



Bosch Group

DANESMOOR UTILITY

12/14, 15/19, 20/25, 26/32

WORCESTER BOSCH

50/70, 70/90, 90/110

FLOOR STANDING OIL-FIRED

PRESSURE-JET BOILERS WHEN FITTED INSIDE

OUTDOOR PACK

INSTALLATION AND SERVICING INSTRUCTIONS



Worcester Bosch supports the
Benchmark code of practice

IMPORTANT: Please discard all previous Installation and Servicing instructions.
Retain ONLY the Worcester Outdoor Pack Installation and Servicing
Instructions.

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE APPLIANCE

This appliance must be installed and serviced by a competent person

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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.

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: 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 Section III and Part J 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.

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

NOTE: When installing the Danesmoor Utility or Worcester Bosch boiler inside the Outdoor Pack only use the Outdoor Pack installation and service instructions, Part Number 8 716 104 781. Discard the Danesmoor Utility (Part No 8 716 104 437), Worcester Bosch (Part No 8 716 8 716 104 438), and the RS short silencer (Part No 8 716 104 861) installation and servicing instructions.

2.1 These instructions cover the Danesmoor Utility or Worcester Bosch appliances when fitted inside the Outdoor Pack (Part Number 7 716 192 273), the RS short silencer (Part Number 7 716 190 002) and flue terminal guard (Part Number 7 716 190 009).

2.2 The **Worcester Danesmoor Utility** appliances covered in these instructions are conventional flued low level discharge appliances, which have been designed to serve domestic central heating and hot water requirements ranging from 12 kW to 32 kW. 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 to 5. The 12/14, 15/19, 20/25 and 26/32 models are only suitable for use with 28 second Kerosene heating oil.

2.3 The **Worcester Bosch** appliances covered in these instructions are conventional flued low level discharge appliances, which have been designed to serve domestic central heating and hot water requirements ranging from 51,000 Btu/h to 109,000 Btu/h. The boiler is factory set to the mid-range output and can be altered, if necessary, by adjusting the burner as specified in Tables 3 to 5. The 50/70, 70/90 and 90/110 models are only suitable for use with 28 second Kerosene heating oil.

2.4 The appliance is suitable for connection to fully pumped conventional indirect hot water systems utilising an indirect double feed cylinder. This appliance is not suitable for use on gravity systems.

2.5 The service engineer should always have access to the inside of the property when servicing the appliance, to check for system faults and reset/replace electrical safety devices. A service switch is provided to allow the service engineer to isolate the boiler. See Section 10.

2.6 The electrical supply to the appliance should be fed via a separate circuit breaker including earth leakage protection.

WARNING: This appliance is serviced and repaired externally. External equipment operated at 230volts should not be serviced or repaired under adverse weather conditions.

WARNING: This appliance should not be installed where there is potential for excessive ground water coverage.

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

2.7 In the event of a lockout condition, the householder resets the burner by completely isolating the appliance inside the property, removing the Outdoor Pack front cover, the boiler front cover, and pressing the lockout reset button on the burner.

2.8 An electrical service lead is fitted to the underside of the external control box enabling the service engineer to use a light or vacuum cleaner.

NOTE: Any electrical equipment used with this lead should be protected by separate RCD safety unit.

NOTE: When installing the Danesmoor Utility or Worcester Bosch in conjunction with the Outdoor Pack and RS Short Silencer only use the Outdoor Pack installation and servicing instructions. The instructions received with the boiler and the RS short silencer should be discarded.

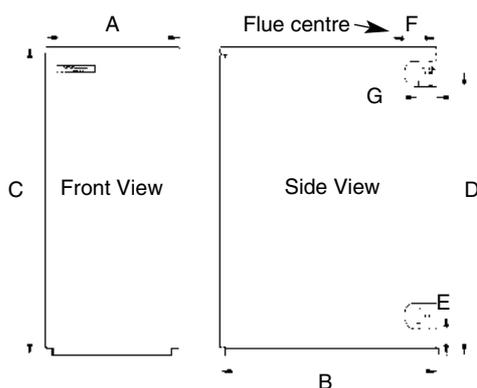
3. Technical Data

Table 1

SPECIFICATIONS				
Danesmoor Utility MODEL	12/14	15/19	20/25	26/32
Worcester Bosch MODEL	/	50/70	70/90	90/110
POWER SUPPLY	230V 50 Hz	230V 50 Hz	230V 50 Hz	230V 50 Hz
IP RATING	IP 45	IP 45	IP 45	IP 45
HEATING FLOW	1 in. BSP	1 in. BSP	1 in. BSP	1¼ in. BSP
HEATING RETURN	1 in. BSP	1 in. BSP	1 in. BSP	1¼ in. BSP
HEIGHT (BOILER)	855	855	855	855
WIDTH (BOILER)	370	370	370	520
DEPTH (BOILER)	600	600	600	600
HEIGHT (OUTDOOR PACK)	975			
WIDTH (OUTDOOR PACK)	670			
DEPTH (OUTDOOR PACK)	760			
FUEL LINE	¼ in. BSP	¼ in. BSP	¼ in. BSP	¼ in. BSP
FLUE REQUIREMENT	RS Short Silencer 7 716 190 002			
HEARTH TEMPERATURE	Below 100°C			
MAXIMUM STATIC HEAD	30m (98 ft.)			
BOILER WEIGHT	94 Kg (207 lbs)	97 Kg (214 lbs)	107 Kg (236 lbs)	138 Kg (304 lbs)
OUTDOOR PACK WEIGHT	36Kg (79lbs)			
PRIMARY WATER CAPACITY	20 litres (4.4 gal.)	20 litres (4.4 gal.)	23.5 litres (5.2 gal.)	29.1 litres (6.4 gal.)
BURNER	Electro Oil Inter B9 A	Electro Oil Inter B9 B	Electro Oil Inter B11C	Electro Oil Sterling 40
WATER SIDE RESISTANCE 10°C Difference	7 mbar	8 mbar	18 mbar	35 mbar
WATER SIDE RESISTANCE 20°C Difference	3 mbar	6 mbar	12 mbar	19 mbar
EXIT FLUE GAS MASS FLOW	24 kg/hr	35 kg/hr	43 kg/hr	57 kg/hr
SEDBUK RATING* (SEDBUK BAND C)	85.3%	85.5%	85.3%	85.3%
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 RESET THERMOSTAT BREAK POINT	110 + 0/ - 6°C			
FROST THERMOSTAT RANGE	5°C cut in to 10°C cut out			

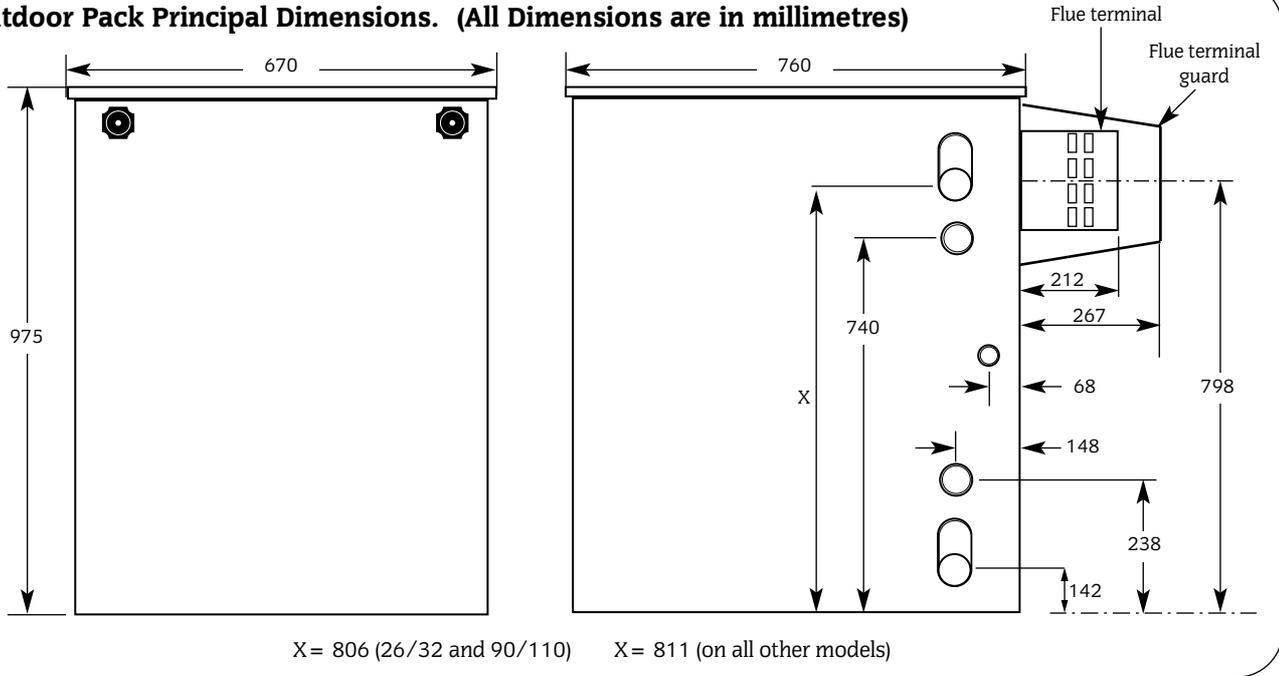
* The value is used in the UK Government Standard Assessment Procedure (SAP) for energy ratings for dwellings.

Fig. 1. Principal Dimensions Of Boiler Fitted Within Outdoor Pack (All Dimensions are in millimetres)



Model	A	B	C	D	E	F	G
12/14	370	600	855	780	110	92	56
15/19 (50/70)	370	600	855	780	110	92	56
20/25 (70/90)	370	600	855	780	110	92	56
26/32 (90/110)	520	600	855	775	110	92	56

Fig. 2. Outdoor Pack Principal Dimensions. (All Dimensions are in millimetres)



X = 806 (26/32 and 90/110) X = 811 (on all other models)

Danesmoor Utility 12/14 Table 2. Electro Oil Inter B9A Burner (See Fig. 29)

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO ₂	Approx. Air Setting	Appliance			
			Kg/h	l/h				Input		Output	
								kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.40 60°ES	130	1.11	1.41	180	10	6.0	13.5	46,000	12	41,000
28 Sec. Kerosene	0.50 60°ES	100	1.30	1.64	195	11.5	7.0	15.5	53,000	14	48,000

Danesmoor Utility 15/19 and Worcester Bosch 50/70 Table 3. Electro Oil Inter B9B Burner (See Fig. 30)

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO ₂	Approx. Air Setting	Appliance			
			Kg/h	l/h				Input		Output	
								kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.50 60°ES	110	1.40	1.77	215	10.5	8.5	17	58,000	15	51,000
28 Sec. Kerosene	0.55 80°EH	115	1.59	2.01	225	10.5	8.75	19	65,000	17	58,000
28 Sec. Kerosene	0.60 60°ES	105	1.78	2.25	235	11.5	9.0	21.5	73,000	19	65,000

Danesmoor Utility 20/25 and Worcester Bosch 70/90 Table 4. Electro Oil Inter B11C Burner (See Fig. 31)

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO ₂	Approx. Air Setting	Appliance			
			Kg/h	l/h				Input		Output	
								kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.60 80°EH	130	1.87	2.37	190	11.0-11.5	5.5	22.5	77,000	20	68,000
28 Sec. Kerosene	0.75 80°EH	105	2.10	2.66	205	11.5-12.0	6.0	25	86,000	22.5	77,000
28 Sec. Kerosene	0.75 80°EH	130	2.34	2.96	220	12.0-12.5	6.5	28	96,000	25	85,000

Danesmoor Utility 26/32 and Worcester Bosch 90/110 Table 5. Electro Oil Sterling 40 Burner (See Fig. 32)

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO ₂	Approx. Air Setting	Appliance			
			Kg/h	l/h				Input		Output	
								kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.85 80°EH	110	2.36	2.99	225	11.0-11.5	11	28.5	97,000	26	89,000
28 Sec. Kerosene	0.85 80°EH	130	2.66	3.37	240	11.0-11.5	12	32	109,000	29	99,000
28 Sec. Kerosene	1.00 80°EH	130	2.95	3.74	245	11.5-12.0	16	35.5	121,000	32	109,000

** 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 and angled towards the flue outlet. 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 CO₂ 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 80°EH may be replaced with a 0.75 80°H).

Fig.3. Conventional Flue Appliance (CF/LLD).

Fitted within Outdoor Conversion Kit.

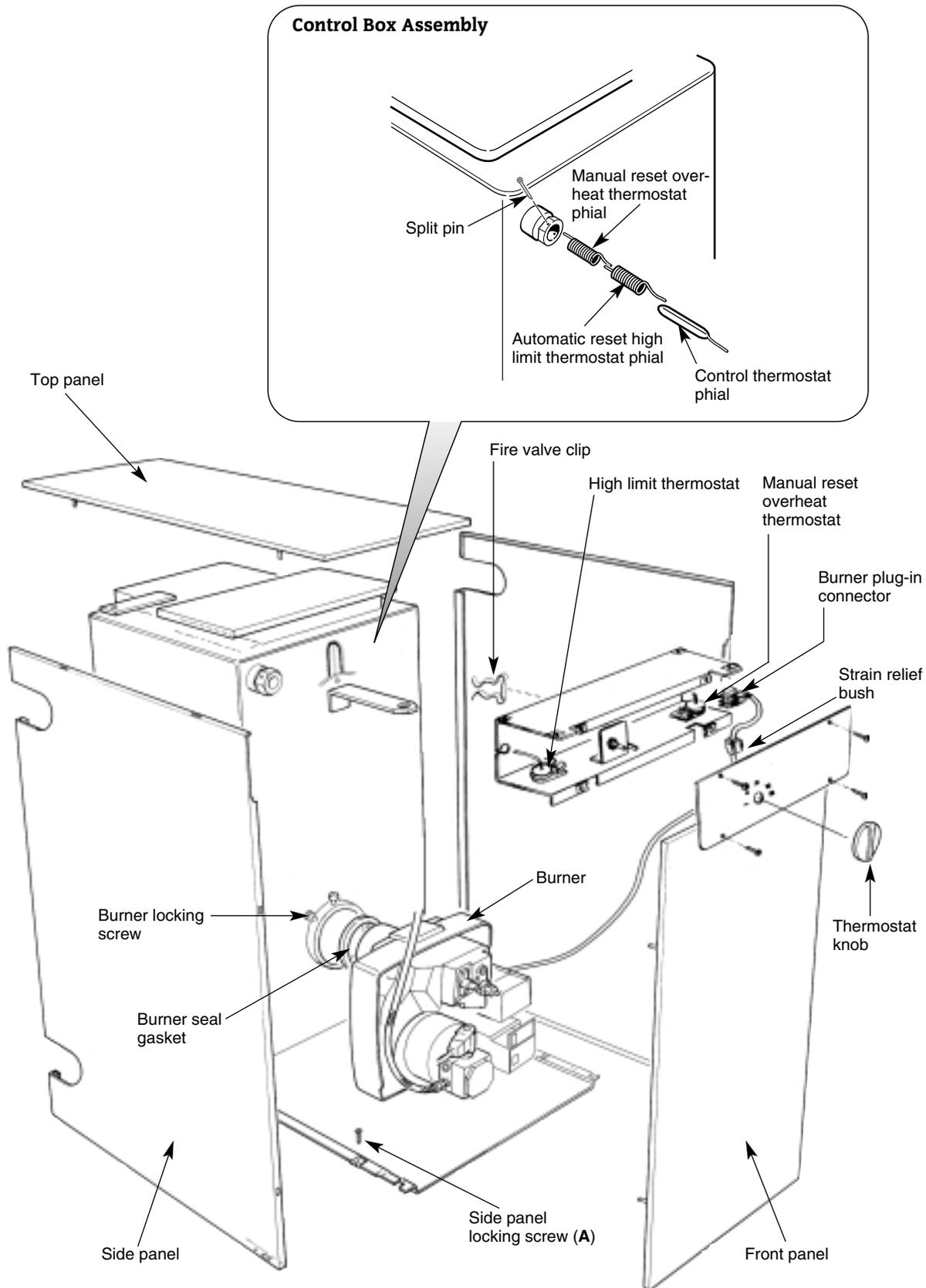
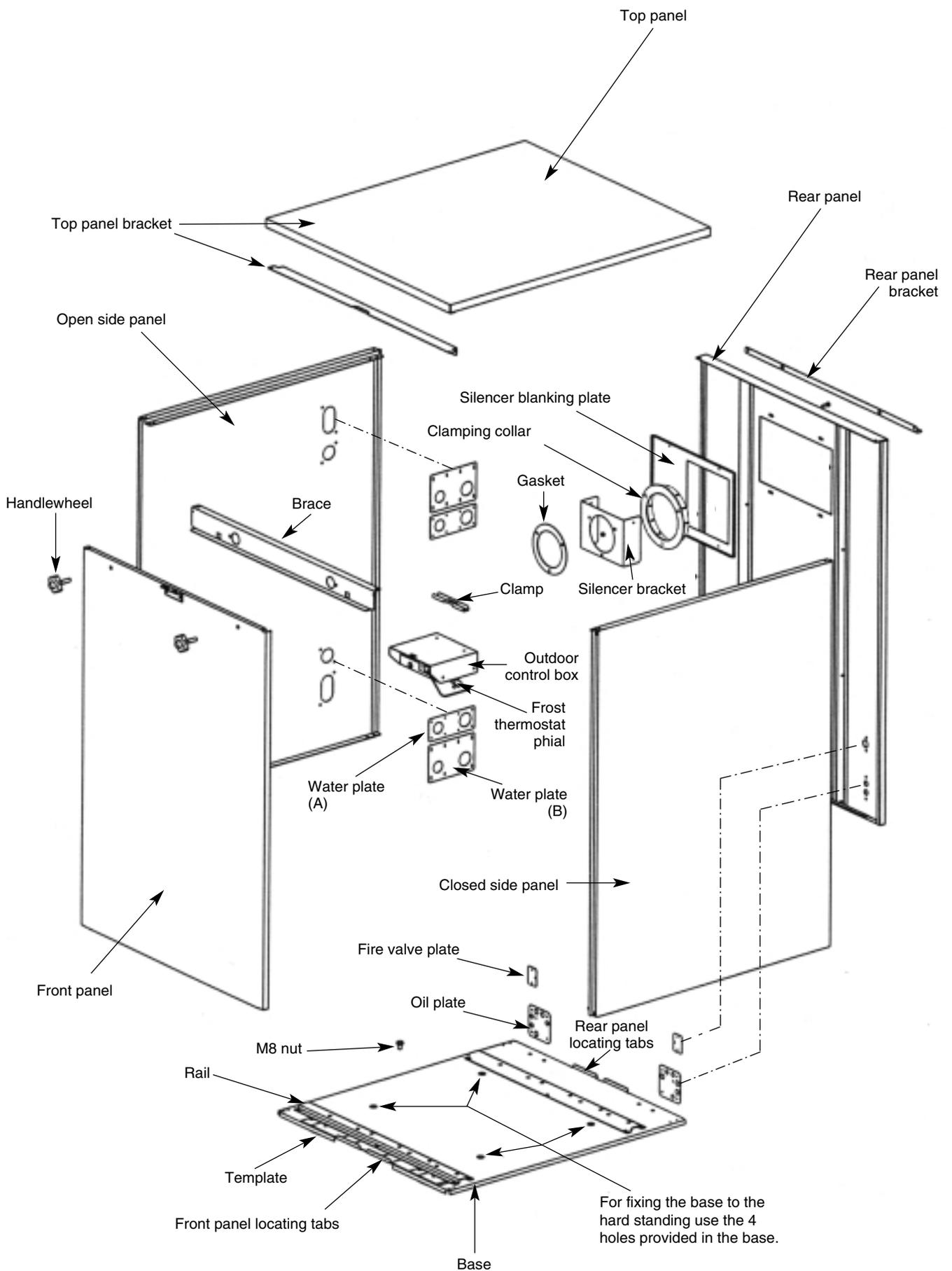


Fig.4. Outdoor Pack.



4. Siting The Appliance

4.1 The appliance is only suitable for external installation.

WARNING: This appliance should not be installed where there is potential for excessive ground water.

4.2 The appliance should be positioned and fastened on a non-combustible solid base and care should be taken to ensure that the appliance is level.

4.3 When siting the appliance the flue terminal must be positioned 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) Above - 600mm
- (b) Rear (from flue terminal) see section 7 and figure 5
- (c) In front - 600mm
- (d) Right or left hand side against wall – 10mm
- (e) Right or left hand side not against the wall of the property – 600mm

5. Removal Of The Cabinet

See Figs. 3 and 4.

Outdoor Pack Removal

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

5.1 Remove the Outdoor Pack front cover by undoing the two handwheels on the door and padlock if fitted. Pull forward at the top of the panel and lift the front cover to release from the locating tabs on the base

5.2 Remove the Outdoor Pack top cover by removing the two fixings and push back to release from the locating strip at the back of rear panel.

Boiler Cabinet Removal

For installation and servicing of the boiler the cabinet should be removed as follows:

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

5.4 Remove the front panel by pulling the bottom of the panel forwards to release the lower ball studs and then repeat the procedure at the top end to release the upper ones. Take care not to pull the bottom end too far forwards as this may cause damage to the spring clips.

5.5 The side panels are removed by firstly following procedures 5.3 to 5.4 as described above, then remove screw (A) from the side panel base and the three screws located in the upper flange of each side panel. Ease the panel clear of the electrical control box and slide forwards to release from the locating lugs on the base plate.

5.6 To remove the outdoor control box, which is positioned below the control, box remove the four fixings and pull down.

5.7 The control box can be removed by undoing the four screws in the front fascia cover and then removing the wing nut on the underside of the control box. The thermostat phials should be carefully removed from the phial pockets and the control box placed in a safe place taking care not to kink the thermostat capillary tubes.

6. Air Supply

The appliance is for external installation only and does not require a separate vent for combustion air.

7. Flue System

7.1 The appliance must be installed in conjunction with the RS Short Silencer kit, this is available from Worcester Heat Systems, Part Number 7 716 190 002. For details on the installation procedure refer to Section 11.4 and 11.5 of these installation and servicing instructions.

7.2 Siting of the flue outlet terminal

1. The flue outlet terminal must be located in a suitable position, as shown in Fig.5, such that the products of combustion can be freely dispersed without the possibility of gases entering the dwelling or that of a neighbouring dwelling.

2. Discharge of flue gases into car ports or narrow passage ways is not recommended.

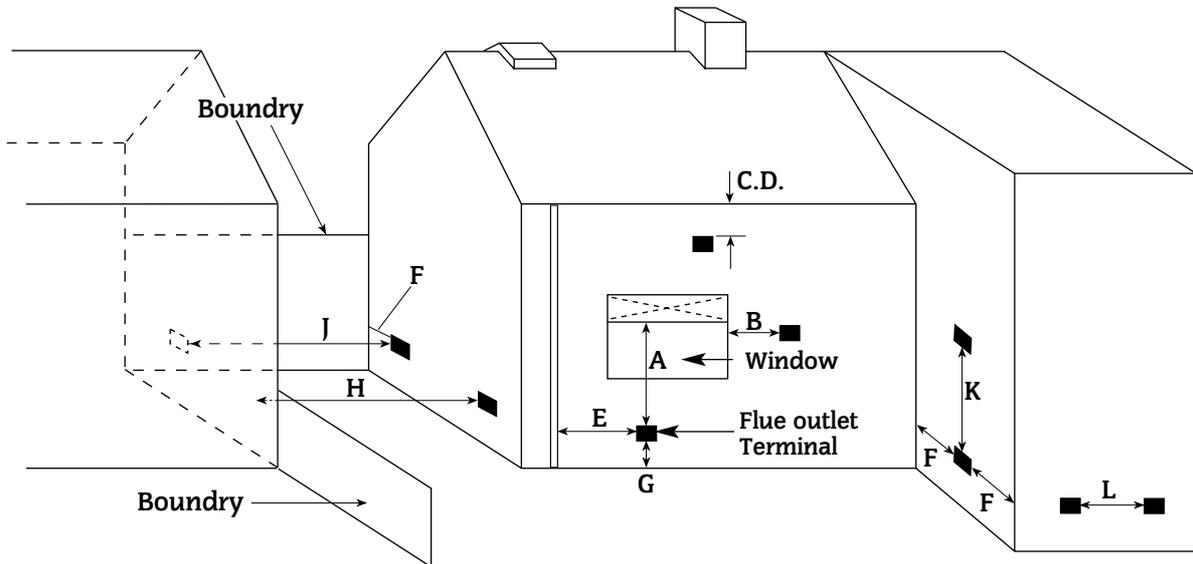
3. The terminal must not cause an obstruction or the discharge cause a nuisance as a result of either flue gases or terminal noise.

4. If the terminal is fitted within 600mm of a plastic/painted gutter or painted eaves an aluminium or stainless steel shield at least 750mm long should be fitted to protect the surface.

5. A flue terminal guard should be fitted. A flue terminal is available from Worcester Heat Systems, Part Number 7 716 190 007. For details on the installation procedure refer to Section 11.6.

Fig.5. Flue outlet 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.



Flue outlet Terminal Position

Minimum Distance (mm)

A	Directly below an opening, air brick, window, etc.....	600
B	Horizontally to an opening, air brick, window, etc.....	600
C	Below a gutter, sanitary pipe or eaves if combustible material protected	75
D	Below a gutter, sanitary pipe, eaves or balcony without protection.....	600
E	From vertical sanitary pipework.....	300
F	From an internal or external corner or boundry along side terminal.....	300
G	Above ground or balcony level.....	300
H	From a surface or boundry facing the terminal.....	600
J	From a terminal facing the terminal.....	1200
K	Vertically from a terminal on the same wall.....	1500
L	Horizontally from a terminal on the same wall.....	750

NOTE: Flue outlet is shown in Fig. 2.

8. Oil Supply

(See Figs. 6, 7 and 11).

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 all 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 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 8 is a general guide to determine the maximum allowable pipe run when using a de-aerator.

Table 8 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 6, 7 and 8 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) Oil supply pipework should be made in rigid pipework firmly attached to the wall or other secure structural element.

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

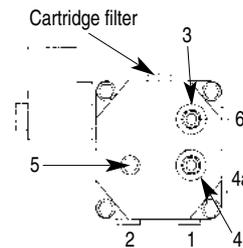
1. A manual isolating valve installed as close to the tank as possible.
2. A fire valve in accordance with BS5410 as shown in Fig. 6. The fire valve should be fitted externally with a fire detection element located within the boiler case. Use of a capillary type valve will allow a neat and simple installation. A suitable valve is the KBB C90 manufactured by Teddington Controls Limited. A spring clip has been provided behind the electrical panel, shown in Fig. 3, 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.

NOTE: The fire valve should be positioned at least 1 metre away from the Outdoor Pack.

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.

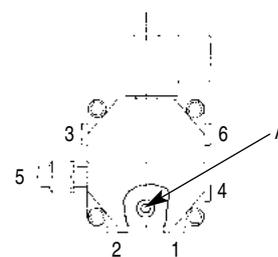
A. Danfoss BFP 41.



- 1 INLET
- 2 RETURN
- 3 BLEED AND PRESSURE GAUGE PORT
- 4 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).

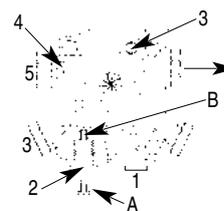
B. Danfoss BFP 11 Oil Pump.



To convert to a double pipe system: Remove the pump front cover, remove the changeover screw (A) nearest to ports 1 and 2, and the horseshoe washer underneath. Replace the changeover screw back into the threaded hole. Connect the flow and return pipes to 1 and 2.

Note: When removing the pump front cover ensure that a suitable receptacle is placed below the pump to catch the oil residue.

C. Suntec AS47C Oil Pump.



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

TABLE 6 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 7 Double Pipe Sub-Gravity Feed System

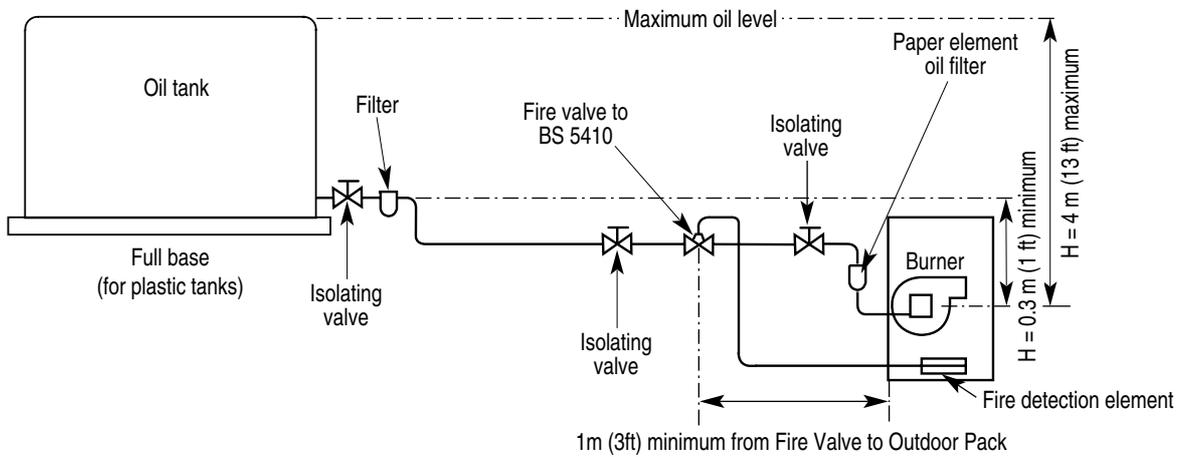
HEAD (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8 mm inside dia. pipe (10 mm O.D. copper)	10 mm inside dia. pipe (12 mm O.D. copper)
0	50	100
0.5	44	100
1.0	38	95
1.5	32	80
2.0	26	66
2.5	20	51
3.0	14	37
3.5	8	22

TABLE 8 Single Pipe Suction Lift with De-aerator

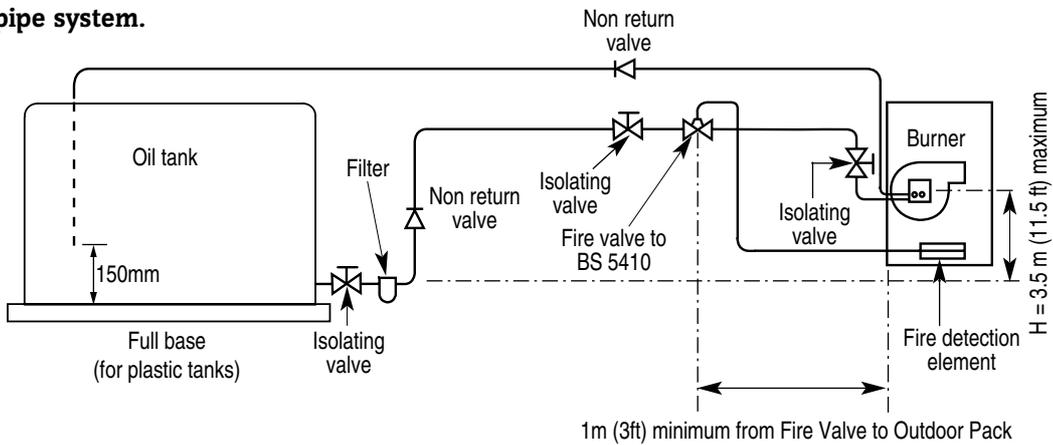
Fuel Flowrate	MAXIMUM ALLOWABLE PIPE RUN FROM TANK TO DE-AERATOR (metres)			
	2.5 (kg/h)	5.0 (kg/h)	10.0 (kg/h)	10.0 (kg/h)
HEAD (metres)	6 mm inside dia. pipe (8 mm O.D. copper)			8 mm inside dia. pipe (10 mm O.D. copper)
0	100	55	26	100
0.5	95	45	23	100
1.0	80	40	20	90
1.5	70	35	17	75
2.0	60	30	14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

Fig. 6. Oil Supply.

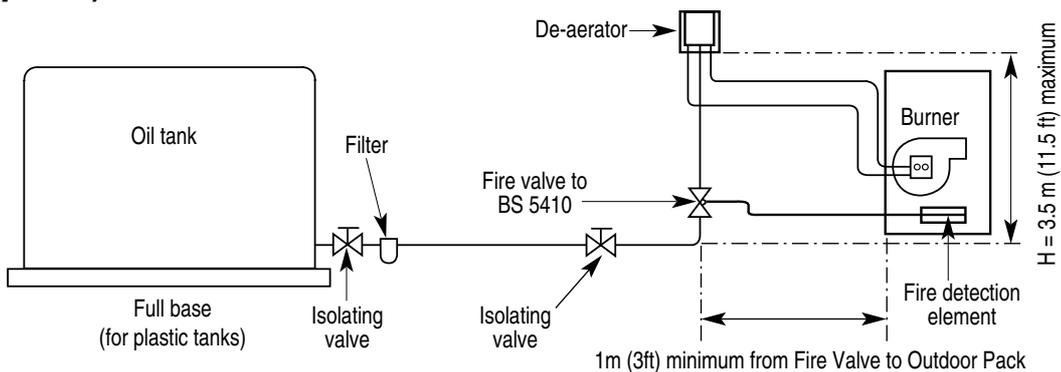
(a) Single pipe system



(b) Double pipe system.



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



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 fully pumped conventional indirect hot water systems utilising an indirect double feed cylinder. This appliance is not suitable for use on gravity systems.

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 must be made on the same side of the boiler depending on the position of the boiler within the Outdoor Pack.

9.3 On new installations it is recommended a room thermostat or programmable room thermostat is used in the main zone and thermostatic radiator valves are used in further heating zones.

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

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

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

9.5 The appliance is suitable for connection to open vent or sealed primary systems.

9.6 Any unused boiler tappings should be plugged prior to filling. It should be noted that the flow tapping on the front of the boiler requires plugging.

9.7 Drain cocks should be fitted on the lowest points on the system to allow draining of the appliance and system.

9.8 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.

9.9 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.

NOTE: Exposed pipework should be properly insulated to protect against frost damage.

Open Vent Primary System (See Fig. 8).

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 recommended 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. 8. 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 Figs. 9 and 10).

The appliance is supplied with a manual reset high limit thermostat and may therefore be fitted to a sealed heating 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 therequirements 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 a sealed system:

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

Fig. 8. Typical fully pumped open vent system (Honeywell 'Y' plan).

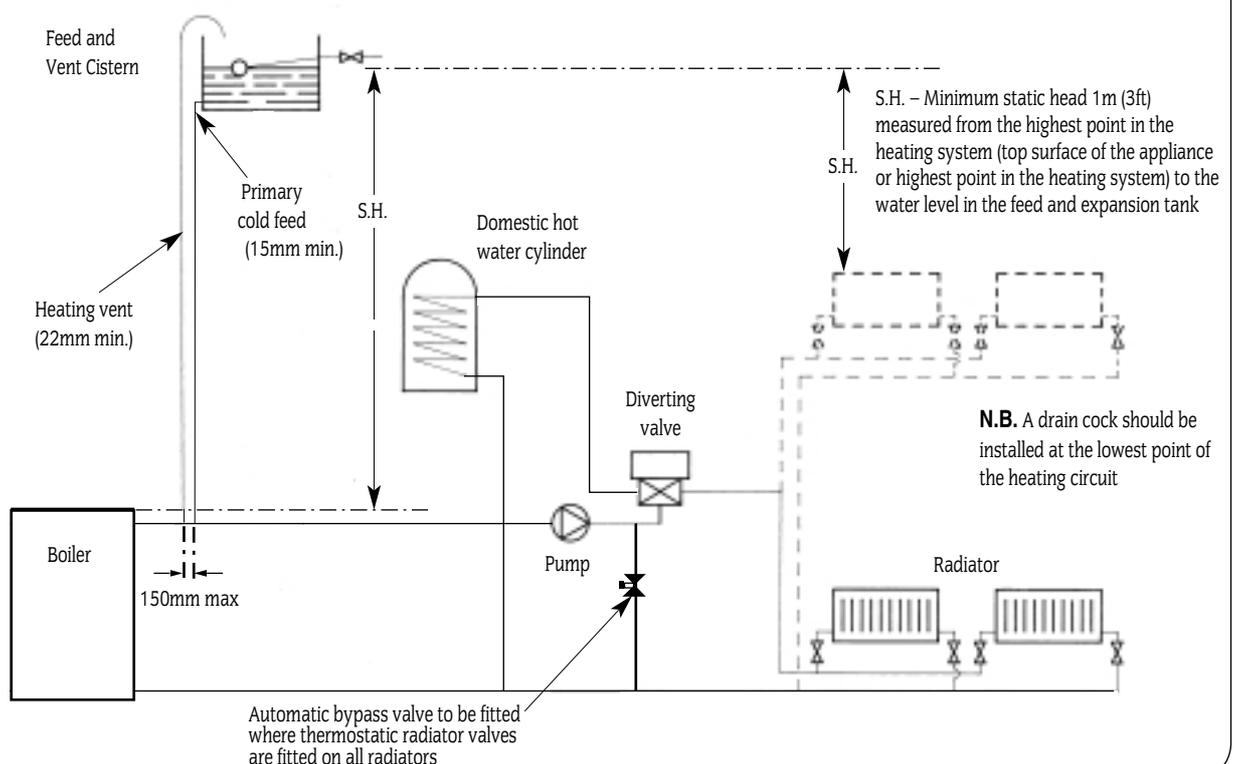


Fig. 9. Typical fully pumped sealed system (Honeywell 'Y' plan).

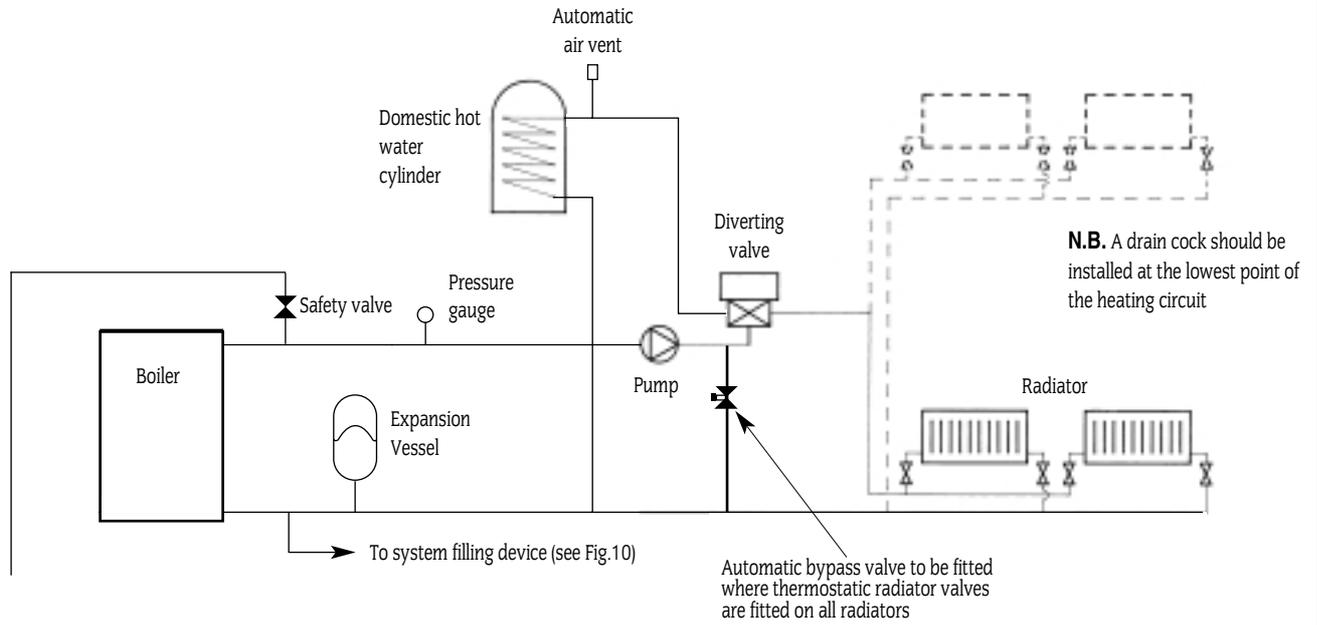
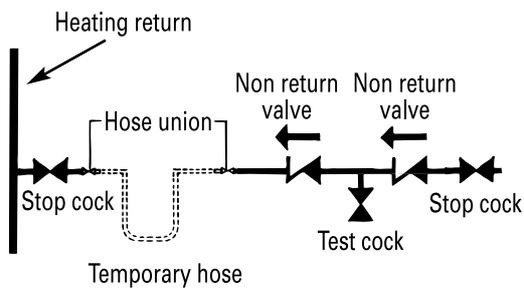
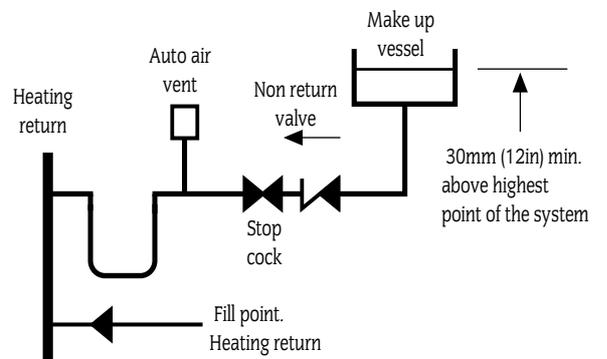


Fig. 10. System filling and make-up



METHOD 1



METHOD 2

10. Electrical

(See Figs. 11 to 13).

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.

The method of connection must allow complete isolation of the appliance and the supply to the boiler must be the only electrical supply to the system. This ensures the safety of a single fused supply.

NOTE: The appliance provides a permanent external electrical supply for servicing and should therefore be fed via a circuit breaker including earth leakage protection.

10.2 To gain access to the electrical terminal strip.

1. Isolate the mains electrical supply from within the property
2. Remove the Outdoor Pack front cover by undoing the two handwheels on the door and padlock if fitted. Pull forwards at the top of the panel and lift the front cover to release from the locating tabs on the base.
3. Remove the boiler front panel by pulling forwards to release the ball studs.
4. Pull the thermostat control knob forwards to remove from its spindle.
5. Undo the fascia retaining screws and remove the plate.

10.3 Mains Wiring

Mains supply - 230 V AC ~ 50 Hz 5A External Fuse to BS1362.
SWITCHED LIVE - Black, NEUTRAL - Blue, EARTH - Green/Yellow, PERMANENT LIVE-Brown

Mains Cable: 0.75mm² (24 x 0.20mm) to BS 6500 Table 16.

The supply to the boiler must be the only electrical supply to the system. This ensures the safety of a single fused supply.

The mains supply four core cable should be connected into the terminals marked Perm L (Permanent Live), Switch L (Switched Live), N (Neutral) and E (Earth) on the outdoor control box terminal strip and securely held in the cable clamp located in the left-hand side of the outdoor control box.

To secure the cable, remove the clamp retaining screws and lift its top section up to allow the cable to be fed through. With the cable in position refit the two screws and fully tighten to grip the cable. Feed the cable between the side panel and the boiler insulation jacket to the back of the boiler. Avoid any hot surface and route through the open/close bush provided on the open side panel of the Outdoor Pack. Once the cable is outside the Outdoor Pack it should be protected by conduit until inside the property.

The mains supply three core cable from the Outdoor Pack control box should be connected into the terminals marked L (Live), N (Neutral) and E (Earth) on the boiler terminal strip and securely held in the cable clamp located in the right-hand side of the electrical tray base. To secure the cable, remove the clamp retaining screw and pull its inner body out to allow the cable to be fed through. With the cable in position refit the screw and fully tighten to grip the cable. The cable clamp on the Danesmoor Utility (12/14, 15/19 and 20/25) and the Worcester Bosch (50/70 and 70/90) should be moved to the alternative position on the right hand side of the boiler electrical control box

The appliance must be earthed.

10.4 Programmer

A time clock or programmer may be added to the control system. A two channel programmer will allow independent control of the central heating and hot water.

NOTE: Under no circumstances should the timer be connected to a separate electrical supply. Safety is assured from 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 shall be checked for short circuits, fuse failure or incorrect polarity of connections.

10.6 Pre-wired Remote Y Plan or S Plan System

(See Fig.13).

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 of two popular proprietary systems (Honeywell and Invensys), for these and other systems from other manufacturers always use the boiler instructions in conjunction with the system instructions..

10.7 Frost Protection

The appliance is supplied with a frost thermostat with the phial positioned within the boiler casing, this protects the boiler only. For full frost protection of the property and/or system a frost thermostat should be fitted so that both the boiler and the circulating pump circuits are energised under frost conditions.

Outdoor Pack control box (See Fig. 3)

A service switch has been provided to allow the service engineer to service the appliance from outside the property (See Fig.11) .

The engineer should have access to the property to set the heating system controls to give a central heating demand so that heat generated during the burner testing can be dissipated.

The switch settings are:

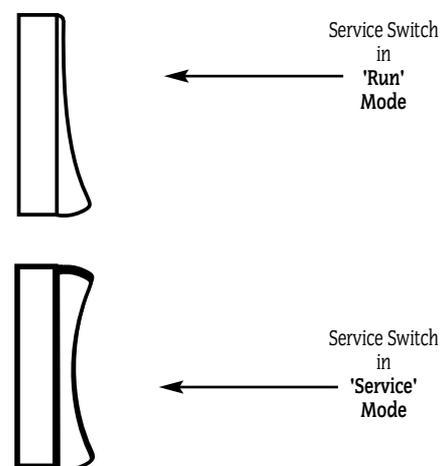
'Run' Mode - The boiler is controlled by the programmer. There is power to the 3-pin trailing socket allowing the use of a light in low light conditions.

'Service' Mode - There is no power to the boiler but there is power to the 3-pin trailing socket allowing the use of a light or vacuum cleaner for servicing purposes.

NOTE: To isolate mains supply to the appliance (including the Outdoor Pack control box) switch off the supply inside the property

After serving the appliance the Service engineer must leave the appliance in the 'run' mode.

Fig. 11. Service Switch Positions



NOTE: ALWAYS SET THE SWITCH TO 'RUN' AFTER SERVICING

Fig. 12. Wiring Diagram (Standard).

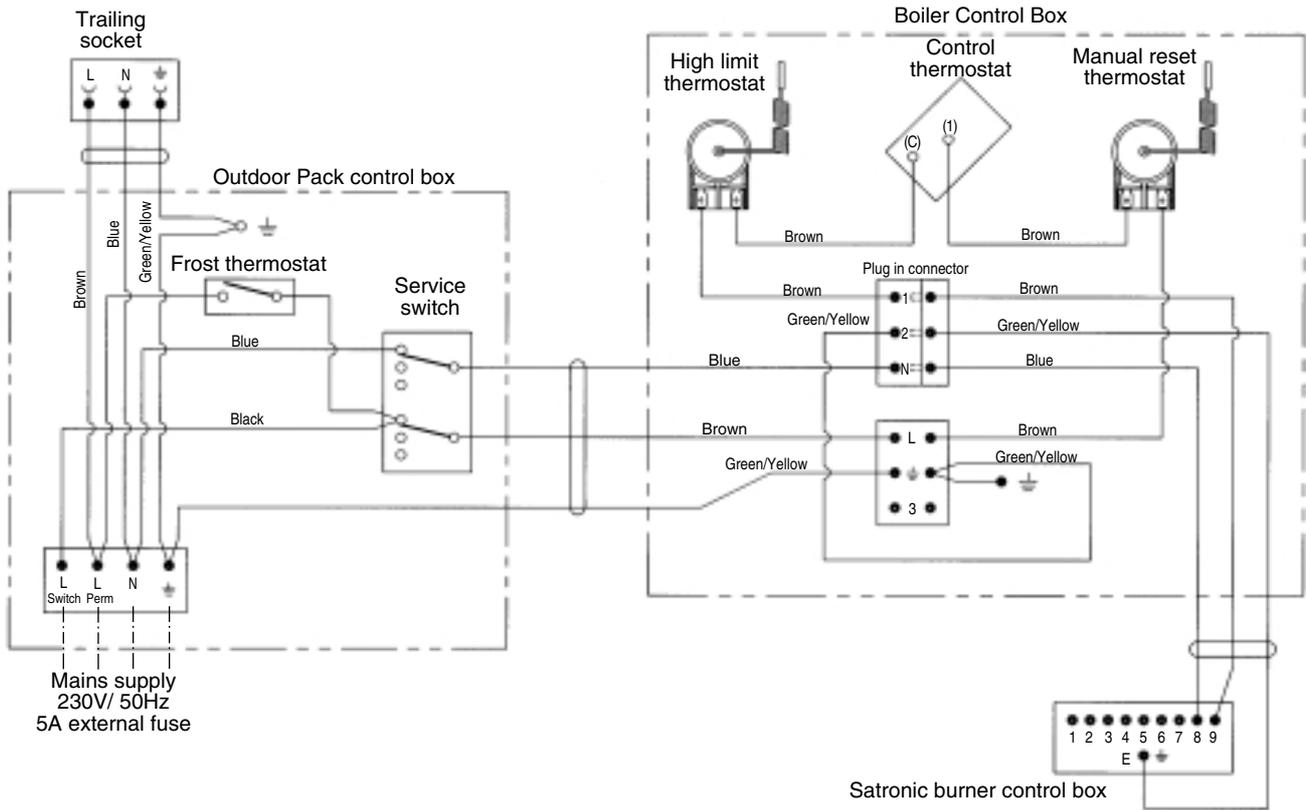
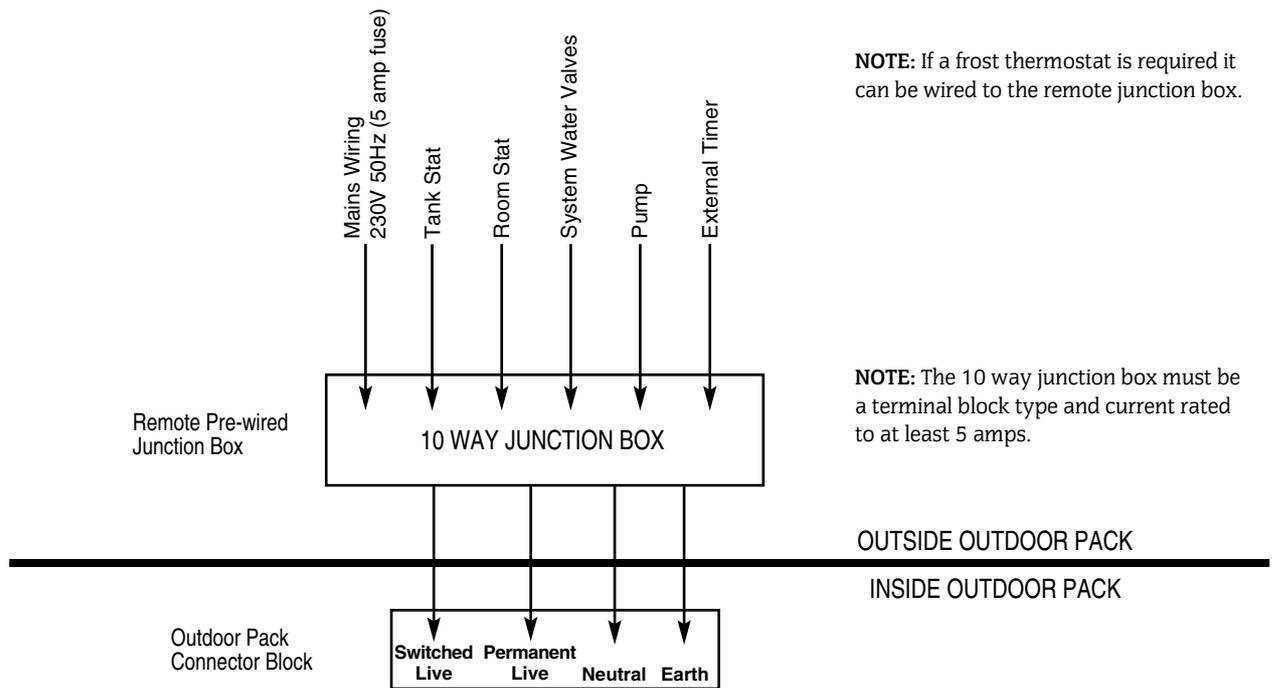


Fig. 13. Pre-wired Remote 'Y' Plan or 'S' Plan.



11. Installation

The outdoor appliance is installed and serviced externally to the property, but the engineer must have access to inside of the property when servicing the appliance.

WARNING: This appliance is serviced and repaired externally. External equipment operated at 230volts should not be serviced or repaired under adverse weather conditions.

WARNING: This appliance should not be installed where there is potential for excessive ground water coverage.

NOTE: When installing the Danesmoor Utility or Worcester Bosch boilers inside the Outdoor Pack only use the Outdoor Pack instructions, Part Number 8 716 104 871. Discard the Danesmoor Utility instructions (8 716 104 437) or Worcester Bosch instructions (8 716 104 438) and the RS short silencer kit installation instructions, (8 716 104 861).

11.1 After unpacking the boiler it is recommended that all cabinet panels are removed, as described in Section 5, and stored in a safe place to avoid damage during installation and allow easy inspection for any leaks after the system has been filled.

11.2 Remove the burner as described below and store in a safe place until the appliance is ready for commissioning.

1. Remove the burner plug-in connector by removing the electrical fascia and pulling the three-pin connector free. Slide the locating bush from the electrical box.

2. Remove the burner from the boiler by slackening the two M6 retaining screws located in the burner housing ring and pulling the burner clear. This will require the use of a 5mm allen key.

11.3 Outdoor Pack installation.

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

1. Carefully place the base in the required position on a flat level hard standing ensuring the correct orientation. A template is fastened to the base this indicates the front of the Pack.

NOTE: Carefully place the base in position do not scrape across the hardstanding.

NOTE: Ensure there is a minimum distance of 30mm from the edge of the base to the wall of the property to allow assembly of the pack.

2. Fasten the base to the hard standing using four holes provided. Care should be taken to ensure that the base is level (see Fig.4).

3. Slide the boiler onto the baseplate from the side being careful not to damage the template or front and rear panel locating tabs.

4. There are two possible positions for each size of boiler. The holes on the baseplate of the boiler should be lined up with the holes on the rail of the Outdoor Pack base (see table 9 and Fig.4, 14 and 15).

5. To aid positioning of the boiler insert the M8 bolt provided into the boiler baseplate and rail of the Outdoor Pack base. Adjust the boiler to the correct position so the two holes on the boiler baseplate line up with the two holes on the Outdoor Pack base.

Table 9

Boiler	Marking on Template	Boiler Position inside the Outdoor Pack	Connection of Pipework and Open side panel position	See Figure
12 to 25 (50 to 90)	A	Left hand side	Right hand side	14
12 to 25 (50 to 90)	B	Right hand side	Left hand side	15
26 to 32 (90 to 110)	C	Left hand side	Right hand side	14
26 to 32 (90 to 110)	D	Right hand side	Left hand side	15

6. The Outdoor Pack can accommodate various pipework options which include:

- 22mm or 28mm pipework.
- Flow pipe exiting from the top and the return pipe from the bottom of the open side panel
- Flow and return side panel exiting from the top of the

open side panel.

7. For ease of installation fix the relevant fittings to the boiler and plug any unused sockets.

8. Hold the open side panel (with the pipework exit holes) on the side, which the pipework will be protruding from the boiler.

9. Using the self tapping screws provided screw the pipework water plates into there required position depending on the pipework configuration required (see Fig. 16). These plates must be fitted on the inside of the panel.

Fig. 14. Boiler Position for Pipework Exiting on the Right Hand Side.

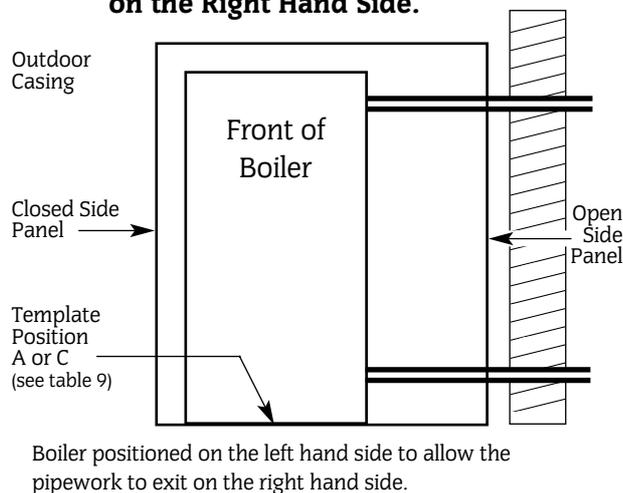
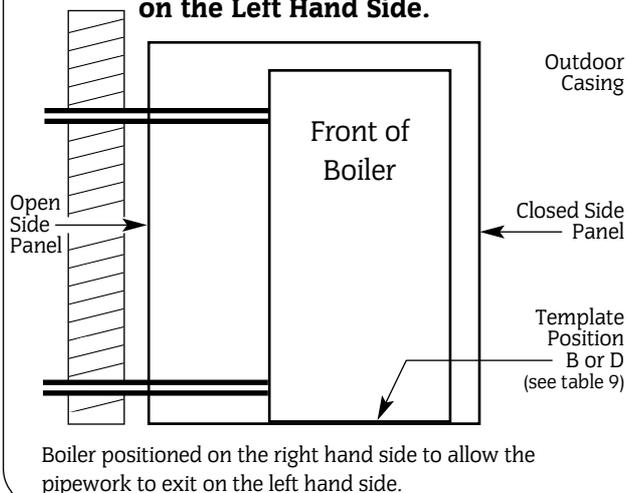


Fig. 15. Boiler Position for Pipework Exiting on the Left Hand Side.



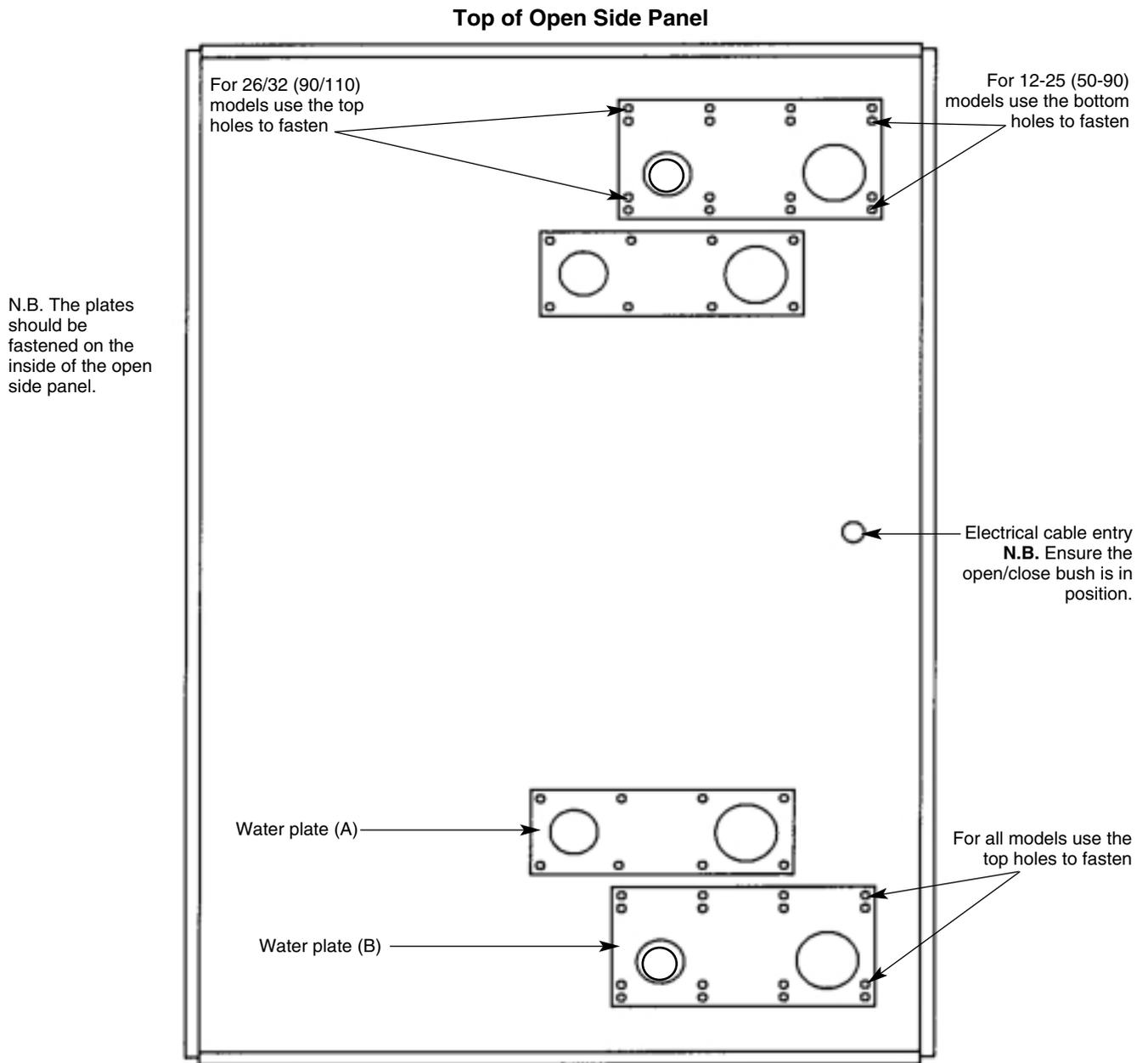
10. Using the water plates provided blank off the remaining pipework options using two of the screws provided.

11. Fasten the brace to the open side panel using two of the screws provided (see Fig.17).

12. Position and fasten the closed side panel to the brace using two of the screws provided (see Fig.17).

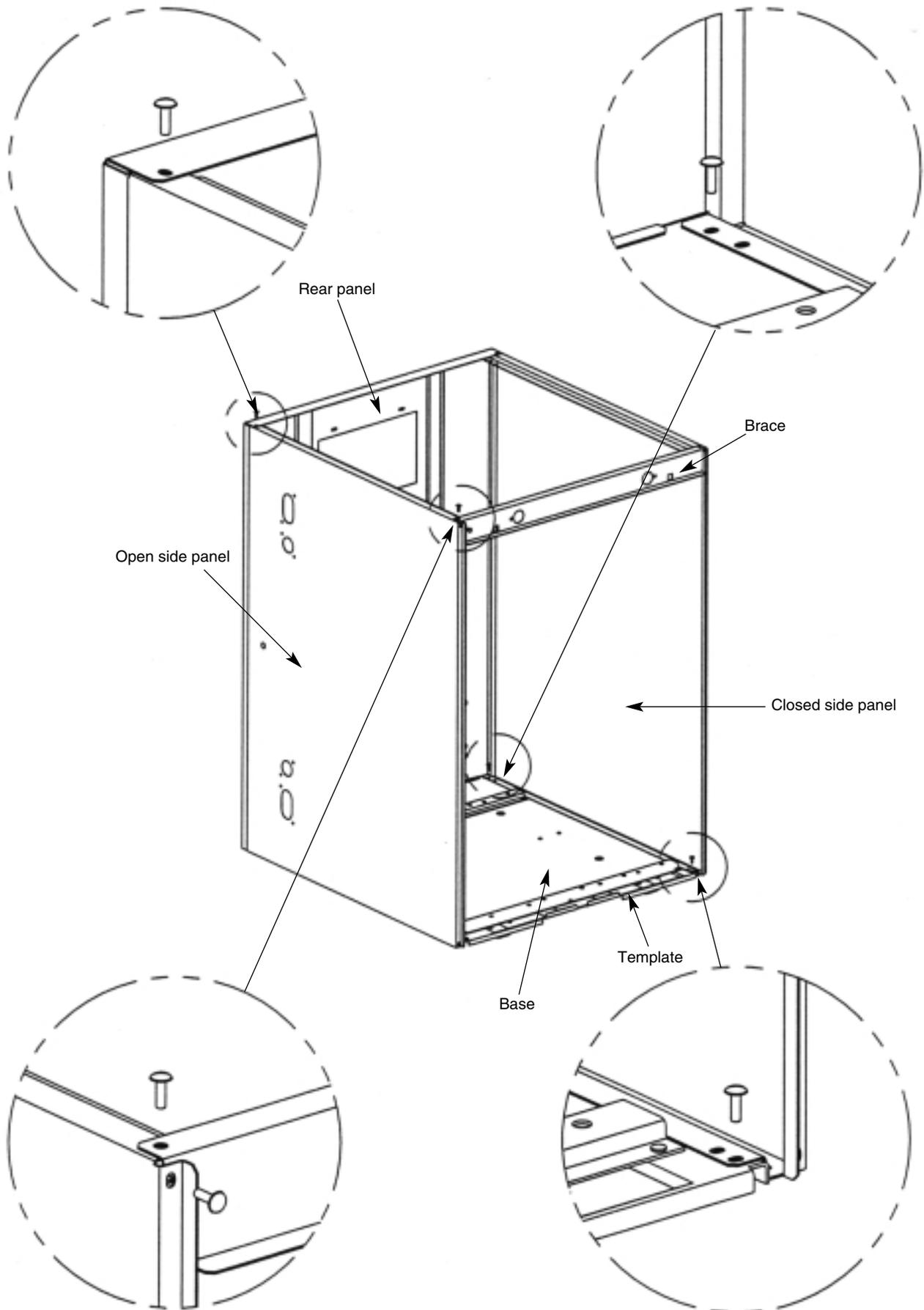
13. Fasten the side panels to the base using the self tapping screws provided. Only fasten the side panel to the side using one fixing at the rear and one at the front (see Fig.17).

Fig.16. Water Plate Positions. (Panel viewed from inside)



N.B. In this installation the water plates are positioned using the 22mm option with the pipes exiting in line with the boiler sockets and the pipe work is shown exiting from the left hand side.

Fig.17. Assembly of the Base/Side/Rear Panels.



14. Check the boiler sockets line up with the water plate holes in the open side panel and make any adjustments required.
15. If positioning the Outdoor Pack next to the wall of the property proceed as follows; if positioning away from the property go to 21.
16. Mark the hole centres on the wall of the property for the flow and return pipes and electrical power supply.
17. Remove the boiler and side panels attached to the brace from the base taking care not to damage the panels.
18. Drill the required holes through the wall of the property for the flow and return and the electrical power supply.
19. Reassemble the boiler and side panels/brace and fasten to the base plate using the self tapping screws provided.
20. Check the boiler sockets line up with the hole positions in the open side panels and with the wall of the property.
21. Plumb the boiler into the heating system.
22. Fasten the oil pipe plates to the rear panel. The options are single pipe 10mm and 12mm, two pipe 10mm and 12mm and fully blanked off. Choose the option required and screw the remaining oil pipe plate to the rear panel in the blanked off option (see Fig. 4, 18 and 19).
23. Insert the fire valve phial through the rear panel and clip the phial to the fire valve clip on the boiler electrical control box. Fasten the fire valve blanking plate to the rear panel making sure the capillary is not damaged (see Fig. 4, 18 and 20).
24. Fasten the remaining blanking plates to the rear panel in the closed position to prevent water ingress.
25. Locate the rear panel in position ensuring the rear slots are located with the tabs on the base and fasten to the side panels using the two self tapping screws provided (see Fig.17).
26. Fasten the rear panel bracket strip to the rear panel and fully tighten (see Fig.18)
27. Fasten the top panel bracket to the top panel and fully tighten with two of the screws provided (See Fig.21)

11.4 Flue Terminal Installation

Install the appliance flue system as described in Section 7.

NOTE: Only use the RS short silencer, Part Number 7 716 190 002

1. Undo the three screws holding the flue spigot and gasket.
2. Undo the three nuts holding the rear flue blanking plate in position.
3. Remove the blanking plate and gasket.
4. Press out and discard the central portion of the gasket.
5. Position the following components onto the boiler flue outlet plate in the following order: gasket, silencer bracket, gasket and clamping collar and secure with the three nuts/washers as shown in Fig.22.
6. Fit the locking band by sliding over the clamping collar ensuring that the screw head is pointing upwards to allow easy access when tightening. Tighten the locking band screw sufficiently to prevent it slipping out of position. Do not overtighten at this stage as this will make it difficult to insert the flue terminal.
7. Fasten the rear silencer outlet plate to the inside of the rear panel using the four screws provided to the desired position checking that the clamping collar is central to the exit of the silencer outlet plate, do not tighten as shown in Fig.18.

11.5 Mount the terminal

1. Place a fillet of fire cement or silicone sealant around the inside of the clamping collar (see Fig.23).
2. Push the terminal through the hole in the rear panel. Ensure the terminal is the correct way up such that the louvers are pointing downwards and the drain holes are on the underside.
3. Insert the terminal spigot into the clamping collar.
4. Fasten the flue terminal to the silencer bracket using the four No.6 self tapping screws provided within the RS short silencer kit.
5. Fully tighten the clamping collar.
6. Smooth the fire cement/silicone sealant around the inside of the clamping collar to form a good seal and remove any surplus.
7. Check the insulation jacket on the rear of the boiler does not block the air inlet channels below the flue terminal. There should be at least 10mm clearance between the bottom of the terminal and the insulation jacket. If there is not sufficient clearance cut around the insulation jacket ensuring 10mm clearance.

8. Blank the top flue hole using the blanking disc as shown in Fig.24.
9. Fully tighten the flue silencer outlet plate to the rear panel.
10. Place a fillet of silicone sealant around the flue terminal to prevent water entering the rear panel (see Fig.26).

11.6 Flue Terminal Guard Installation

1. Attach the Outdoor Pack top panel to the Outdoor Pack ensuring the rear panel bracket locks the the rear of the top panel in position as shown in Fig.25.
2. Position the flue guard (Part No 7 716 190 009) with the locating eyes to the side of the flue terminal and positioned centrally to the flue terminal.
3. Position the flue guard so there is a 1mm gap between the edge of the flue guard and the underneath of the top panel to allow easy removal.
4. Mark centrally in the four locating eyes (A) and using a 6mm drill bit; drill through the rear panel.
5. Remove the top panel and fasten the flue guard to the rear panel using the M5, bolts and washers provided.
6. Check the top panel can be fitted and make any necessary adjustments.

11.7 Mounting of the Outdoor Pack Electrical Control Box

1. Replace the electrical control panel to the boiler as described in Section 5.
 2. Pull the thermostat knob forwards to remove from its spindle.
 3. Undo the fascia retaining screw and remove the plate.
 4. Undo the wing nut on the underside of the boiler control box.
 5. Fasten the Outdoor Pack control box top to the underside of the support bracket using the wing nut as shown in Fig.27.
 6. Using the clamp and the two screws provided fasten the outdoor control box top to the support bracket as shown in Fig.27.
 7. Feed the four core cable through the hole half way down the open side panel; route between the boiler white casing and the insulation jacket avoiding contact with hot surfaces.
- NOTE:** Make sure the plastic open/close bush is fixed in place to the open side panel as this will protect the cable from the edge of the open side panel.
8. Connect the mains supply four core cable to the outdoor electrical control box as described in Section 10.3.
 9. Push the Outdoor Pack control box into the control box top ensuring the switch is facing the front of the appliance and fasten using four screws provided.
 10. Using the three core cable supplied connect to the boiler on the terminal strip as described in Section 10.3.
 11. Gently clip the frost thermostat phial into the tool clip provided being careful not to kink or damage the capillary.

11.8 Heating system installation.

(Benchmark) Before the appliance is fitted to the heating system flush the system and mains water supply.

1. If not done previously plumb the boiler into the central heating system.
- Note: Drain cocks should be fitted on the lowest point on the system to allow draining of the appliance and 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.
 5. The primary system should be flushed and treated in accordance with the recommendations of BS 7593.

Note: Place a fillet of sealant around all pipework and the 4 core cable entering the Outdoor Pack to prevent water ingress.

11.9 Oil supply installation (see Figs. 6 to 7).

Note: Never route the oil supply pipe/hose directly below the combustion chamber base.

1. Fit the oil supply pipe as described in Section 8. Route the pipework through the Outdoor Pack rear panel and down either side of the boiler in the gap between the base tray and the boiler shell.
- Note: Never use soldered joints on oil supply pipes as this could cause a hazard in the case of a fire.**
2. Fit an isolating valve at the end of the oil line close to the burner and ensure that the valve is closed.

3. Open the main oil supply valve at the tank and check for any leaks.
4. Place a suitable container below the bulkhead fitting and open the valve.
5. Draw off at least 2.5 litres of oil until a steady flow of clear uncontaminated oil can be seen and turn off the isolating valve.

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

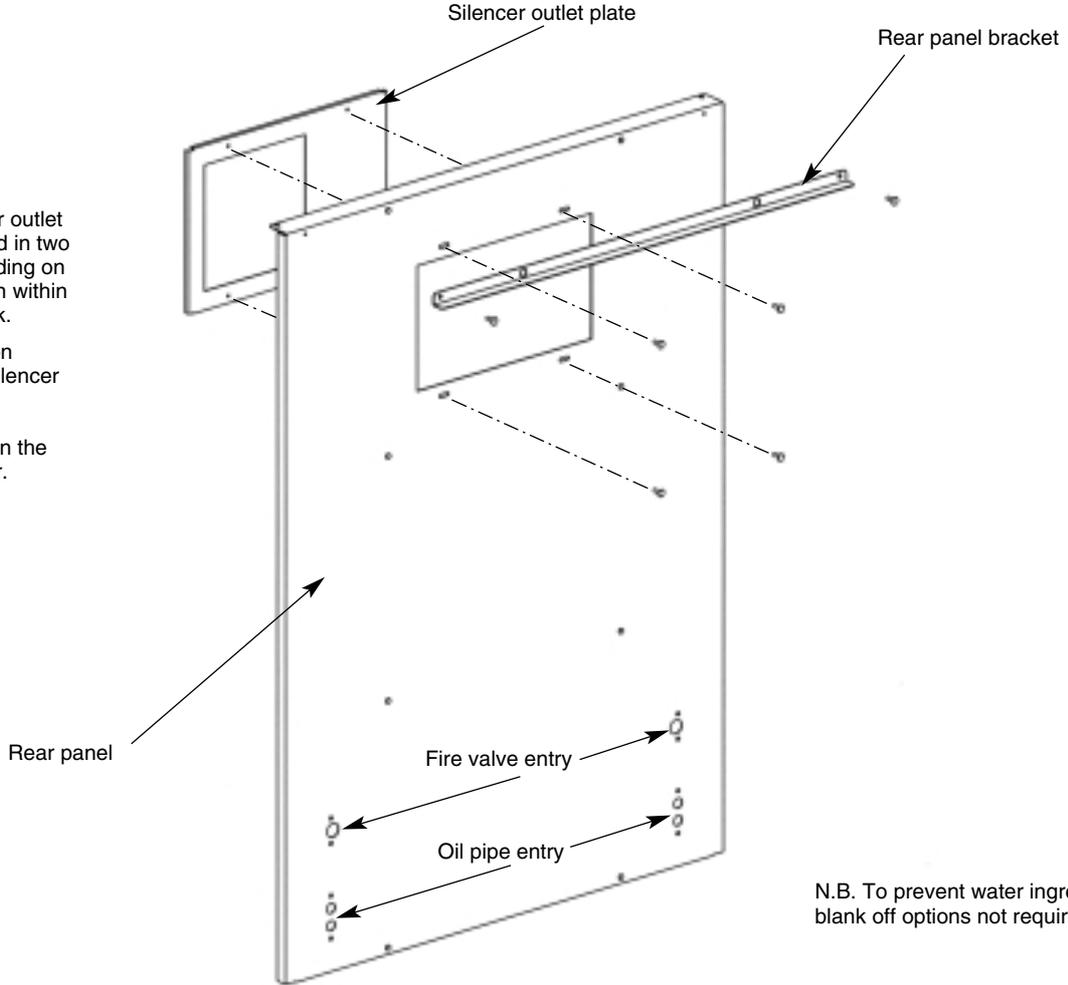
and remove and clean the oil pump filter to remove any debris collected as a result of installation.

11.6 Replace the electrical control panel and boiler side panels in reverse order to the removal procedure of Section 5 and connect the electrical supply as described in Section 10.

Fig.18. Rear Panel Assembly.

N.B. The silencer outlet plate can be fitted in two positions, depending on the boiler position within the Outdoor Pack.

Choose the option which lines the silencer outlet plate hole centrally with the clamping collar on the back of the boiler.



N.B. To prevent water ingress blank off options not required.

Fig.19. Oil Plate Fixing Hole Positions.

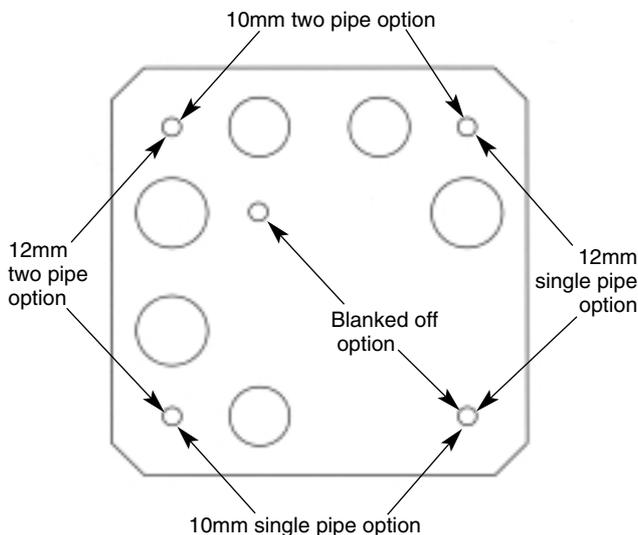


Fig.20. Fire Valve Plate.

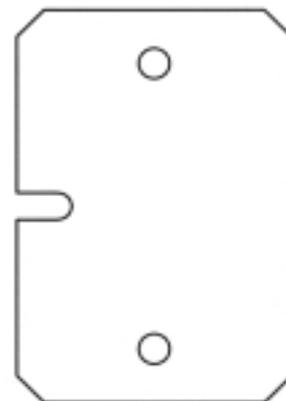


Fig.21. Fastening the Top panel Bracket to the Top Panel

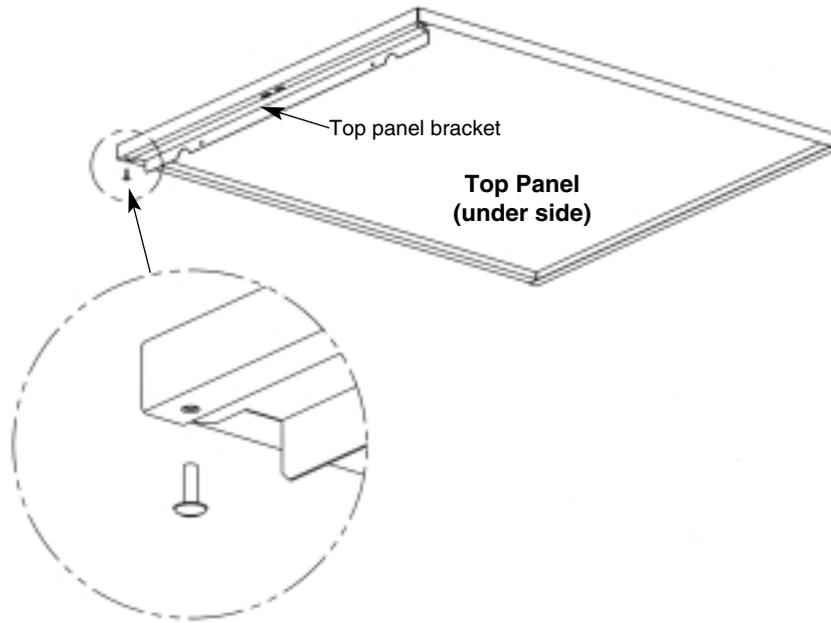


Fig.22. Flue Terminal Assembly.

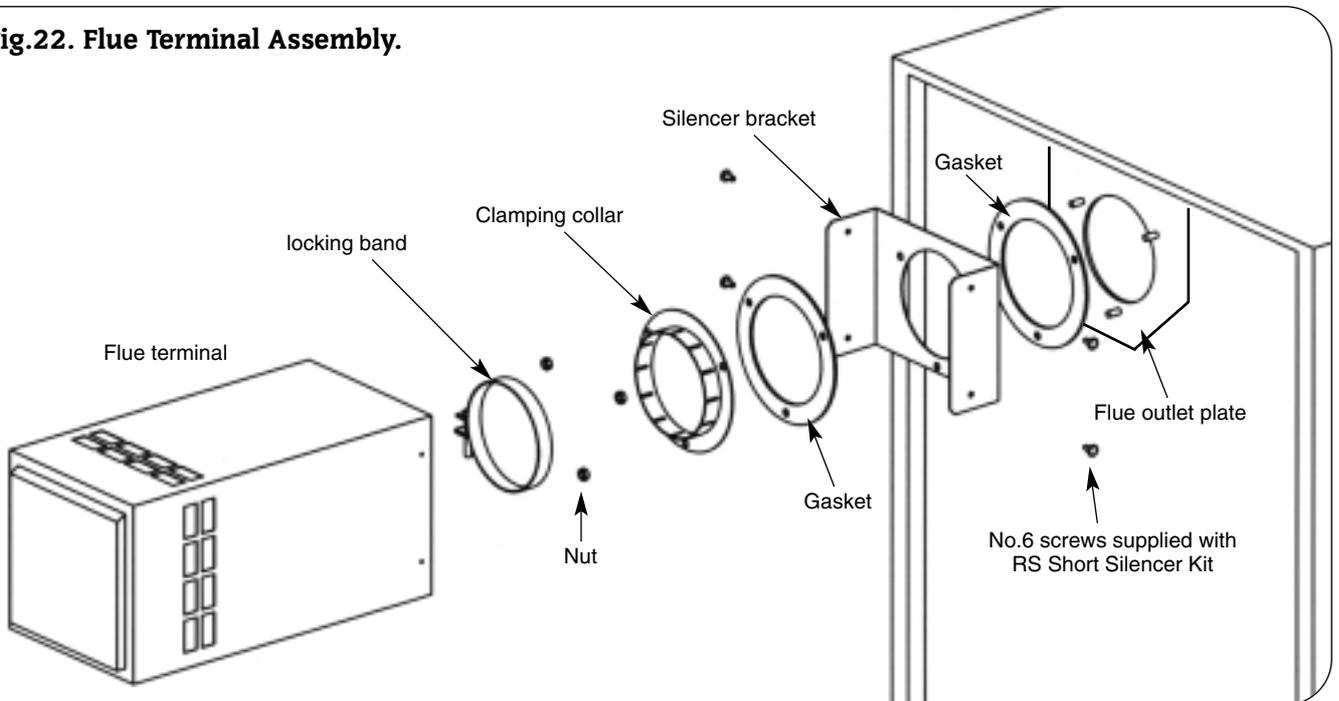


Fig. 23. Rear Flue Outlet Seal.

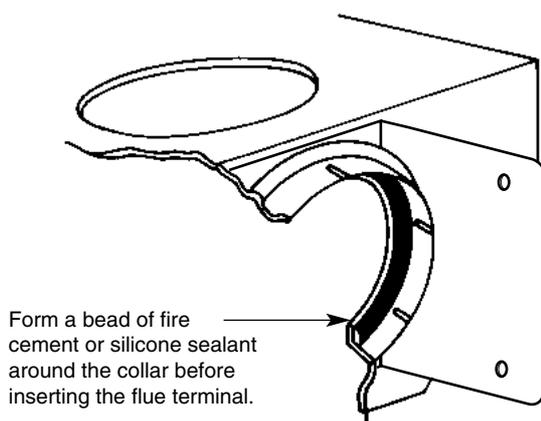


Fig. 24. Flue Blanking Arrangement.

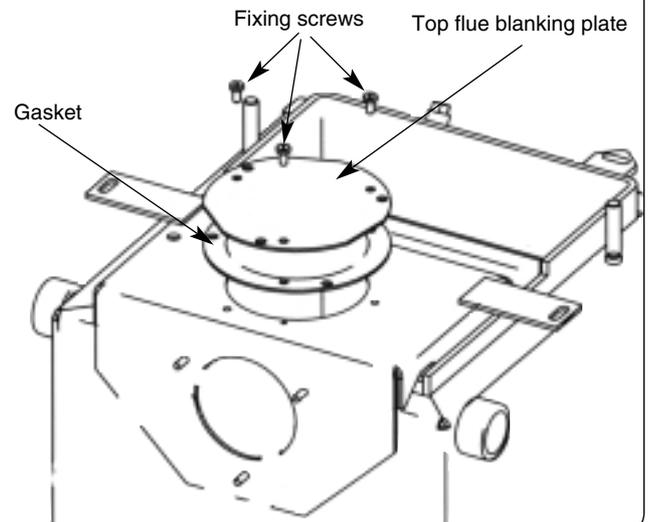


Fig.25. Assembling Top panel to the Outdoor Pack.

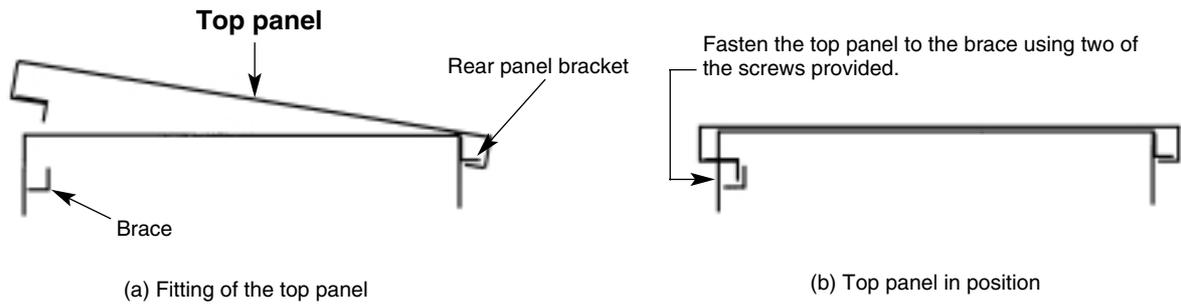


Fig.26. Flue Guard Position.

N.B. Ensure that there is a 1mm gap between the top of the flue guard and top panel.

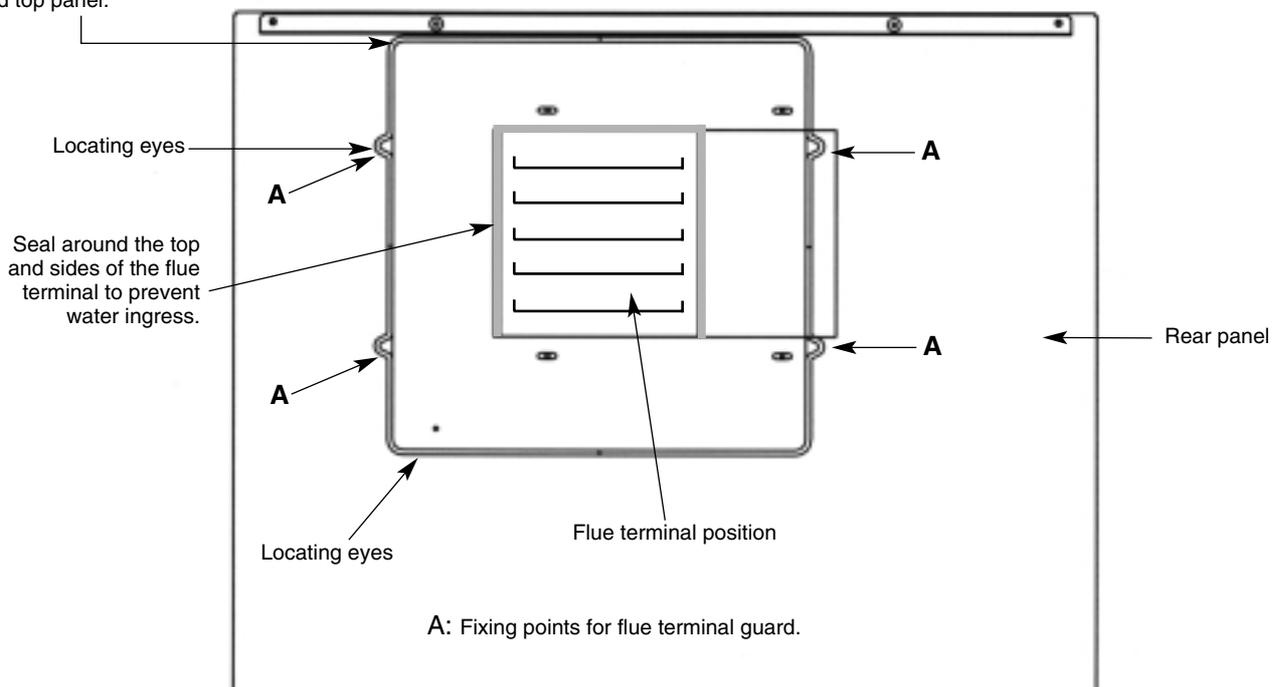
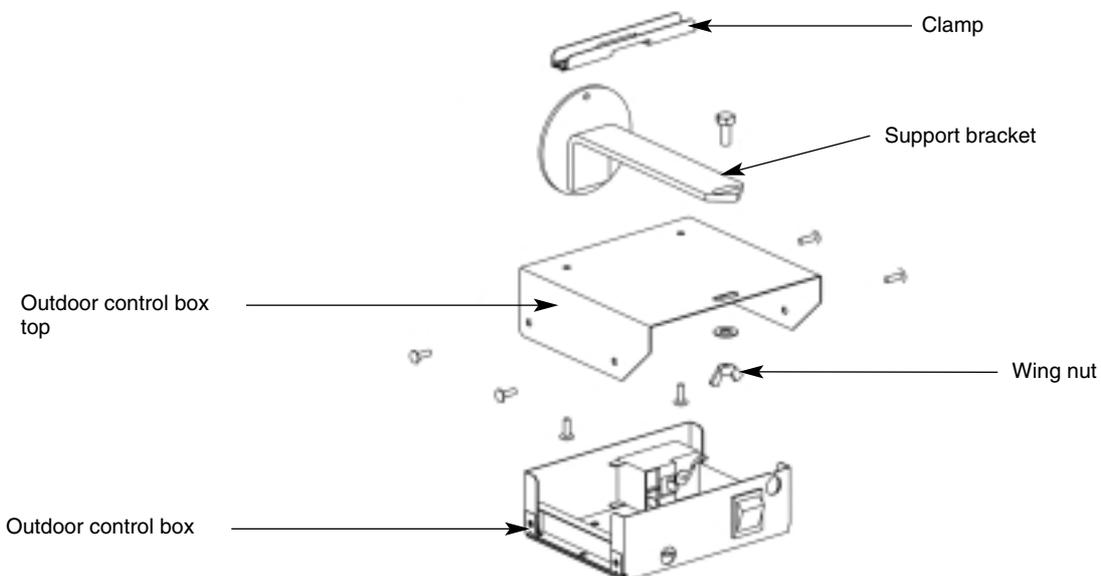


Fig.27. Outdoor Pack Control Box Assembly .



12. Commissioning The Appliance

WARNING: This appliance is serviced and repaired externally. External equipment operated at 230volts should not be serviced or repaired under adverse weather conditions.

NOTE: The Outdoor Pack is not load bearing, it only provides weather proofing for the boiler inside.

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

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 remove the burner first as described in section 14.3.



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 4209563 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.

12.3 Prepare the heating system

1. After initial installation and checking for leaks, as previously described, drain down the system sufficiently to add a flushing agent. After flushing drain the system before filling.

2. Refill the system.

12.4 Check the Burner

1. Check that the nozzle and electrode settings are correct for the relevant burner. (See Figs. 28, 29, 30 and 31).

2. Check that the nozzle lies central with the combustion head hole.

3. Check for any visible defects.

12.5 Replace the burner

1. Connect the flexible oil supply hose to the isolating valve and tighten sufficiently to form a good seal. Where a double pipe system or a single pipe system with de-aerator is being used fit the bypass plug, as described in Fig.6, and connect the oil return flexible hose to the return pipe fitting.

2. With the sponge O-ring gasket around the burner blast tube insert the burner into the housing tube. Push the burner firmly forward to compress the gasket and tighten the two locking screws using a 5mm Allen key.

Note: It is important that a good seal is made between the burner and the boiler to prevent re-circulation of the flue gases from the combustion chamber to the burner inlet.

3. Re-connect the electrical lead plug into the control box .

12.6 Check the installation

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

2. Check the combustion chamber base insulation board is positioned correctly in the bottom of the heatexchanger

3. Check that all baffles are correctly located and the heat shield is correctly mounted (Danesmoor utility 20/25, 26/32, Worcester Bosch 70/90 and 90/110 models only) as shown in Fig.32.

4. Check that the baffle retainer is correctly mounted (Danesmoor utility 20/25, 26/32, Worcester Bosch 70/90 and 90/110 models only) as shown in Fig.32.

5. Check that the control thermostat and auto reset high limit

thermostat phials are correctly located in the boiler thermostat pocket positioned in the top front of the boiler as shown in Fig.3.

6. Check that the manual reset limit thermostat is located in the steel pocket above the electrical box mounting bracket on the front face of the boiler as shown in Fig.3.

7. Check the frost thermostat phial is positioned within the boiler cabinet underneath the outdoor electrical control box. Locate the phial of the frost thermostat in the clip underneath the outdoor electrical control box

8. Check that all of the air-ways to the burner are clear of any obstruction.

Note: Check the insulation jacket on the rear of the boiler does not block the air inlet channels below the flue terminal. There should be at least 10mm clearance between the bottom of the terminal and the insulation jacket. If there is not sufficient clearance cut around the insulation jacket ensuring 10mm clearance.

12.7 Fit a pressure gauge and manifold to the burner pump at the point indicated in Fig.8 or the pressure gauge port shown in Fig. 31 on the Danesmoor Utility 20/25 and Worcester Bosch 70/90.

12.8 Turn on the electricity to the appliance from within the property and set the switch to the 'Run' mode on the Outdoor Pack electrical control box (see Fig.11).

12.9 Bleed the burner.

Single Pipe System

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 burner control box. 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 burner control box. 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 boiler run to lockout. Wait two minutes and reset the burner control box. 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 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 of the de-aerator.
- Prime the de-aerator and reconnect the de-aerator to the flexible oil inlet hose.

12.10 Adjust the air shutter and pump pressure to the settings recommended in Tables 2 to 5. 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/reset button in the burner control box will illuminate indicating that the burner has gone to lockout. In this instance wait two minutes and press the lockout reset button to initiate another start sequence. Repeat the procedure until a flame is established.

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

12.11 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 blast tube. 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 and refit the nozzle. Replace the burner and continue to run the boiler for three minute periods until after-spurting stops.

Note: In order that after-spurting is reduced to a minimum during the commissioning period it is recommended that a pressure gauge only is fitted on the external pressure gauge port on the Electro Oil B11 (See Fig.30). Use of a "T" piece pressure gauge manifold will increase the oil line volume and hence increase the degree of after-spurting.

12.12 Run the boiler for a further 15 minute period and then finally fine tune the air shutter setting to give the CO₂ level specified in Tables 2 to 5 less 0.5% CO₂. During this period some smoke will be emitted due to the burning of the organic binder in the base insulation board. Smoke readings will therefore be inaccurate at this point.

Note: A flue gas sampling point is located on the boiler top plate.

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

12.14 Check that the flue temperature does not exceed the value specified in Tables 2 to 5. If this is the case then check that the baffles are correctly located. If the baffles are correctly located then reduce the pump pressure since nozzle variations of up to + or - 15% may occur.

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

12.16 Allow the burner to run for a further five minutes and then recheck the CO₂ level and adjust the air setting if required. Check that the smoke number is in the range 0-1. Repeat the fine tuning procedure if found necessary.

12.17 Refit the boiler cabinet top and front panels in the reverse order to that described in Section 5.

12.18 When the heating circuit has reached full operating temperature check the whole system for any leaks.

12.19 Locate and fully tighten the top panel to the brace with the two screws provided ensuring it sits on the side panels..

12.20 Locate the front panel and tighten to the Outdoor Pack using the two handwheels provided.

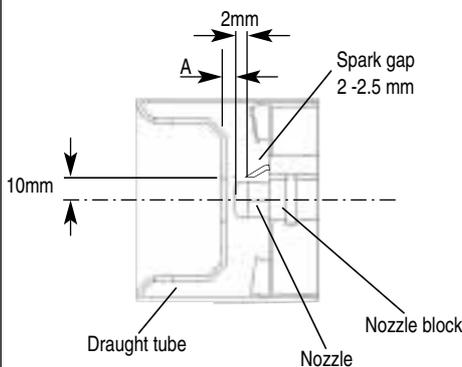
12.21 Locking the Outdoor Pack

Provision has been made to lock the outdoor front panel using a padlock underneath the front of the top panel. A suitable padlock is the P73 manufactured by Yale Security Products, or the use of a Padlock which has 20 to 22 mm between the two centres on the shackle and 15mm to 20mm between the inside of the body and the shackle and a shackle diameter of 5mm.

For the Security of the Outdoor Pack ensure the top panel is sitting on the side panels and fully tightened to the brace with the two screws provided.

**Fig. 28. Electro Oil Inter B9A Burner.
(12/14 model)**

Combustion Head



Output kW	Head Type	Dimension A
12	PL 6/7/21.5/10-E	3 mm
14	PL 6/7/21.5/10-E	5 mm

To adjust the nozzle position, undo the locking screw located at the rear of the nozzle line and rotate the adjusting disc one turn anti-clockwise to move forward by 1 mm.

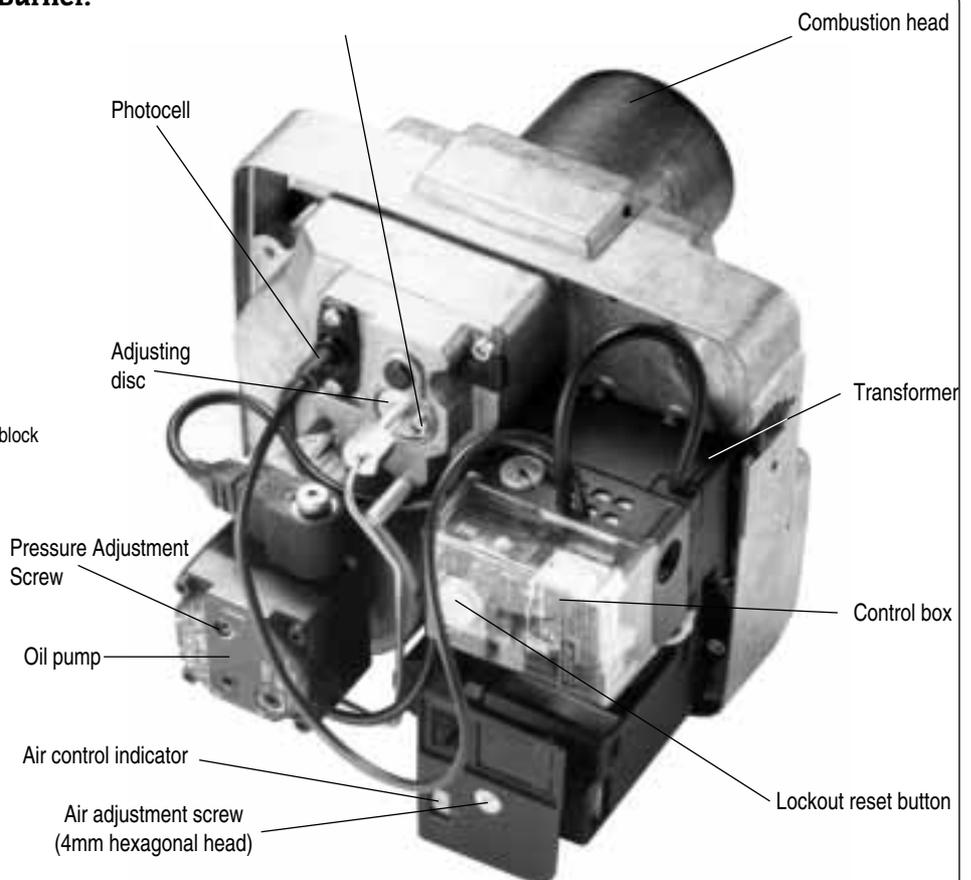
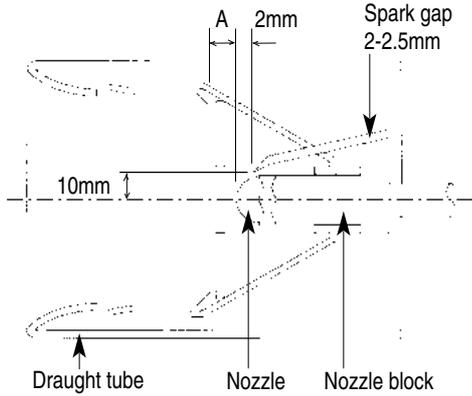


Fig. 29. Electro Oil Inter B9B Burner.
Danesmoor Utility (15/19 Model)
Worcester Bosch (50/70 Model)

Combustion Head

All Dimensions are in mm



To adjust the nozzle position, undo the locking screw located at the rear of the nozzle line and rotate the adjusting disc one turn anti-clockwise to move forward by 1mm.

Output		Combustion Head	Dimension A
kW	Btu/hr		
15	51,000	PL 6/7/21.5/10	3mm
17	58,000	PL 6/7/21.5/10	5mm
19	65,000	PL 6/7/21.5/10	5mm

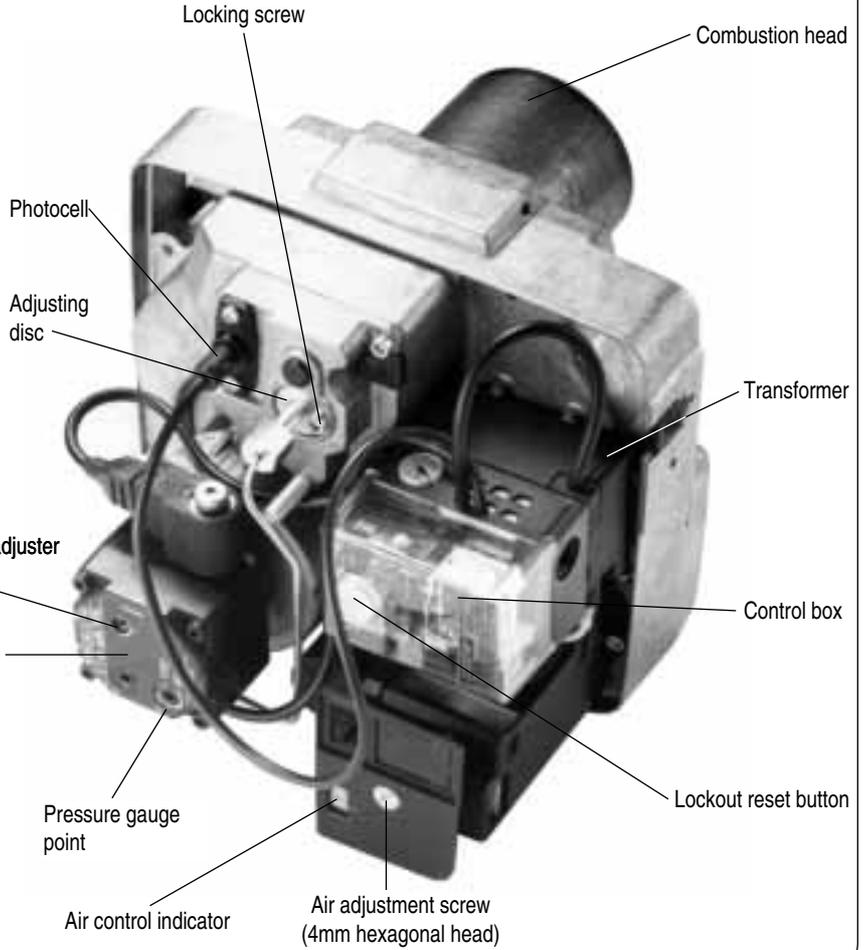


Fig. 30. Electro Oil Inter B11 Burner.
Danesmoor Utility (20/25 Model)
Worcester Bosch (70/90 Model)

Combustion Head -
PL 10/4/24/10 x 78mm

All Dimensions are in mm

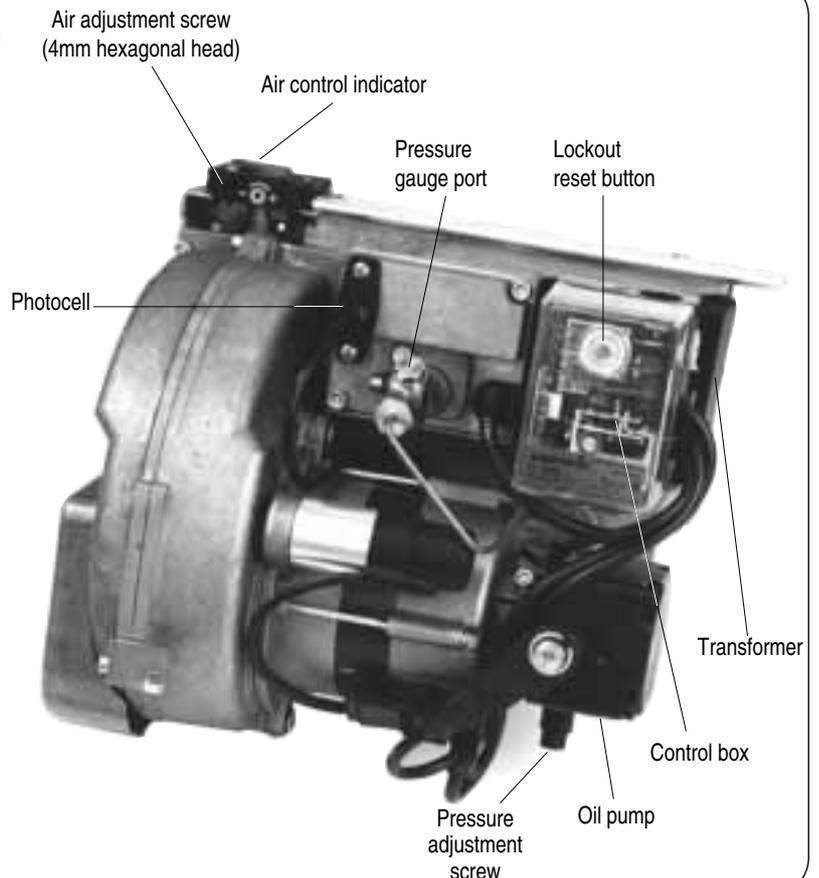
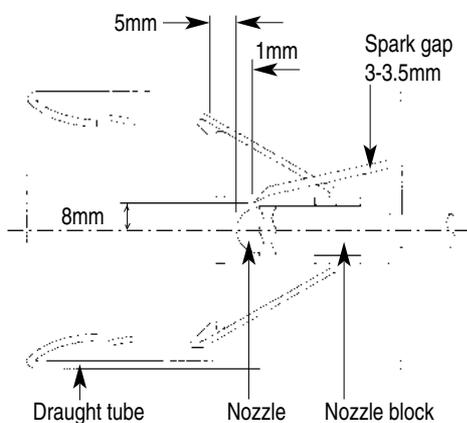


Fig. 31. Electro Oil Sterling Burner.
Danesmoor Utility (26/32 model)
Worcester Bosch (90/110 Model)

Combustion Head - PL 6/7/21.5/10 x 78mm

All Dimensions are in mm

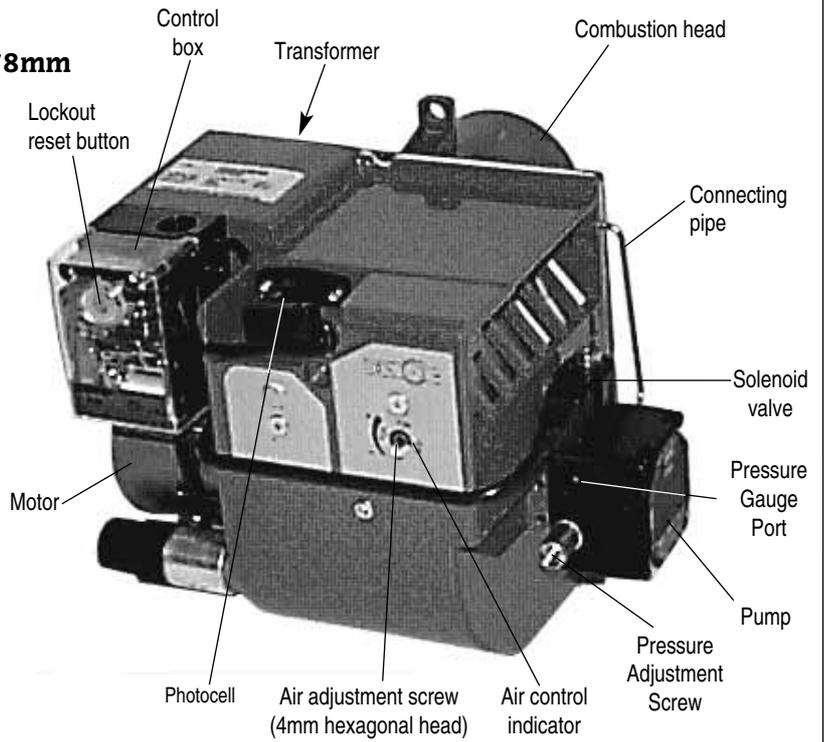
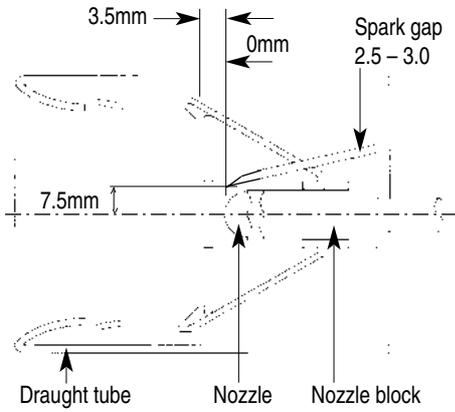
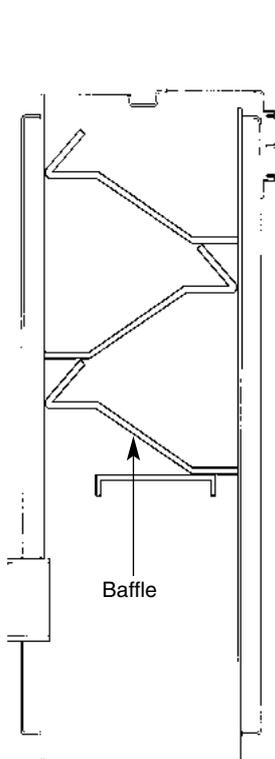
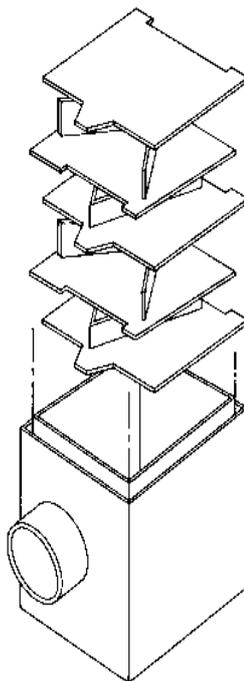


Fig. 32. Location of Boiler Flueway Baffles.

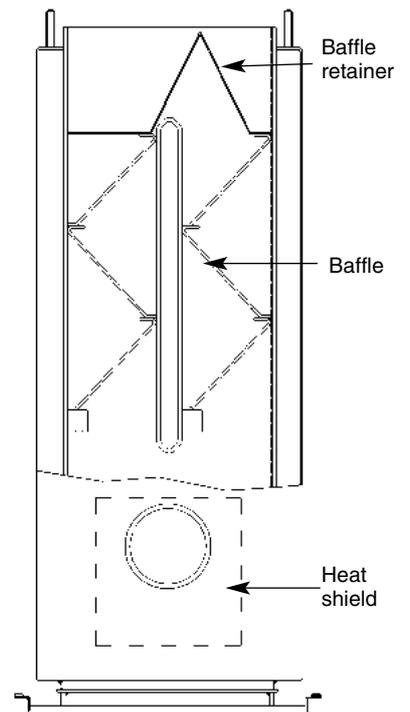
(a) Danesmoor Utility 12/14



**(b) Danesmoor Utility 15/19
 Worcester Bosch 50/70**



**(c) Danesmoor Utility 20/25 and 26/32
 Worcester Bosch 70/90 and 90/110**



13. Instructions To The User

13.1 *(benchmark)* Hand the Outdoor Pack users instructions (Part Number: 8 716 102 841) and Benchmark booklet 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 Discard the Danesmoor Utility user instructions (Part Number: 8 716 145 137) and Worcester Bosch user instructions (Part Number: 8 716 145 077).

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 Heat Systems Limited 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

WARNING: The appliance is serviced and repaired externally. External equipment operated at 230volts should not be serviced or repaired under adverse weather conditions.

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

Note: The service engineer should have access to the property to check for system faults and reset/replace electrical safety devices.

Note: The service engineer should take any necessary precautions to protect him/herself and any third party against hot surfaces on the appliance.

Note: The Outdoor Pack is not load bearing it only provides weather proofing for the boiler inside.

1. Carry out a pre-service check noting any operational faults.
2. Check and clean the burner.
3. Check and clean the intake grille at the end of the terminal and remove any debris from around the appliance.
4. Check and clean the baffle retainer (Danesmoor utility 20/25, 26/32, Worcester Bosch 70/90 and 90/110 models only) as shown in Fig. 32.
5. Check and clean the baffles.
6. Check and clean the heat exchanger surface.
7. Check the heat shield (Danesmoor utility 20/25 and 26/32 and Worcester Bosch 70/90 and 90/110 models only) as shown in Fig. 32.
8. Check the combustion chamber base insulation board.
9. Check that the flue system is unobstructed and clean as necessary.
10. 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 Outdoor Pack front and top panels as described in section 5.
2. Remove the boiler front and top panels as described in section 5.
3. Operate the appliance and system, noting any faults which may need to be corrected during the service.

14.3 Cleaning the Burner

IMPORTANT: Disconnect the electrical supply at the mains before commencing any servicing. Turn off the oil at the service cock.

1. Remove the burner.
 - (a) Isolate the oil supply at both the oil tank and the isolating valve located close to the burner.
 - (b) Slacken the two M6 burner locking screws, using a 5mm

Allen key, and remove the burner.

2. Clean the fan impeller using the following procedure:

Electro-oil Inter B9 Burner

- (a) Remove the two screws holding the combustion head in position and withdraw the combustion head and air guide collar (where fitted).
- (b) Remove the three remaining screws holding the front cover plate in position and withdraw the cover to expose the fan impeller.
- (c) Clean both sides of the fan impeller and remove any debris from the burner housing.
- (d) Check that the impeller rotates freely.
- (e) Clean the air inlet passage and check that the adjustment mechanism operates freely.
- (f) Re-assemble the components.

Electro Oil Inter B11

- (a) Remove the acoustic fan inlet cover.
- (b) Remove the three screws holding the fan cowl in position and remove the cowl noting how the fan control flap is positioned.
- (c) Check that the air control flap pivots freely and ensure 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 that the impeller rotates freely.
- (f) Re-assemble the components.

Electro Oil Sterling

- (a) Remove the air adjustment cover.
- (b) 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 4mm allen key. Check the condition of the Gasket between these two parts and replace if necessary.
- (c) Note the position of the air damper adjustment and check the air damper moves freely.
- (d) Check the air path to the burner head is clear.
- (e) Clean both sides of the fan impeller and remove any debris from the burner housing.
- (f) Check the impeller rotates freely.
- (g) Re-assemble the components.

3. Remove the combustion head and thoroughly clean all deposits.

4. Inspection of Mechanical Shut-off Valve.

- a) Remove the nozzle.
- b) Fasten an M5 screw, with a minimum length of 30mm, into the threaded hole (A) and pull the screw to withdraw the check valve.
- c) Check that the nozzle holder is clear of any debris and clean if necessary.
- d) 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.
- e) Replace in the reverse order.

5. It is strongly recommended that the oil atomising nozzle is 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.

6. Check and reset the electrodes, where necessary, as shown in Figs. 28, 29, 30 and 31.

7. Replace the combustion head and check that the nozzle lies central to the combustion head and the head settings are as shown in Figs. 28, 29, 30 and 31.

8. Withdraw the photocell from its housing and clean.

9. Remove and clean the oil pump internal filter using kerosene or white spirit. The internal filter is accessed by removing the oil pump cover on the Danfoss BFP 11 and Suntec AS47C and by unscrewing and withdrawing the cartridge on the Danfoss BFP 41 as indicated in Fig. 6.

10. 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.

11. Re-assemble the burner components.

12. 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 re-circulated into the burner inlet.

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 boiler top access door by releasing the M10 nuts and check the fibreglass rope seal. Replace the seal if necessary.

2. Remove and check the baffle retainer, where fitted (Danesmoor utility 20/25, 26/32, Worcester Bosch 70/90 and 90/110 models only) as shown in Fig. 32.

3. Remove the baffles, clean and check their condition. Replace any baffles considered to be badly corroded.

4. Thoroughly clean all of the heat exchanger surfaces using a stiff wire brush and vacuum clean all loose debris from the combustion chamber. Take care not to damage the base insulation!

8. Remove and check the heat shield where fitted (Danesmoor utility 20/25, 26/32, Worcester Bosch 70/90 and 90/110 models only) as shown in Fig. 32.

9. Check the combustion chamber base insulation and replace if there is any sign of damage.

10. Check and clean the flue.

11. Replace the items in reverse order noting the baffle positions shown in Fig. 32.

14.7 Fire Valve.

Check that a fire valve is fitted to the incoming oil line with the body located outside the premises and Outdoor Pack and the detection element located within the appliance case. A fire valve clip is provided for this purpose as shown in Fig. 3. Test the operation of the fire valve to ensure that the mechanism operates and that the oil supply is completely isolated.

14.8 Recommission the Burner.

1. 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 return pipe fitting.

2. With the sponge O-ring gasket around the burner blast tube insert the burner into the housing tube. Push the burner firmly forward to compress the gasket and tighten the two locking screws, using a 5mm Allen key.

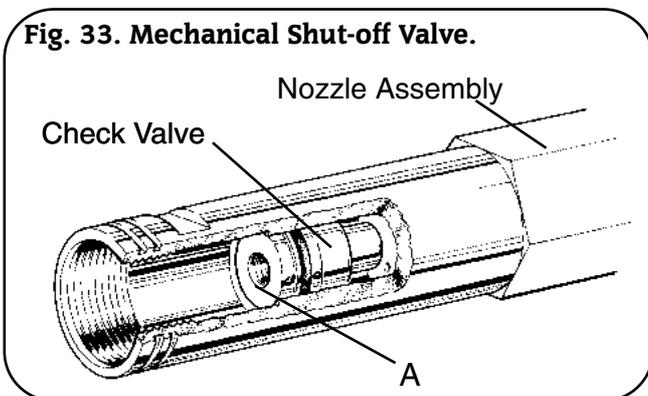
Note: It is important that a good seal is made between the burner and the boiler to prevent recirculation of the flue gases from the combustion chamber to the burner inlet.

3. Reconnect the electrical lead plug into the control box.

4. Turn on the oil supply at the service cock.

5. Recommission the boiler as described in Section 12.

Fig. 33. Mechanical Shut-off Valve.



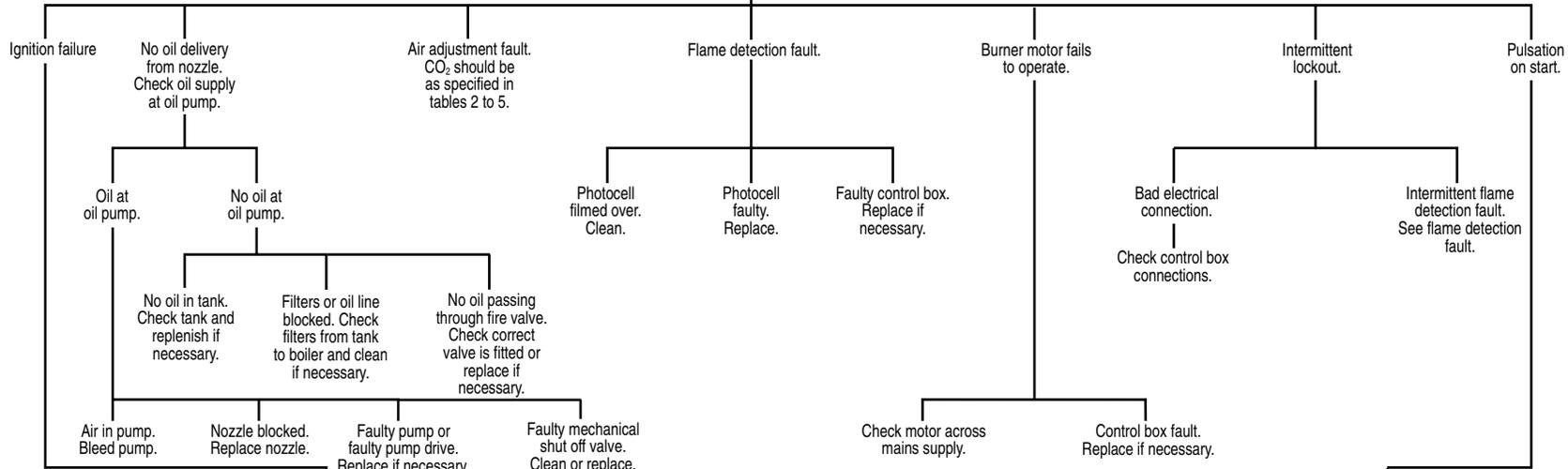
15. Short Parts List

Part	Manufacturers Reference	Qty	WHS Part No.
Burner for 12/14	Bentone B9A	1	8 716 104 431 0
B9A Combustion Head	PL 6/7/21.5/10 E x 78mm	1	8 716 157 041 0
Burner for 15/19 or WB 50/70	Bentone B9B	1	8 716 142 705 0
B9B Combustion Head	PL 6/7/21.5/10 x 78mm	1	8 716 156 697 0
Burner for 20/25 or WB 70/90	Bentone B11C	1	8 716 104 432 0
B11C Combustion Head	PL 10/4/24/10 x 78mm	1	8 716 142 784 0
Burner for 26/32 or WB 90/110	Bentone Sterling 40	1	8 716 142 700 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 TF 832:3	1	8 716156 648 0
B9 and B11	Photocell Satronic MZ770	1	8 716 142 735 0
Sterling 40	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 (12/14, 15/19 or WB 50/70)	AEG or Simel 70 W	1	8 716 156 597 0
Motor (20/25 or WB 70/90)	AEG (FHP) 90 W	1	8 716 142 732 0
Motor (26/32 or WB 90/110)	AEG (FHP) 90 W	1	8 716 156 645 0
Oil Pump (12/14, 15/19 or WB 50/70)	Danfoss BFP41L3	1	8 716142 743 0
Oil Pump (20/25, 26/32 or WB 70/90, 90/110)	Danfoss BFP11L3	1	8 716 142 736 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	WHS	1	8 716 156 663 0
Burner 'O' Shaped Gasket	WHS	1	8 716 140 902 0
Control Thermostat	Seibe K36-P2312	1	8 716 142 309 0
Automatic Reset High Limit Thermostat	Seibe LO7-P1022	1	8 716 142 311 0
Manual Reset High Limit Thermostat	Seibe LM7-P5075	1	8 716 142 310 0
Frost Thermostat	Seibe K36-P1363	1	8 716 142 393 0
Handwheel		2	8 716 102 555 0
Outdoor Pack Front Panel	WHS	1	8 716 102 517 0
Outdoor Pack Top Panel	WHS	1	8 716 102 534 0
Outdoor Pack Rear Panel	WHS	1	8 716 102 523 0
Outdoor Pack Open Side Panel	WHS	1	8 716 102 532 0
Outdoor Pack Closed Side Panel	WHS	1	8 716 102 529 0
Outdoor Pack Brace	WHS	1	8 716 102 514 0
Outdoor Pack Base	WHS	1	8 716 102 500 0

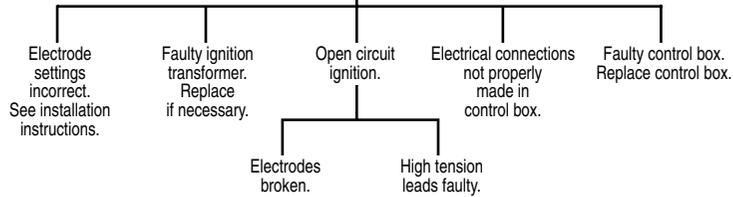
LOCKOUT

INDICATED BY RED LAMP ON CONTROL BOX

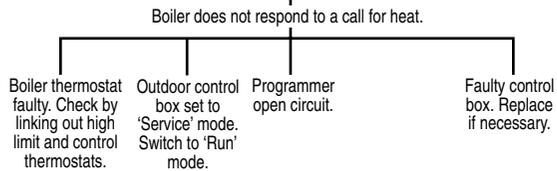
To Re-set wait 2 minutes and press re-set button



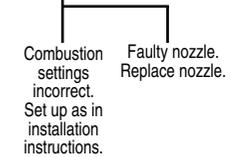
IGNITION FAILURE



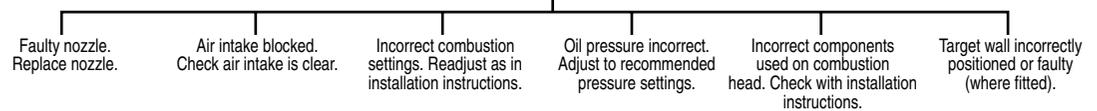
BURNER FAILS TO START



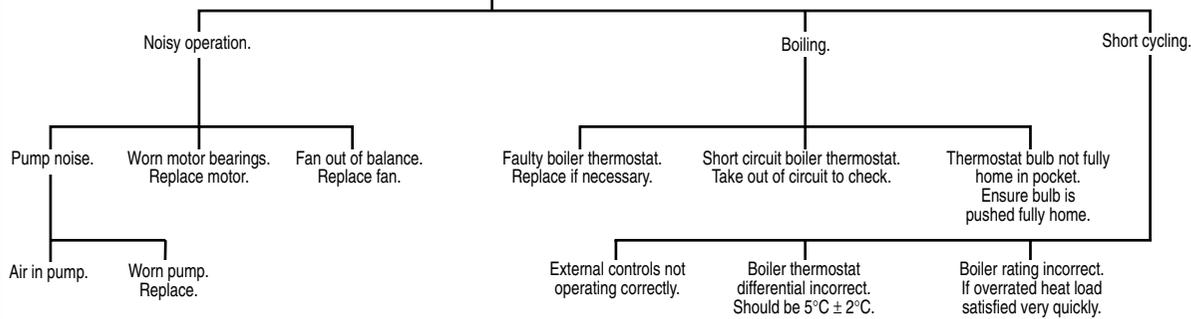
PULSATION ON START



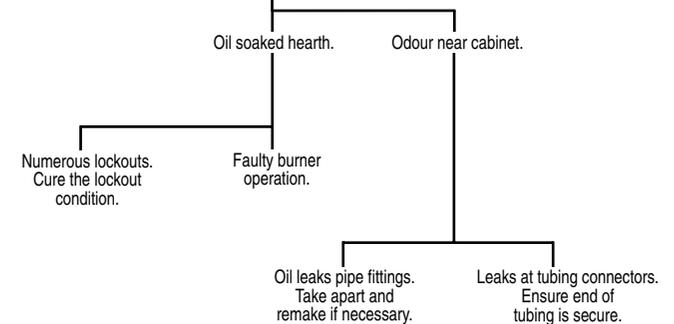
HIGH SMOKE NUMBER



FAULTY BOILER OPERATION



OIL SMELLS





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