.

8. Flow isolating valve.

9. Return isolating valve.

10. Grundfos pump.

11. High temperature overheat thermostat.

12. Stainless steel all gas burner with permanent pilot and thermo-electric valve flame failure protection.

13. Piezo ignitor.

14. Levelling bolts.

15. Boiler thermostat and electrical connection box.

16. Flanged gas header.

17. Flanged water monotube (insulated).

18. Double pole isolating switches for each module.

19. Fuses for each module.

20. Built in draught diverter. (Fitted on Flexiflame 280 supplied separate with the Flexiflame 420.)

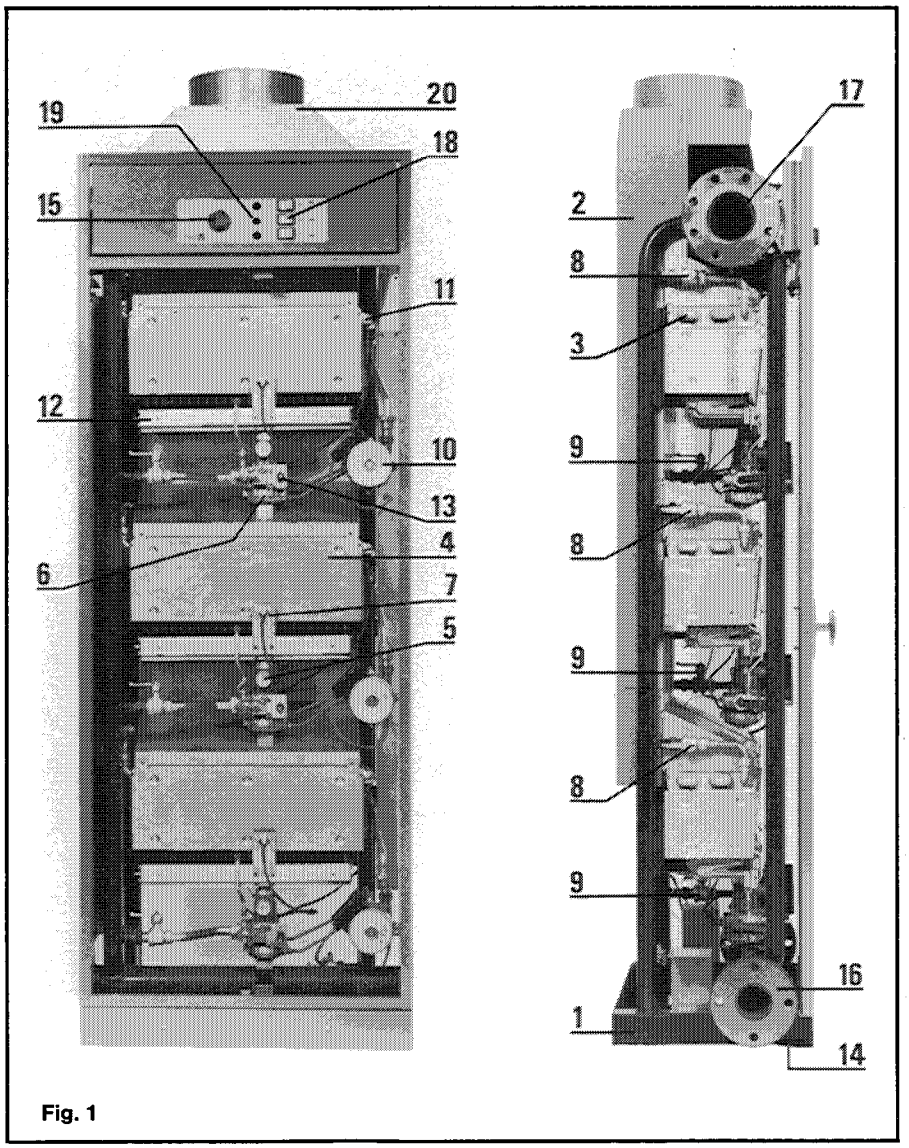


Fig. 1

Please note – If side panels are required to complete an installation, please consult installation instructions section 4 before ordering boilers.

INSTALLATION AND OPERATING FEATURES

The Flexiflame 280 and 420 are designed to be used in installations where space for plant accomodation is limited, and where modulating output is a requirement. Three features distinguish these boilers from others of comparable output.

Compact Construction – The materials and methods of construction produce the following output to floor space ratios.

CORVEC Flexiflame 280 - equivalent to 268 kW/m²
CORVEC Flexiflame 420 - equivalent to 399 kW/m²

These ratios will be of particular significance where existing plant rooms are required to provide higher output, and where roof top installations are under consideration.

System design – The use of a unique monotube water flow arrangement obviates the need to include boiler resistance in pump sizing. Each module is provided with a pump to overcome the resistance of the associated heat exchanger. The modules are connected in parallel to a single water flow pipe (monotube) flanged at each end for simple connection to the system or additional boilers. This arrangement simplifies design, particularly in changeover installations where existing pump sizes may not be known. The boilers must be used with indirect systems and should only be used in multiples. The 280 should not be less than 2 off and the 420 not less than 3 off.

Controls – The boilers are fitted with simple controls suitable for use in a wide variety of applications. On/off control

of modules is by starting and stopping the associated pump either under the influence of the boiler thermostat or an external control signal. Each boiler is fitted with a variable setting thermostat that brings modules under fire at 1 °C intervals. Where more than one boiler is installed, continuous sequencing of modules can be effected, either by using boiler thermostats or by using an external signal from a step controller. Each module also includes a water stopping device that prevents unnecessary water circulation through unfired modules.

The boilers are arranged in series to provide increments of temperature rise to match variations in load and hence return water temperatures. The boilers are designed for a system temperature drop of 20 °C (36 °F), but the monotube arrangement provides a built-in by pass feature for temperature differences of less than 20 °C. Figures 3 and 4 show a typical boiler arrangement and a schematic layout of a single boiler.

The Flexiflame 280 & 420 boilers must only be used with indirect fully pumped systems.

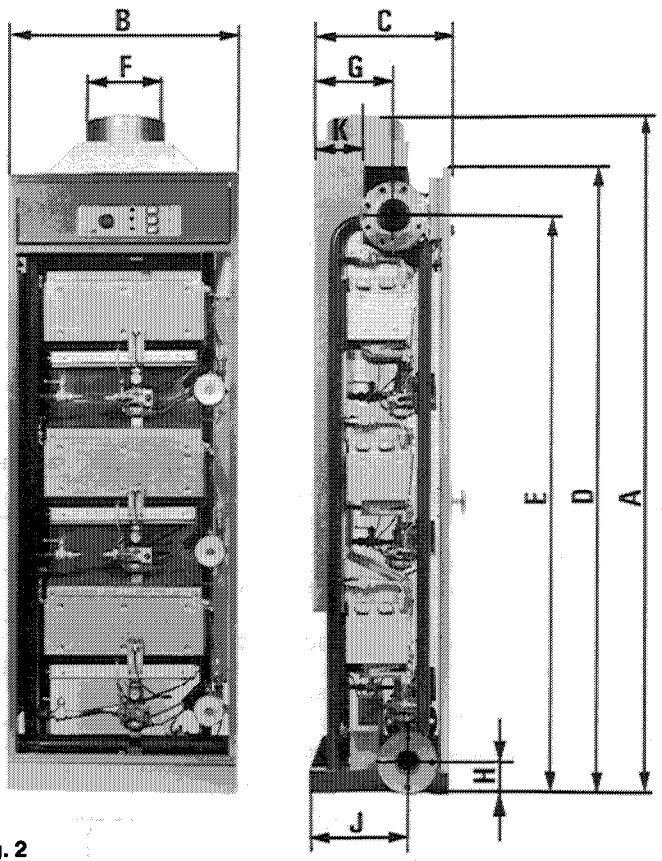
The system circulating pump should be sized relative to the resistance of the connected load and the system design Δt selected. The mass flow rate through the monotube should not be less than 0.6 l/s (8.1 gpm) per **module** and the temperature difference across the monotube should not be greater than 20° C.

Example :

2 × model 280 = 4 modules = minimum flow rate through the monotube of 2.45 l/s (32.4 gpm)

2 × model 420 = 6 modules = minimum flow rate through the monotube of 3.68 l/s (48.6 gpm).

DIMENSIONS



	Flexiflame 280		Flexiflame 420	
	mm	ins	mm	ins
A	1 640	64.5	2 142	84.3
B	711	28	711	28
C	430	16.9	430	16.9
D	1 410	55.6	1 912	75.2
E	1 268	49.2	1 110	69.7
F	250	10	250	10
G	260	10.25	260	10.25
H	112	4.4	112	4.4
J	305	12.0	305	12.0
K	160	6.3	160	6.3

Fig. 2

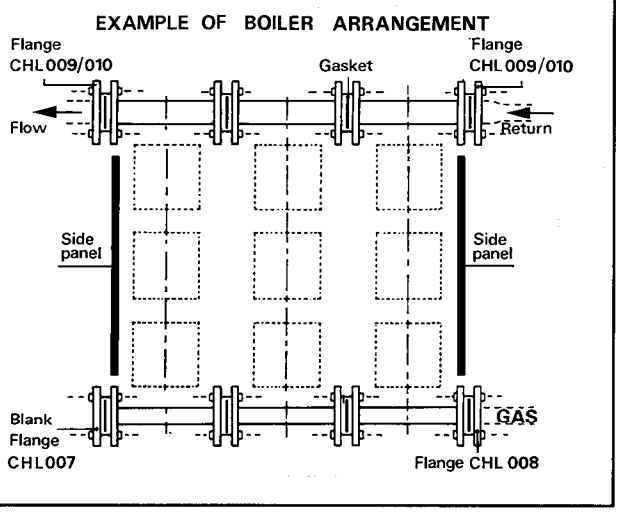


Fig. 3

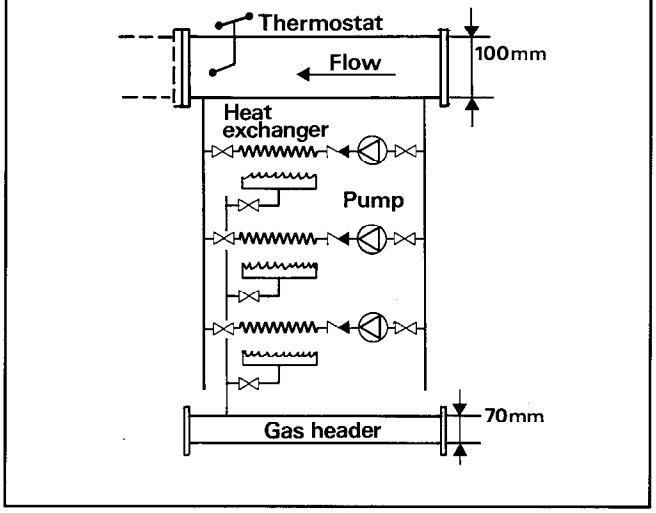


Fig. 4

DESIGN DATA

The installation of the boiler(s) must be in accordance with the relevant requirements of the Gas Safety Regulations, building regulations, I.E.E. Regulations and the byelaws of the local Water Undertaking.

It should be in accordance also with any relevant requirements of the local gas region and local authority and the relevant recommandations of the following documents :

The Building Regulations – 1976

The Gas Safety Regulations – 1972

The Public Health Act – 1936

British Gas Publications – Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters (1979)
"Combustion and Ventilation Air – Guidance Notes for Boiler Installations in excess of 586 kW output"

British Standards

BS 864 : Part 2 – "Capillary and compression tube fittings of copper and copper alloy"

BS 1387 – "Steel tubes and tubulars suitable for screwing to BS 21 pipe threads"

BS 2871 : Part 1 – "Copper tubes for water gas and sanitation"

BS 2871 : Part 2 – "Copper and copper alloy tubes for general purposes"

BS 4504 : Part 1 – Flanges and Bolting for pipes, valves ans fittings

Code of Practice

BS CP 331 : Part 3 – "Gas supplies to appliances"

BS CP 332 : Part 3 : 1970 (4.5) – "Air for Combustion and Ventilation for Installations of up to 586 kW output"

BS CP 341 300 - 307 – Central Heating by low pressure hot water

BS CP 342 – Centralized hot water supply :
Part 1 - Individual dwellings
Part 2 - Buildings other than individual dwellings

Chaffoteaux Limited Services – Chaffoteaux Limited are delighted to assist with technical and design enquiries on all the product range. Chaffoteaux Limited do not normally prepare working drawings for installations, but all Consultants and Designers are encouraged to submit their proposals to the Company for comment.

Chaffoteaux Limited have Technical Advisers, who, for a normal fee to cover travelling and time, are available to commission installations throughout the United Kingdom. We will attend on site if appliance problems exist, but only where the installer will be present and when Representatives of other manufacturers who may be involved are present.

INSTALLATION INSTRUCTIONS

1) Handling the boiler – The boilers are delivered fully assembled in wooden crates.
The draught diverter is packed separately in the Flexiflame 420.
The delivered weights are 113 kg (280) 155 kg (420).
Remove the wooden crate and any other packing materials.
Remove the accessory boxes and gaskets from within the boiler casing.

Do not lie the boiler on its back.

2) Positioning the boiler – Check that the proposed boiler location is sufficiently strong to take the weight of the boilers and other components.
No purpose made plinth is required for reasonably even floors.
Position the boilers away from adjacent walls by a minimum of 100 mm (4"). The boilers are self supporting and do not need to be fixed to the structure.
Level the boiler using the bolts provided in the accessory box (14 - fig. 1).

3) Connecting the boilers – For multi boiler installations fit the intermediate gaskets and bolt up the flanges.

Do not connect the end appliances to the system before reading 4.

4) Side panels – Side panels are not supplied with the boilers.
If side panels are required, the following accessories are available from Chaffoteaux Limited.

Component	Part N°
Side panel for 280 (left and right)	60675/06
Side panel for 420 (left and right)	48580/06
Top brackets 280 & 420 (left and right)	48579
Screws 280/420 (six of each required per panel)	5799/13
Nuts 280/420	26501/03

Before connecting end appliances to the system, fit side panel support brackets.

5) Connecting to system – Mating flanges are not provided with the boilers.
Should mating flanges not be readily obtainable, the following are available from the manufacturer.

Flange	Part N°
Blank for gas supply	CHL 007
Mating for gas supply screwed 2½" BSP Internal	CHL 008
Mating for monotube screwed 4" BSP Internal	CHL 009
Mating for monotube, slip on 4" BSP pipe for welding	CHL 010

6) Draught diverter – Fit the draught diverter if supplied separately to each boiler and complete flue.

7) Electrical connections – Connect the boilers to the electrical supply as shown in the wiring diagram (fig. 12).

8) Gas connection – The gas supply can be connected to either end of the flanged manifold. An isolating tap should be fitted adjacent to the boilers.

9) Water connection – It is important that the flow and return connections are made so the direction of water flow is from right to left through the boilers.

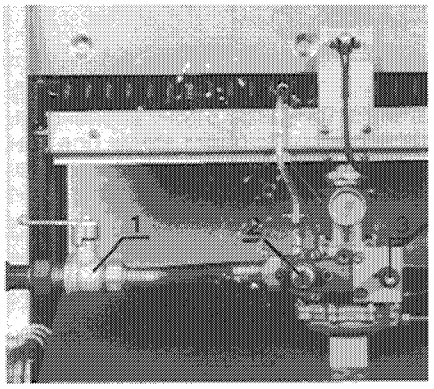


Fig. 5

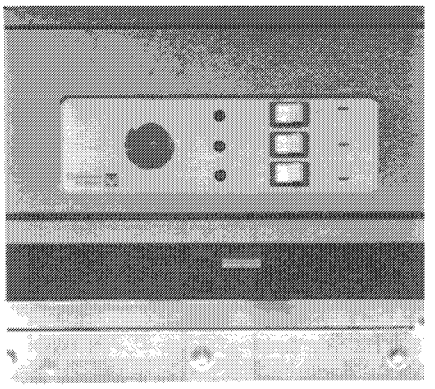


Fig. 6

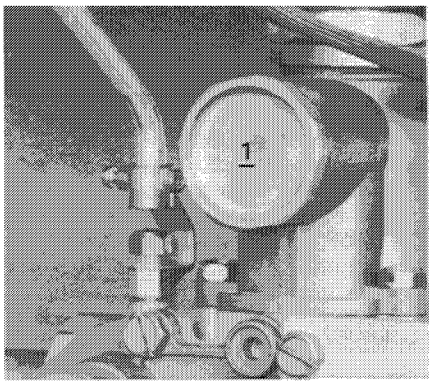


Fig. 7

OPERATING AND COMMISSIONING INSTRUCTIONS

10) Filling the system – Fill the system slowly. The filling operation should be carried out with the flow and return isolating valves on each module (8 and 9 - Fig. 1) fully open.

11) Lighting the pilots – Open the gas valve on each module by turning gas cock in line with pipe (1 - Fig. 5). Press the gas control spindle (2 - Fig. 5) and hold in. Light the pilot by pressing piezo ignitor (3 - Fig. 5) and wait for approximately 20 seconds.

Release the gas control spindle (2 - Fig. 5) and the pilot should remain alight. If the pilot will not establish, check that the gas supply to each boiler is purged of air.

Repeat the lighting procedure.

12) Firing the modules – Establish the pilots on all modules as in 11.

Set the boiler thermostat on each boiler (Fig. 6) to a minimum, and check that all module isolating switches are off (18 - Fig. 1). The switches are wired to be on when at (*) and off when at " STOP "

Check that pumps are free by using screwdriver on end of spindle.

Set the primary circulation pump in operation, and check that all system circuits are open and will allow circulation.

Turn up the boiler thermostat (Fig. 6) to the required value, and switch on the individual modules at the isolating switches. The modules should now fire. Check for gas leaks and flue spillage.

13) Checking the gas rate – The burner pressure of each module should be checked before completing the commissioning.

Turn off the module to be checked at the isolating switch (18 - Fig. 1) and remove the cap from the volume governor (1 - Fig. 7).

Remove the plug from the pressure test point on the end of the burner manifold and connect a suitable pressure gauge.

Turn on the module at the isolating switch and adjust the gas pressure to the value given in Technical Data on page 3.

Earlier models of the Flexiflame 280 and 420 have a knurled ring fitted around the gas control spindle.

Where this is fitted, screw in to reduce the gas rate, and screw outto increase the gas rate (2 - Fig. 5).

14) Setting the boiler thermostats – Where the modules are operated by an external control signal set the boiler thermostat to 50 °C above the maximum expected return temperature.

Where the modules are to be controlled in sequence by the boiler thermostats, the following table details the intervals between thermostat settings for various design temperature drops around the system.

N° of	Interval between thermostat settings °C			
Boilers	T = 20 °C	T = 15 °C	T = 11 °C	T = 8 °C
2	10	7.5	5.5	4
3	7	5	4	3
4	5	4	3	2.5
5	4	3	2.5	–
6	3.5	2.5	–	–
7	3	–	–	–
8	2.5	–	–	–

Where the interval would be less than 2.5 °C, it is recommended that boilers be grouped in pairs or threes, depending on the total number.

e.g. 1 – If 5 boilers were installed to provide a flow temperature of 82 °C at a system drop of 11 °C, the thermostat settings would be 82, 79.5, 77, 74.5 and 72 °C. The boiler nearest the flow would be set at 82 °C and the boiler nearest the return at 72 °C.

e.g. 2 – If 8 boilers were installed to provide a flow temperature of 90 °C at a system drop of 20 °C, the thermostat settings would be 90, 87.5, 85, 82.5, 80, 77.5, 75, 72.5 °C. The boiler nearest the flow would be set at 90 °C and the boiler nearest the return at 72.5 °C.

e.g. 3 – If 12 boilers were installed to provide a flow temperature of 82 °C at a system drop of 11 °C, the thermostat settings would be 82 for boilers 1 and 2, 79.5 for boilers 3 and 4, 77 for boilers 5 and 6, 74.5 for boilers 7 and 8, 72 for boilers 9 and 10, and 69.5 for boilers 11 and 12.

SERVICING REQUIREMENTS

Chaffoteaux Limited recommend that boilers are serviced annually.

Installers and clients are reminded that the boilers are guaranteed for twelve months from the date of installation.

Spare parts lists and prices are available from the manufacturers.

15-1 Remove the boiler doors by removing lower hinge pin and pulling forwards at the bottom.

Isolate the module to be serviced by turning the isolating switch off (24 - Fig. 1).

Close the gas isolating valve turning gas cock across pipe (6 - Fig. 1).

Release the screw (1 - Fig. 8) holding the pilot supply pipe and remove the pipe (2 - Fig. 8).

Unscrew the union securing the thermocouple to the electromagnet at the rear of the gas section (4 - Fig. 1). Remove electrode lead from piezo, remove both overheat and skirt overheat from heat exchanger, remove complete electrode and thermocouple bracket assembly from appliance with the burner assembly.

Remove the screws holding the burner to the back plate (1 - Fig. 9).

Unscrew the union nut securing the burner to the gas section (2 - Fig. 9).

Clean the burner by removing any deposits with a brush.

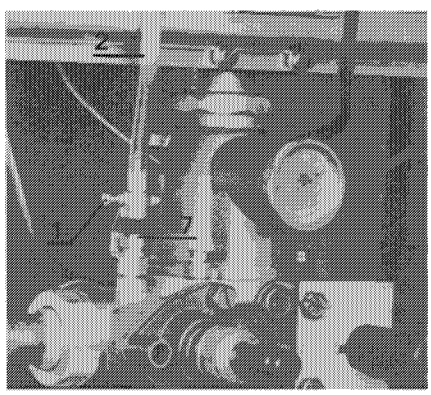


Fig. 8

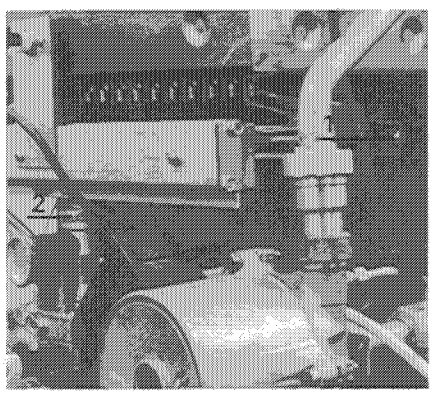


Fig. 9

15-2 To remove the pilot

Isolate the module as detailled in 15-1.
Release the screw (1 - Fig. 8) holding the pilot supply pipe and remove the pipe (2 - Fig. 8).
Unscrew the pilot injector (7 - Fig. 8) and replace if necessary. Do not attempt to clean the pilot injector as this could result in damage.

15-3 To remove the burner manifold

Isolate the module as detailled in 15-1.
Remove the pilot supply pipe s in 15-2.
Unscrew the manifold retaining screws (3 - Fig. 10) taking care not to release the fusible overheat link.
Remove the burner manifold and clean away any lint with a soft brush.

15-4 To remove the heat exchanger

Isolate the module as in 14 and close the flow and return isolating valves (7 and 8 - Fig. 1).
Remove the burner as in 15-3.
Drain down the module. Remove right and left hand tubes from heat exchanger. Remove top two front plate screws and four rear retaining screws and lift out heat exchanger.
Clean the heat exchanger with very hot water and detergent. Do not use wire wool or similar.
Replace the heat exchanger using new washers where necessary.
Replace the burner.

15-5 To remove the diaphragm

Isolate and drain down the module as in 17.
Disconnect the high and low pressure pipes from the water section (2 and 3 - Fig. 11).
Unscrew the retaining screws holding the water section to the underside of the gas section (4 - Fig. 11).
Remove self tapping screws and bracket under water section.
Remove water section.
Remove screws from water section and split into two halves.
Replace the diaphragm and "o" ring.
Re-assemble water section and refit to module.

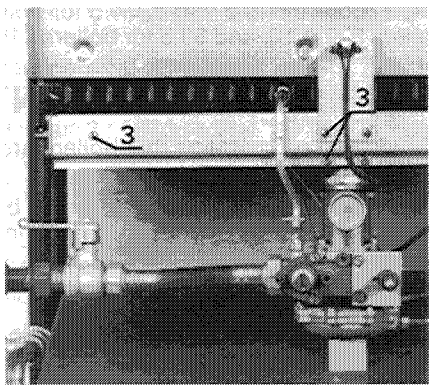


Fig. 10

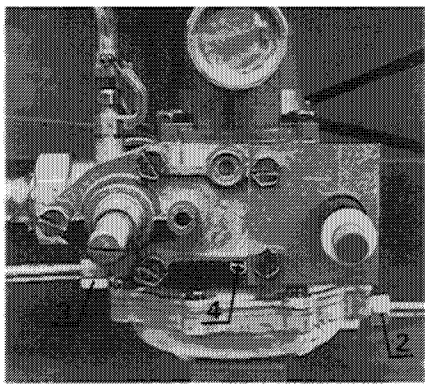


Fig. 11

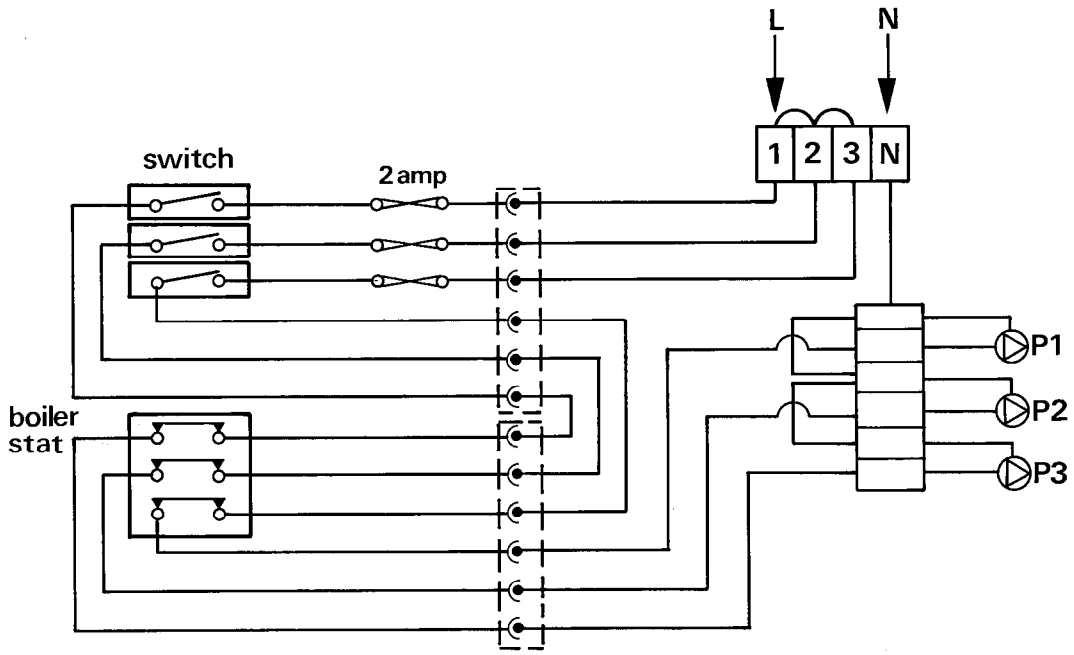


Fig. 12

Fault finding chart

Fault	Possible cause	Remedy
Pilot will not light	1) Gas supply not turned on.	Turn on.
	2) Gas supply pipes not purged of air.	Purge.
	3) Blocked pilot filter or injector.	Clean or replace (15-2).
Pilot goes out when gas knob is released	1) Gas control knob not fully held in before releasing.	Press firmly before releasing.
	2) Thermocouple not in tip of pilot flame.	Adjust (12 milli-volts min. required measured at high limit thermostat).
	3) Pilot flame too soft.	Tighten pilot injector securing nut (15-2).
	4) Faulty thermocouple or union loose.	Replace or tighten.
	5) Main gas valve not purged.	Repeat ignition sequence.
	6) Faulty thermoelectric valve.	Replace (15.1).
	7) Overheat failing.	Replace (15.1).
	8) Loose connection on overheat thermostat.	Tighten.
Main burner will not light or lights at low flame	1) Electricity not switched on to boiler.	Switch on.
	2) Fuses missing or blown in control box.	Replace 1 amp.
	3) Boiler thermostat at low setting.	Turn up fully.
	4) Boiler thermostat faulty or not plugged into control box.	Replace or check connection.
	5) Gas supply insufficient.	Check working pressure-8 in w.g. required at inlet.
	6) Lack of water in system.	Fill.
	7) Air in system.	Purge.
	8) Boiler pump faulty.	Check or replace (10 - fig. 1).
	9) Water filter in return pipe blocked or high presure and balancing tubes blocked.	Remove and clean.
	10) Bearing plate spindle bent or dry.	Replace or grease (15-5).
	11) Diaphragm split or stretched.	Replace (15-5).
	12) Heat exchanger blocked.	Descale or replace (15-4).
Complaints of noise	1) Over-gassed.	Check gas rate and adjust (13-2 - fig. 5).
	2) Air in system.	Purge.
	3) Boiler thermostat wrongly set or faulty.	Check flow temperature.
	4) Water section sticking open.	Check operation and grease (15-5).
	5) Gas valve sticking open.	Clean or grease.
	6) Dirt/swarf on gas valve facing.	Clean and reassemble.
	7) Resistance to water flow.	Open valves.
	8) Pump noise or vibrating.	Replace or refit (10 - fig. 1).
	9) Heat exchanger partially blocked.	Clean heat exchanger and check system (15-4).
Excessively noisy burner	1) Over-gassed.	Check gas rate (see 13 - fig. 5).
	2) Dirty burner bars.	Clean (13-3).
	3) Burr on injectors.	Remove or replace.
Frequent sooting of heat exchanger and burners	1) Linting.	Clean burner (13-3).
	2) Insufficient combustion air to room or compartment.	Check requirements.
	3) Heat exchanger fins blocked.	Remove and wash throughly (15-4).
	4) Restriction in flue.	Check flue.
	5) Wrong injectors fitted.	Check and replace (Page 3).
Gas staying on after pump is switched off	1) High pressure or balancing tubes blocked.	Remove and clean.
	2) Gas valve sticking open.	Clean and grease.
	3) Water section sticking open.	Clean and grease.

TECHNICAL DATA	280	420	280	420
Output	81.4 kW	122.1 kW	280,000 Btu/h	420,000 Btu/h
Input	104 kW	156 kW	354,000 Btu/h	532,000 Btu/h
Gas Rate	9.6 m³/h	14.4 m³/h	338 ft³/h	508 ft³/h
Burner Pressure	15 mbar	15 mbar	6 ins w.g.	6 ins w.g.
Burner Injector Diam.	1.18 mm	1.18 mm	0.046 ins	0.046 ins
Pilot Injector Diam.	0.30 mm	0.30 mm	0.012 ins	0.012 ins
Height	1640 mm	2142 mm	64.5 ins	84.3 ins
Width	710 mm	710 mm	28.1 ins	28.1 ins
Depth	430 mm	430 mm	16.9 ins	16.9 ins
Weight	113 kg	155 kg	249 lbs	342 lbs
Water Content	15 litres	18 litres	3.29 galls	3.9 galls
Max Flow Temperature	110 °C	110 °C	230 °F	230 °F
Max Return Temperature	90 °C	90 °C	194 °F	194 °F
Min Static Head	0.3 bar*	0.3 bar	10 ft w.g.*	10 ft w.g.
Max Static Head	7.0 bar	7.0 bar	233 ft w.g.	233 ft w.g.
Flue Connection 10 in. Ø (250 mm Ø)				
Electrical Supply 240 V a.c. 50 Hz				

* All combustion data is for natural gas. For data on town and LP gases, please contact Chaffoteaux Limited.

* Minimum static head for flow temperatures not exceeding 82 °C (180 °F).

DESIGN DATA

(i) **Hydraulics** – The maximum number of boilers that can be installed in series dependent upon the maximum mass flow capacity of the monotube. The following tables detail the total monotube resistance for installations of up to 2442 kW (8.3 million Btu/h) output, and for various system design temperature drops.

CORVEC Flexiflame

No. of Boilers	Total Output kW	Total Length of Monotube m	Total Monotube Resistance in Metres w.g. T = 20 °C	T = 15 °C	T = 11 °C	T = 8 °C
1	81.4	0.71	Total Monotube Resistance in less than 0.01 Metres w.g.			
2	162.8	1.42				
3	244.2	2.13				
4	325.6	2.84				0.01
5	407	3.55		0.01	0.01	0.02
10	814	7.10	0.03	0.04	0.07	0.14
15	1221	10.65	0.07	0.15	0.24	0.46
20	1628	14.20	0.20	0.32	0.58	1.07
25	2035	17.75	0.36	0.62	1.12	–
30	2442	21.30	0.62	1.04	1.91	–
CORVEC Flexiflame						
1	122.1	0.71	Total Monotube Resistance in less than 0.01 Metres w.g.			
2	244.2	1.42				
3	366.3	2.13				0.01
4	488.4	2.84			0.01	0.02
5	610	3.55	0.01	0.01	0.02	0.04
10	1221	7.10	0.05	0.10	0.17	0.32
15	1831.5	10.65	0.17	0.30	0.53	1.02
20	2442	14.20	0.41	0.69	1.27	–

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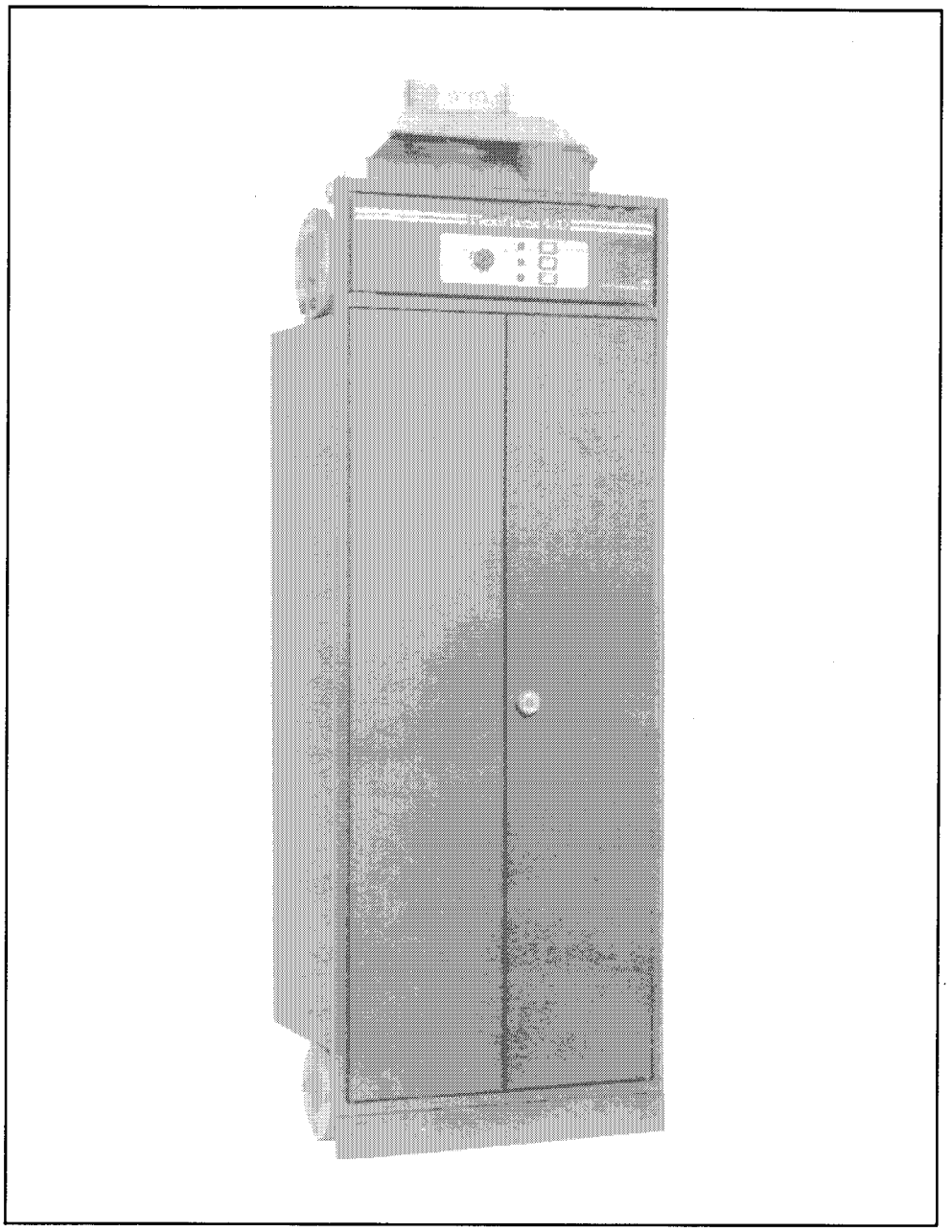
Chaffoteaux

Chaffoteaux Ltd, Concord House, Brighton Road, Salfords, Redhill, Surrey RH1 5DX. Telephone: Horley (0293) 772744. Telex: 87378.

Flexiflame 280 & 420 MK II



installation and servicing instructions

(leave these instructions adjacent to the gas meter)

Chaffoteaux et Maury

Looking Good. Heating Better

Introduction

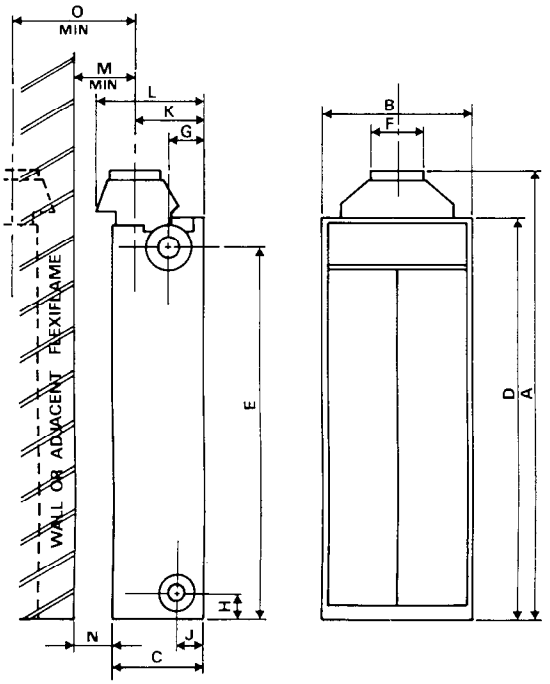
The Flexiflame 280 and 420 are developments of the widely used Flexiflame 140 and comprise two or three standard boiler assemblies (modules), each with an output of 41 kW (140,000 Btu/h), mounted vertically above each other providing high output to floor space and high output to weight ratios.

The Flexiflame 280 and 420 are supplied with flanged water and gas connections to allow the simple connection of second or subsequent boilers. Each boiler has an integral common flue and is contained in a pre-assembled case that permits easy access for installation and maintenance.

Guarantee

The manufacturer's guarantee is to supply free of charge any defective part of a Flexiflame boiler for a period of twelve months from the date of installation, the guarantee is void if the appliance is not installed in accordance with the recommendations made herein or in a manner approved by the appliance manufacturer.

DIMENSIONS



	FLEXIFLAME 280		FLEXIFLAME 420	
	MM	INS	MM	INS
A	1636	64.4	2138	84.2
B	711	28	711	28
C	430	16.9	430	16.9
D	1410	55.5	1912	75.3
E	1268	49.9	1770	69.7
F	255	10	255	10
G	170	6.7	170	6.7
H	112	4.4	112	4.4
J	125	4.9	125	4.9
K	287	11.3	287	11.3
L	479	18.9	479	18.9
M	291 min.	11.5 min.	291 min.	11.5 min.
N	149 min.	5.9 min.	149 min.	5.9 min.
O	582 min.	22.9 min.	582 min.	22.9 min.

Fig. 1

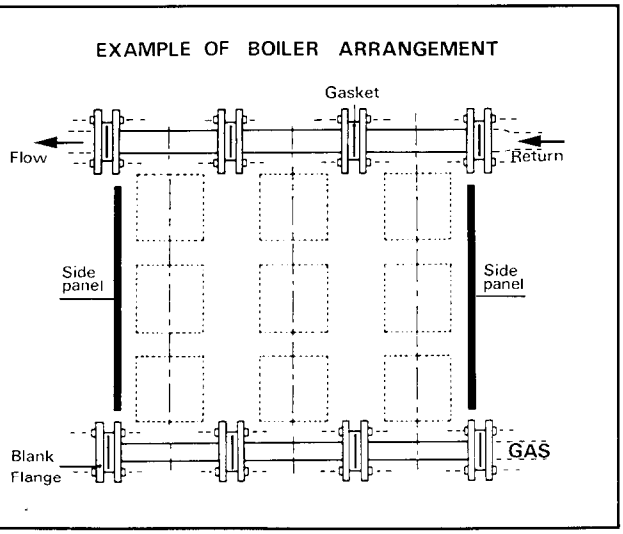


Fig. 2

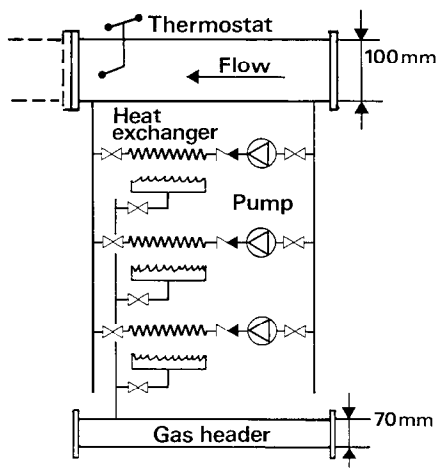


Fig. 3

Technical Data

	280	420	280	420
Output	82 kW	123 kW	280,000 Btu/h	420,000 Btu/h
Input	102 kW	152.6 kW	348,000 Btu/h	520,000 Btu/h
Gas Rate	9.6 m^3/h	14.4 m^3/h	338 ft^3/h	508 ft^3/h
Burner Pressure	13 mbar	13 mbar	5.2 ins w. g.	5.2 ins w. g.
Burner Injector Diameter	1.18 mm	1.18 mm	0.46 ins	0.46 ins
Pilot Injector Diameter	0.30 mm	0.30 mm	0.012 ins	0.012 ins
Height	1636 mm	2138 mm	64.4 ins	84.2 ins
Width	711 mm	711 mm	28.0 ins	28.0 ins
Depth	430 mm	430 mm	16.9 ins	16.9 ins
Weight	154 kg	193 kg	339 lbs	425 lbs
Water Content	15 litres	18 litres	3.29 galls	3.9 galls
Max flow Temperature	82°C	82°C	180°F	180°F
Max return temperature	71°C	71°C	160°F	160°F
Max working pressure	7 bar	7 bar	103 PSI	103 PSI
Min working pressure	0.3 bar	0.3 bar	4.4 PSI	4.4 PSI
Max static head	70 m	70 m	230 ft	230 ft
Min static head	3 m	3 m	9.8 ft	9.8 ft
Flue Connection diameter	250 mm	250 mm	10 ins.	10 ins.
Flue Gas Volume	270 m^3/h	400 m^3/h	9535 ft^3/h	14126 ft^3/h
Flue Gas Temperature	110°C	110°C	230°F	230°F

Electrical Supply	240 V	50 Hz
Each module Internally Fused at	1A	

Clearances

Rear	100 mm for draught diverter operation (See dimensions M, N and O - fig. 1)
Sides	50 mm for access to bolted flanges
Front	600 mm for servicing

All combustion data is for natural gas.
For PROPANE, please contact Chaffoteaux Limited.

Design Data

Hydraulics – The maximum number of boilers that can be installed in series is dependent upon the mass flow rate through the monotube. The following table details the total flow rate for installations for various system design temperature drops.

Btu/h	kW	11° C (20° F)	15° C (27° F)	18° C (32° F)	20° C (36° F)
280	82	1,76	1,3	1,09	0,97
420	123	2,65	1,96	1,65	1,46
560	164	3,51	2,61	2,2	1,96
840	246	5,3	3,92	3,31	2,93
1120	328	7,06	5,23	4,41	3,92
1260	369	7,95	5,88	4,97	4,41
1400	410	8,83	6,54	5,52	4,90
1680	492	10,6	7,85	6,62	5,88
1960	574	12,37	9,16	7,72	6,87
2100	615	13,25	9,81	8,28	7,36

Monotube = Flow rate in kg/s

Description

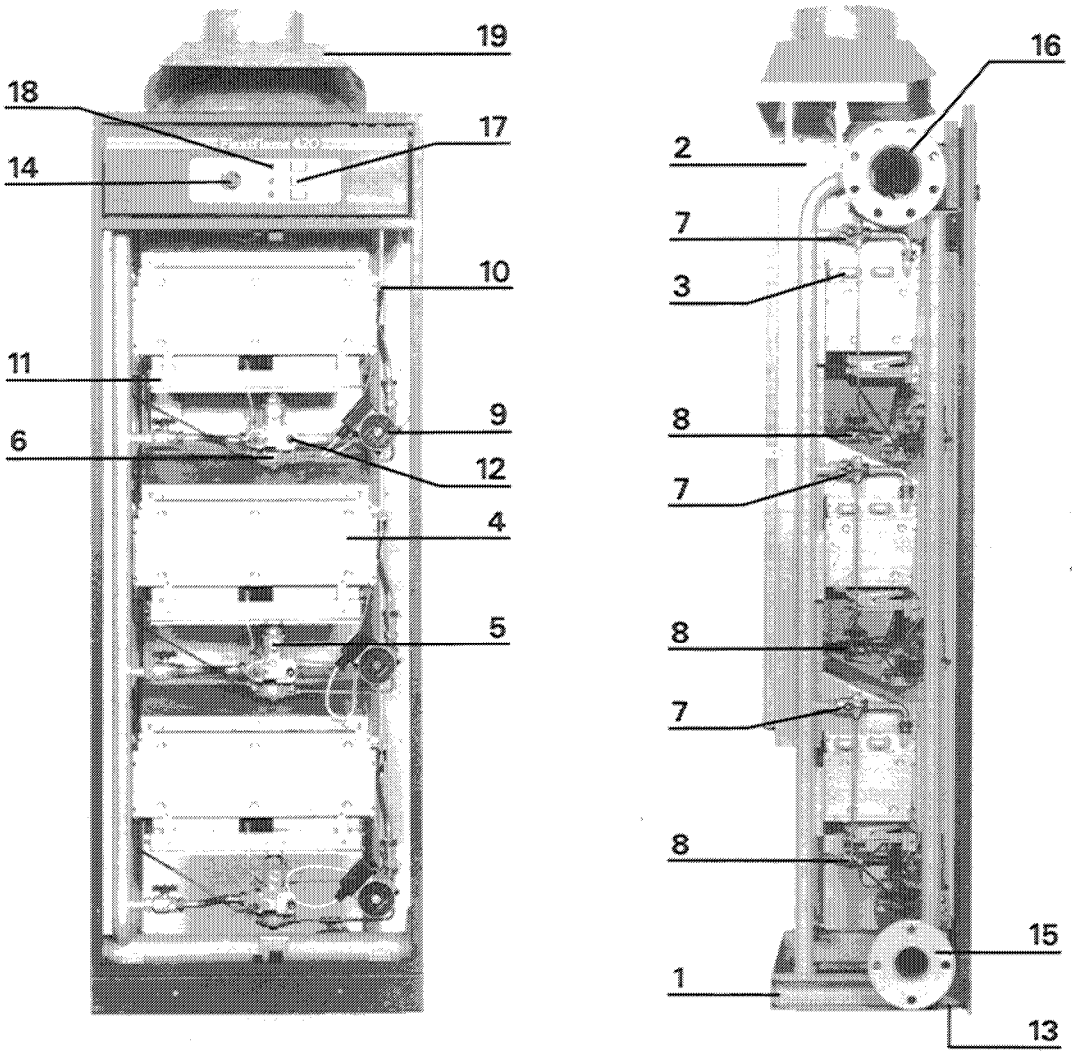


Fig. 4

1. Steel chassis.
2. Aluminium flue duct.
3. Finned copper tube heat exchanger.
4. Steel, dry wall, lined, combustion chamber.
5. Gas section, ON/OFF with two stage gas valve for quiet and stable ignition.
6. Water section. Differential pressure, water section ensures gas valve cannot open until pump (10) is operating.
7. Flow isolating valve.
8. Return isolating valve.
9. Grundfos pump.
10. High temperature overheat thermostat.
11. Stainless steel all gas burner with permanent pilot and thermo-electric valve flame failur protection.
12. Piezo ignitor.
13. Levelling bolts.
14. Boiler thermostat and electrical.
15. Flanged gas header nominal size 65 mm to BS 4504 Pt. 1 : 1969 Table 16/4.
16. Flanged water monotube nominal size 100 mm to BS 4504 Pt. 1 : 1969 Table 16/3.
17. Isolating switches for each module.
18. Fuses for each module.
19. Built in draught diverter.

Please note – If side panels are required to complete an installation, please CONSULT installation instructions section 4.4.

1 INSTALLATION AND OPERATING FEATURES

The Flexiflame 280 and 420 are designed to be used in installations where space for plant accommodation is limited, and where modulating output is a requirement. These features distinguish these boilers from others of comparable output.

1.1 Compact construction

The materials and methods of construction produce the following output to floor space ratios.

Flexiflame 280 – equivalent to 268 kW/m².
Flexiflame 420 – equivalent to 399 kW/m².

These ratios will be of particular significance where existing plant rooms are required to provide higher ouptut and where roof top installations are under consideration.

1.2 System design

The use of a unique monotube water flow arrangement obviates the need to include boiler resistance in pump sizing. Each module is provided with a pump to overcome the resistance of the associated heat exchanger. The modules are connected in parallel to a single water flow pipe (monotube) flanged at each end for simple connection to the system or additional boilers. This arrangement simplifies design, particularly in changeover installations where existing pump sizes may not be known. The boilers must be used with indirect systems. Particular attention must be paid to achieve minimum flow rates – see 1.4.

1.3 Controls

The boilers are fitted with simple controls suitable for use in a wide variety of applications. ON/OFF control of modules is by starting and stopping the associated pump either under the influence of the boiler thermostat or an external control signal. Each boiler is fitted with a variable setting thermostat that brings modules under fire at approximately 1° C intervals.

Where more than one boiler is installed, sequencing of modules can be effected, either by using boiler thermostats or by using an external signal from a step controller or Building Services Management controls. Each module also includes a water stopping device that prevents water circulation through unfired modules.

The boilers are arranged in series to provide increments of temperature rise to match variations in load and hence return water temperatures. The boilers are designed for a temperature rise of 20° C (36° F) at full load but the monotube arrangement provides a built-in by pass feature for temperature differences of less than 20° C. Figures 2 and 3 show typical boiler arrangements and a schematic layout of a single boiler.

1.4 Minimum flow rates

The Flexiflame 280 and 420 boilers must only be used with indirect fully pumped systems.

The system circulating pump should be sized relative to the resistance of the connected load and the system design Δt selected. The mass flow rate through the monotube should not be less than 0,6 l/s (8,1 gpm) per module and the temperature difference across the monotube should not be greater than 20° C.

Example :

2 × model 280 = 4 modules = minimum flow rate through the monotube of 2,45 l/s (32,4 gpm).

2 × model 420 = 6 modules = minimum flow rate through the monotube of 3,68 l/s (48,6 gpm).

2 INSTALLATION REQUIREMENTS

2.1 General

The installation of the boiler(s) must be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the byelaws of the local Water Undertaking.

It should be in accordance also with any relevant requirements of the local gas region and local authority and the relevant recommendations of the following documents :

The Building Regulations
The Gas Safety Regulations –
(Installation and Use) Regs
The Public Health Act – 1936
British Gas Publications – Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters (1979) IM/11 British Standards.
BS 4504 : Part 1 – Flanges and Bolting for pipes, valves and fittings.

BS6644 Installation of gas-fired hot water boilers of rated inputs between 60 kW and 2 MW.
Code of Pratice
BS CP 331 : Part 3 – "Gas supplies to appliances"
BS CP 341 300 – 307 Central Heating by low pressure hot water
BS CP 342 – Centralized hot water supply :
Part 1 – Individual dwellings
Part 2 – Buildings other than individual dwellings
BS 6759 Safety valves
BS 4076 Specifications for steel chimneys.

2.2 Chaffoteaux Limited Services

Chaffoteaux Limited are pleased to assist with technical and design enquiries on all the product range. Chaffoteaux Limited do not normally prepare working drawings for installations, but all Consultants and Designers are encouraged to submit their proposals to the Company for comment.

Chaffoteaux Limited have Technical Advisers, who, for a nominal fee to cover travelling and time, are available to commission installations throughout the United Kingdom. We will attend on site if appliance problems exist during the warranty period but only where the installer will be present and when Representatives of other manufacturers who may be involved are present.

2.3 Location

The position chosen for the boiler must permit the provision of a satisfactory flue termination and also provide adequate space for servicing and air circulation around the boiler.

Where installation will be in an unusual position, special procedures may be necessary, and BS6644 : 2 gives detailed guidance on this aspect.

A compartment used to enclose the boiler must be designed and constructed specifically for this purpose. An existing compartment may be used provided that it is modified for the purpose.

Details of essential features of compartment design are given in BS6644 :2.

2.4 Gas Supply

The gas installation should be in accordance with CP 331 :3.

The meter to be used must be of adequate capacity to meet the total gas load, i.e. boiler plus other gas appliance.

Ensure that the pipework from the meter to the boiler is of adequate size. The complete installation must be tested for soundness as described in the above Code.

2.5 Flueing

Detailed recommendations for flueing are given in British Gas document IM/11.

The following notes are for guidance only :

2.5.1 The boiler should be sited such that the maximum possible length of the flue system can be contained within the building and that the route of the flue rises continuously to the terminal and is as direct as practicable.

2.5.2 The first 600 mm (2 ft) of flue pipe should rise vertically from the draught diverter connection before the use of any bends or elbows.

2.5.3 Horizontal or shallow angle runs, right angled bends and mitred elbows should be avoided.

2.5.4 Where an existing brick chimney is to be used it should be swept thoroughly before connection of the new boiler, and the chimney should be lined. The boiler can be used with fan assisted or fan diluted flues.

2.5.5 An approved British Gas terminal must be fitted and the terminal sited at not less than 600 mm (2 ft) above the roof edge, and, where possible, above the ridge line. The flue must not be terminated at or adjacent to a wall face (except for fan diluted flues).

2.6 Air Supply

Detailed recommendations for air supply are given in BS 6644.

The following notes and table are intended to give general guidance.

2.6.1 Natural Ventilation

Where the boiler is to be installed in a room or internal space, the boiler requires the room or internal space containing it to have a permanent air vent. This vent must be either direct to outside air or to an adjacent room or internal space which must itself have a permanent air vent of at least the same size direct to outside air.

The openings shall be fitted with grilles of negligible resistance and shall be sited so that they cannot be easily blocked or flooded. The grilles shall have a total minimum free area as follows.

Low-level (inlet) 540 cm^2 plus 4,5 cm^2 per kilowatt in excess of 60 kW total rated input.

High-level (outlet) 270 cm^2 plus 2,25 cm^2 per kilowatt in excess of 60 kW total rated input.

2.6.2 Mechanical Ventilation

Where air extraction is by means of a fan, the minimum flow rates of air supplied and extracted shall be in accordance with IM/11.

Any fan installed for extraction purposes shall not cause a negative pressure (relative to the outside atmosphere) to develop in the boiler house.

2.7 Cold Feed and Open Vent

The size for cold feeds and open vents vary with the connected load and should be sized in accordance with the table (see page 7).

The preferred location of the cold feed and open vent is close coupled on the suction side of the pump.

2.8 Electrical Supply

THIS APPLIANCE MUST BE EARTHED. All wiring must conform to the I.E.E. Regulations. The Flexiflame boilers require a 240 V, single phase, 50 Hz supply. The boiler should be connected to the mains via a fused double pole switch. The fuse rating should be readily accessible and adjacent to the boiler (see Technical Data page 2).

2.9 Water Treatment

In a commercial installation where water volumes are very much higher, consideration should be given to treating the fill water to ensure that hardness is less than 60 ppm.

Extra care should be taken with flushing and cleaning the system before it is fired for the first time and the use of an active chemical cleaner is recommended.

Whilst Chaffoteaux do not generally recommend the use of inhibitors, it may be that the specification or local water quality make it a condition where an inhibitor must be used. In these circumstances we recommend that advice is sought from a water treatment company.

We give below the details for Messrs Grace Dearborn and Fernox Manufacturing Company who can be approached for advice.

Messrs Grace Dearborn	Fernox Manufacturing
Widnes	Britannica Works
Cheshire	Clavering
WA8 8UD	Essex CB11 4QZ
051-424 5351	0799 550811

COLD FEED AND OPEN VENT SIZES
COMBUSTION AND VENTILATION AIR OPENINGS

Boiler		Input	Cold Feed	Open Vent	Combustion and Ventilation Air Openings			
					Low Level		High Level	
		kW	Min. Bore mm	Min. Bore mm	cm^2 *	in^2 *	cm^2 *	in^2 *
280	1	104	25	32	738	114	369	57
	2	208	32	38	1206	187	603	94
	3	312	38	50	1674	260	837	130
	4	416	38	50	2142	332	1071	166
	5	520	38	50	2605	404	1302	202
	6	624	50	63	3068	477	1539	239
	7	728	50	63	3546	550	1773	275
	8	832	50	63	4014	622	2007	311
	9	936	50	63	4482	695	2241	348
	10	1040	50	63	4950	767	2475	384
	11	1144	50	63	5418	840	2709	420
	12	1248	50	63	5886	912	2943	456
420	1	156	32	38	972	151	468	76
	2	312	38	50	1674	260	837	130
	3	468	38	50	2376	368	1189	184
	4	624	50	63	3078	477	1539	239
	5	780	50	63	3180	586	1890	293
	6	936	50	63	4482	695	2241	348
	7	1092	50	63	5184	804	2592	402
	8	1248	50	63	5886	912	2943	456
	9	1404	50	63	6588	1021	3294	511
	10	1560	50	63	7290	1130	3645	565
	11	1716	50	63	7992	1239	3996	620
	12	1872	50	63	8694	1348	4347	674

* FREE area.

3. SYSTEM GUIDANCE

The Flexiflame is suitable for connection to all types of fully pumped system provided that the constant water flow through the boiler is not affected by manual or automatic operation of controls within the system.

Protection against pump failure is desirable e.g. by the fitting of water flow switch. The modular arrangement of the Flexiflame and its high tolerance to condensation allows for efficient control of heat output without the use of mixing valves. The matching of heat output to demand can be achieved using a step controller and compensator to sequence the modules reducing system water temperature at a constant flow rate.

. General guidance on system layouts are shown in figures 5, 6, 7, 8 and 9 are intended as a guide ONLY.

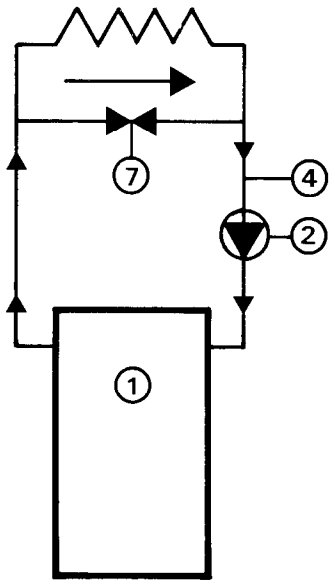


Fig. 5 **PUMP IN RETURN**

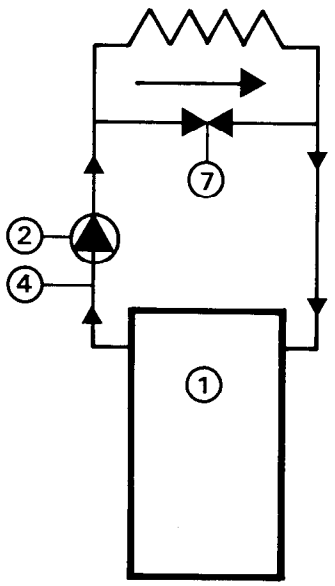


Fig. 6 **PUMP IN FLOW**

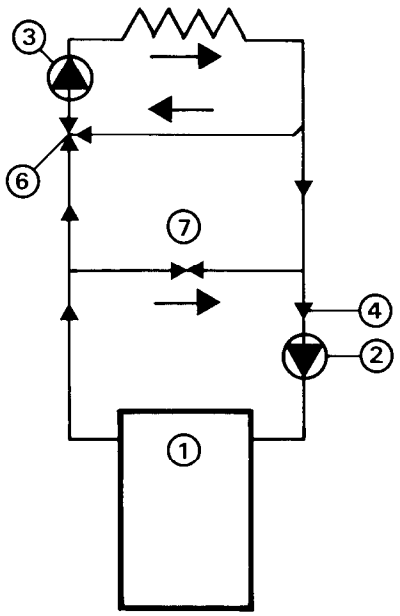


Fig. 7 **WITH MIXING VALVE**

BASIC SYSTEMS

KEY

1. Flexiflame boilers
2. Primary Pump
3. Secondary Pump
4. Expansion vessels or close coupled feed and open vent.
5. Manifold
6. Mixing Valve
7. Bypass with Regulating Valve.

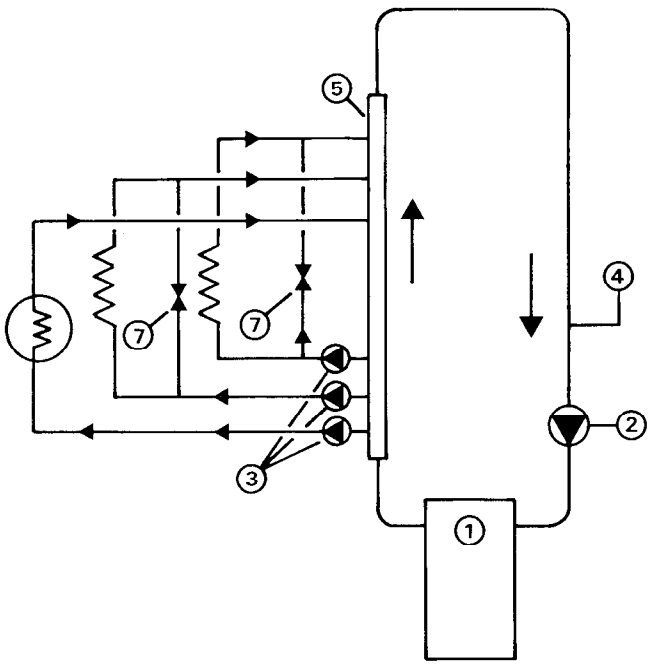


Fig. 8

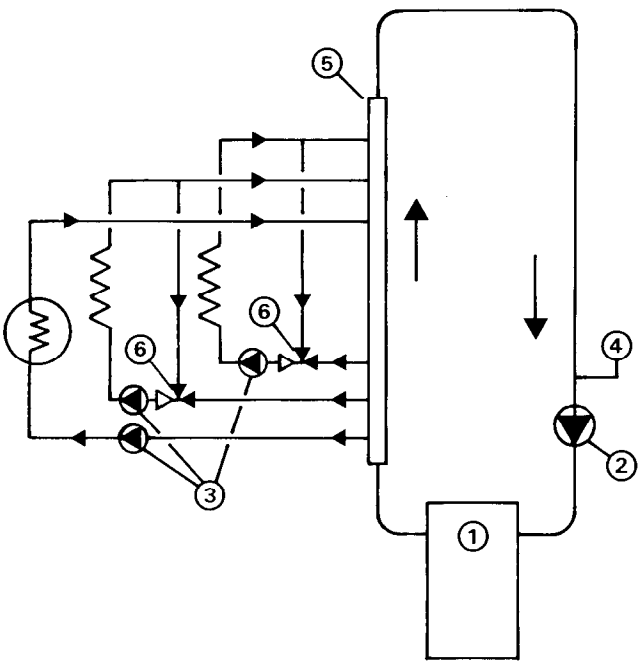


Fig. 9

SYSTEMS WITH PRIMARY AND SECONDARY CIRCUITS

KEY

1. Flexiflame boilers
2. Primary pump
3. Secondary pump
4. Expansion vessel or close coupled feed and open vent
5. Manifold
6. Mixing valves
7. Bypass with regulating valve

4 INSTALLATION INSTRUCTIONS

4.1 Handling the boiler

The boilers are supplied fully assembled covered in polythene and secured in a wooden crate with four bolts and nuts, two at the base and one on each top monotube flange.

Note :

The bolts securing the boiler to the crate may be retained as spares for flanges.

Remove the wooden crate and any other packing materials.

Remove the accessory box and gaskets from within the boiler casing.

List of contents

1 × plastic bag taped to combustion chamber containing flange gaskets (one for monotube and one for gas header).

1 × set of instructions taped to inside of door.

1 × carton located behind doors on lower monotube containing :

12 × 16 mm by 70 mm long bolts
12 × 16 mm nuts
4 × 16 mm by 50 mm long levelling screw (use 8 mm key)
2 × keys for door lock taped on tube to pump.

Note :

Do not lie the boiler on its back

4.2 Positioning the boiler

Check that the proposed boiler location is sufficiently strong to take the weight of the boilers and other components.

No purpose made plinth is required for reasonably even floors.

Position the boilers away from adjacent walls by a minimum of 100 mm (4"). The boilers are self supporting and do not need to be fixed to the structure.

Level the boiler using the screws provided in the accessory box.

4.3 Connecting the boilers

For multi boiler installations fit the intermediate gaskets and bolt up the flanges.

Do not connect the end appliances to the system before reading 4.4

4.4 Side Panels

Side panels are not supplied with the boilers.

If side panels are required, the following accessories are available from Chaffoteaux Limited.

Component	Part No.
Side panel for 280 (Left or Right)	1001144
Side panel for 420 (Left or Right)	1001143

Before connecting end appliances to the system, fit side panel support brackets.

4.5 Connecting to system

Mating flanges are not provided with the boilers.

Should mating flanges not be readily obtainable, the following are available from the manufacturer.

Flange kits	Part No.
Gas	
Blank	CHL 007
Screwed 2 1/2" BSP	CHL 008
Water	
Screwed 4" BSP	CHL 012

4.6

Electrical connections

Connect the boilers to the electrical supply as shown in the wiring diagram (fig. 10).

Multiple Installations

Where more than one boiler is installed, continuous sequencing of modules can be effected either by using boiler thermostats or by using an external signal from a step controller.

Boiler can be wired to operate as one unit under the control of boiler thermostat by linking terminals 1, 2 and 3 or by separate control from a sequence controller.

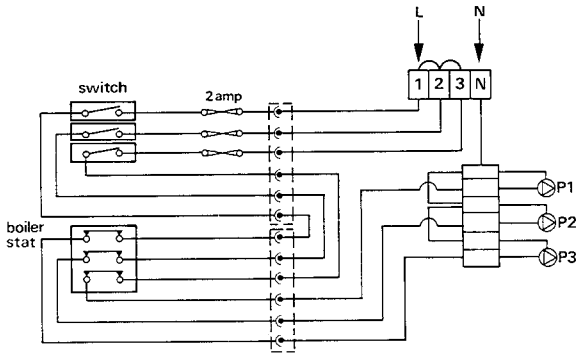


Fig. 10

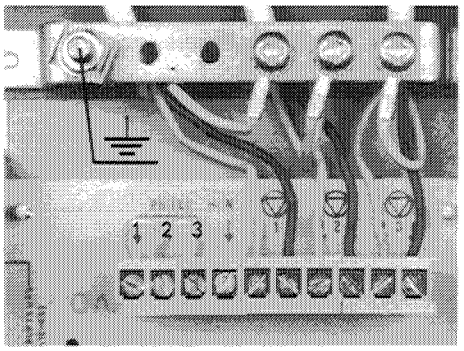


Fig. 11

4.7 Gas connection

The gas supply can be connected to either end of the flanged manifold. An isolating valve should be fitted adjacent to the boilers and provision made for measuring working inlet gas pressure.

4.8 Water connection

It is important that the flow and return connections are made so the direction of water flow is from right to left through the boilers.

5. OPERATING AND COMMISSIONING INSTRUCTIONS

5.1

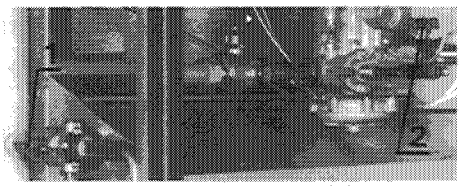


Fig. 12

Filling the system

Fill the system slowly. The filling operation should be carried out with the flow and return isolating valves on each module (1 and 2 - fig. 12) fully open.

5.2

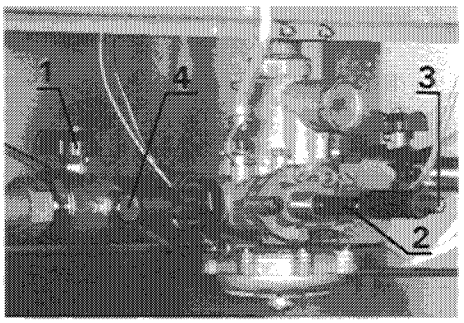


Fig. 13

Lighting the pilots

a) Open the gas cock on each module by turning gas cock handle in line with pipe (1, fig. 13).

b) Press the gas control spindle (2, fig. 13) and hold in.

c) Light the pilot by pressing piezo ignitor (3, fig. 13) and wait for approximately 20 seconds.

d) Release the gas control spindle (2, fig. 13) and the pilot should remain alight.

NOTE – If the pilot will not establish, check that the gas supply to each module is purged of air by loosening the plug in the side of the gas cock (4, fig. 13). When air has been purged tighten the plug and repeat the lighting procedure.
Test for gas joint soundness.

5.3

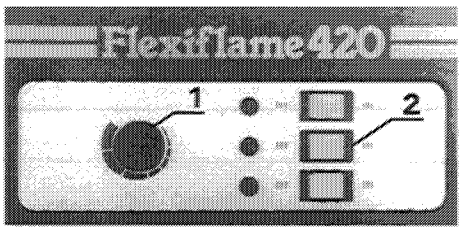


Fig. 14

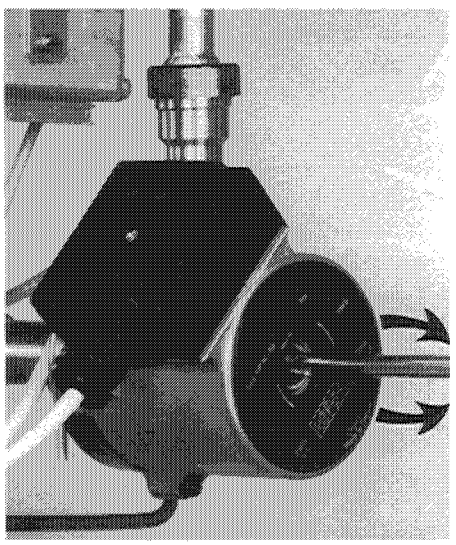


Fig. 15

Firing the modules

Establish the pilots on all modules as in 5.2

Set the boiler thermostat on each boiler (1, fig. 14) to a minimum, and check that all module isolating switches (2, fig. 14) are off.

Check that pumps are free by removing end cap and using screwdriver to rotate end of spindle (fig. 15).

Set the primary circulation pump in operation, and check that all system circuits are open and will allow circulation.

Turn up the boiler thermostat (1, fig. 14) and switch on the individual modules at the isolating switches (2, fig. 14). The modules should now fire.

NOTE – Check for gas soundness and correct flue operation.

5.4

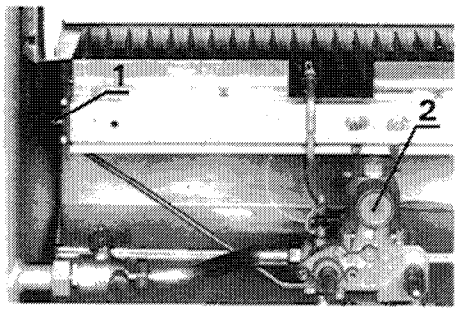


Fig. 16

Checking the gas rate

The burner pressure of each module should be checked before completing the commissioning.

a) Turn off the module to be checked at the isolating switch (2, fig. 14).

b) Remove the plug (1, fig. 16) from the pressure test point on the end of the burner manifold.

c) Connect a suitable pressure gauge to the test point.

d) Remove the cap (2, fig 16) from the volume governor.

e) Turn on the module being checked at the isolating switch (2, fig. 14).

f) Adjust the gas pressure to the value given in the technical data on page 2 by turning the regulating screw with a suitable screw driver.

(**NOTE:** Screw in to reduce burner pressure and out to increase burner pressure).

g) Turn off module being checked to replace pressure test point plug and volume governor cap.

6. SERVICING REQUIREMENTS

Chaffoteaux Limited recommend that boilers are serviced annually.

Installers and clients are reminded that the Flexiflame boiler is guaranteed for twelve months from the date of installation.

Spare parts are available from Authorised Spares Stockists only.

6.1 Routine Servicing

For efficient and trouble free operation it is important that the Flexiflame receives annual maintenance. This routine service will normally be confined to :

1. Cleaning the burner
2. Cleaning the heat exchanger
3. Checking the gas controls
4. Cleaning the pilot
5. Cleaning the thermocouple

The following checks are recommended :

a) Check the function of appliance and burner pressure after allowing it to warm up thoroughly.
b) Check by observing flame picture for flame lift off, flame bounce and excessive yellow tips.
c) Check, clean or replace components as necessary.
d) The diaphragm should be replaced on the third year of service unless previously found necessary.

N.B. Before commencing any service work ensure that :

A) The gas and water are turned off at the service cocks.
B) The electricity supply is isolated.
C) The gas and water connections are checked for soundness after service or re-assembly.

NOTE – Access to the modules will be improved by removing doors.

6.2

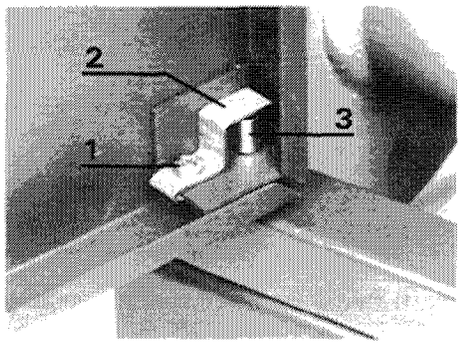


Fig. 17

To remove the boiler doors

a) Open door.
b) Remove Phillips screw holding retaining wire at top of door.
c) Remove Phillips screw (1, fig 17) at bottom of door and remove bracket (2, fig. 17).
d) Lift out pin (3, fig. 17) and slide door from frame – bottom edge first.
e) Replace in reverse order.

6.3

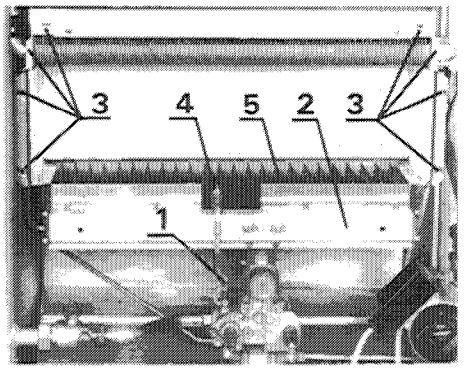


Fig. 18

To clean the burner

a) Slacken screw (1, fig. 18) retaining pilot tube and lift out tube.

b) Remove manifold by unscrewing 8 screws and lift off with manifold gasket.

c) Remove combustion chamber front cover by unscrewing 8 screws (3, fig. 18).

d) Disengage thermocouple and electrode support bracket (4, fig. 18) by sliding forward and lifting up.

e) Remove two screws (2, fig. 28) from burner rear fixing to chassis.

f) Remove two screws (1, fig. 24) securing burner front to burner base.

g) Remove thermocouple and electrode from bracket by undoing retaining screw (2, fig. 24) and parting both halves of bracket.

h) Lift out burner head assembly (5, fig. 18).

j) The burner can be cleaned by inverting and brushing with a soft brush to remove any deposits.

k) Replace components in reverse order. Use new manifold gasket.

6.4

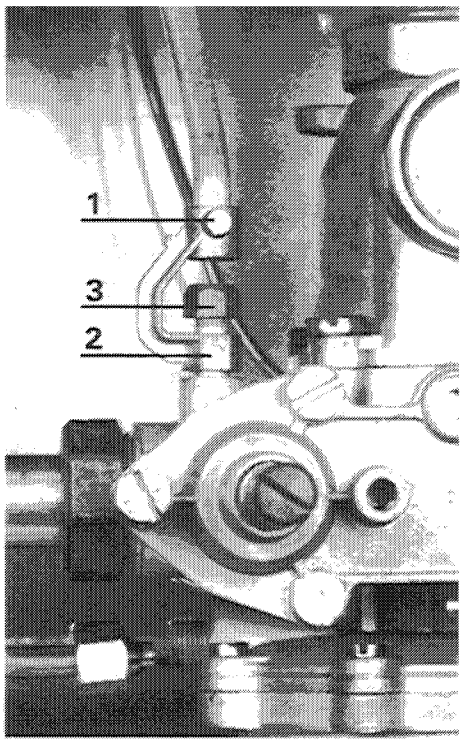


Fig. 19

To clean pilot

a) Slacken screw (1, fig. 19) retaining pilot tube and lift out tube.

b) Unscrew pilot tube bracket (2, fig. 19) using 10 mm spanner.

c) Remove pilot injector retaining nut (3, fig. 19) using 10 mm spanner.

d) Remove injector and rubber seal from retaining nut.

e) Rinse pilot injector in solvent and use warm air (or by blowing) to clear.

NOTE – Do not use wire to clear pilot as damage may be caused to injector orifice.

f) Replace components in reverse order.

6.5

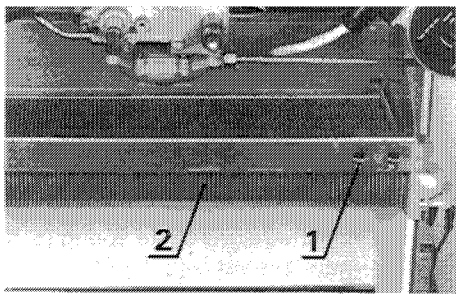


Fig. 20

To clean heat exchanger

a) Isolate electrical supply to module.

b) Remove burner as detailed in 6.3

c) Remove two screws (1, fig. 20) and slide out flue duct inspection cover.

d) The heat exchanger may be cleaned in position by using brushes or vacuum cleaner but in severe cases it may be necessary to remove the heat exchanger from the appliance – if so proceed as follows : –

a) Isolate module with flow (1, fig. 12) and return (2, fig. 12) valves.

b) Remove four screws (1, fig. 28) retaining combustion chamber sides to chassis.

c) Remove thermocouple (1, fig. 23) from thermoelectric valve at rear of gas section using 10 mm spanner.

d) Unscrew pump union (1, fig. 22) at return outlet.

e) Unscrew left hand side flow union at isolating valve (1, fig. 12).

f) Lower heat exchanger and remove from appliance.

g) Invert matrix (2, fig. 20) and remove two fixing screws from rear of combustion chamber panel to heat exchanger.

h) The heat exchanger can now be washed and brushed with warm soapy water.

j) Rinse off and leave to dry.

k) Re-assemble heat exchanger and components in reverse order.

NOTE – Ensure flue access plate (5, fig. 29) is located correctly by centre fixing clip.

6.6

To clean thermocouple and electrode

a) Remove pilot tube and manifold (see Section 6.3 a to d).

b) Clean thermocouple and electrode by using a lint free cloth to remove any deposits.

N.B. : If the thermocouple tip appears burnt or cracked, exchange to avoid a possible break down at a later date (see Section 7.2).

Thermocouple output :
Closed 18 millivolts ± 2
Open 24 millivolts ± 2

c) Examine and clean the electrode tip, if the tip appears damaged replace electrode and lead assembly.

6.7

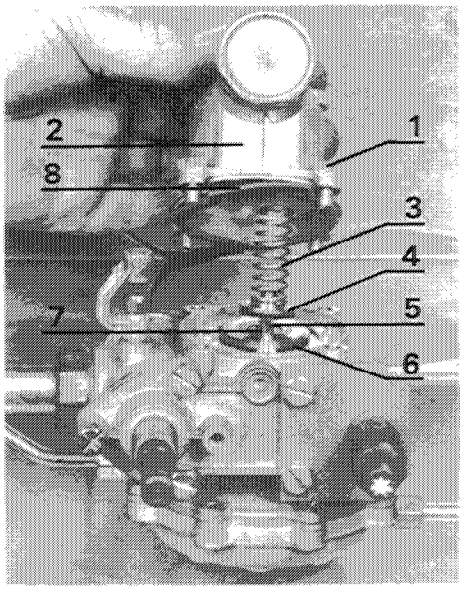


Fig. 21

To clean gas valve

a) Remove the burner as in 6.3

b) Remove four screws (1, fig. 21) securing governor housing to gas section.

c) Lift off and remove governor housing (2, fig. 21).

d) Lift off in sequence :
- main gas valve spring (3, fig. 21)
- first stage gas valve (4, fig. 21)
- first stage gas valve spring (5, fig. 21)
- main gas valve (6, fig 21)

Place all components on clean surface.

e) Withdraw main gas valve spindle (7, fig. 21) and remove all grease using lint free cloth. Re-grease using silicone and reposition in gas valve.

f) Clean the valve seating and replace the gas valve facing if necessary.

g) Renew gasket (8, fig. 21) between governor housing and gas valve body.

h) Re-assemble components in reverse order.

6.8

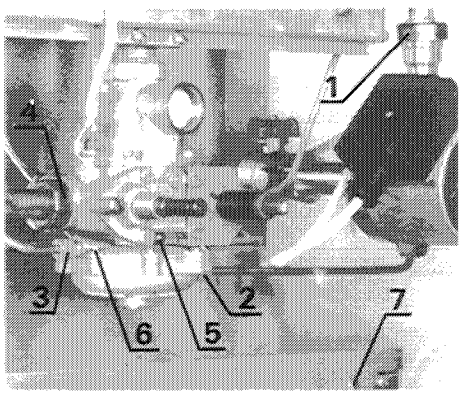


Fig. 22

To service the water section

a) Remove screw 7.

b) Remove inspection cover.

c) Unscrew unions to high (2, fig. 22) and low (3, fig. 22) pressure tubes using a 13 mm spanner.

d) Unscrew gas union nut (4, fig. 22), using a 30 mm spanner.

e) Ease high and low pressure tubes aside and withdraw gas and water section assembly complete.

f) Slacken two retaining grub screws (5, fig. 22) gas section to water section and separate components noting position of high and low pressure unions.

g) Remove 8 screws (6, fig. 22) holding water section halves together.

h) Separate halves of water section and remove diaphragm, bearing plate and spindle. Wash out components in warm soapy water ensuring high and low pressure tubes bores are clear.

j) Check spindle for any scale deposits – if found remove before re-assembling.

k) Check condition of diaphragm and replace if necessary.

l) Reposition diaphragm in bottom half of water section.

m) Grease spindle and gland washer and reposition spindle in gland washer, top cover water section.

n) Re-assemble two halves and tighten the eight screws (6, fig. 22) evenly.

o) Reposition the water section in gas section and tighten the grub screws (5, fig. 22) noting high pressure port, lower water section facing to right.

p) Reposition gas and water section in appliance and tighten all union nuts.

6.9 Final checks

a) Replace all components in reverse order noting particularly that the gasket between the gas section and the manifold is replaced and correctly positioned upon reassembly.

b) Open all isolation valves.

c) Restore any system controls to their original setting.

d) After the boiler is lit, check all gas and water connections for soundness.

e) Allow the boiler to warm up thoroughly, then check the burner pressure and adjust if necessary to that given in the technical data section (see page 2).

7. Replacing components

Before commencing replacing components ensure that :

A) The gas and water are turned off at Service Cocks.

B) The electricity supply is isolated.

C) The gas and water connections are checked for soundness after re-assembly.

7.1

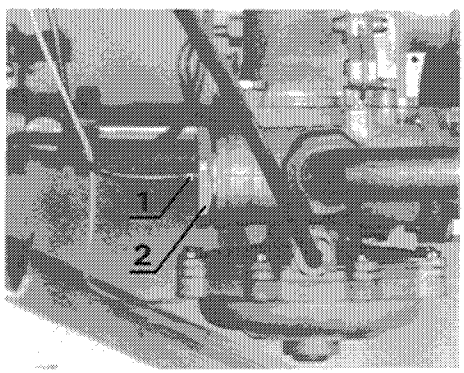


Fig. 23

To replace the thermoelectric valve

a) Remove thermocouple nut (1, fig. 23) using 10 mm spanner.

b) Unscrew valve (2, fig. 23) from gas section using a 35 mm or adjustable spanner.

c) Withdraw thermoelectric valve. Replace components in reverse order.

7.2

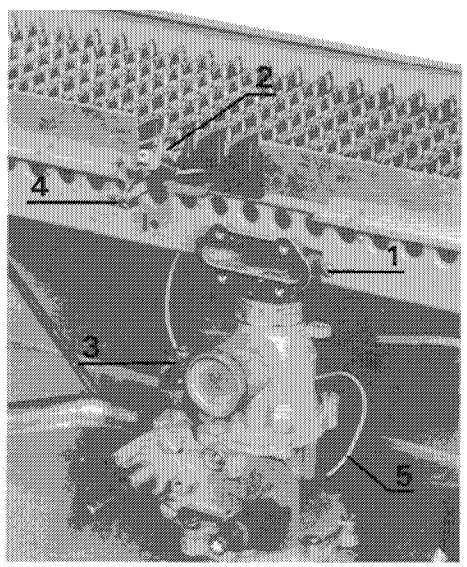


Fig. 24

To replace thermocouple and over heat cut off device

a) Remove two screws (3, fig. 28) retaining over heat thermostat to right hand side of heat exchanger matrix.

b) Remove thermocouple nut (1, fig. 23) from thermocouple valve at the rear of gas section.

c) Slacken grub screw (3, fig. 24) holding pilot tube.

d) Remove eight screws (2, fig. 18) holding manifold to gas section and burner.

e) Remove manifold.

f) Slide thermocouple support bracket (4, fig. 24) forwards and lift clear of burner.

g) Remove clamping screw (2, fig. 24) and part thermocouple support bracket.

h) Lift thermocouple tip out of bracket and slide down through burner bars and remove from appliance.

j) Using new thermocouple and safety over heat thermostat replace in reverse order.

7.3

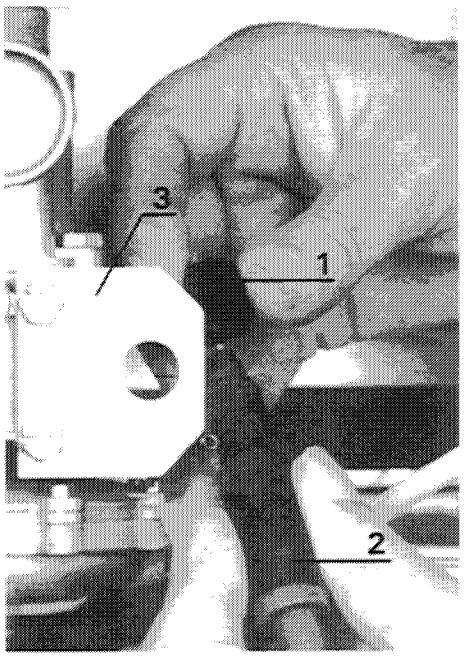


Fig. 25

To replace piezo unit

a) Pull electrode lead (5, fig. 24) off to the rear.

b) Unscrew plastic retaining nut (1, fig. 25) from rear of piezo body.

c) Remove piezo (2, fig. 25) cartridge from mounting bracket (3, fig. 25).

d) Replace with new unit in reverse order.

7.5

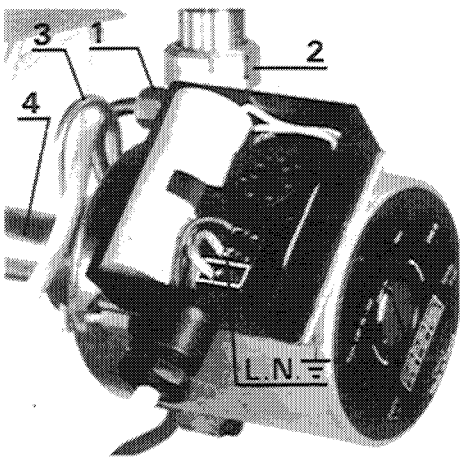


Fig. 27

To replace pump and volute

a) Isolate electrical supply.

b) Isolate module at flow and return valves (1 and 2, fig. 12).

c) Remove cover from electrical box and disconnect wiring (L and N, fig 27) to pump.

d) Unscrew nut (1, fig. 27) at rear of volute using 12 mm spanner and disconnect high pressure tube.

e) Unscrew union nut (2, fig. 27) volute to non return valve.

f) Remove clip (3, fig. 27) volute to extension tube.

g) Remove pump and volute by sliding forward off extension tube (4, fig. 27). Replace components in reverse order.

7.6

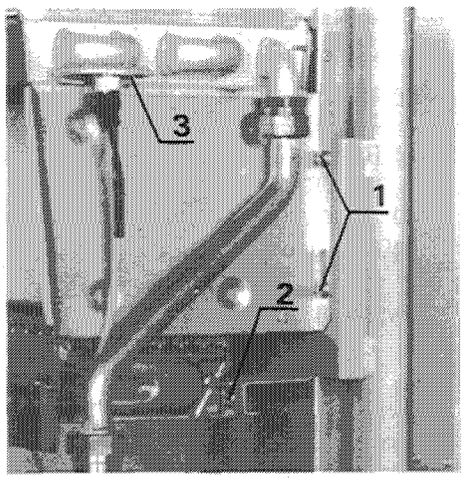


Fig. 28

To replace heat exchanger matrix

a) Isolate electrical supply.

b) Isolate module with flow (1, fig. 12) and return (2, fig. 12) valves.

c) Remove burner as detailed in 6.3

d) Remove 2 screws (1, fig. 20) and slide out flue duct inspection cover.

e) Remove 4 screws (1, fig. 28) retaining combustion chamber sides to chasis.

f) Remove thermocouple nut (1, fig. 23) from valve at rear of gas section using 10 mm spanner.

g) Unscrew pump union (1, fig. 22).

h) Unscrew left hand side flow union at isolating valve (1, fig. 12).

j) Lower heat exchanger and remove from appliance.

k) Invert matrix (2, fig. 20) and remove two fixing screws from rear of combustion chamber panel to heat exchanger.

l) Remove two screws (3, fig. 28) retaining safety over heat thermostat to right hand side of heat exchanger matrix.

m) Re-assemble heat exchanger and components in reverse order.

7.7

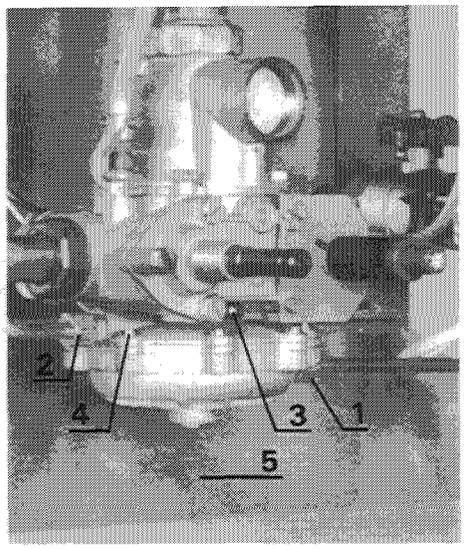


Fig. 29

To replace diaphragm

NOTE – For removal of centre and upper water section, it may help to remove the flue access plate which is retained by two screws (1, fig. 20) to facilitate removal of the water section – upon replacement ensure access plate (5, fig. 29) is located by centre fixing clip.

a) Undo high (1, fig. 29) and low (2, fig. 29) pressure union nuts using 13 mm spanner.

b) Slacken the centre and right hand grub screws (3, fig. 29) retaining water section to gas section.

c) Lower water section and remove from appliance.

d) Remove eight fixing screws (4, fig. 29) holding top to bottom half of water section.

e) Lift off top section casting and remove diaphragm.

f) Replace components in reverse order.

7.8

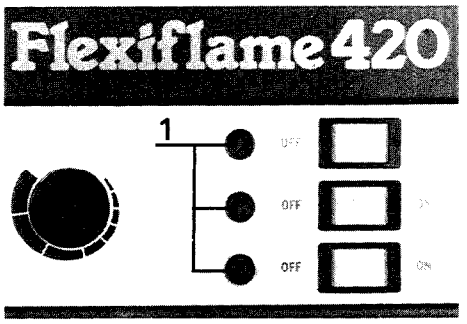


Fig. 30

To replace fuse.

a) Isolate electrical supply to the boiler.

b) Using 6 mm wide blade screwdriver, push fuse holder (1, fig. 30) in and turn 90° anti-clockwise.

c) Release pressure and remove fuse holder by pulling out.

d) Fit new fuse to holder and replace.

e) Re-establish electrical supply.

8. FAULT FINDING

FAULT	POSSIBLE CAUSE	REMEDY
Pilot will not light	**1.** Gas supply not turned on. **2.** Gas supply pipes not purged of air **3.** Blocked pilot or injector	(See 5.2) (See 5.2 and Note) Clean or replace (See 6.4).
Pilot goes out when gas knob is released (See 6.4)	**1.** Gas knob not fully held in before releasing **2.** Thermocouple not in pilot flame **3.** Pilot flame too soft. **4.** Faulty thermocouple or union loose. **5.** Main gas valve not purged. **6.** Faulty thermoelectric valve. **7.** Overheat failing.	Press firmly before releasing (See 5.2). Adjust (12 milli-volts min, required measured at high limit thermostat). Tighten pilot injector securing nut Replace or tighten (See 7.2) Repeat ignition sequence (See 5.2) Replace (See 7.1) Replace (See 7.2)

FAULT	POSSIBLE CAUSE	REMEDY
Main burner will not light or lights at low flame	**1.** Electricity not switched on.	Switch on (See 5.3)
	2. Fuses missing or blown in control box.	Replace 1 amp. (See 7.8)
	3. Boiler thermostat at low setting.	Turn up fully (See 5.3)
	4. Boiler thermostat faulty or not plugged into control box.	Replace or check connection.
	5. Gas supply insufficient.	Check working pressure – 8 in w.g. required at inlet.
	6. Lack of water in system.	Fill (See 5.1)
	7. Air in system.	Purge system.
	8. Boiler pump faulty.	Check or replace (See 7.4)
	9. Water filter in return pipe blocked or high pressure and balancing tubes blocked.	Remove and clean.
	10. Bearing plate spindle bent or dry.	Replace or grease (See 6.8)
	11. Diaphragm split or stretched.	Replace (See 7.7)
	12. Heat exchanger blocked.	Descale or replace (See 6.5).
Complaints of noise	**1.** Over-gassed.	Check gas rate and adjust (See 5.4)
	2. Air in system.	Purge system.
	3. Boiler thermostat wrongly set or faulty.	Check flow temperature Refer to technical date (p. 2)
	4. Water section spindle sticking.	Check operation and grease (See 6.8)
	5. Gas valve sticking open.	Clean or grease (See 6.7)
	6. Dirt/swarf on gas valve facing.	Clean and reassemble (See 6.7)
	7. Insufficient water flow.	(See 1.4)
	8. Pump noise or vibrating.	Replace or refit (See 7.4)
	9. Heat exchanger partially blocked.	Clean heat exchanger and check system (See 6.5).
Excessively noisy burner	**1.** Over-gassed.	Check gas rate (See 5.4)
	2. Dirty burner bars.	Clean (See 6.3)
	3. Burr on injectors.	Remove or replace.
Frequent sooting of heat exchanger and burners	**1.** Linting.	Clean burner (See 6.3)
	2. Insufficient combustion air to room or compartment.	Check requirements (See 2.6)
	3. Heat exchanger fins blocked.	Remove and wash thoroughly (See 6.5)
	4. Restriction in flue.	Check flue (See 2.5)
	5. Wrong injectors fitted.	Check or replace. Refer to technical data (p. 2).
Gas staying on after pump is switched off	**1.** High pressure or balancing tubes blocked.	Remove and clean.
	2. Gas valve sticking open.	Clean and grease (See 6.7)
	3. Water section spindle sticking.	Clean and grease (See 6.8)

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Imp. SH - Re 1-133 / 00 - 5/94

NSPrint (0939) 232796

ESP026