



Bosch Group

# DANESMOOR

## FS12/18 & FS18/25

CONVENTIONAL FLUE AND ROOM SEALED BF  
FLOOR STANDING OIL-FIRED PRESSURE JET APPLIANCES

## INSTALLATION AND SERVICING INSTRUCTIONS



### Patents Pending

Boiler — Application No. 0203466.8

Baffle — Application No. 0303731.4

Burner Silencer — Application No. 0317154.3



### BOILER OUTPUT

Hot Water and Central Heating

**12/18 MINIMUM 12 kW** (41,000 Btu/h)  
**MAXIMUM 18 kW** (61,500 Btu/h)

**18/25 MINIMUM 18 kW** (61,500 Btu/h)  
**MAXIMUM 25 kW** (85,000 Btu/h)



Worcester supports the  
Benchmark code of practice

THESE INSTRUCTIONS APPLY TO UK MODELS ONLY

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE APPLIANCE

## Contents

1. Installation Regulations .....	Page 2	9. Heating and Hot Water System.....	Page 14
2. General Information .....	Page 2	10. Electrical .....	Page 14
3. Technical Data.....	Page 3	11. Installation .....	Page 20
4. Siting the Appliance .....	Page 5	12. Commissioning the Appliance .....	Page 21
5. Removal of the Cabinet.....	Page 5	13. Instructions to the User .....	Page 23
6. Air Supply.....	Page 5	14. Routine Cleaning and Inspection.....	Page 23
7. Flue System.....	Page 7	15. Short Parts List.....	Page 25
8. Oil Supply .....	Page 9	16. Fault Finding .....	Page 26

## 1. Installation Regulations

1.1 General installation information and advice may be obtained from the Oil Firing Technical Association for the Petroleum Industry (OFTEC). Training courses are also offered by OFTEC, leading to inclusion on their list of registered engineers.

1.2 The appliance should be installed by a competent person. The person installing the appliance should be aware of the Health and Safety at Work Act and take appropriate action to ensure that the regulations are adhered to. In order to give optimum efficiency and trouble free operation the appliance should be commissioned by a qualified engineer. OFTEC recommends the use of registered engineers for the commissioning of oil-fired burners.

1.3 The manufacturers notes must not be taken, in any way, as overriding statutory obligations.

1.4 The compliance with a British Standard does not, of itself, confer immunity from legal obligations. In particular the installation of this appliance must be in accordance with the relevant requirements of the following British Standards and regulations in respect of the safe installation of equipment.

BS 5410: part 1 & 2: Code of practice for Oil Fired Boilers.

BS 799: part 5: Specification for Oil Storage Tanks.

BS 7593: Code of Practice for treatment of water in domestic hot water central heating systems.

BS 5449: part 1: Specification for forced circulation hot water central heating for domestic premises.

BS 5955: part 8: Specification for the installation of thermoplastic pipes and associated fittings for use in domestic hot and cold water services and heating systems.

BS 7291: Thermoplastic pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings.

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

BS 7671: IEE Wiring Regulations, current edition.

The Building Regulations Part J and L1 England and Wales; Part F and Part J Section III Scotland; Part L and Part F Northern Ireland.

Local water company bye-laws.

The Control of Pollution (Oil) Regulations.

1.5 To ensure that the installation will perform to the highest standards, the system and components should conform to those mentioned in the instructions.

## 2. General Information

**benchmark** The **Benchmark** initiative is the new code of practice to encourage the correct installation, commissioning and servicing of domestic central heating boilers and system equipment.

**The 'Log-book' is a vital document that must be completed by the installer at the time of installation. It confirms that the boiler has been installed and commissioned according to the manufacturers instructions.**

Without the completion of the Log-book, manufacturers may refuse to respond to a call-out from a householder, who will be advised that he or she must call back the installer, who has not fulfilled his obligations to record the information required by the initiative.

**It is important that:**

The services and the system are properly flushed as specified.

The User is clearly instructed on the correct operation of the appliance.

The benefits of regular servicing are explained - to maintain the efficiency and extend the life of the appliance.

2.1 These instructions cover both conventional flue (CF) and room sealed balanced flue (RS) appliances.

2.2 The Worcester Danesmoor range of appliances covered in these instructions has been designed to serve domestic central heating and hot water requirements ranging from 12kW to 25kW.

2.3 The RS balanced flue appliance forms a fully room sealed system by supplying air to the burner through a flexible tube. The sealed burner alleviates the need for an air brick to be located in the boiler room.

Because the balanced flue system does not rely on the cabinet panels to form the room seal, combustion readings can be taken from the flue outlet plate as on a conventional appliance, and the cabinet panels can be easily removed during installation thereby preventing any damage.

2.4 The boiler is factory set to the mid-range output and can be altered, if necessary, by adjusting the burner as specified in Tables 2 and 3. The room sealed 12/18 and 18/25 models are only suitable for use with 28 second kerosene heating oil.

**NOTE: It is a mandatory requirement of the building regulations that only 28 second kerosene is used on low level discharge flues.**

2.5 The conventional flue 12/18 and 18/25 models may be converted to burn 35 second gas oil by changing the nozzle and burner settings as specified in Tables 2 and 3.

2.6 A colour co-ordinated twin channel programmer can be fitted to the appliance fascia panel. This is available from Worcester, Bosch Group as an optional extra.

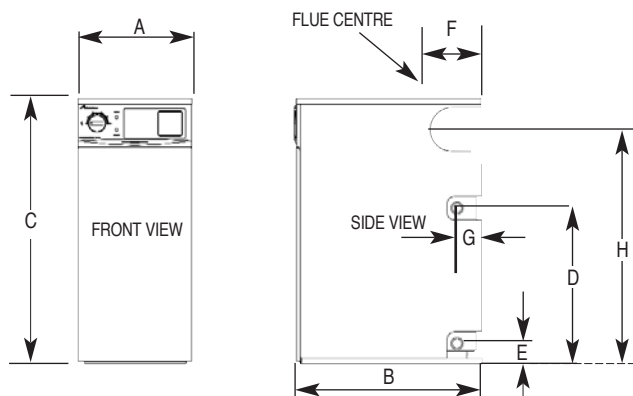
### 3. Technical Data

Table 1

SPECIFICATIONS		
Model	12/18	18/25
POWER SUPPLY	230V. 50 Hz. 140W	
IP RATING	IP20	
HEATING FLOW	1 in. BSP	
HEATING RETURN	1 in. BSP	
FUEL LINE	10 mm Compression	
MINIMUM FLUE REQUIREMENT	CF	100 mm (4 in.)
	RS	Balanced Flue Kit Section 7.2
HEARTH TEMPERATURE	Below 100°C	
MAXIMUM STATIC HEAD	30 m (98 ft.)	
PRIMARY WATER CAPACITY	20.5 litres	
WEIGHT	105 Kg	108 Kg
BURNER	Bentone Sterling 35	Bentone Sterling 40
WATER SIDE RESISTANCE 10°C Difference	40 mbar	77 mbar
WATER SIDE RESISTANCE 20°C Difference	16 mbar	20 mbar
EXIT FLUE GAS MASS FLOW	35kg/hr	43kg/hr
SEDBUK RATING*	85.7%	85.7%
CONTROL THERMOSTAT RANGE	55°C minimum Cut In to 82°C maximum Cut Out	
CONTROL THERMOSTAT DIFFERENTIAL	5°C	
HIGH LIMIT THERMOSTAT BREAK POINT	100 +0/- 6°C	
MANUAL THERMOSTAT BREAK POINT	110 +0/- 6°C	

\* The value is used in the UK Government Standard Assessment Procedure (SAP) for energy ratings for dwellings.

**Fig. 1. Principal Dimensions (All Dimensions are millimeters)**



MODEL	A	B	C	D	E	F	G	H
12/18	370	600	855	500	67	100	84	754
18/25	370	600	855	500	67	100	84	754

**12/18 Table 2. Bentone Sterling 35 Burner. (See Fig. 22)**

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO <sub>2</sub>	Approx. Air Setting	Appliance			
			Kg/h	l/h				Input		Output	
								kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.35 80°S	115	1.10	1.39	165	9.0	3.0	13.3	45500	12	41000
28 Sec. Kerosene	0.5 60°ES	100	1.40	1.77	195	10.5	6.5	16.7	57100	15	51000
28 Sec. Kerosene	0.55 60°ES	120	1.60	2.03	205	11.0	8.0	20	68400	18	61500
35 Sec. Gas Oil*	0.35 80°S	165	1.41	1.66	190	10.5	6.0	16.7	57100	15	51000
35 Sec. Gas Oil*	0.4 80°S	190	1.67	1.96	200	12.5	7.0	20	68400	18	61500

**18/25 Table 3. Bentone Sterling 40 Burner. (See Fig. 22)**

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO <sub>2</sub>	Approx. Air Setting	Appliance			
			Kg/h	l/h				Input		Output	
								kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.55 60° ES	120	1.60	2.03	170	11.0	6.0	20	64800	18	61500
28 Sec. Kerosene	0.6 60°ES	135	1.89	2.39	190	12.0	7.5	23.9	81700	21.5	73500
28 Sec. Kerosene	0.75 60°ES	115	2.23	2.89	205	12.5	10.0	27.8	95100	25	85500
35 Sec. Gas Oil*	0.40 80°S	190	1.65	1.94	175	11.0	7.0	20	68400	18	61500
35 Sec. Gas Oil*	0.5 80°S	180	2.02	2.38	195	11.5	10.0	23.9	81700	21.5	73500
35 Sec. Gas Oil*	0.55 80°S	175	2.29	2.69	205	12.0	11.0	27.8	95100	25	85500

\* **NOTE:** for use on conventional flue only.

\*\* **NOTE:** The flue gas temperature is measured in the gas sampling hole on the flue outlet plate. The probe should be inserted to a depth of 50mm. The temperature measured is not an absolute flue gas temperature and is for general guidance purposes only!

† **NOTE:** The pump pressure given is for general guidance only as variations in nozzle output can be up to ± 15%. It is, therefore, essential that the air is adjusted to give the correct CO<sub>2</sub> value.

‡ **NOTE:** The nozzle type used on 28 Sec. Kerosene outputs are nozzles calibrated specifically for use with 28 Sec. Kerosene which gives less variation in nozzle output than the standard 35 Sec. Gas Oil nozzles. However, if a 28 Sec. Kerosene nozzle is not available at servicing or commissioning it is appropriate to install a 35 Sec. Gas Oil nozzle providing the output, spray angle and pattern of the nozzle is the same as the 28 Sec. Kerosene nozzle (e.g. 0.75 60°ES may be replaced with a 0.75 60°S).

## 4. Siting the Appliance

**4.1** The appliance is not suitable for external installation unless a suitable enclosure is provided.

**4.2** The appliance should be positioned on a non-combustible solid base as near to the flue location point as possible. Care should be taken to ensure that the appliance is level; use packing at the corners where necessary.

**4.3** When fitting an RS model, the appliance must be positioned near an external wall such that the flue terminal can safely discharge the flue gases as described in Section 7.

**4.4** The following clearances must be left to allow access for installation and servicing:

- a) In front — 600mm
- b) Above, sufficient clearance to allow the control box to be positioned (see Section 5.4) in the service position.
- c) Left and right hand side — sufficient for panel removal and access to pipe connections where required.

## 5. Removal of the Cabinet

For installation of the appliance the cabinet should be removed as follows:

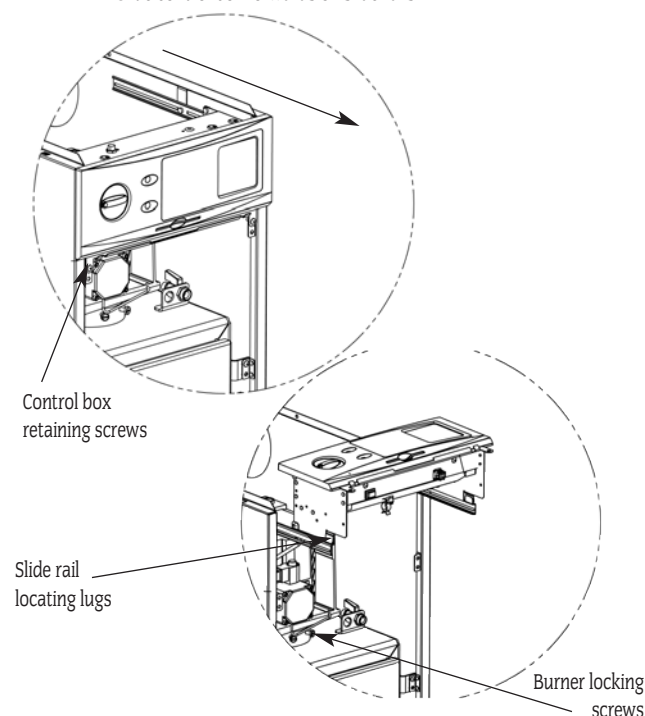
**5.1** Remove the cabinet top panel by lifting squarely upwards to release the four ball stud connections.

**5.2** Remove the front panel by pulling the bottom of the panel forwards to release the ball studs and lifting the panel upwards and forwards to release from its supporting ledge.

**5.3** Unplug the burner lead from the control box.

**5.4** Remove the control box retaining screws, as shown in the figure below. Slide the control box up into the service position (see figure below) allowing the locating lugs to locate on the slide rail.

Slide control box forwards on slide rails



**5.5** Remove the burner by releasing the burner locking screws as shown above. Lift the burner clear of the heat exchanger and place the burner on the floor.

**5.6** Release the split pin from the thermostat pocket and carefully remove the thermostat phials from the thermostat pocket (as shown in Fig 2).

**5.7** Remove the eight side panel screws labelled (A) and (B) in Fig. 2. Slide the cabinet assembly and control box assembly forwards to release the cabinet side panels from the base plate locating lugs.

**5.8** Carefully store the cabinet assembly and control box assembly.

**5.9** Install the cabinet assembly and control box assembly by following 5.1 to 5.7, in reverse order.

NOTE: The side panels should be slid along the inside of the base plate using the leading edge on the base of the side panels, as shown in Fig. 2.

## 6. Air Supply

### OPEN FLUE MODEL ( CF )

**6.1** In order to ensure clean and efficient combustion an adequate supply of air must be delivered to the combustion chamber. To provide sufficient air a suitable inlet should be provided into the room or space in which the boiler is situated, the sizes of which are given in Table 4. An air brick or other form of continuous air supply may have to be built into the installation in order to ensure an adequate supply of air.

**6.2** If the appliance is to be installed in a confined space or compartment two air vents are required, one at high level and one at low level. The minimum free area of each vent is given in Table 5 and depends whether the air is taken from another room or from outside the building. Where the air is taken from another room that room must contain an air inlet as described in 6.1.

**6.3** There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. The clearances required for installation and servicing will normally be adequate for ventilation. See Section 4.4.

### ROOM SEALED BALANCED FLUE MODEL ( RS )

**6.4** The appliance does not require a separate vent for combustion air.

**6.5** Installation in cupboards or compartments require permanent vents for cooling purposes, one at high level and one at low level, either direct to outside air or to a room. Both vents must pass to the same room or be on the same wall to the outside air. The minimum air vent free area is given in Table 6.

**Table 4. Minimum Combustion Air Inlet Free Area for Open Flue appliances**

APPLIANCE	AREA OF AIR INLET	
	cm <sup>2</sup>	in. <sup>2</sup>
12/18	99	15.3
18/25	138	21.5

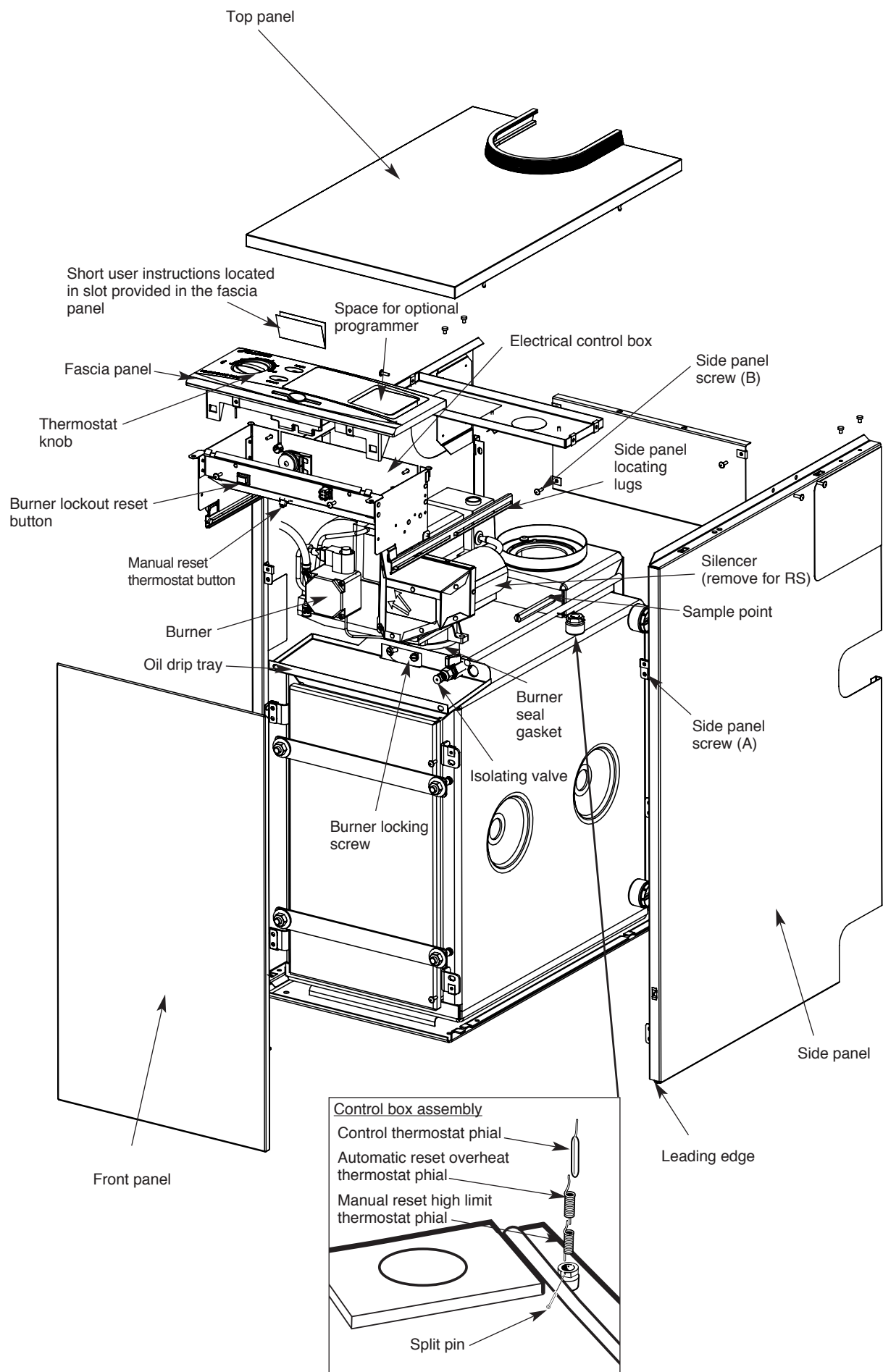
**Table 5. Minimum Air Vent Free Area for Open Flue appliances installed in a compartment.**

Appliance model	Ventilation to room or internal space		Ventilation to outside	
	High Level	Low Level	High Level	Low Level
12/18	198cm <sup>2</sup>	297cm <sup>2</sup>	99cm <sup>2</sup>	198cm <sup>2</sup>
18/25	275cm <sup>2</sup>	413cm <sup>2</sup>	138cm <sup>2</sup>	275cm <sup>2</sup>

**Table 6. Minimum Air Vent Free Area for Room Sealed appliances installed in a compartment.**

Appliance model	Ventilation to room or internal space		Ventilation to outside	
	High Level	Low Level	High Level	Low Level
12/18	198cm <sup>2</sup>	198cm <sup>2</sup>	99cm <sup>2</sup>	99cm <sup>2</sup>
18/25	275cm <sup>2</sup>	275cm <sup>2</sup>	138cm <sup>2</sup>	138cm <sup>2</sup>

**Fig. 2. General Assembly.**





## 7. Flue System

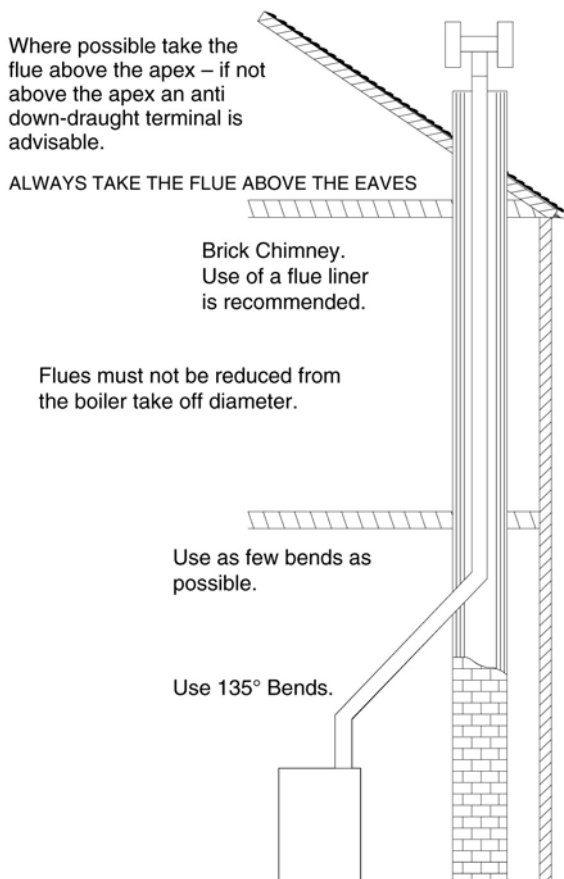
A flue system must be provided in accordance with BS5410:Parts 1 & 2 and the current Building Regulations.

### 7.1 CONVENTIONAL FLUE (CF).

See Fig. 3.

Conventional Flue Diameters: 12/18 – 100 mm (4 in.)  
18/25 – 100 mm (4 in.)

**Fig. 3. Flue Installation.**



**NOTE:** External flues systems must be of the insulated flue type.

The boiler is fitted with a conventional flue locating spigot. The flue pipe fits into the spigot and should be correctly sealed with fire cement.

**NOTE:** The size of the flue must never be reduced from the take-off diameter. An increase in flue size is permissible provided that the joint is sealed correctly.

When installed the flue should be vertical and contain as few bends as possible. Where bends are necessary, a maximum of two are permitted and 135 degree bends should be used.

All brick and masonry chimneys should be lined with a suitable non-combustible material, properly jointed and able to withstand the effects of the working temperature of the appliance and any condensate which may form.

Down-draught conditions will adversely affect the operation of the boiler and must be avoided. Where possible the flue should be extended beyond the apex of the roof and should always be taken beyond the eaves of the building. Where down-draught is

experienced a suitable anti down-draught terminal should be fitted to the flue termination.

The natural flue draught must be checked in the flue pipe immediately above the appliance or in the hole provided in the flue outlet plate. The flue draught should be no less than 0.75 mm W.g. and no greater than 5.1 mm W.g. If a flue draught greater than 5.1 mm W.g. is experienced a draught stabiliser should be introduced into the flue and adjusted to achieve a flue draught within the specified range.

### 7.2 ROOM SEALED BALANCED FLUE MODEL (RS).

The appliance is supplied ready for installation as a room sealed balanced flue system by the simple addition of one of the flue terminal kit options.

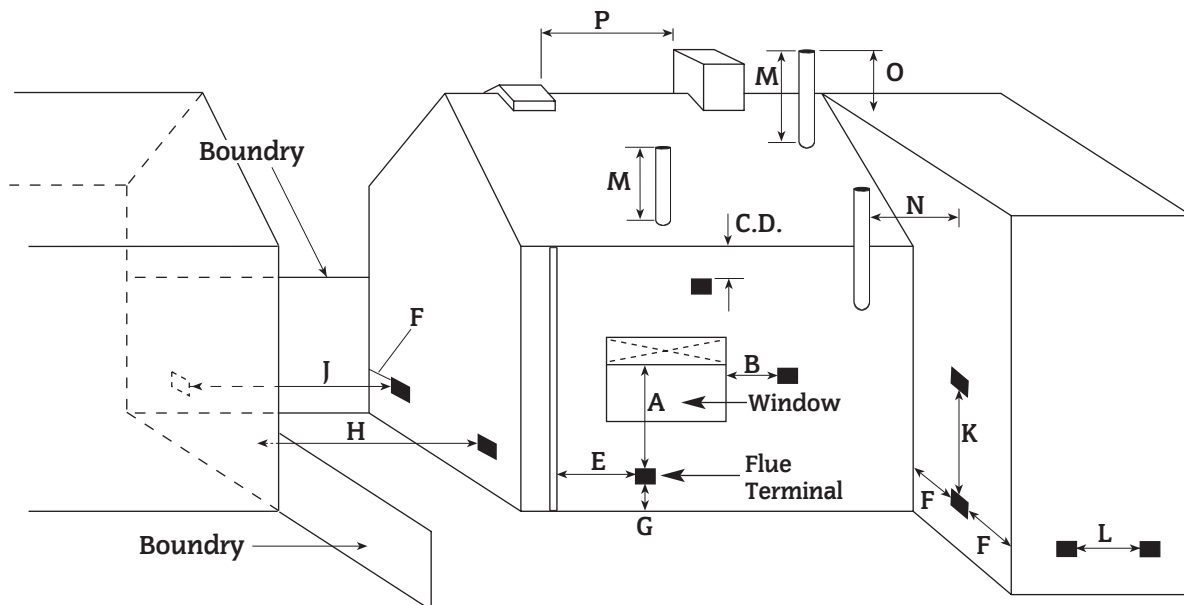
Details of the installation procedure are included in the Flue Terminal Instructions supplied with the terminal kit..

### 7.3 Siting the flue terminal

1. The flue terminal must be located in a suitable position, such that the products of combustion can be freely dispersed without the possibility of the gases entering the dwelling or that of a neighbouring dwelling.
2. Discharge of flue gases into car ports or narrow passageways is not recommended.
3. The terminal must not cause an obstruction nor the discharge cause a nuisance as a result of either flue gases or terminal noise.
4. If the terminal is fitted within 1 m of a plastic or painted gutter or within 500 mm of painted eaves then an aluminium or stainless steel shield at least 1 m long should be fitted to protect the surface.
5. Take care to ensure that combustion products do not enter ventilated roof voids.

**Fig. 5. Flue terminating positions for oil-fired appliances**

**NOTE:** The dimensions given are for general guidance only. Other surrounding buildings or objects may affect the clearance of combustion products. An alternative flue terminal position should be sought when there is any possibility of a nuisance being caused by inadequate dispersal of flue products. Terminals should be positioned so as to avoid products of combustion entering into buildings.



Terminal Position	Minimum Distance (mm)	
	Open Flue	Low-Level Discharge
A Directly below an opening, air brick, window, etc. ....	Not allowed	600
B Horizontally to an opening, air brick, window, etc. ....	Not allowed	600
C Below a gutter or sanitary pipe if combustible material protected. ....	Not allowed	75
D Below a balcony, eaves, gutter or drainage without protection to combustible material. ....	Not allowed	600
E From vertical sanitary pipework.. ....	Not allowed	300
F From an internal or external corner or boundry along side terminal. ....	Not allowed	300
G Above ground or balcony level. ....	Not allowed	300
H From a surface or boundry facing the terminal. ....	Not allowed	600
J From a terminal facing the terminal. ....	Not allowed	1200
K Vertically from a terminal on the same wall. ....	Not allowed	1500
L Horizontally from a terminal on the same wall. ....	Not allowed	750
M Above an intersection with the roof. ....	600	Not applicable
N From a vertical structure on the side of the terminal.....	750	Not applicable
O Above a vertical structure less than 750mm from the side of the terminal.	600	Not applicable
P From a ridge terminal to a vertical structure on the roof.....	1500	Not applicable



## 8. Oil Supply

(See Figs. 6, 7 and 8).

**8.1** Plastic or steel tanks should be installed to BS5410.

A steel tank should also conform to BS799: part 5 and be arranged with a slope of 1 in 24 away from the outlet valve with a sludge cock at its lower end.

**8.2** Do not use galvanised steel tanks or pipework for the oil supply system.

**8.3** Do not use soldered joints on the oil supply pipework as this could cause a hazard in the case of a fire.

**8.4** The burners on both appliances are supplied so as to be connected to a single pipe gravity feed system. Details of how to convert the burners to a double-pipe sub-gravity feed system are shown in Fig. 6.

### 8.5 Oil Supply System

#### (a) Single Pipe System

If a single pipe system is employed then the tank must be positioned such that the oil level does not exceed 4 metres above the level of the burner oil pump and in addition the minimum oil level must be at least 0.3 metres above the level of the oil pump. Should it prove impossible to site the tank below the 4 metres maximum oil level a head breaking device must be installed between the tank and the burner.

#### (b) Double Pipe System

If a double pipe system is used then the maximum suction height allowable is 3.5 metres.

#### (c) Single Pipe Suction Lift with De-aerator

If a single pipe suction lift with a de-aerator is used, the oil tank must be positioned below the burner. An inlet and return loop should be created between the de-aerator and oil pump. The oil pump should be connected as for a double pipe system. Details of how to convert to a double pipe system are shown in Fig. 6.

Oil inlet and return flexible hoses should be connected to the oil pump inlet and return ports.

Table 9 is a general guide to determine the maximum allowable pipe run when using a de-aerator.

Table 9 does not override the de-aerators manufacturers instructions and should only be used in conjunction with the manufacturers instructions.

If a non-return valve is not incorporated within the de-aerator unit, a non-return valve should be fitted in the oil line between the oil tank and the de-aerator.

**NOTE:** If a de-aerator is used it should be fitted externally to the building.

### 8.6 Oil Supply Pipework

**a)** The oil supply pipe diameter can be determined using Tables 7, 8 and 9 depending on whether a single or double pipe system or single pipe system with de-aerator is being installed. Selection of the correct pipe diameter will depend on the position of the oil storage tank relative to the burner and the length of the pipe run.

**b)** The oil supply pipe should be laid as level as possible to avoid air pockets and unnecessary friction losses.

**c)** The following components should be fitted in the fuel line between the storage tank and burner:

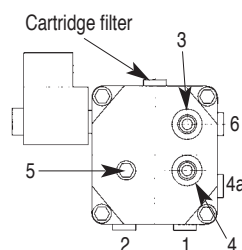
1. A manual isolating valve installed as close to the tank as possible.

2. A fire valve in accordance with BS5410 as shown in Fig. 7. The fire valve should be fitted externally with a fire detection element located within the appliance case. Use of a capillary type valve will allow a neat and simple installation. A suitable valve is the KBB manufactured by Teddington Controls Limited. A spring clip has been provided on the cabinet top bracket, to allow a fire valve element to be mounted. Alternatively a fusible link or electrical system may be used. Under no circumstances should a combination isolating/fire valve be used as the sole fire protection device.

3. An oil filter should be fitted close to the oil storage tank. If there is doubt about the internal oil line condition, a further filter should be fitted near the boiler.

**Fig. 6. Oil Pump.**

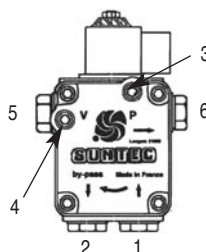
#### A. Danfoss BFP 41.



- 1 INLET
- 2 RETURN
- 3 BLEED AND PRESSURE GAUGE PORT
- 4 & 4a VACUUM GAUGE PORT
- 5 PRESSURE ADJUSTMENT
- 6 NOZZLE OUTLET

To convert to a double pipe system, remove plug 4a and insert the grub screw provided into the threaded hole. Connect flow and return pipes to (1) and (2).

#### B. Suntec AS47CK.



To convert to a double pipe system, remove the return plug and insert the screw provided into the threaded hole. Connect flow and return pipes to (1) and (2).

**TABLE 7 Single Pipe Gravity Feed System**

HEAD (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8 mm inside dia. pipe (10 mm O.D. copper)	10 mm inside dia. pipe (12 mm O.D. copper)
0.5	12	30
1.0	25	69
1.5	37	91
2.0	49	100
2.5	62	100
3.0	74	100
3.4	87	100
4.0	99	100

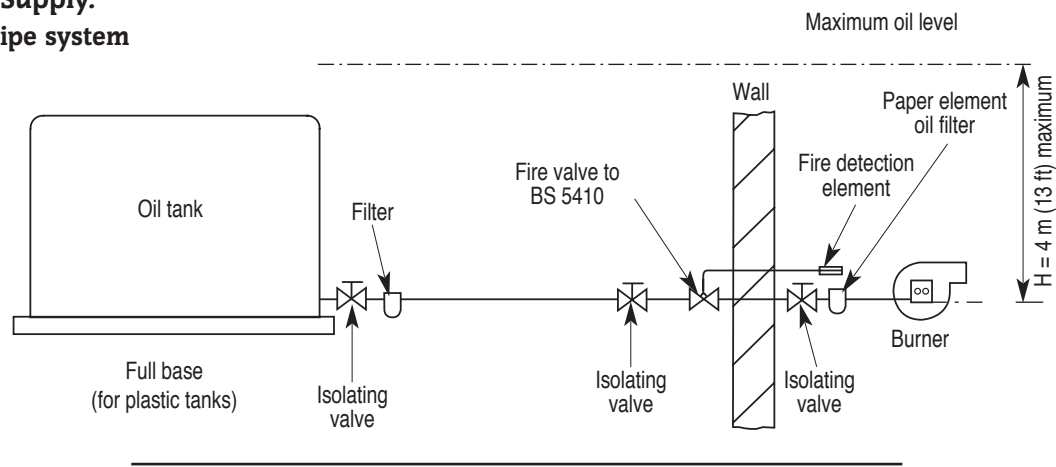
**TABLE 8 Double Pipe Sub-Gravity Feed System**

HEAD (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8 mm inside dia. pipe (10 mm O.D. copper)	10 mm inside dia. pipe (12 mm O.D. copper)
0	50	100
0.5	44	100
1.0	38	95
1.5	32	80
2.0	26	66
2.5	20	50
3.0	14	37
3.5	8	22

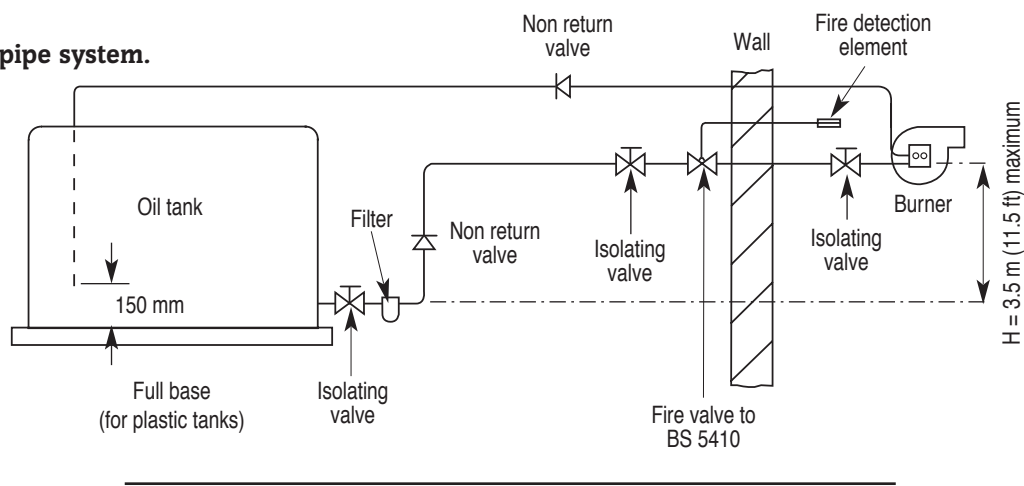
TABLE 9 Single Pipe Suction Lift with De-aerator

Fuel Flowrate	MAXIMUM ALLOWABLE PIPE RUN FROM TANK TO DE-AERATOR (metres)			
	2.5 (kg/h)	5.0 (kg/h)	10.0 (kg/h)	10.0 (kg/h)
HEAD (metres)	6 mm inside dia. pipe (8 mm O.D. copper)			8 mm inside dia. pipe (10 mm O.D. copper)
0	100	55	26	100
0.5	95	45	23	100
1.0	80	40	20	90
1.5	70	35	17	75
2.0	60	30	14	65
2.5	45	25	11	50
3.0	35	15	8	35
3.5	25	10	5	20

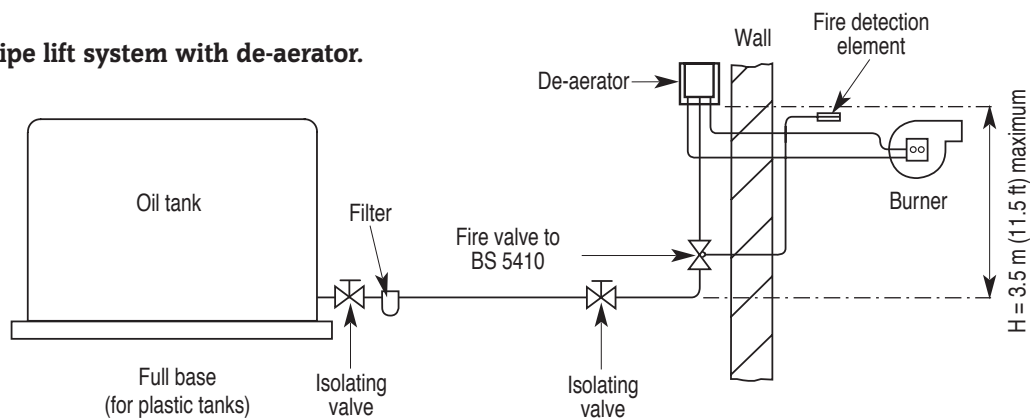
Fig. 7. Oil Supply.  
(a) Single pipe system



(b) Double pipe system.

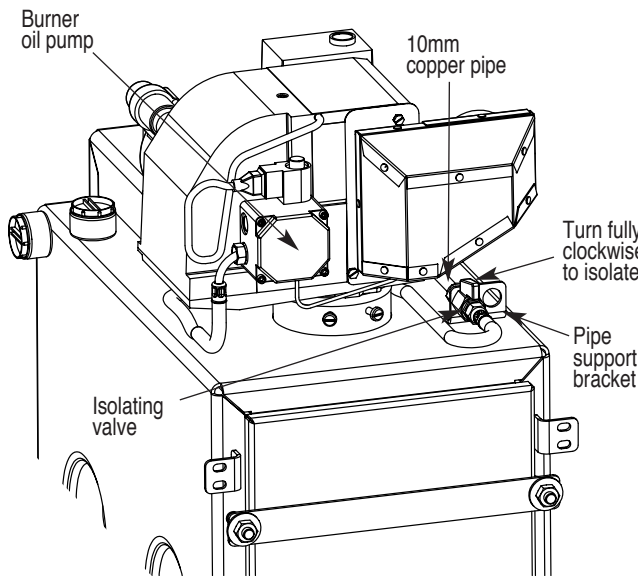


(c) Single pipe lift system with de-aerator.

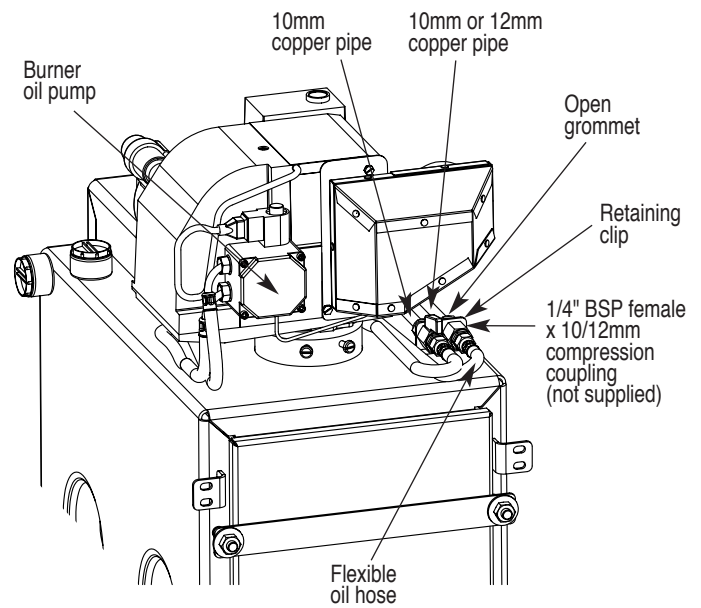


**Fig. 8. Oil Pipe Installation.**

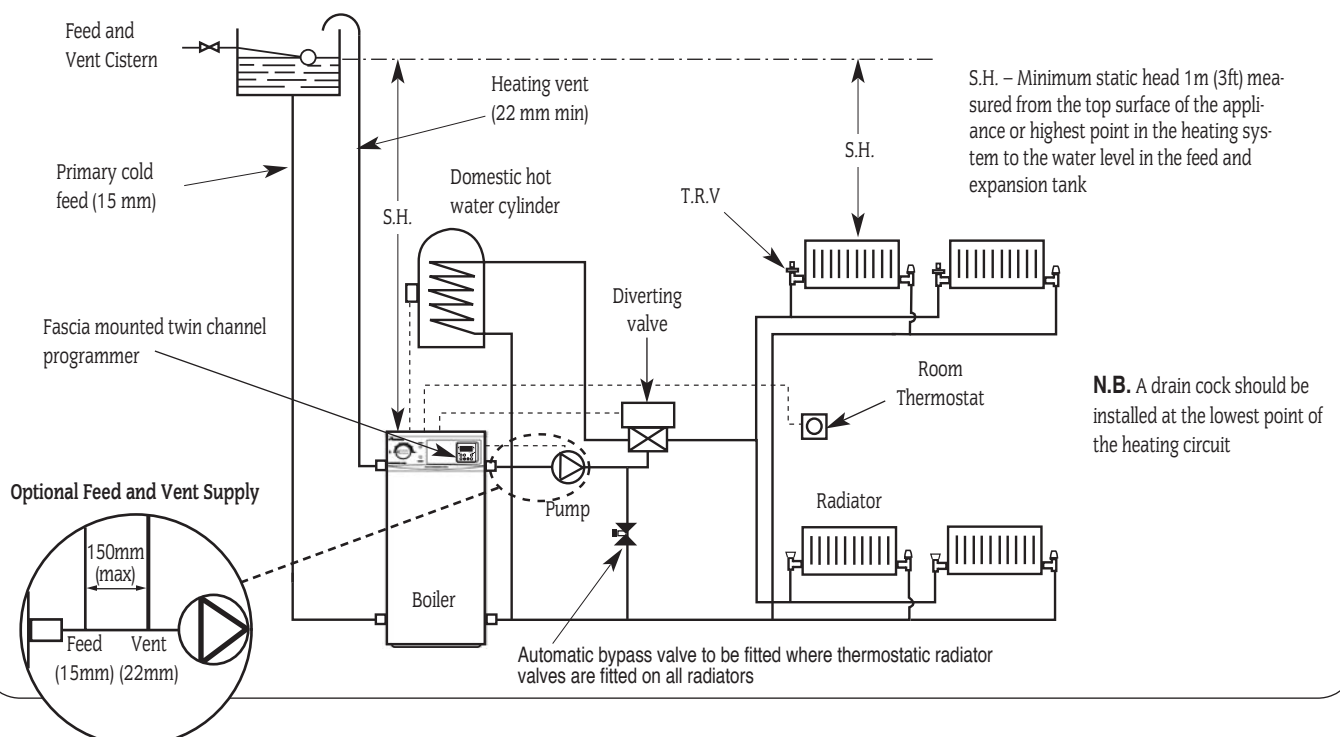
**(a) Single Pipe System .**



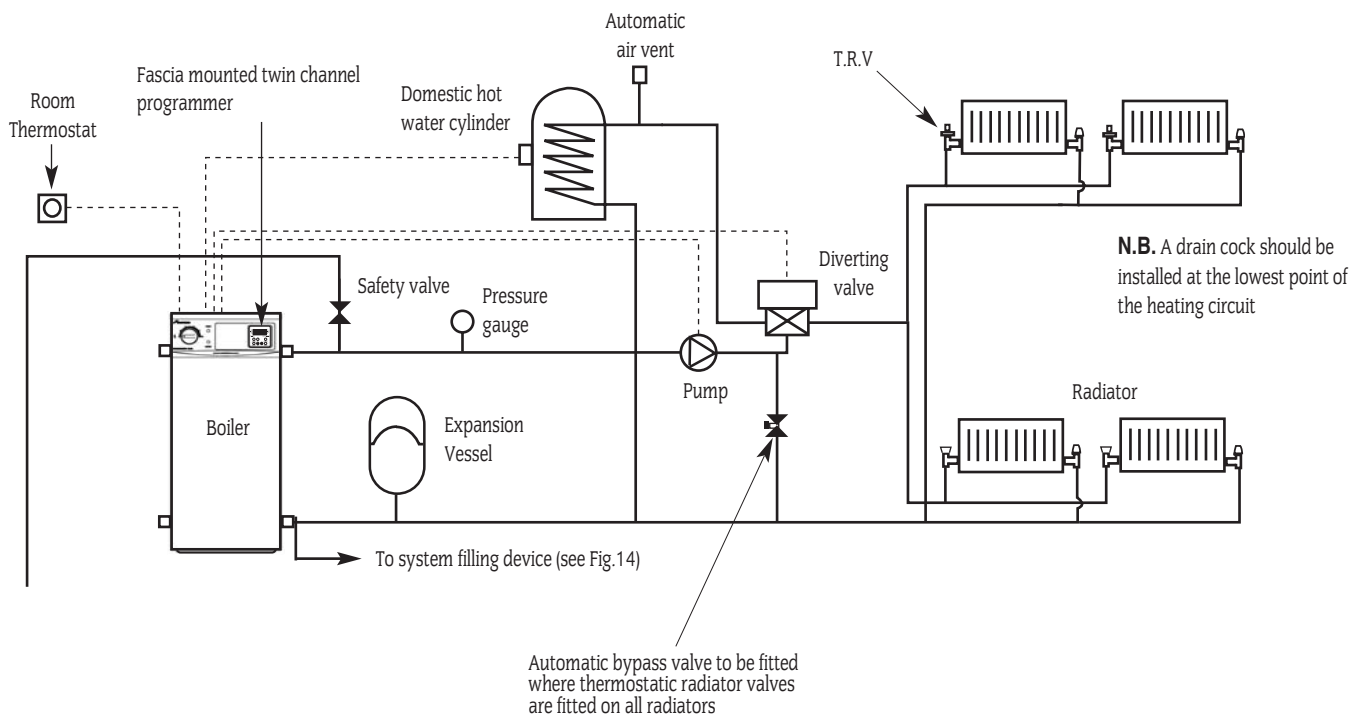
**(b) Double Pipe System or Single Pipe Suction Lift with De-aerator.**



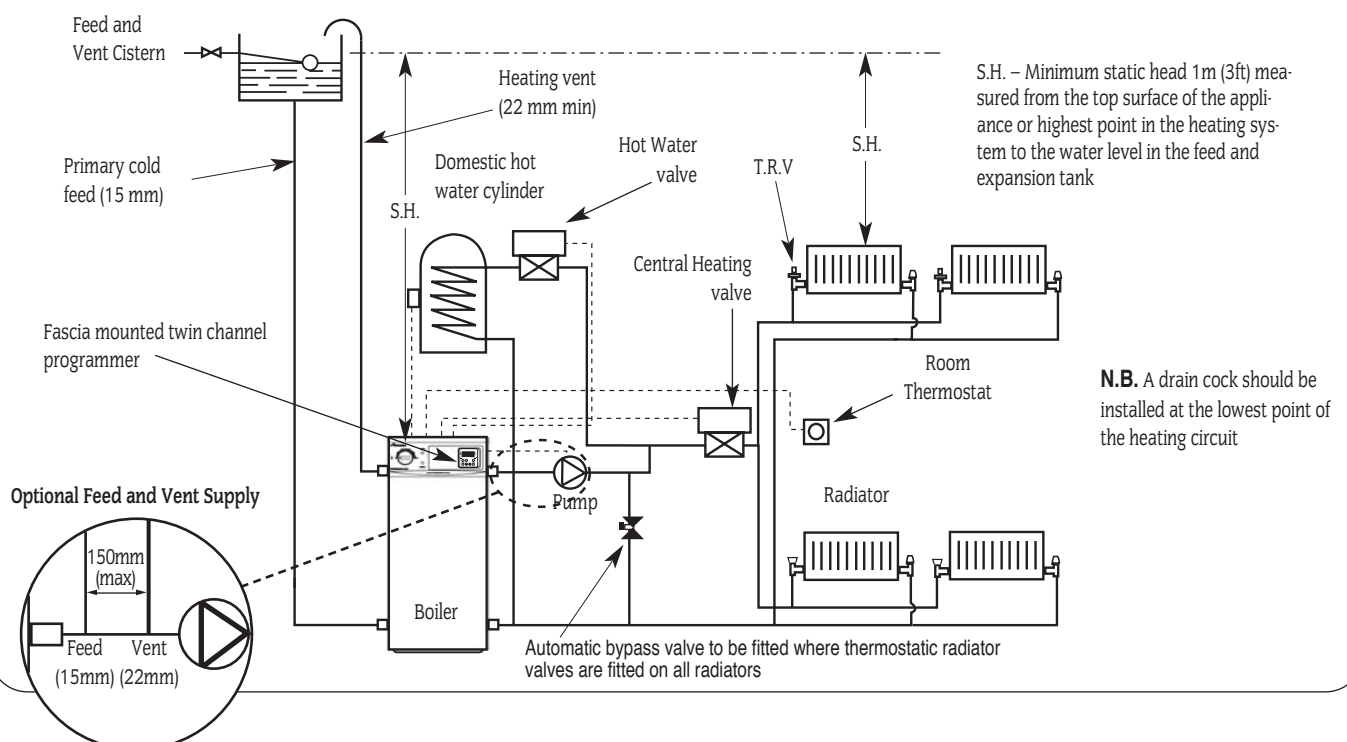
**Fig. 9. 3 Port Valve Control Set (Open Vent Fully Pumped System).**



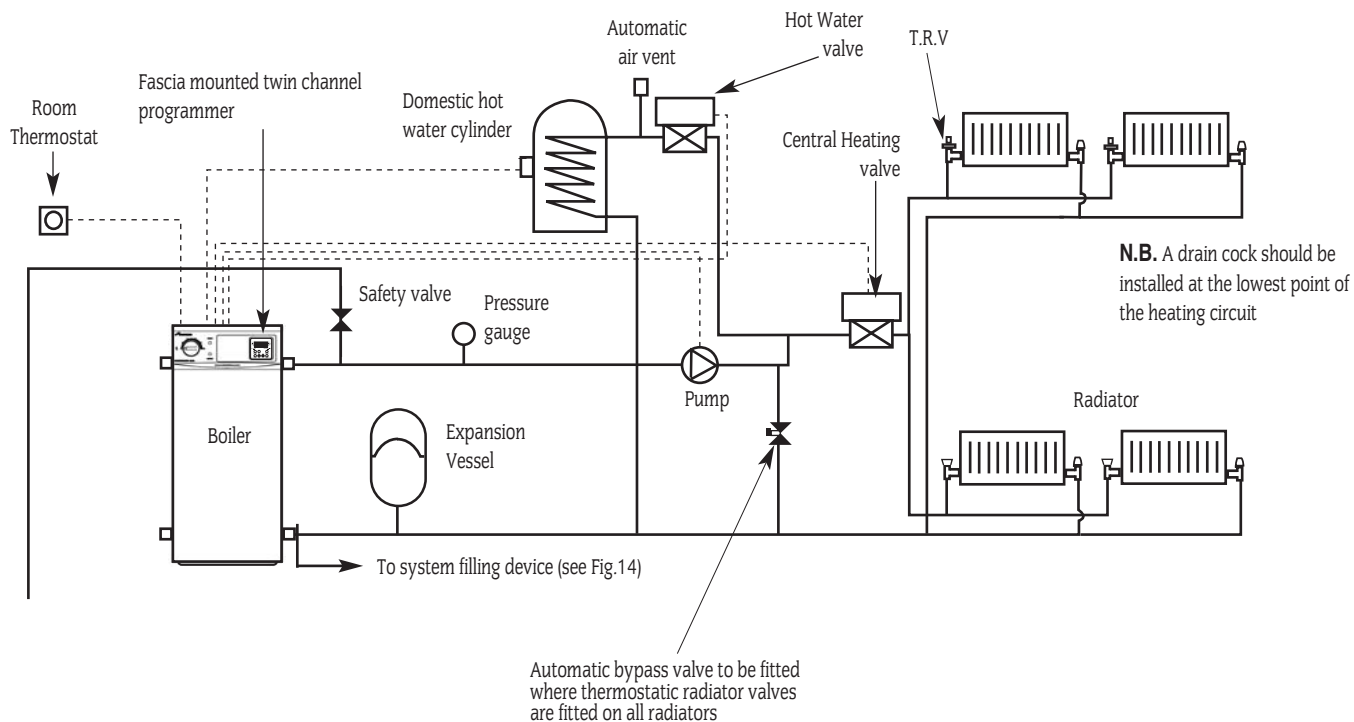
**Fig. 10. 3 Port Valve Control Set (Fully Pumped Sealed System).**



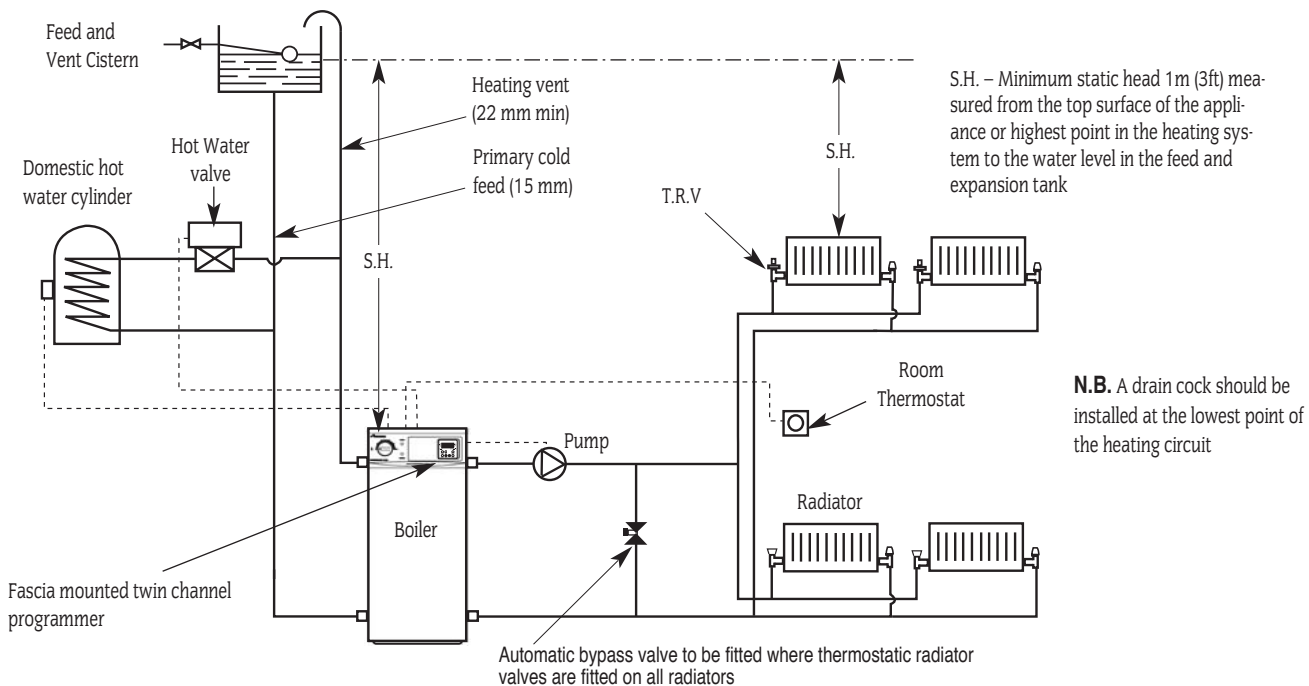
**Fig. 11. 2 Port Valve Control Set (Open Vent Fully Pumped System).**



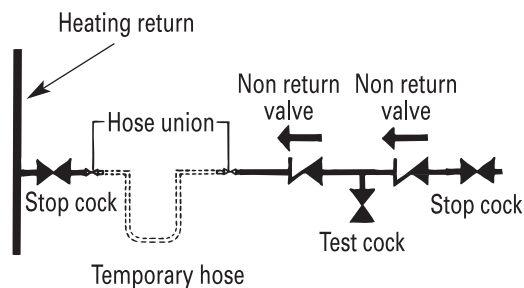
**Fig. 12. 2 Port Valve Control Set (Fully Pumped Sealed System).**



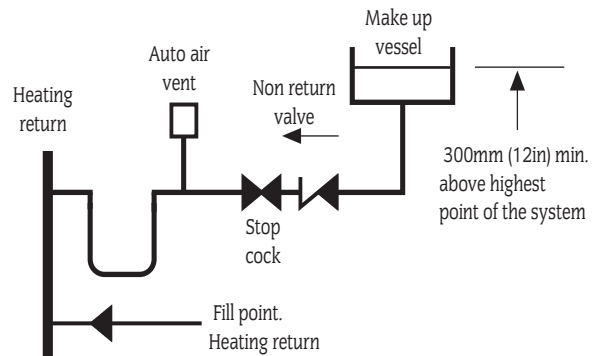
**Fig. 13. Semi-Gravity Control Set**



**Fig. 14. System filling and make-up**



**METHOD 1**



**METHOD 2**

## 9. Heating and Hot Water System

The heating and hot water system must be provided in accordance with the current Building Regulations.

**9.1** The appliance is suitable for connection to all conventional indirect hot water systems utilising an indirect double feed cylinder.

**9.2** The flow and return sockets are located at the rear of the appliance, two at high level (flow) and two at low level (return). Connection of the flow and return sockets can either be made on diagonally opposite sockets or on the same side of the boiler.

**9.3** Provision has been made for locating the circulating pump within the appliance cabinet. If required, the socket located on the top of the boiler should be used and the flow pipe run to the right hand side of the boiler (See Fig. 2).

**9.4** On new installations a room thermostat or programmable room thermostat is used in the main zone and thermostatic radiator valves used in heating zones.

On existing systems where a room thermostat is already fitted it is necessary to fit thermostatic radiator valves at least in the sleeping zones.

An automatic system bypass should be fitted on heating systems when all of the radiators are fitted with thermostatic radiator valves.

**9.5** The pressure jet burner fitted to the appliance has full automatic control and hence there is no requirement for heat leak radiators.

**9.6** Any unused boiler tappings must be plugged prior to filling. It should be noted that the flow tapping on top of the boiler requires plugging when not used.

**9.7** The primary system should be flushed and treated in accordance with the recommendations of BS 7593 before the system is handed over to the user.

**9.8** The pump should be set in accordance with the heating load requirements to give a flow and return differential temperature of 11°C under full load conditions.

### Open Vent Primary System.

(See Fig.9, 11 and 13).

The following points are for guidance only. The system installation should be carried out in accordance with BS 5449: Part 1.

#### 1. System Pipework

The first metre of pipework from all appliance connections must be in copper; afterwards copper or plastic pipe can be used. The plastic pipe must be manufactured to BS 7291 and installed to BS 5955 part 8. It is important to protect the system

components; the plastic pipe specified must be resistant to the ingress of oxygen.

### 2. Feed and Expansion System

The feed and expansion pipes must rise continuously from the appliance and must be of the minimum diameter shown in Fig. 9.

The cistern must be arranged to provide a minimum static head of 1 metre above the top of the highest point in the heating circuit.

### 3. Filling and Venting

Air in the appliance is expelled through the vent pipe or dissipated into the system. Manual air vents should be fitted at any high points in the system.

### Sealed Primary System

(See Fig. 10 and 12 )

The appliance is supplied with a manual reset thermostat and is suitable for use with a sealed primary system.

#### 1. System Pipework

Copper pipework must be used when installing the appliance on a sealed system.

#### 2. General

The system should be installed in compliance with the requirements of BS5449: Part 1. The boiler must be fitted with a spring loaded safety valve set to operate at 3 bar (45 psi) and the pipe connections made throughout the system must be capable of sustaining a pressure of up to 3 bar.

The following is a list of major items which must be fitted to the system:

1. Safety valve – 3 bar
2. Pressure gauge – 0 to 4 bar.
3. Expansion vessel
4. Automatic air vent.

## 10. Electrical

(See Fig. 15).

**10.1** The wiring between the appliance and the electrical supply shall comply with current IEE wiring regulations (and any local regulations which apply) for fixed wiring to a stationary appliance.

**NOTE:** It must be possible to completely isolate the appliance.

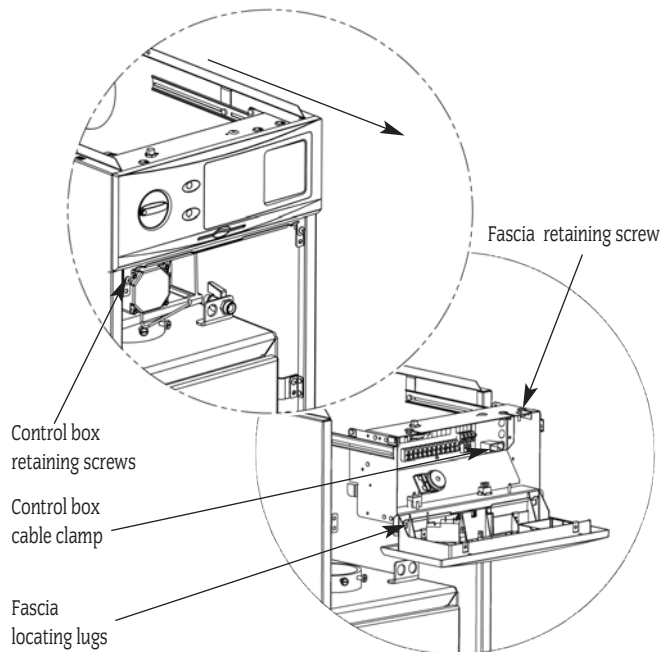
**10.2** To gain access to the electrical terminal strip.

- a) Isolate the mains electrical supply.
- b) Remove the cabinet top panel and the front panel as



- c) Remove the two control box retaining screws and slide the control box forward, as shown in the figure below.
- d) Remove the four fascia retaining screws and position the fascia assembly on the two fascia location lugs as shown below.

Slide control box forwards on side rails



### 10.3 Mains Wiring

Mains supply – 230V AC ~ 50 Hz 5A External Fuse to BS1362.

LIVE - Brown, NEUTRAL - Blue, EARTH - Green/Yellow

Mains Cable: 0.75mm<sup>2</sup> (24 x 0.20 mm) to BS 6500 Table 16.

A mains cable should be connected to a double pole isolator with a contact separation of 3mm on both poles and supplying the appliance controls only.

The boiler and system controls must be supplied using a single fused supply.

To connect to the mains supply cable:

- 1) Feed the cable into the rear of the cabinet avoiding any hot surfaces.
- 2) Remove the control box cable clamp retaining screw (as shown above) and pull its inner out to allow the cable to be fed through. Slacken the P-clip on the cabinet top bracket to allow the cable to be fed through.
- 3) Feed the cable through the P-clip, through the cable clamp, and fasten the cable to the terminals marked **L** (Live), **N** (Neutral) and **E** (Earth) on the control box terminal strip.
- 4) Secure the cable clamp and P-clip, and ensure 450mm of cable is left between the two clamps.

### 10.4 Programmer

(See Fig. 16a).

A plug in, colour co-ordinated, 2 channel electronic programmer is available from Worcester, Bosch Group. Full instructions covering installation and operation of the programmer are included with the kit.

The programmer will give fully independent central heating (CH) and hot water (HW) programmes when the pins on the rear of the unit is set to pumped.

(See Fig. 16b).

If an external programmer is to be fitted to the boiler the link plug should be removed from the programmer terminal strip. The LIVE, NEUTRAL and EARTH wires should be connected to the LIVE, NEUTRAL and EARTH terminals on the main terminal strip and the switched lines connected to terminals 1 and 2.

**NOTE:** The mains supply cable should not be connected to an

external time switch when a frost thermostat is fitted to the Danesmoor standard wiring block.

**NOTE:** Under no circumstances should the timer be connected to a separate electrical supply. Safety is assured by a single fused supply to the boiler.

### 10.5 Safety Check

In the event of an electrical fault after the installation of the appliance, the electrical system should be checked for short circuits, fuse failure or incorrect polarity of connections.

### 10.6 Pre-wired Remote 3 or 2 port valve control sets

(See Fig. 17).

If the system is fully pre-wired at a junction box remotely from the boiler it can be connected to the boiler. The diagram shows connection details for a 3 or 2 port valve control set.

The Worcester fascia mounted programmer can be fitted instead of an external programmer to the remote junction box. Remove the link plug (8 to 9) and connect the programmer plug into the time clock connector. Connect terminal 1 from the boiler terminal block to the 'HOT WATER ON' on the remote 10 way junction box. Connect terminal 2 from the boiler terminal block to the 'HEATING ON' on the remote 10 way junction box..

**NOTE:** A 3 port valve control set requires a live feed from 'HOT WATER OFF' switch position. In order to achieve this, using a Worcester programmer, remove the orange wire from terminal 9 and pull back through the tie wraps. Ensure the brown wire is firmly secured in terminal 9. Connect the orange wire to terminal 6 on the boiler terminal block to the 'HOT WATER OFF' connection at the remote 10 way junction box.

### 10.7 2 port valve control set

(See Fig. 18).

The 2 port valve control set provides complete control on installations having pumped circulation to both the domestic hot water and radiator circuits.

The domestic hot water and radiator circuits are independently controlled by two motorised valves via a cylinder thermostat and a room thermostat. Both thermostats switch the water circulator and the boiler on and off.

### 10.8 3 port valve control set

(See Fig. 19).

The 3 port valve control set provides complete control on installations having pumped circulation to both the domestic hot water cylinder and radiator circuits.

The domestic hot water and radiator circuits are controlled by a 3 port motorised valve via a cylinder thermostat and a room thermostat. Water flow is diverted to either circuit or to both circuits at the same time. Both thermostats switch the water circulator and the boiler on and off.

**Note:** The 3 port valve control set requires a live feed from the "hot water OFF" switch position. In order to achieve this, using a Worcester programmer, remove the orange wire from terminal 9 and pull back through the tie wraps. Do not attempt to cut the tie wraps. Ensure that the brown wire is firmly secured in terminal 9. Connect the orange wire to terminal 6.

### 10.9 Semi-Gravity Control Set

(See Fig. 20).

As supplied the boiler will give a gravity hot water output when HW is selected or a pumped heating circuit and gravity hot water supply when CH and HW is selected. The hot water and central heating temperature is controlled by the boiler control thermostat. Additional control may be obtained by the use of a room thermostat, having removed the link from terminal 2 to 4.

### 10.10 Frost Protection

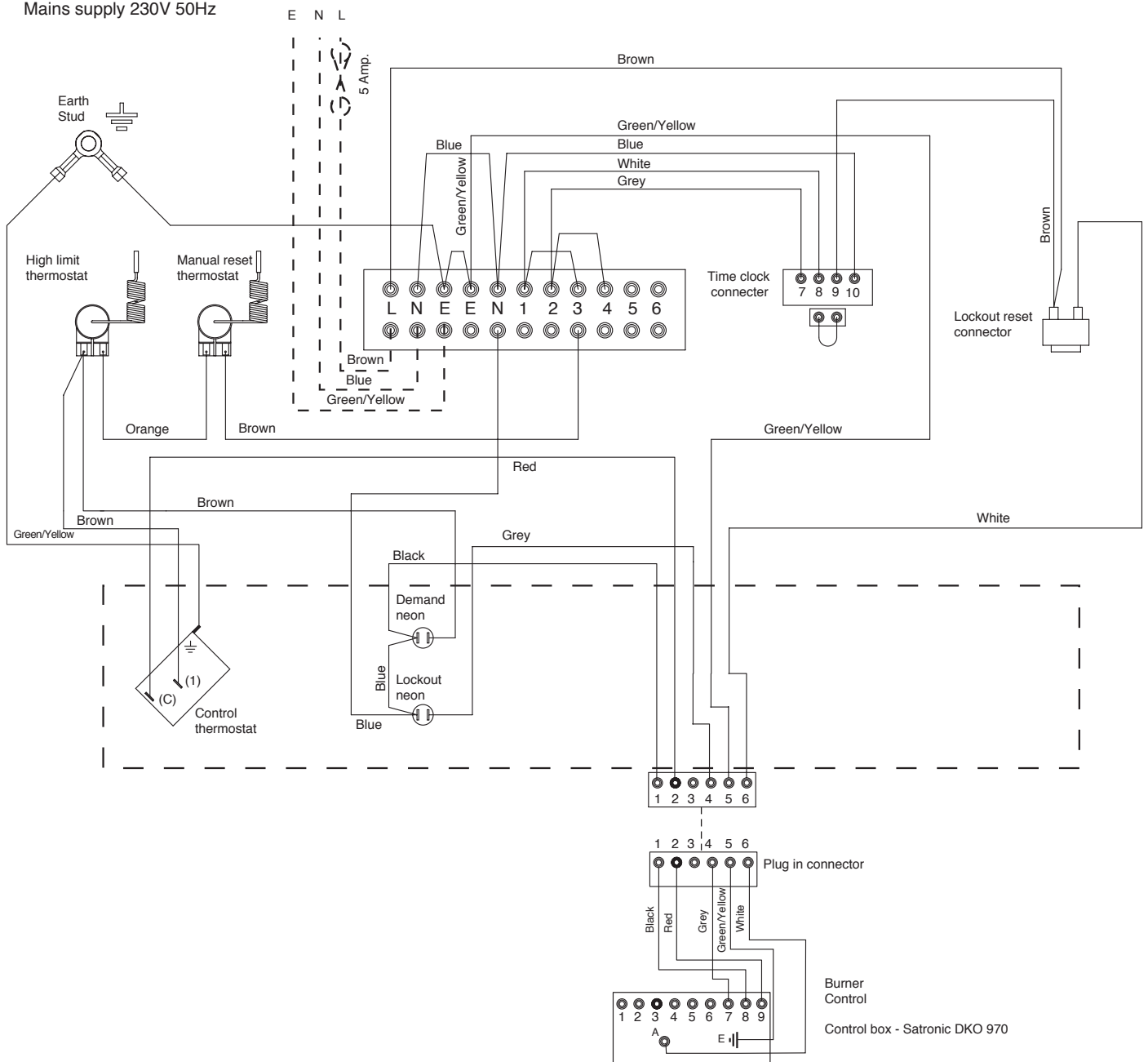
(See Fig. 21).

For full frost protection a single pole double switch thermostat should be fitted so that both the boiler and the circulating pump circuits are energised under frost conditions. Frost protection will be lost if there is no power supply to the boiler.



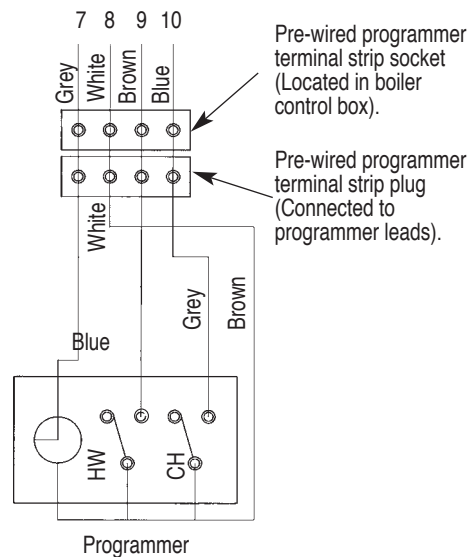
**Fig. 15. Wiring Diagram (Standard).**

Mains supply 230V 50Hz

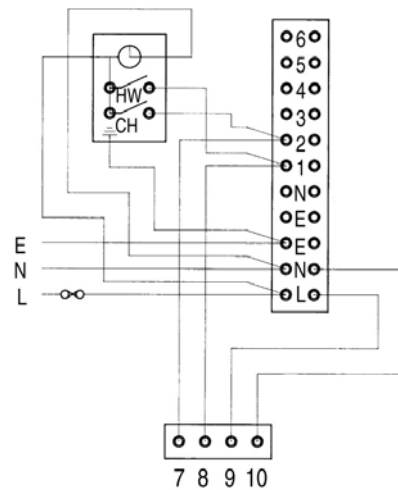


**Fig. 16. Programmer Connections**

**(a) Internal Programmer**



**(b) External Programmer**

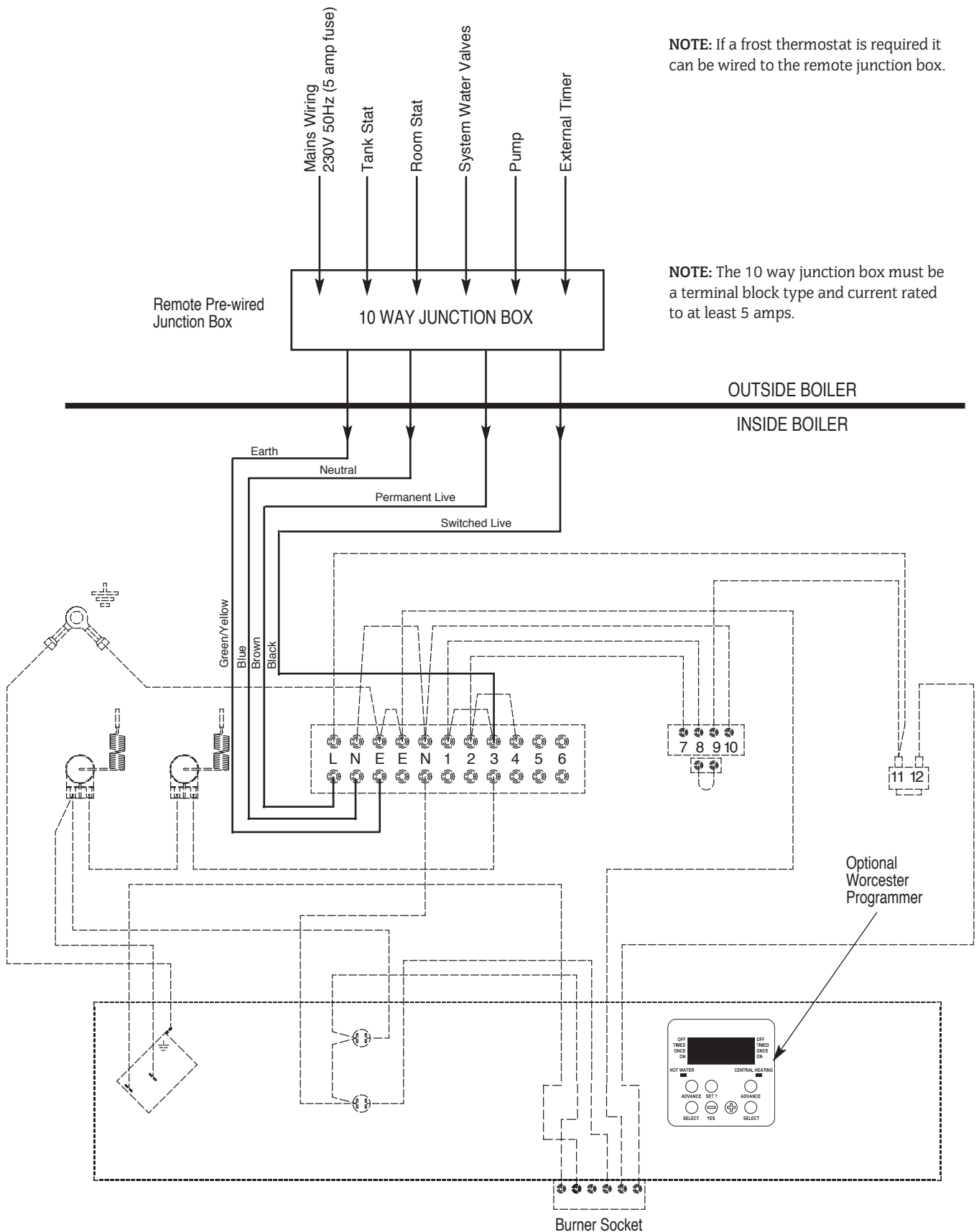


## Fig. 17. Pre-wired Remote 3 or 2 Port Valve Control Sets

**NOTE:** When using a Worcester programmer set the pin on the rear of the programmer to 'Pumped'.  
Remove link 1 to 3

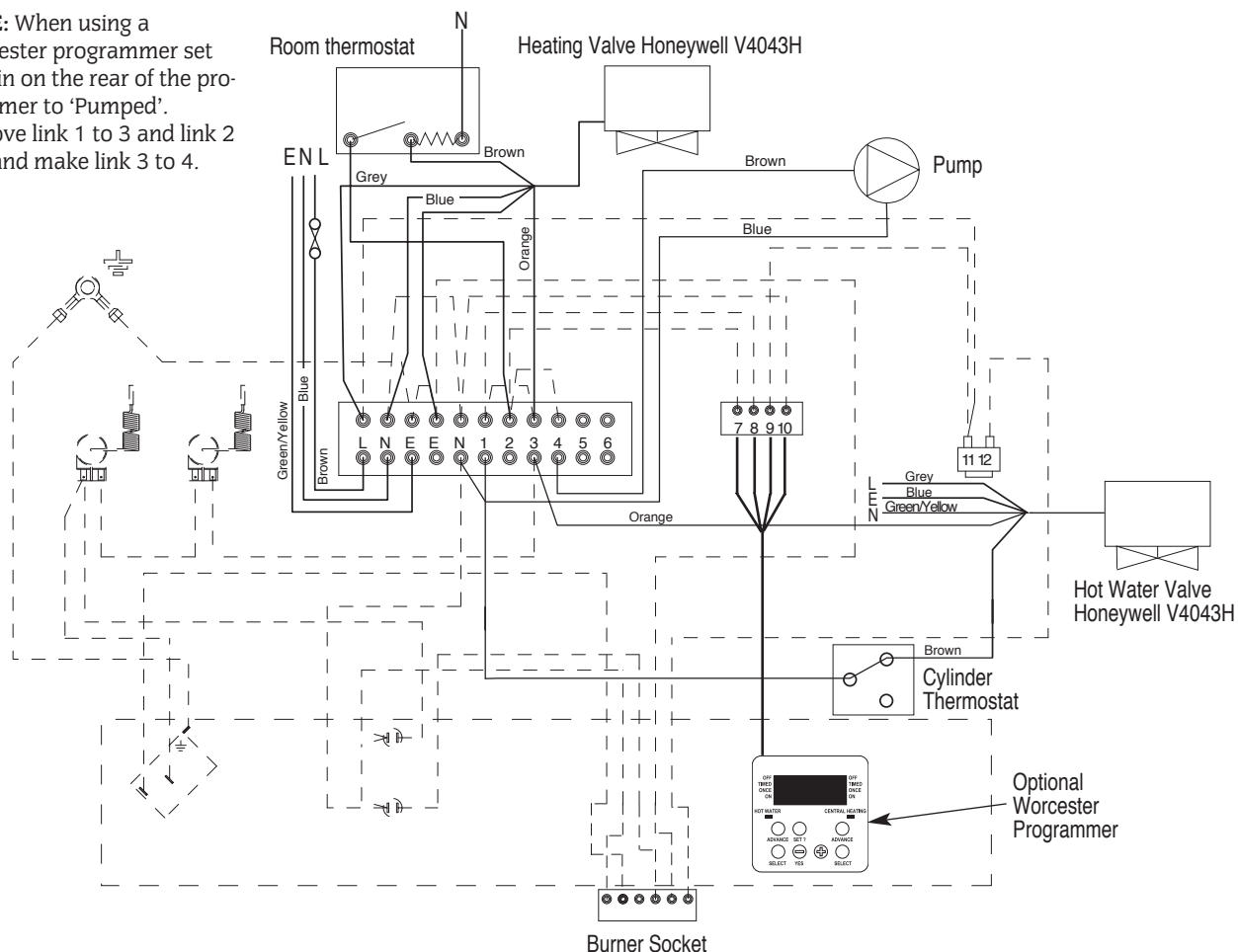
**NOTE:** If a frost thermostat is required it can be wired to the remote junction box.

**NOTE:** The 10 way junction box must be a terminal block type and current rated to at least 5 amps.



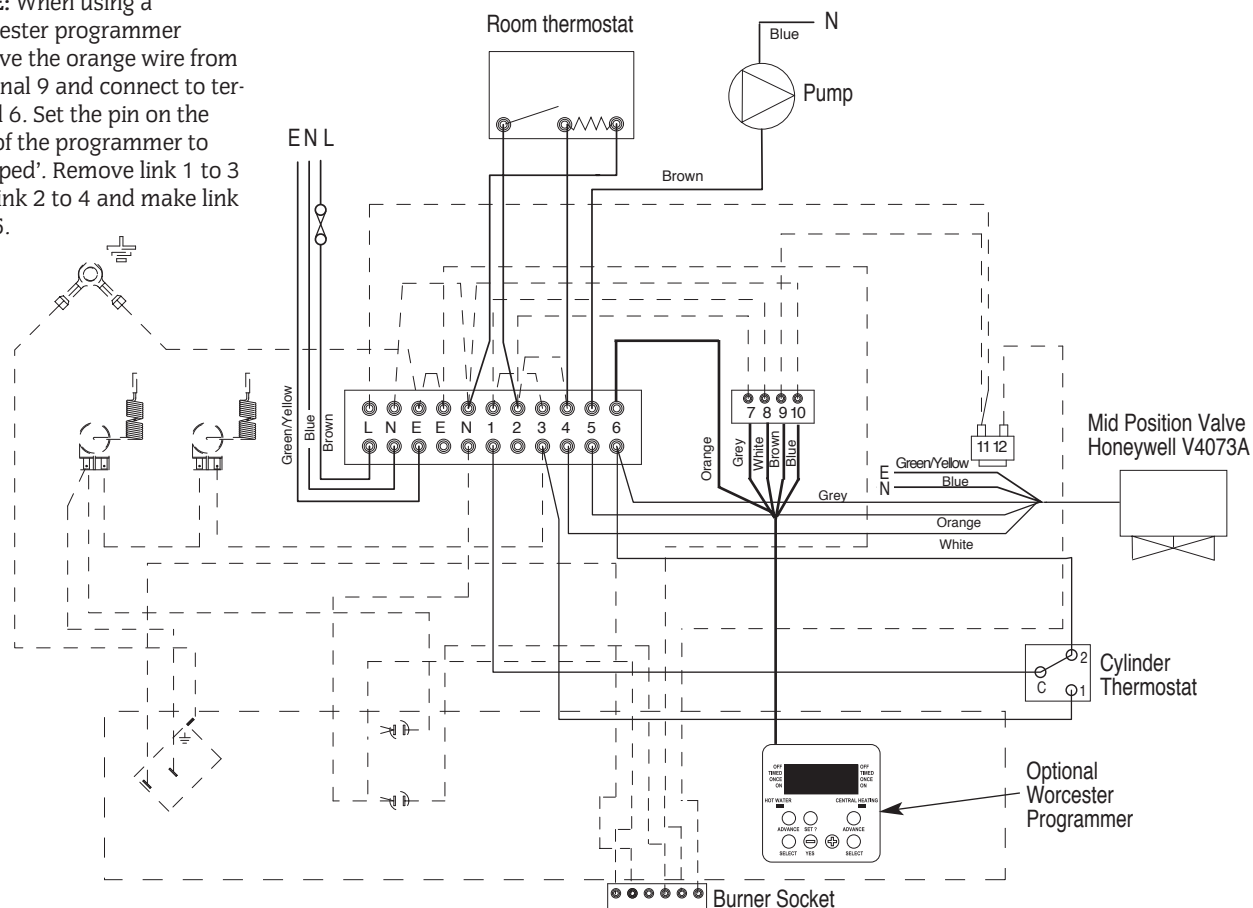
**Fig. 18. 2 Port Valve Control Set.**

**NOTE:** When using a Worcester programmer set the pin on the rear of the programmer to 'Pumped'. Remove link 1 to 3 and link 2 to 4 and make link 3 to 4.



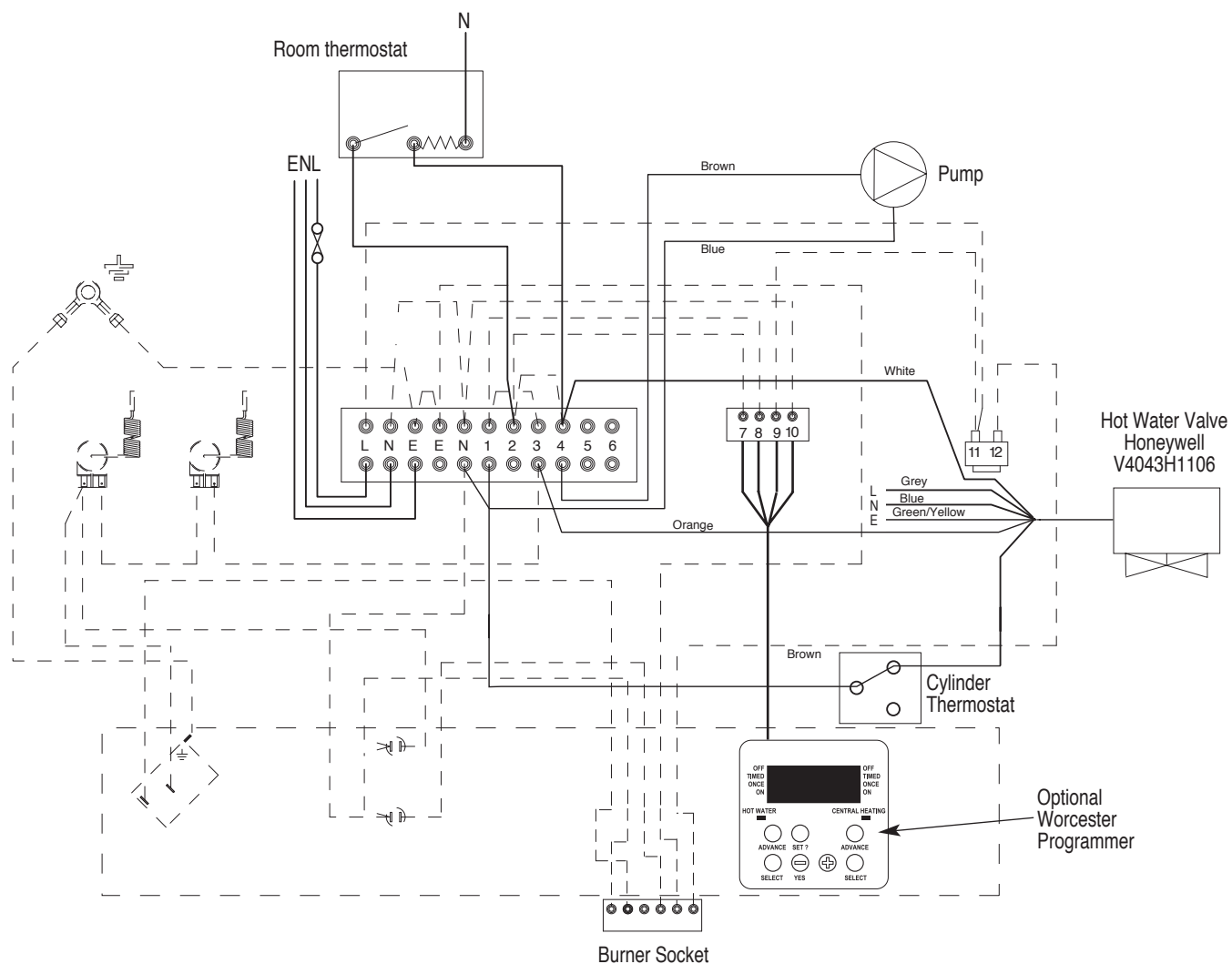
**Fig. 19. 3 Port Valve Control Set.**

**NOTE:** When using a Worcester programmer remove the orange wire from terminal 9 and connect to terminal 6. Set the pin on the rear of the programmer to 'Pumped'. Remove link 1 to 3 and link 2 to 4 and make link 3 to 5.

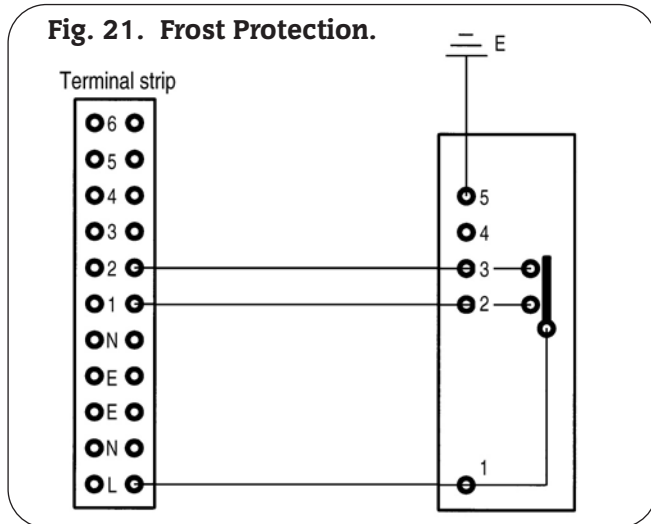


**Fig. 20. Semi Gravity Control Set.**

**NOTE:** When using a Worcester programmer set the pin on the rear of the programmer to 'Pumped'.  
Remove link 1 to 3 and link 2 to 4



**Fig. 21. Frost Protection.**



described in Section 5.1 & 5.2.

## 11. Installation

**11.1** After unpackaging the appliance it is recommended that all cabinet panels, control box and burner are removed, as described in Section 5.1 —5.7, and stored in a safe place to avoid damage during installation and allow easy inspection for any leaks after the system has been filled.

~~Never~~ Discard the extra packaging around the burner.

### 11.2 Heating system installation.

**Before the appliance is fitted to the heating system flush the system and mains water supply.**

1. Plumb the boiler into the central heating system.
2. Check that all unused sockets have been plugged.
3. Fill the system and vent all radiators and high points to remove air from the system.
4. Check the boiler and all pipework connections for leaks.

### 11.3 Flue system installation.

Install the appliance flue system as described in Section 7.

### 11.4 Oil supply installation.

**NOTE:** Never route the oil supply pipe/hose directly in front of the access door. Never connect to the oil pump with a rigid tube.

#### (a) Single pipe system

1. Bend a piece of 10mm or 12mm copper tube (as selected) to the correct profile to allow the pipe to be fed into the cabinet and along the top of the heat exchanger to the bulkhead bracket. The pipe may be routed along either the right or left hand side of the appliance as required. When using 12mm pipe fit a 12mm to 10mm compression coupling and connect to the valve with a short piece of 10mm pipe, otherwise connect direct to valve.

**NOTE:** Never use soldered joints on oil supply pipes as this could cause a hazard in case of fire.

2. Route the pipe back to the oil supply tank ensuring no potential interference with the cabinet will occur.
  3. With the isolating valve in the correct orientation tighten the back-nut.
  4. Turn the isolating valve fully clockwise to close the valve.
  5. Open the main oil supply valve at the tank and check for any leaks.
  6. Connect a suitable tube to the isolating valve, place a suitable container below the tube end and open the isolating valve.
  7. Draw off at least 2.5 litres of oil until a steady flow of clear uncontaminated oil can be seen. Turn off the isolating valve.
- For connection of single pipe suction lift with de-aerator follow the procedure as for a double pipe system as described below.

**NOTE:** This method may not be possible on some installations

where a sub-gravity system is used. Where this problem arises bleed the system using the oil pump as described in Section 12 remove and clean the oil pump filter to remove debris collected as a result of installation.

#### (b) Double pipe system oil return pipe.

1. Fit the double pipe screw to the oil pump as described in Section 8.
2. Connect the oil supply pipe as described in part (a) 1 — 4.
3. Fit the open grommet supplied in the plastic bag in the bulk-head, as shown in Fig 2.
4. Bend a piece of 10mm or 12mm copper tube ( as selected ) to the correct profile to allow the pipe to be fed into the cabinet and along the top of the heat exchanger to the bulkhead bracket. The pipe may be routed along either the right or left hand side of the appliance as required. Make a slight chamfer on the end of the pipe to be fed through the grommet to facilitate easy insertion.
5. Lubricate the grommet hole with vaseline (or butter etc.) and slide the pipe through the hole, supporting the grommet on its opposite side to prevent it dislodging.
6. Pull the pipe forward sufficiently to allow a 10mm compression to  $\frac{1}{4}$ " BSP female fitting to be fitted for the connection of the oil return flexible hose.
7. Connect the fitting to the pipe and fit a  $\frac{1}{4}$ " BSP taper thread flexible hose, ensuring a good seal using PTFE tape or suitable sealing compound. The flexible hose should have a  $\frac{1}{4}$ " BSP rotating union taper fitting at the other end with a 90° bend and a  $\frac{1}{4}$ " BSP nipple for the connection to the burner oil pump.

#### (c) Single pipe suction lift system with de-aerator.

For connection of a single pipe suction lift with de-aerator follow the procedure as for a double pipe system as described above.

**11.5** Reinstall the cabinet panels, control box and burner as described in section 5.9.

**11.6** Connect the flexible oil line(s).

**11.7** Connect the electrical supply as described in Section 10.

**11.8** Insert fascia leaflet into fascia, which is supplied in the literature pack.

**IMPORTANT:** If the appliance is going to be installed into a fitted kitchen under a 'permanent' work top it is very important that all the connections, both water and flue, are fully checked at full operating temperature before the units and work top are permanently fixed.

## 12. Commissioning the Appliance

Ensure that no foreign matter is left in the system as this could cause damage to the appliance.



**Benchmark Water Treatment:** For optimum performance after installation, this boiler and its associated central heating system should be flushed in accordance with the guidelines given in BS7593:1992 - Treatment of water in domestic hot water systems. Full instructions are supplied with proprietary cleansers sold for this purpose. If an inhibitor is to be used after flushing, it should be used in accordance with the inhibitor manufacturers instructions.

Suitable flushing agents and inhibitors are available from Betz Dearborn Tel: 0151 4209595 and Fernox Tel: 01799 550811. Instructions for use are supplied with these products.

**IMPORTANT:** Any system cleanser must be flushed from the system before an inhibitor is added.

12.1 Check that the electrical supply to the appliance is switched off.

12.2 When commissioning the appliance after initial installation follow the procedure from 12.3, otherwise follow the procedure from 12.4.

### 12.3 Prepare the heating system

1. After initial installation as previously described in Section 11, drain down the system sufficiently to add a flushing agent. After flushing drain the system before re-filling

2. Refill the system.

### 12.4 Prepair the boiler

1. Remove the burner as described in Section 5.1—5.5. On an RS flue system, release the flexible duct by unscrewing the jubilee clip.

**NOTE:** If the oil hose is to be disconnected, isolate the oil supply at both the bulkhead isolating valve (see Fig. 2), and tank isolating valve.

2. Check the nozzle lies central to the combustion head hole.

3. Remove the sponge O-ring seal and combustion head, and check the nozzle and electrode settings shown in Fig. 22.

4. Check for any visible defects.

5. Re-assemble the burner.

6. Check the position of the thermostat phials, by releasing the split pin and carefully removing the thermostat phials. Re-install the thermostat phials in the correct order as indicated in Fig. 2.

7. Install the burner.

8. Check the appliance is correctly wired as described in Section 10.

9. Turn the isolating valve fully clockwise to close the valve.

10. Fit a pressure gauge and manifold to the burner oil pump port, indicated in Fig. 6.

11. Turn the isolating valve fully anti-clockwise to open the valve.

12. Turn on the electricity to the appliance.

13. Bleed the burner.

### Single pipe system only

Release the fuel bleed port on the manifold and place a suitable receptacle beneath. Turn on the boiler thermostat and allow the burner to run through to lockout. Wait two minutes and reset the remote lockout reset button positioned beneath the control box assembly. Repeat the procedure at least three times or until a steady stream of oil, without air, is exhausted from the bleed port. Re-lock the bleed port.

### Double pipe system

A double pipe system will automatically vent the air back to the oil tank. Turn on the boiler thermostat and allow the burner to run through to lockout. Wait two minutes and reset the remote lockout reset button positioned beneath the control box assembly. Repeat the procedure until the burner fires and runs in a steady state. This may take several attempts depending on the oil pipe length and height.

### Single pipe suction lift system with de-aerator

A single pipe suction lift system with de-aerator will automatically vent air through the de-aerator by turning on the boiler thermostat and allowing the burner run to lockout. Wait two minutes and reset the remote lockout reset button positioned beneath the control box assembly. Repeat the procedure until the burner fires and runs in a steady state.

On long oil pipe runs from the oil tank to the boiler it is recommended that the de-aerator be primed to prevent damage to the oil pump. To prime the de-aerator follow the following procedure:

- Disconnect the flexible oil inlet hose end nearest the de-aerator and place in a container of oil.
- Place an empty container to collect oil from the oil inlet pipe connection from the de-aerator.
- Prime the de-aerator and reconnect the de-aerator to the flexible oil inlet hose.

12.5 Adjust the air shutter and pump pressure to the settings recommended in Table 2 and 3. After a pre-ignition period of approximately 15 seconds the burner should ignite. Flame sensing is carried out by means of a photocell mounted in the burner body. Should the boiler fail to establish a normal firing pattern (or should flame failure occur during running), the absence of a flame is sensed and the control box is monitored to a safe lockout condition and the boiler is shut down. The lockout indicator light in the boiler fascia panel will permanently illuminate indicating that the burner has gone to lockout. In this instance wait two minutes and press the remote lockout reset button positioned beneath the control box assembly as shown in Fig. 2. Another start sequence is then initiated. Repeat the procedure until a flame is established.

**Note:** Persistent lockout when running indicates a fault and a Service Engineer should be consulted.

12.6 Run the boiler for approximately 3 minutes and switch off checking that there is no after-spurting from the nozzle. This can be detected by oil saturation on the combustion head. If after-spurting occurs remove the burner from the boiler, unscrew the nozzle, and while holding the burner in a vertical position, fill the nozzle holder with oil. Refit the burner and continue to run the boiler for three minute periods until after-spurting stops.

12.7 Run the boiler for a further 15 minute period and then finally fine tune the air shutter setting to give the CO<sub>2</sub> level specified in Table 2 and 3 less 0.5% CO<sub>2</sub>. During this period some smoke will be emitted due to the burning of the organic binder in the access door insulation board. Smoke readings will therefore be inaccurate at this point.

**Note:** A flue gas sampling point is located in the front of the flue plate on the right-hand side.

12.8 Check that the smoke reading is in the range 0-1. If this cannot be achieved then check that the burner combustion head is set correctly and the nozzle is in good condition.

12.9 Check that the flue temperature does not exceed the value specified in Table 2 and 3. If this is the case then check that the baffles are correctly located as shown in Fig 23. If the baffles are correctly located then reduce the pump pressure since nozzle variations of up to + or - 15% may occur.

12.10 Turn off the electricity supply.

12.11 Turn the isolating valve fully clockwise to close the valve.

12.12 Remove the oil pressure gauge and manifold and check all oil system joints for any signs of leakage.

12.13 Turn the isolating valve fully anti-clockwise to open the valve.

12.14 Turn on the electricity supply.

12.15 Allow the burner to run for a further five minutes and then recheck the CO<sub>2</sub> level and adjust the air setting if required.

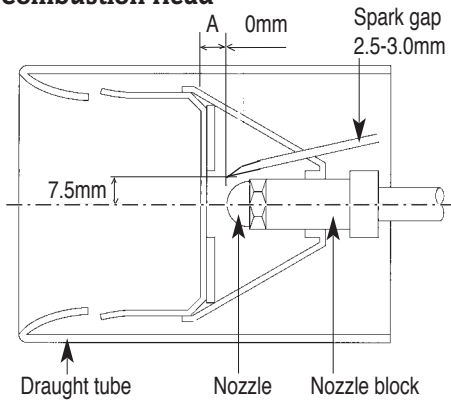
12.16 Replace the sample point plug.

12.17 Refit the cabinet front panel and control box assembly as described in Section 5.1—5.4 in the reverse order.

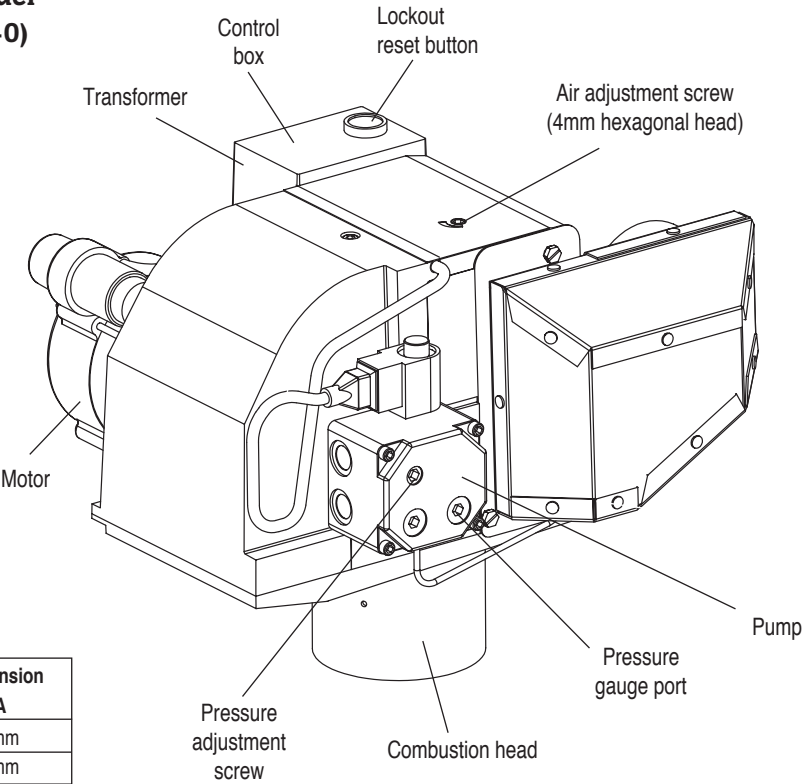
12.18 When the heating circuit has reached full operating temperature check the whole system for any leaks. This is particularly important if the appliance is installed under a 'permanent' work surface as access later will be difficult.

**Fig. 22. Electro Oil Sterling Burner.**  
**12/18 model and 18/25 model**  
**(Sterling 35) (Sterling 40)**

**Combustion Head**



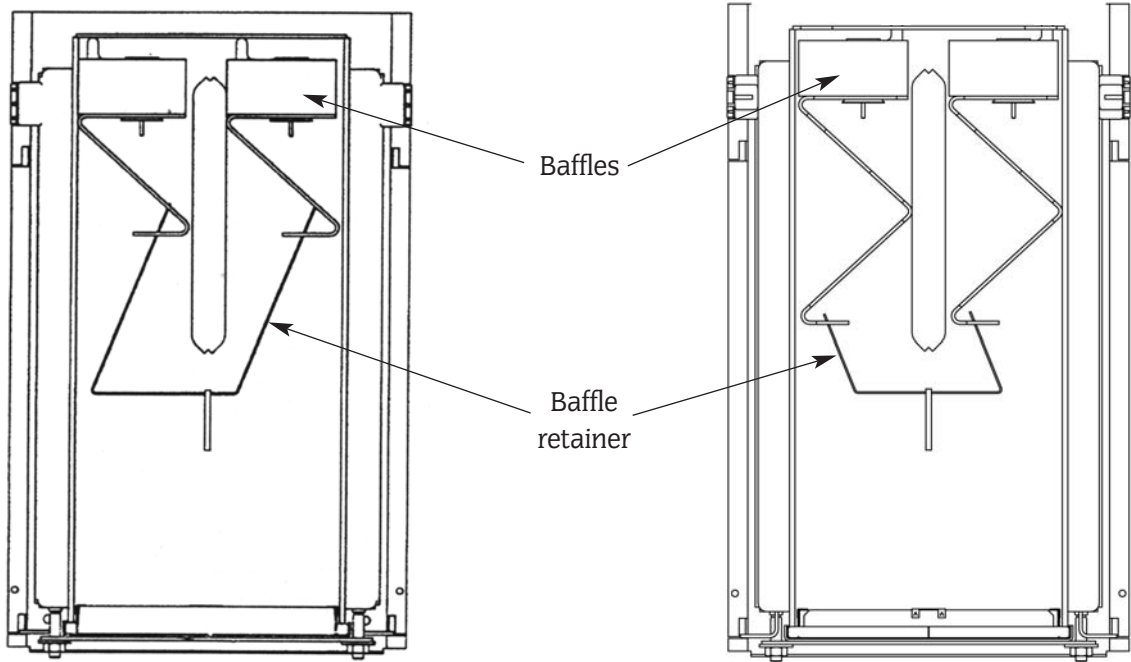
Output kW	Combustion Head	Dimension A
12-18	PL 6/7/21.5/10 x 78 mm	5mm
18-25	PL 6/7/21.5/10 x 78 mm	5mm



**Fig. 23. Baffle Arrangements.**

**12/18 model**

**18/25 model**





## 13. Instructions to the User

**13.1** *benchmark* Hand the users instructions and Benchmark Log Book to the user or purchaser for retention and instruct them in the efficient and safe operation of the appliance and the heating/hot water system.

**13.2** Advise the user or purchaser of the precautions necessary to prevent damage to the heating/hot water system and to the building in the event of the heating system remaining inoperative during frost conditions.

**13.3** Finally advise the user or purchaser that for continued efficient and safe operation of the appliance it is important that adequate servicing is carried out by a qualified engineer at least once per year.

Worcester, Bosch Group will be pleased to discuss and offer a comprehensive maintenance contract.

**13.4** Set the system controls to the users requirements.

## 14. Routine Cleaning and Inspection

**14.1** The following should be carried out at least once per year for 28 second Kerosene and twice per year for 35 second Gas Oil, to ensure efficient, trouble free operation.

1. Carry out pre-service check noting any operational faults.
2. Check and clean the burner.
3. On the CF model check and clean the air intake grille located in the boiler room.
4. On the RS balanced flue model check and clean the flue system by removing the grille at the end of the terminal.
5. If the appliance has been installed in a compartment check that the ventilation areas are clear.
6. Clean all oil filters.

Some of the servicing points are covered more fully in the following instructions:-

### 14.2 Pre-Service Check

1. Remove the front panel by pulling the bottom of the panel forwards to release the ball studs and lifting the panel upwards and forwards to release from its supporting ledge.
2. Operate the appliance and system, noting any faults which may need to be corrected during the service.

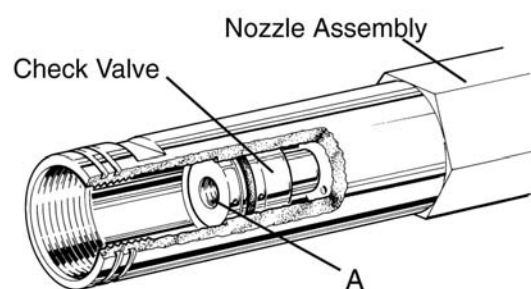
### 14.3 Cleaning the Burner

1. Check that the electrical supply to the appliance is switched off.
2. Remove the burner as described in Section 5.1—5.5.
3. Turn the isolating valve fully clockwise to close the valve.

#### Electro Oil Sterling

- (a) Separate the main body of the burner from the burner front by removing the M6 allen screw (located beneath the air adjustment screw), using a 5mm allen key.
- (b) Note the position of the air damper adjustment and check the air damper moves freely.
- (c) Check the air path to the burner head is clear.
- (d) Clean both sides of the fan impeller and remove any debris from the burner housing.
- (e) Check the impeller rotates freely.
- (f) Re-assemble the components.

**Fig. 24. Mechanical Shut-off Valve.**



#### 6. Inspection of Mechanical Shut-off Valve. (See Fig. 24)

- (a) Remove the sponge O-ring seal and combustion head.
- (b) Remove the nozzle.
- (c) Fasten an M5 screw, with a minimum length of 30mm, into the threaded hole (A) and pull the screw to withdraw the check valve.
- (d) Check that the nozzle holder is clear of any debris and clean if necessary.
- (e) Check that the 3 holes in the check valve are clear of any debris. Discard the check valve if the holes cannot be cleared or if the unit is defective and replace with a new one.
- (f) Replace the mechanical shut off valve.

7. Replace the Nozzle.

**NOTE:** It is strongly recommended that the oil atomising nozzle be replaced at each service. If this is not possible then remove and clean the integral filter, but under no circumstances should the nozzle be stripped into its component parts and never attempt to clean the nozzle tip.

8. Check and reset the electrodes, where necessary, as shown in Fig. 22.

9. Replace the combustion head and check that the nozzle lies central to the combustion head and the head settings are as shown in Fig. 22.

10. Withdraw the photocell from its housing and clean.

11. Remove and clean the oil pump internal filter using kerosene or white spirit. The internal filter is accessed by unscrewing and withdrawing the cartridge on the Danfoss BFP 41 as indicated in Fig. 6.

12. It is recommended that the standard flexible oil line is replaced at each yearly service to prevent the possibility of a leak due to ageing.

13. Re-assemble the burner components.

14. Check the sponge O-ring seal located around the combustion head and replace if necessary. It is imperative that this seal is in good condition since failure will cause the flue gases to be circulated into the room.

14.4 Remove the paper element from the external oil filter and replace. If the filter contains a washable element then thoroughly clean in Kerosene or white spirit and re-assemble into the filter.

**14.5 Clean the Boiler**

1. Remove the access door by releasing the four M10 nuts and check the rope seal and insulation board. Replace if necessary.

2. Remove the baffle retainer, as shown in Fig 23.

3. Remove the baffles, clean and check their condition. Replace any baffles considered to be badly corroded, or having insulation blocks showing damage.

4. Thoroughly clean all of the heat exchanger surfaces using a stiff wire brush and vacuum clean all loose debris from the combustion chamber.

5. Check and clean the flue.

6. Refit the baffles, making sure that they are pushed to the back of the boiler as shown in Fig. 23.

7. Refit the baffle retainer as shown in Fig. 23.

8. Replace the access door.

**14.7 Fire Valve.**

1) Check that a fire valve is fitted in accordance with BS 5410, as stated in Section 8.6.2.

2) Test the operation of the fire valve to ensure that the mechanism operates and the oil supply is completely isolated.

**14.8 Refitting the Burner.**

1. Remove the sample point screw.

2. Connect the flexible oil supply hose to the isolating valve and tighten sufficiently to form a good seal. Where a double pipe system is being used connect the oil return flexible hose to the return pipe fitting.

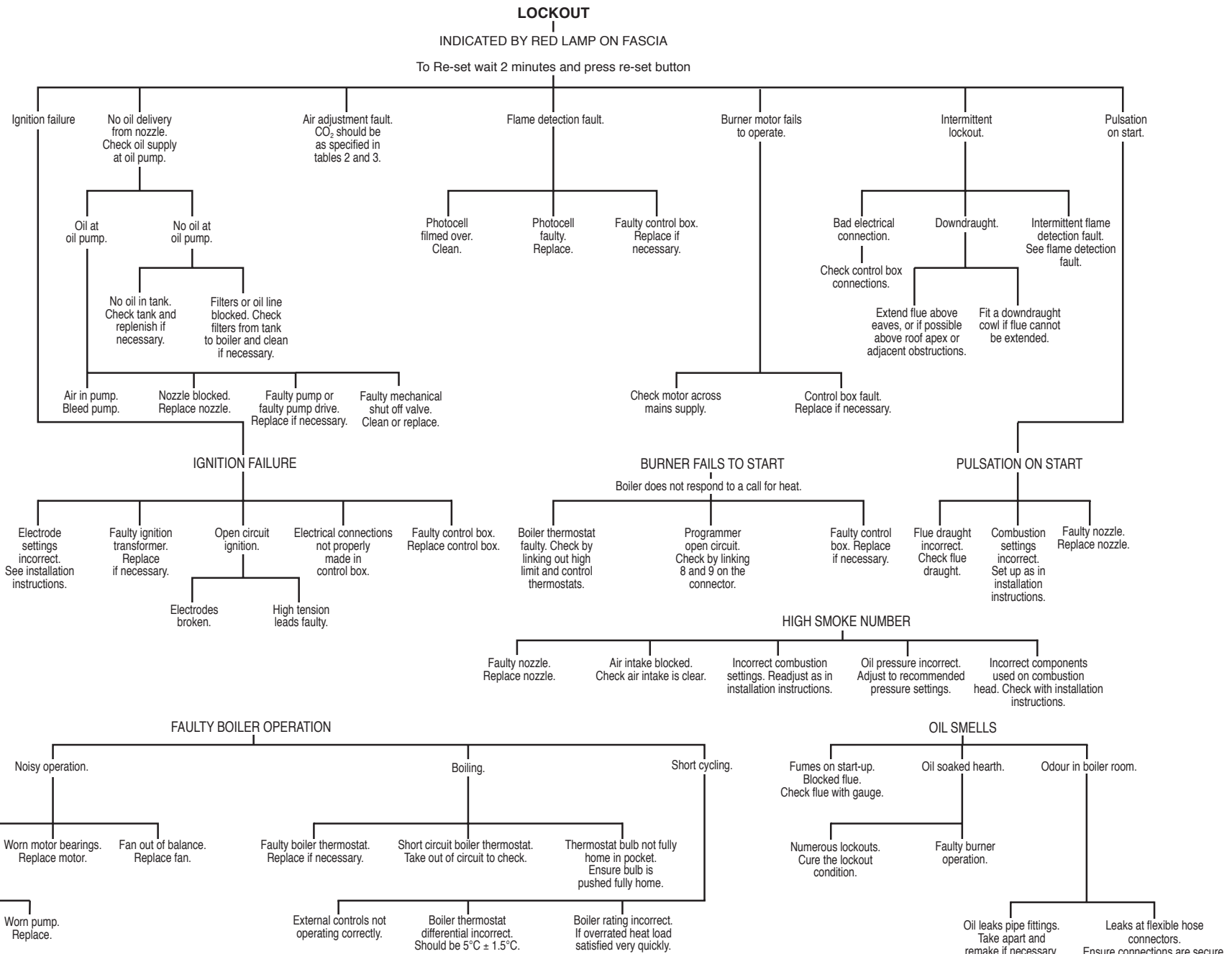
3. Turn the isolating valve fully anti-clockwise to open the valve.

4. With the sponge 'O' ring gasket around the burner combustion head, repeat 5.1—5.5 in reverse order.

5. Re-commission the burner as described in Section 12.

## 15. Short Parts List

Part	Manufacturers Reference	Qty	Worcester Part No.
Burner for 12/18	Bentone Sterling 35	1	8 716 105 376 0
Sterling 35 Combustion Head	PL 6/7/21.5/10 x 78mm	1	8 716 156 697 0
Burner for 18/25	Bentone Sterling 40	1	8 716 105 375 0
Sterling 40 Combustion Head	PL 6/7/21.5/10 x 78mm	1	8 716 156 697 0
Burner control 1. Control Box	Satronic DKO 970 Mod 21	1	8 716 142 396 0
Photocell	Satronic MZ770	1	8 716 156 692 0
Control Box Base	Satronic S01 S701	1	8 716 142 782 0
Ignition Electrode		1	8 716 142 752 0
Motor	AEG (FHP) 90W	1	8 716 156 645 0
Oil Pump 1	Danfoss BFP41L3	1	8 716 142 743 0
Oil Pump 2	Suntec AS47C	1	8 716 157 014 0
Transformer	Danfoss EBI 052F0030 (excludes cable)	1	8 716 156 696 0
Mechanical Shut-Off Valve		1	8 716 156 658 0
Flexible Oil Line Kit	Worcester	1	8 716 156 663 0
Burner 'O' Shaped Gasket	Worcester	1	8 716 140 902 0
Control Thermostat	Siebe K36-P2312	1	8 716 142 390 0
Automatic Reset High Limit Thermostat	Siebe LO7-P1022	1	8 716 142 391 0
Manual Reset High Limit Thermostat	Siebe LM7-P5075	1	8 716 142 392 0





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