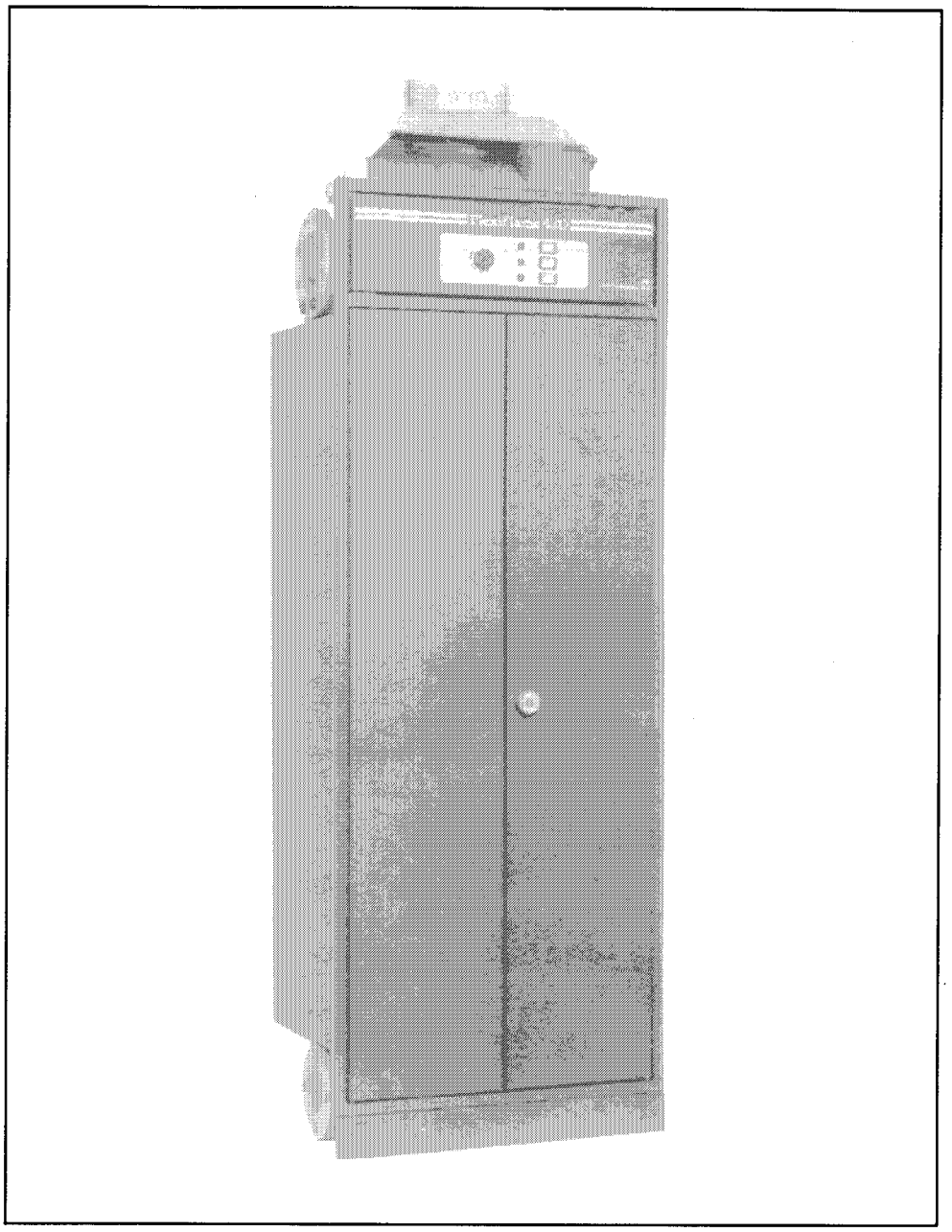
Flexiflame 280 & 420 MK II



installation and servicing instructions

(leave these instructions adjacent to the gas meter)

Chaffoteaux et Maury

Looking Good. Heating Better

Introduction

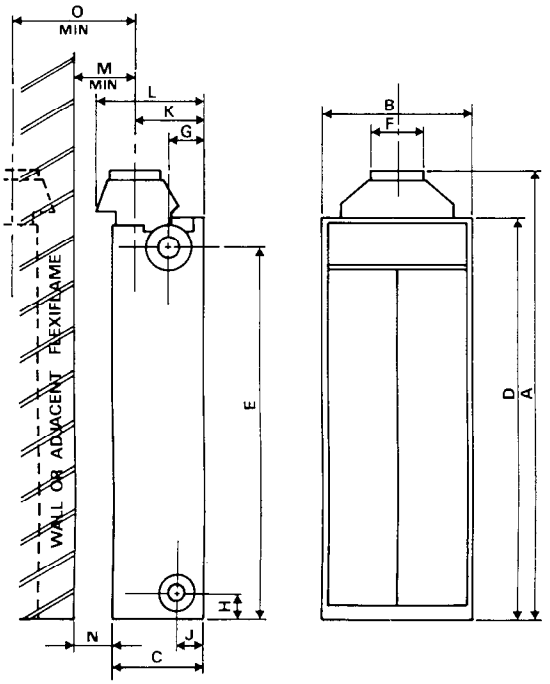
The Flexiflame 280 and 420 are developments of the widely used Flexiflame 140 and comprise two or three standard boiler assemblies (modules), each with an output of 41 kW (140,000 Btu/h), mounted vertically above each other providing high output to floor space and high output to weight ratios.

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

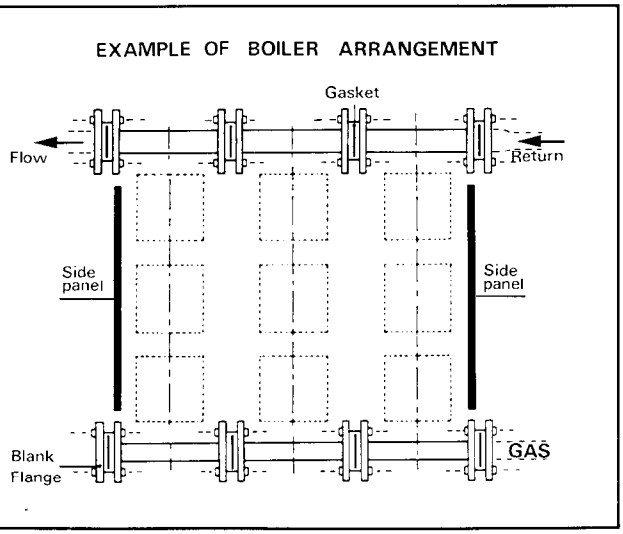


Fig. 2

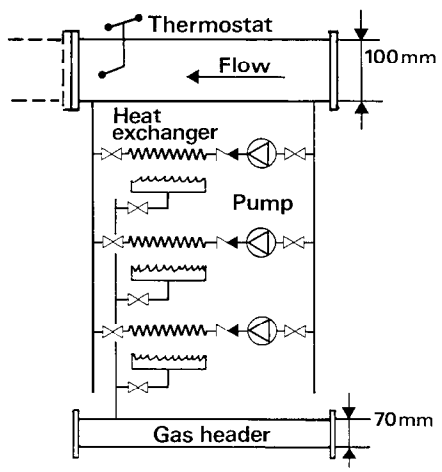


Fig. 3

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

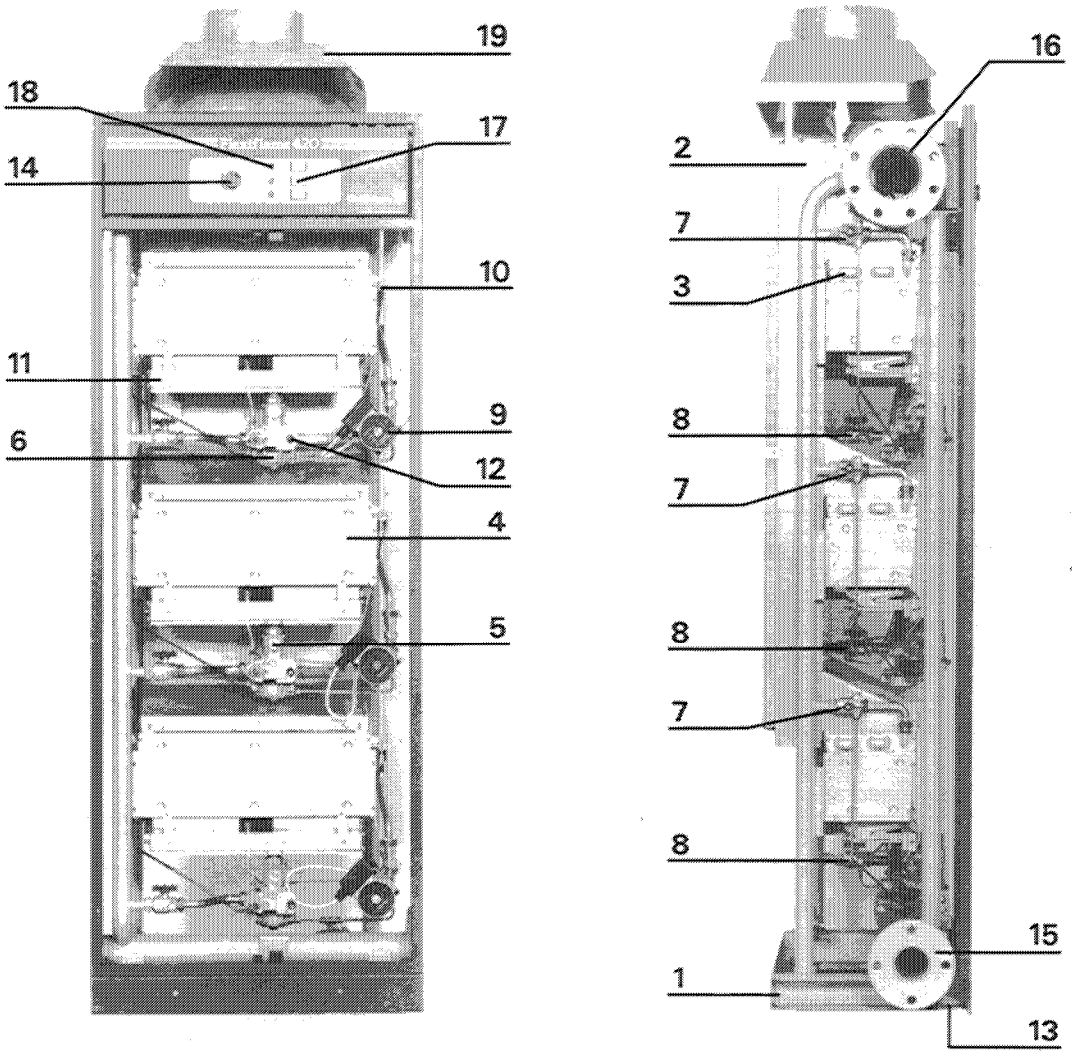


Fig. 4

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.

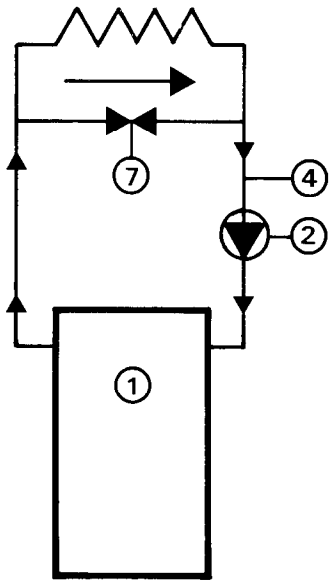


Fig. 5 **PUMP IN RETURN**

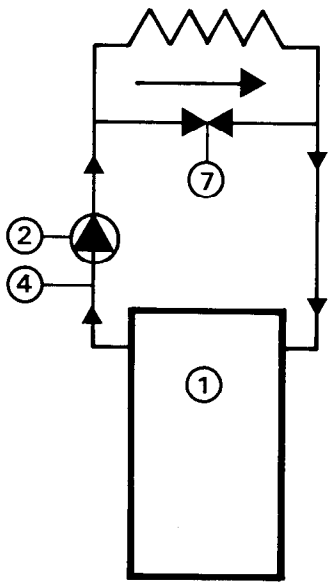


Fig. 6 **PUMP IN FLOW**

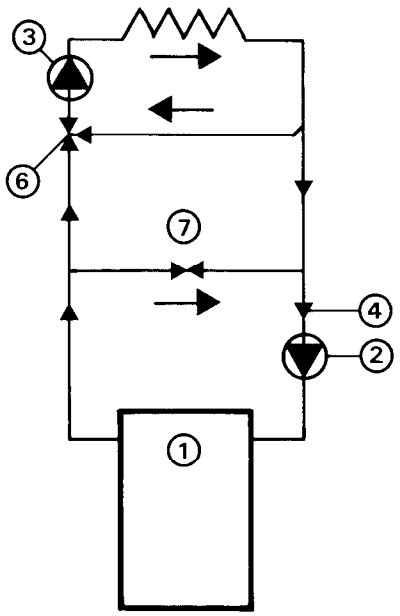


Fig. 7 **WITH MIXING VALVE**

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.

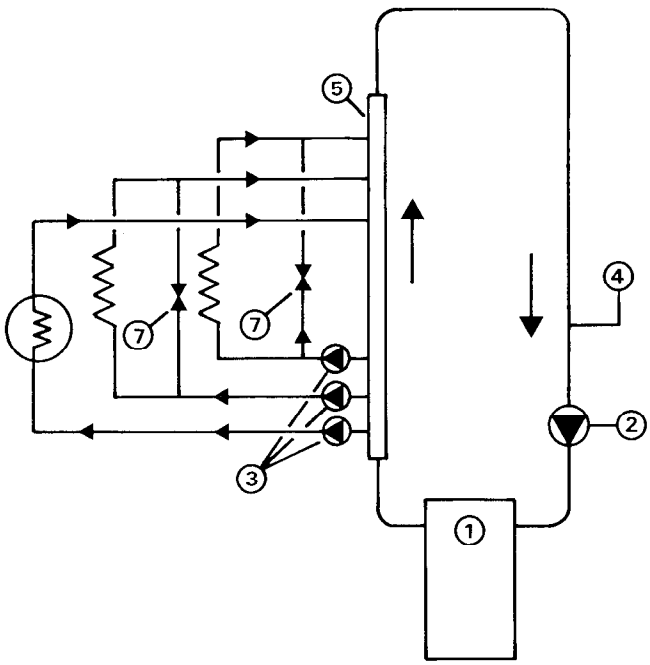


Fig. 8

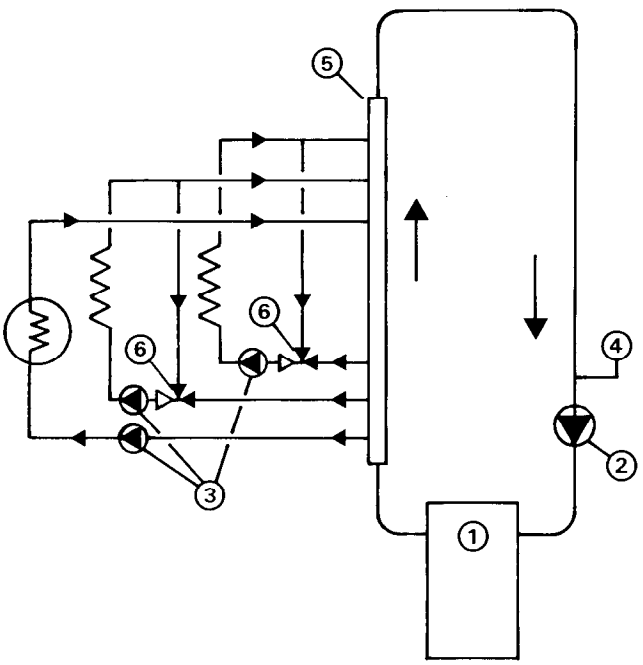


Fig. 9

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.

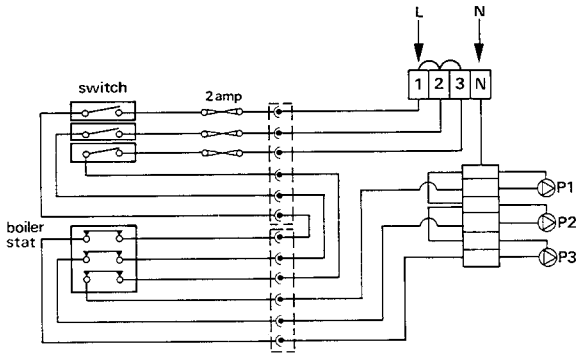


Fig. 10

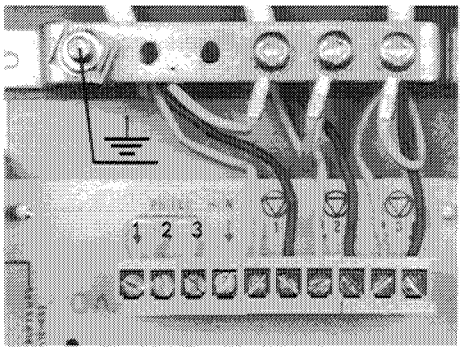


Fig. 11

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

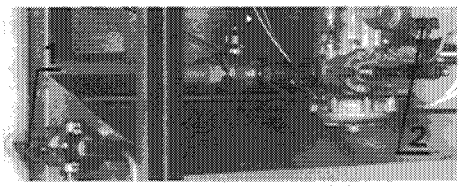


Fig. 12

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

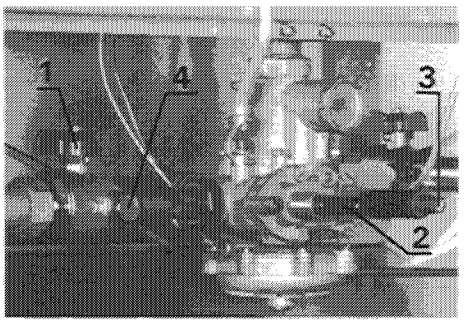


Fig. 13

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

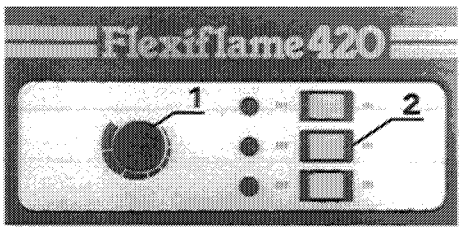


Fig. 14

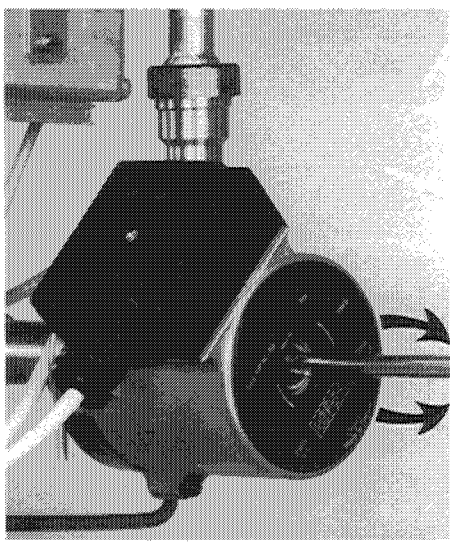


Fig. 15

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

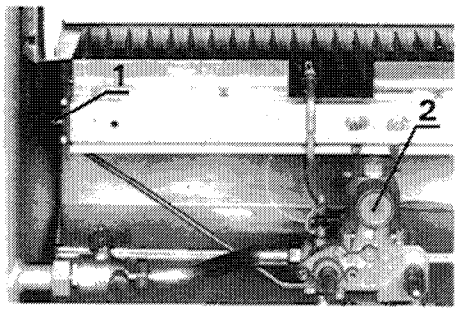


Fig. 16

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

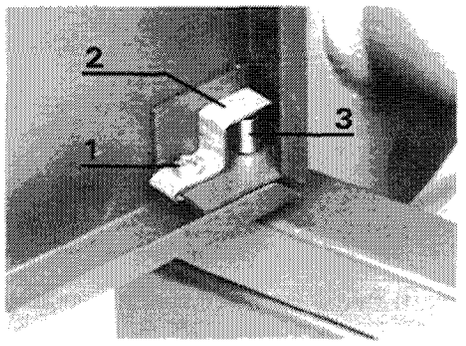


Fig. 17

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

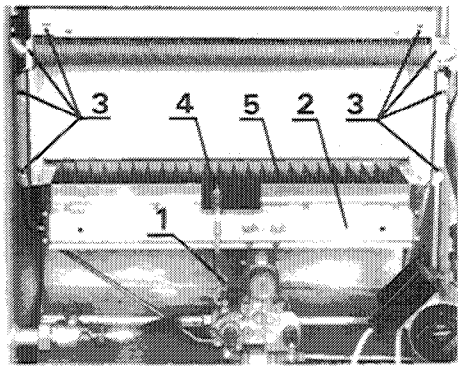


Fig. 18

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

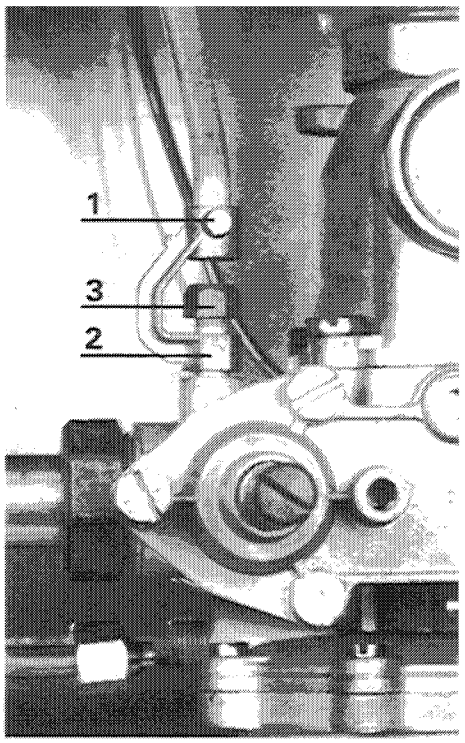


Fig. 19

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

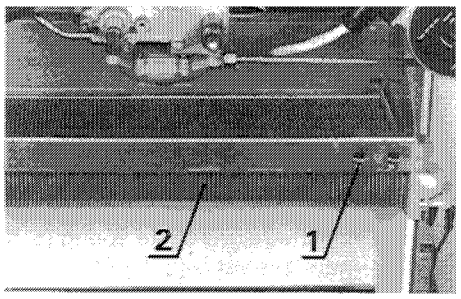


Fig. 20

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

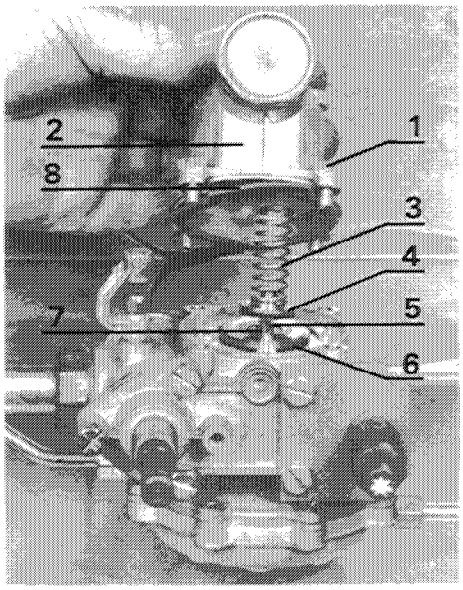


Fig. 21

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

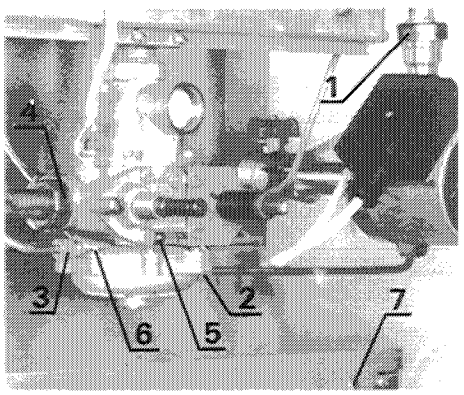


Fig. 22

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

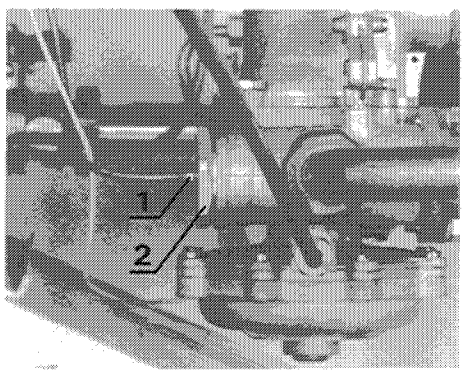


Fig. 23

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

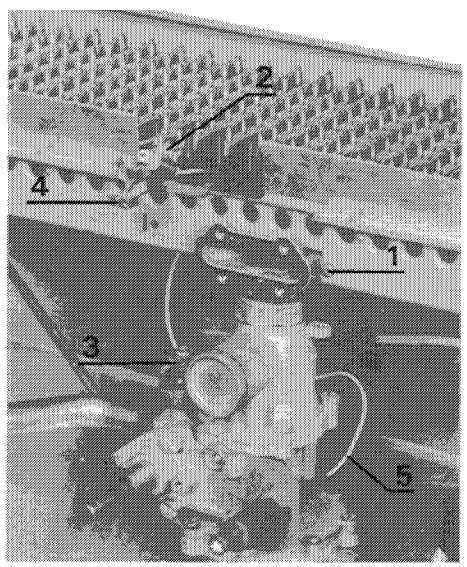


Fig. 24

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

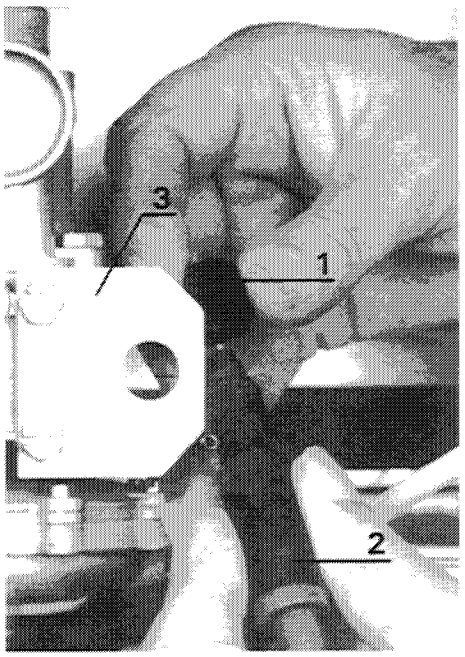


Fig. 25

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

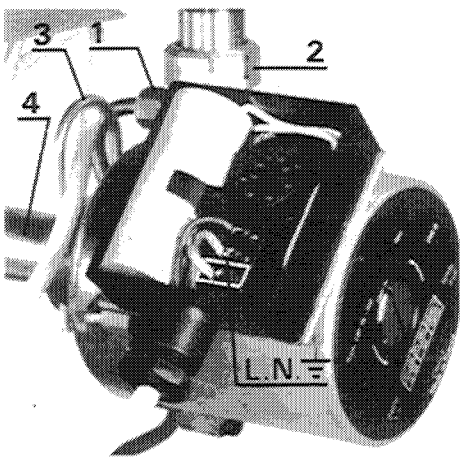


Fig. 27

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

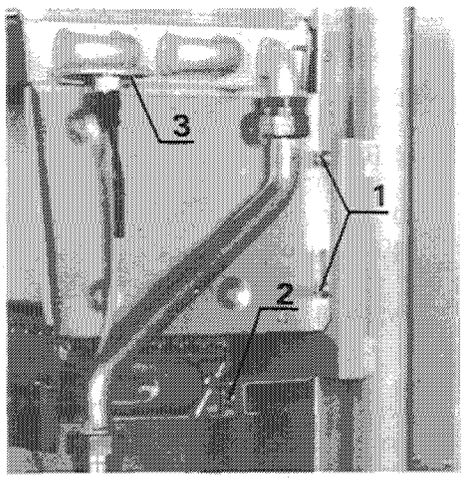


Fig. 28

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

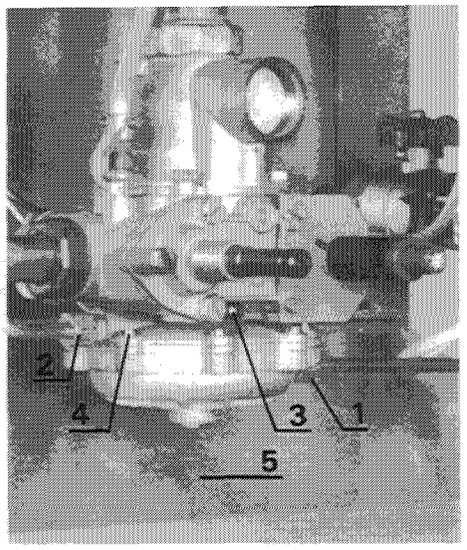


Fig. 29

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

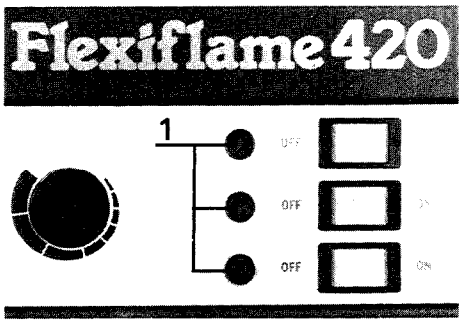


Fig. 30

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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