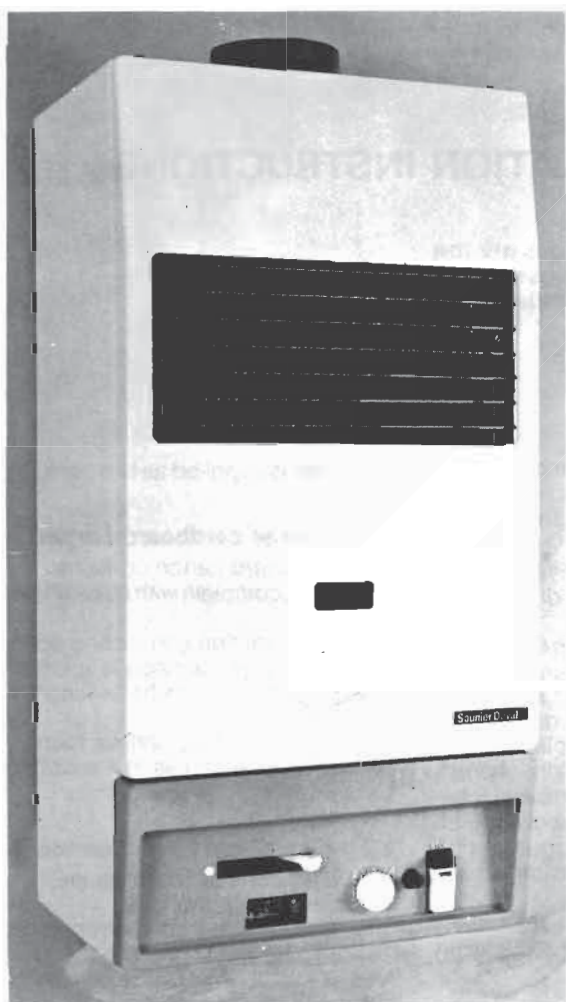


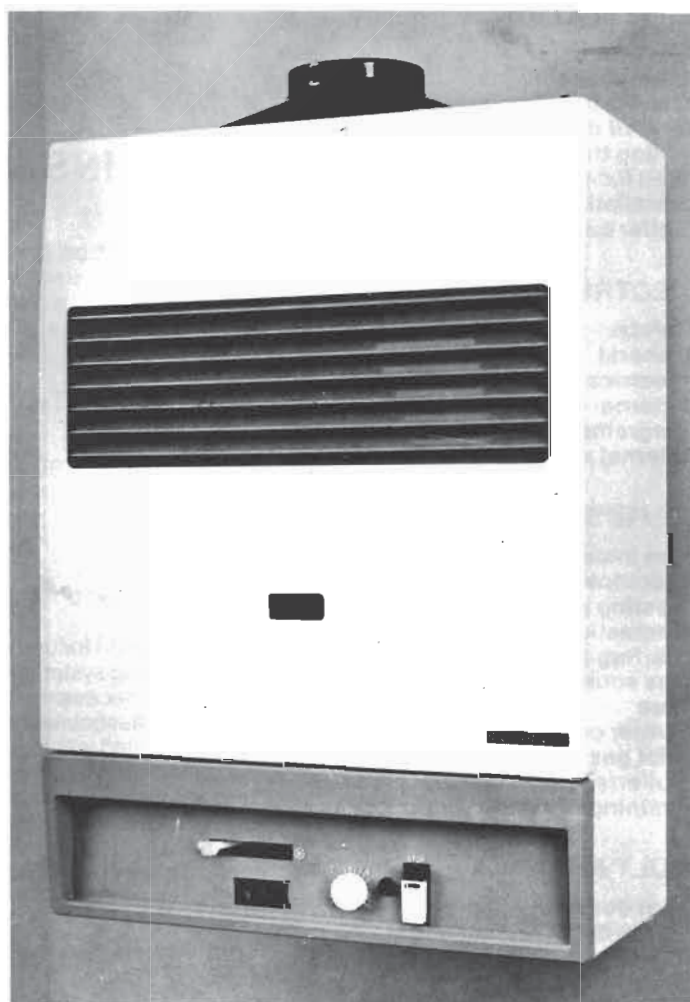


Saunier Duval

Installation Instructions SD223C–SD123C and SD235C–SD135C Combination Boilers



Model SD223C



Model SD235C

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INSTALLATION INSTRUCTIONS

These installation instructions are the property of the user and must be left with the boiler when installation is completed.

1 INTRODUCTION

The Saunier Duval SD223C and SD235C are wall mounted combination boilers providing *both* central heating and instantaneous domestic hot water.

The Saunier Duval SD123C and SD135C are wall mounted boilers providing central heating *only*.

All are designed for use as part of a sealed central heating system with pumped circulation. The necessary pump, expansion vessel and associated safety devices are all incorporated within the appliance.

The boilers are all conventionally, or open, flued appliances – they draw and consume air from the room or compartment in which they are situated and discharge the products of combustion to the outside air via a conventional flue system.

The boilers are available in the following versions:

SD223C – SD123C

for use with natural gas, LPG, town gas or LPG/air mixtures.

SD235C – SD135C

for use with natural gas or LPG

(Refer to **4 Technical data section** for details.)

2 PACKAGING

The boiler is supplied as two packages, as follows:

2.1 A large cardboard carton

This cardboard carton contains:
The boiler, complete with all casing panels fitted.

An aluminium flue connecting collar.
Also within this package is a small polythene bag containing the sealing washers and filters.

N.B. This small bag can be found in the central circular recess in the upper polystyrene packing piece.

2.2 A small cardboard carton

The polystyrene carton contains:
Complete wall fixing jig.

Small domestic expansion vessel (SD223C and SD235C only).

Also within this package are two small polythene bags which contain:

The connecting pipe for the domestic expansion vessel, complete with sealing washers.

Brass connecting strips, plastic grommets, cable clamps and screws for the electric connection box of the boiler.

Please check that you have all the above items *before* commencing the installation of the boiler.

3 CONSTRUCTION

3.1 Boiler

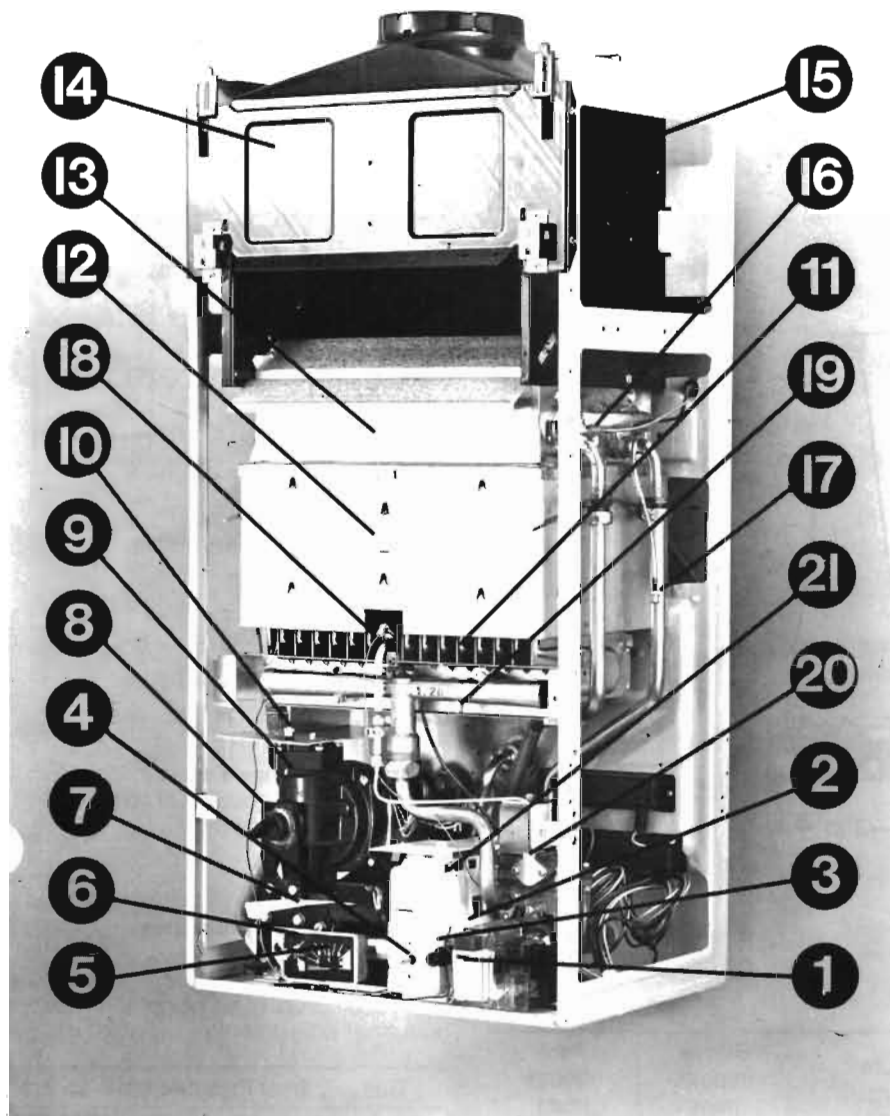


Fig. 1

- | | |
|---|---|
| 1 Start push-button. | 14 Draught diverter. |
| 2 Stop push-button. | 15 Expansion vessel(s) (not visible – behind boiler). |
| 3 Piezo ignition button. | 16 Domestic hot water thermistor*†. |
| 4 Aquastat – to regulate central heating water temperature. | 17 Heat exchanger air vent. |
| 5 Temperature gauge. | 18 Pilot. |
| 6 Pressure gauge. | 19 Burner gas pressure test point. |
| 7 Summer-winter selector lever*. | 20 Gas valve assembly. |
| 8 Pump assembly. | 21 Potentiometer – to adjust heating output. |
| 9 Automatic air vent assembly. | |
| 10 Automatic air vent cap. | |
| 11 Burner. | |
| 12 Heat exchanger skirt. | |
| 13 Heat exchanger. | |

*Fitted to SD223C and SD235C only.
† Thermistor on left side of heat exchanger on SD235C.

3.2 Wall fixing jig

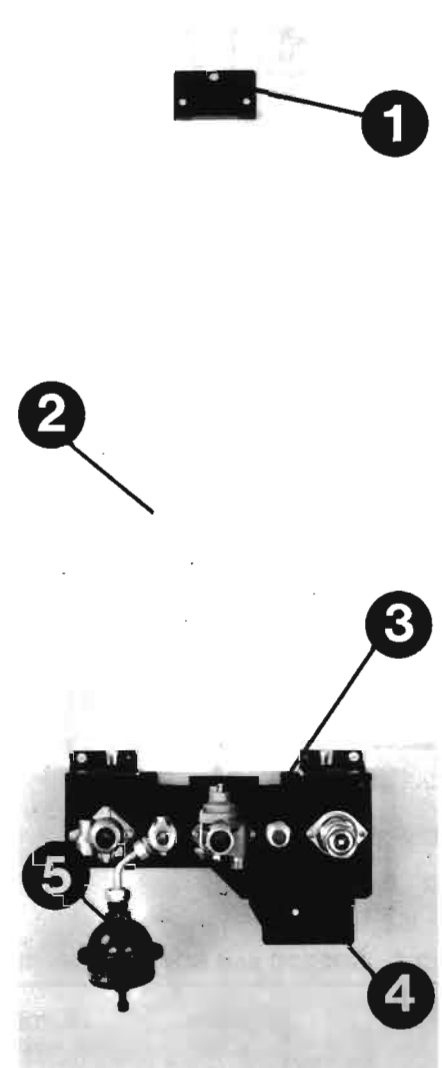


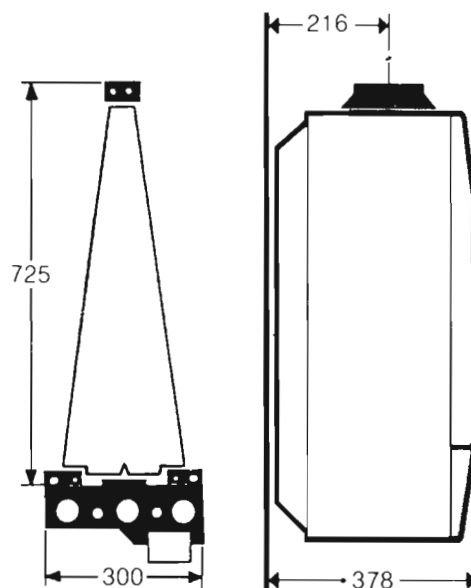
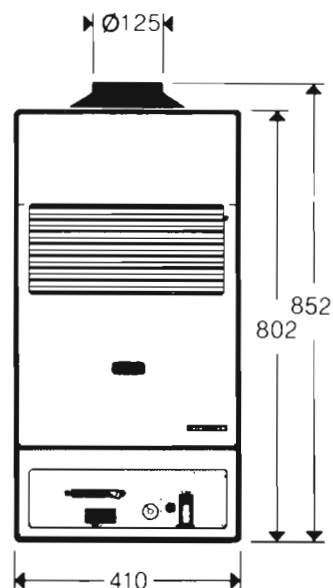
Fig. 2

- | |
|--|
| 1 Hook |
| 2 Template |
| 3 Connecting plate |
| 4 Electrical connection box |
| 5 Domestic hot water expansion vessel. |

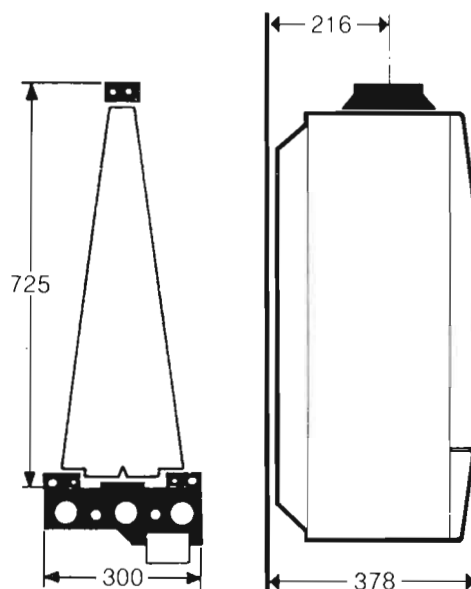
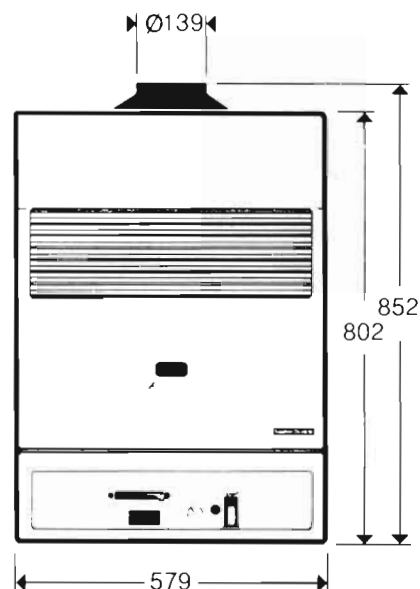
4 TECHNICAL DATA

4.1 Dimensions

SD223C – SD123C



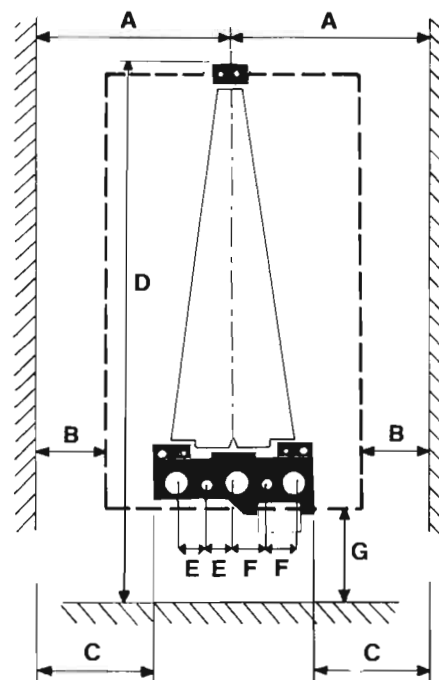
SD235C – SD135C



SD223C – SD123C

Dimensions and clearances

- A 280 minimum
- B 75 minimum
- C 130 minimum
- D 1135
- E 55
- F 57.5
- G 300 minimum



SD235C – SD135C

Dimensions and clearances

- A 365 minimum
- B 75 minimum
- C 215 minimum
- D 1135
- E 55
- F 57.5
- G 300 minimum

All dimensions shown are in millimetres.
Dotted line shows outline of boiler.
Drawings are not to scale.

Fig. 3

4.2 Gas pressures

4.2.1 SD223C and SD123C

Gas	Boiler Code	Burner Pressure (at maximum output)	Burner Injector (mm)	Pilot Injector (mm)
Natural	N	10.3 mbar (4.1 in wg)	1.20	0.28
Propane	L	37.0 mbar (14.9 in wg)	0.70	0.18
Butane	L	28.0 mbar (11.3 in wg)	0.70	0.18
Towns	V	—	2.40	0.60

4.2.2 SD235C and SD135C

Gas	Boiler Code	Burner Pressure (at maximum output)	Burner Injector (mm)	Pilot Injector (mm)
Natural	N	12.2 mbar (4.9 in wg)	1.15	0.35
Propane	L	37.0 mbar (14.9 in wg)	0.73	0.18
Butane	L	28.0 mbar (11.3 in wg)	0.73	0.18

4.2.3 Gas inlet pressures

The gas valve assembly is factory set for the inlet pressure given below and requires no further adjustment.

Gas	Inlet Pressure mbar (in wg)
Natural	20 (8.0)
Propane	37 (14.9)
Butane	28 (11.3)

4.3 Central heating

4.3.1 All the boilers are range rated as follows and may be adjusted by the installer to suit the requirements of individual systems.

SD223C – SD123C

8.7 kW (30,000 Btu/hr) to
23.3 kW (80,000 Btu/hr).

SD235C – SD135C

11.7 kW (40,000 Btu/hr) to
34.8 kW (119,000 Btu/hr).

These tables below give approximate burner gas pressure settings and corresponding heat output (refer to **8 Commissioning** for details of adjustment method).

Table 1 – SD223C and SD123C

Heat Output	Burner Gas Pressure mbar (in wg)					
Btu/hr kW	30,000 8.7	40,000 11.7	50,000 14.7	60,000 17.6	70,000 20.5	80,000 23.3
Natural Gas	1.4 (0.6)	2.6 (1.0)	4.1 (1.7)	5.9 (2.4)	7.8 (3.2)	10.3 (4.1)
Propane	5.2 (2.1)	9.3 (3.7)	14.5 (5.8)	20.8 (8.4)	28.3 (11.4)	37.0 (14.9)
Butane	4.0 (1.6)	7.0 (2.8)	10.9 (4.4)	15.8 (6.4)	21.5 (8.6)	28.0 (11.3)

Table 2 – SD235C and SD135C

Heat Output	Burner Gas Pressure mbar (in wg)								
Btu/hr kW	40,000 11.7	50,000 14.7	60,000 17.6	70,000 20.5	80,000 23.3	90,000 26.4	100,000 29.3	110,000 32.2	119,000 34.8
Natural Gas	1.4 (0.6)	2.2 (0.9)	3.1 (1.2)	4.2 (1.7)	5.5 (2.2)	7.0 (2.8)	8.7 (3.5)	10.5 (4.2)	12.2 (4.9)
Propane	4.1 (1.7)	6.4 (2.6)	9.3 (3.7)	12.6 (5.1)	16.4 (6.6)	20.8 (8.4)	25.7 (10.3)	31.1 (12.5)	37 (14.9)
Butane	1.2 (0.5)	2.7 (1.1)	7.1 (2.9)	9.6 (3.9)	12.5 (5.0)	15.9 (6.4)	19.6 (7.9)	23.7 (9.5)	28.0 (11.3)

4.3.2 The boiler is supplied with the central heating output set to maximum.

4.3.3 Maximum heat output and input values are as follows:

Model	Maximum Input	Maximum Output
SD223C – SD123C	29.4 kW (100,000 Btu/hr)	23.3 kW (80,000 Btu/hr)
SD235C – SD135C	44.0 kW (150,000 Btu/hr)	34.8 kW (119,000 Btu/hr)

4.3.4 Heating water flow temperature is adjustable by the user from 30°C to 90°C approximately.

4.4 Domestic hot water

4.4.1 Heat input is automatically controlled by a thermistor as follows:

SD223C: 8.7 kW (30,000 Btu/hr) to 23.3 kW (80,000 Btu/hr)

SD235C: 11.7 kW (40,000 Btu/hr) to 34.8 kW (119,000 Btu/hr).

4.4.2 Specific temperature rise:

SD223C: 30°C at 11 litres/min (54°F at 2.4 gal/min)

SD235C: 30°C at 16.5 litres/min (54°F at 3.5 gal/min).

4.3.3. Minimum water flow rate (threshold rate): 3.0 litres/min.

4.4.4 Water pressure:

Maximum 10 bar (145 psi)

Minimum 1 bar (14.5 psi)

Minimum for shower installations: 2 bar (29 psi).

4.5 Electrical supply

Supply voltage: 240v 50Hz – fused 3A

Absorbed power:

SD223C / SD123C – 100W

SD235C / SD135C – 100W

5 INSTALLATION REQUIREMENTS

5.1 Statutory requirements

5.1.1 Important: The installation of this boiler must be carried out by a competent person, and must be in accordance with the relevant requirements of the Gas Safety Regulations, relevant Building Regulations, I.E.E. Wiring Regulations and the Byelaws of the local water undertaking.

5.1.2 Installation should be in accordance with any relevant requirements of the local authority. It is in your interest and that of safety, to ensure that the law is complied with.

5.1.3 Detailed recommendations are contained in the following British Standards Codes of Practice, which must be referred to:

BS6891: 1988 Specification for the installation of low pressure gas pipework in domestic premises.

CP342: Centralised hot water supply

Part 1: Individual dwellings

Part 2: Buildings other than individual dwellings.

BS6798: 1987 Specification for the installation of gas fired hot water boilers of rated input not exceeding 60 kW.

BS5440: Flues and air supply for gas appliances of rated input not exceeding

60 kW. (1st & 2nd family gases.)

Part 1: 1978 Flues

Part 2: 1976 Air Supply.

BS5449: Central heating for domestic premises

Part 1: Forced circulation hot water systems.

BS5482: 1979 Installation of gas hot water supplies for domestic purposes. (2nd family gases.)

BS5482: Domestic butane and propane gas burning installations

Part 1: 1979 installations in permanent dwellings.

5.2 Boiler location

5.2.1 As it is a conventionally flued (open flued) appliance the boiler **MUST NOT BE INSTALLED** in a bathroom, or any room containing a bath or shower. Furthermore, it should not be installed in a bedroom or bedsitting room.

5.2.2 Installation of the boiler in a toilet or cloakroom is not recommended, but is acceptable provided that the correctly sized air vents communicate directly to the outside air – refer to BS 5440 – Part 2: 1976 – Air Supply.

5.2.3 When the boiler is to be installed in a cupboard or compartment, it should be designed and constructed for this purpose. An existing cupboard or compartment must be suitably modified for the purpose.

Any installation in a cupboard or compartment or airing cupboard must comply with the requirements of BS6798.

5.2.4 Where the boiler is installed in a more unusual location, detailed guidance on any special procedures which may be required is given in BS5546 and BS6798.

5.2.5 If the appliance is to be installed in a timber framed building it should be fitted in accordance with the British Gas Publication – 'Guide For Gas Installation in Timber Framed Housing' reference DM2. If in doubt, advice must be sought from the local Gas Region of British Gas.

5.3 Gas supply

5.3.1 The local gas region should be consulted at the design/planning stage to ensure that an adequate supply of gas will be available to operate the appliance.

5.3.2 An existing gas service pipe must not be used without prior consultation with the local gas region.

5.3.3 A gas meter must be connected to the service pipe by the local gas region, or the local gas region contractor.

5.3.4 An existing meter must be checked to ensure that it is capable of passing the additional quantity of gas, as given below, before the boiler is installed.

SD223C / SD123C	2.80 m ³ /hr (99 ft ³ /hr)
SD235C / SD135C	4.15 m ³ /hr (147 ft ³ /hr)

5.3.5 For an LPG boiler – ensure that the gas storage/supply installation (i.e. the storage cylinders or bulk storage tank) is of sufficient size to provide the required

quantity of gas, as given below, before the boiler is installed.

Model	Propane (at 37 mbar)	Butane (at 27 mbar)
SD223C / SD123C	1.14 m ³ /hr (40 ft ³ /hr)	0.86 m ³ /hr (30 ft ³ /hr)
SD235C / SD135C	1.70 m ³ /hr (60 ft ³ /hr)	1.30 m ³ /hr (46 ft ³ /hr)

If it is an existing LPG supply installation, ensure that it is capable of providing an *additional* quantity of gas as given above.

5.3.6 Installation pipes should be fitted in accordance with BS6891: 1988.

5.3.7 Pipework from the meter or, in the case of an LPG installation the low pressure regulator, to the boiler must be of adequate size to carry the maximum flow of gas without excessive pressure loss.

Do not use pipes of a smaller size than the boiler gas connection.

5.3.8 The complete installation, including the meter, must be tested for soundness and purged as described in the above code.

5.4 Electrical

5.4.1 All electrical wiring must be carried out by a competent electrician. All external components shall be of the approved type and shall be connected in accordance with I.E.E. wiring regulations, and any local regulations which apply.

5.4.2 The boiler must be earthed, and connection of the appliance and any system controls to the mains supply should be through an unswitched shuttered socket outlet and a 3 amp fused 3 pin plug. Alternatively, a 3 amp fused double pole isolating switch may be used, having a minimum double pole contact separation of 3 mm, servicing only the boiler and system controls.

5.4.3 The boiler is connected to the 240v, 50Hz supply using the connection box mounted on the wall fixing jig.

For electrical wiring instructions refer to section 7.

5.5 Flue system

BS5440: Part 1 gives detailed recommendations for the flueing of the boiler which **must be complied with**. The following notes are intended for general guidance.

5.5.1 The flue diameter required must not be less than that specified below – a flue collar is supplied with the boiler to facilitate the connection of this size of flue.

Model	Flue Diameter
SD223C – SD123C	125 mm (5 in)
SD235C – SD135C	150 mm (6 in)

5.5.2 To allow easy disconnection of the flue pipe from the boiler – when required – a split socket connector should be used when fitting the flue pipe.

5.5.3 Flue pipes and fittings should be manufactured from one of the following materials:
Asbestos cement
(or Asbestos free substitute)
Aluminium
Stainless steel

5.5.4 External flues should be insulated or of twin-walled stainless steel – of a type acceptable to British Gas.

5.5.5 Right angle bends, mitred elbows, tee junctions and horizontal runs of flue should be avoided.

5.5.6 Where a chimney is to be used – which is not composed of or lined with a non-porous acid-resistant material – it should be lined with a stainless steel flexible flue liner of a type acceptable to British Gas.

5.5.7 The flue should take the most direct route, rising continuously towards the terminal.

If there is a choice of flue routes, choose that which is least likely to cause cooling of the flue gases.

5.5.8 Provision should be made in the flue system to prevent condensation or rain water flowing back into the boiler.

5.5.9 A terminal of a type tested and approved by British Gas must always be used.

This terminal must be sited in accordance with BS5440: Part 1, and must not be within 600 mm (2 feet) of an openable window, air vent or any other ventilation opening.

5.6 Air supply

BS5440: Part 2 gives detailed recommendations for the air supply required by the boiler which **must be complied with**. The following notes are intended for general guidance only.

5.6.1 Being an open flued appliance, the room or space in which the boiler is located must have a permanent air vent. This vent must be either direct to the outside air, or to an adjacent room or internal space – which must itself have a permanent air vent of at least the same size – direct to outside air.

The minimum effective area for this permanent air vent, based on the heat input to the boiler (in accordance with BS5440: Part 2), is given below:

Model	Minimum Vent Area
SD223C – SD123C	100 cm ² (16.0 in ²)
SD235C – SD135C	170 cm ² (26.0 in ²)

5.6.2 When the boiler is to be installed in a cupboard, or compartment, permanent air vents are required at both high and low level to provide air for combustion, flue dilution and cooling.

These vents must either communicate with the room or internal space in which the cupboard is situated, or be direct to outside air.

The minimum effective area for the permanent air vents required in the cupboard or compartment, based on heat input to the boiler (in accordance with BS5440: Part 2), are given in the table below:

Air Vent Position		Minimum Vent Area	
		Air from room or internal space	Air direct from outside
High Level	SD223C – SD123C	260 cm ² (40 in ²)	130 cm ² (20.0 in ²)
	SD235C – SD135C	400 cm ² (62 in ²)	200 cm ² (31.0 in ²)
Low Level	SD223C – SD123C	520 cm ² (80 in ²)	260 cm ² (40 in ²)
	SD235C – SD135C	800 cm ² (124 in ²)	400 cm ² (62 in ²)

N.B. Both air vents must communicate with the same room or internal space, or must be both on the same external wall to the outside air.

5.6.3 When the cupboard or compartment air vents communicate with the room or internal space in which the cupboard is located, that room or internal space must have a permanent air vent as specified in 5.6.1.

5.7 Central heating circulation system

5.7.1 The boiler is suitable for use with small bore, micro-bore, single pipe and two pipe central heating systems. Detailed recommendations for the water circulation system are given in BS6798, BS5449: Part 1 (small bore and micro-bore systems) and CP.342.

5.7.2 Horizontal pipe runs should be avoided wherever possible to prevent air collecting in the system. If horizontal runs are unavoidable they should rise towards a vent point.

5.7.3 Draining taps must be located in accessible positions which permit the draining of the whole system, including the boiler and the hot water system. Draining taps should be at least ½ inch nominal size and comply with BS2876.

5.7.4 Pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated under-floor spaces.

5.7.5 Copper tubing to BS2871: Part 1 is recommended for the water carrying pipework.

For general guidance reference should be made to the British Gas publication – Materials and Installation Specifications for Domestic Central Heating and Hot Water and also BS6798 and BS5449: Part 1.

5.8 Hot water system SD223C and SD235C only

5.8.1 The boiler will supply instantaneously heated hot water to a limited number of draw-off points – but to only **one** point at a time.

5.8.2 To ensure economic operation, the pipe runs between the boiler and taps should be in 15 mm copper – and be as short as possible.

N.B. Reference should be made to the Byelaws of the local water undertaking, which limit the length of pipe runs from water heating devices.

5.8.3 Any exposed sections of pipework should be insulated to reduce heat loss.

5.8.4 The water supply pipework should have NO loose jumper washers on any stop taps, or any non-return valves fitted.

Important. The SD223C / 123C / 235C / 135C combination boilers have a maximum

domestic water working pressure of 10 bar (145 psi). This pressure must *not* be exceeded in service, as damage to the boiler may result. Such water pressures are unnecessarily high and cause noisy operation of the boiler. Under such circumstances, it is strongly recommended that either a pressure reducing, or limiting valve – set to approximately 3.5 bar (50 psi) – be fitted in the cold water supply to the boiler.

5.8.5 In hard water areas, a scale controlling device should be fitted to the cold water supply to the boiler, to prevent premature scaling of the heat exchanger.

6 INSTALLATION

6.1 General

6.1.1 The boiler is a wall mounted appliance. An area of vertical flat wall of sufficient size to accommodate the boiler is thus required.

6.1.2 The boiler should be fitted on a fire-resistant wall. If the wall is of combustible material, the wall must be protected by a sheet of fire-proof material.

6.1.3 Do not fit the boiler above a cooker. The grease present in the atmosphere over the cooker may result in poor performance or malfunction of the boiler.

Important: Ensure that the structure and condition of the wall is such that it is capable of supporting the weight of the boiler. Where necessary, use an alternative method for fixing to obtain the required strength.

6.2 Clearances

The location of the boiler *must* be such that adequate space for servicing and air circulation exists around the appliance.

6.2.1 A minimum clearance of 75 mm (6 in) either side of the boiler is required.

6.2.2 A minimum clearance of 600 mm (24 in) must be available in front of the boiler to enable servicing of the appliance.

6.2.3 A minimum clearance of 300 mm (12 in) below the boiler is required.

6.2.4 If the boiler is to be installed in a cupboard a minimum distance of 100 mm (4in) is required between the front of the boiler and the inside face of the door.

6.3 Central heating system

6.3.1 The circulating pump is incorporated within the boiler.

The performance of this pump, running at maximum speed, varies according to the pump by-pass setting, as shown on the relevant graph below.

6.3.2 The pump by-pass, incorporated in the reversing valve assembly, causes a partial re-cycling in the heating circuit within the boiler.

No other circulating pump is required, or should be fitted, in the heating circuit connected to the boiler.

This is adjusted by turning the brass screw located under the diverter valve (refer to Fig. 6). Turning the screw clockwise closes the by-pass, and turning anti-clockwise opens the by-pass.

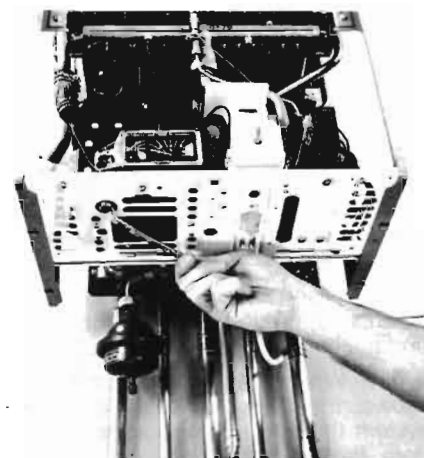


Fig. 6

6.3.3 When using thermostatic radiator valves (T.R.V.) a separate adjustable by-pass must be fitted between the flow and return of the heating circuit.

6.3.4 If an existing boiler on a heating/hot water system is being replaced, it is strongly recommended that both systems are thoroughly cleaned out, using a suitable proprietary cleaner, before installing the new boiler.

6.3.5 If the water in the central heating system is being treated, the additive must not be aggressive or capable of causing corrosion or damage within the boiler and heating system.

Any such additive should be suitable for use with a copper tube heat exchanger, and also be compatible with the pipe and radiator materials used.

6.4 Sealed systems

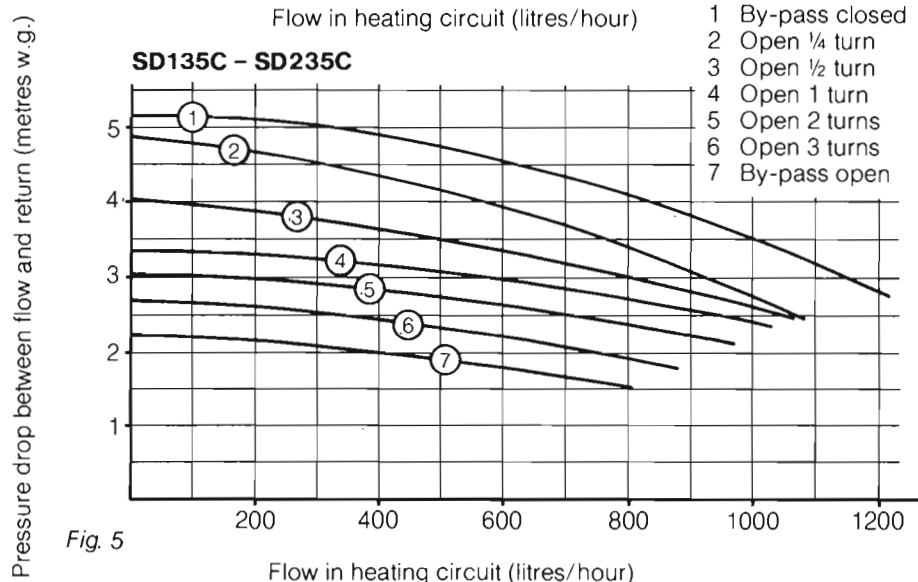
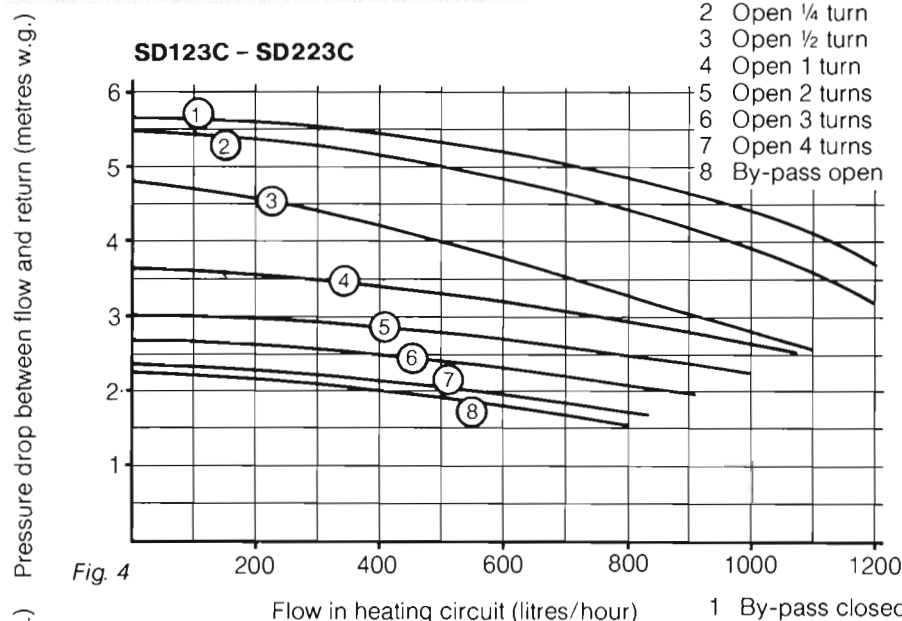
Sealed systems do not require feed or expansion cisterns, open vents, etc.

It is important that only good quality radiator valves and fittings are used to minimise the possibility of leaks and the consequent detrimental 'topping-up' of the system.

6.4.1 An expansion vessel is incorporated in the boiler to maintain a pressure in the sealed heating system and accommodate the expansion of the heated water.

6.4.2 The expansion vessel is pressurised to 0.5 bar (7.5 psi) at the factory – this corresponds to a maximum static head of 5 metres.

PUMP PERFORMANCE CHARACTERISTICS



6.4.3 The size of the expansion vessel is sufficient for a sealed system with a maximum volume as specified below, at an average temperature of 75°C and a maximum working pressure of 3 bar.

Model	Maximum system volume
SD223C – SD123C	160 litres (35 galls)
SD235C – SD135C	320 litres (70 galls)

6.4.4 A pressure relief valve is required on all sealed heating systems. This is incorporated in the heating flow connection on the wall fixing jig. The lift pressure is pre-set at 3 bar (45 psi) and is non-adjustable.

6.5 Filling the system

6.5.1 The system should be filled with water via a separate filling point (i.e. a valved tee) fitted at a convenient point on the heating circuit.

6.5.2 Important: No direct filling connection between the heating system and incoming cold main is incorporated in the boiler.

The heating system will not be automatically filled from the domestic cold water main.

6.5.3 Filling *must* be carried out in a manner approved by the local water undertaking.

6.5.4 Where the local water undertaking allows, the filling of a sealed heating system through a temporary connection from the mains supply may be used provided that:

- the temporary connection is made to a double check valve assembly which is *permanently* connected to the sealed circuit.
- the connection between the mains supply pipe and the sealed circuit must be *removed* when filling is completed.

Such an arrangement is shown in Fig. 7.

Proposed method for filling a sealed heating system from water main

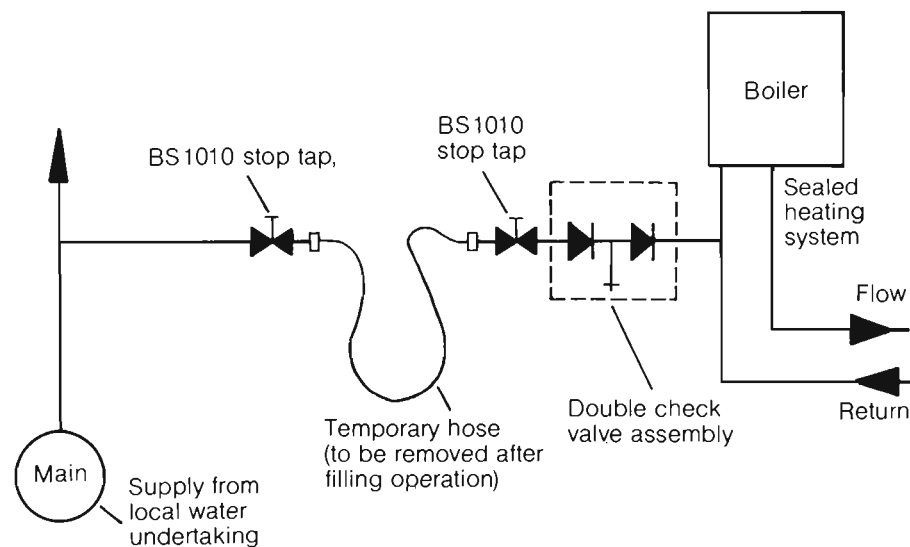


Fig. 7

6.6 Wall fixing jig

6.6.1 The wall fixing jig serves a triple function:

The connecting plate facilitates the connection and soundness testing of all the pipework, and the connection of the electrical wiring, *before* the boiler is installed.

The hook supports the weight of the boiler.

The template ensures that the hook and connecting plate are correctly located relative to each other.

6.6.2 The connecting plate incorporates the following for the installers/service engineer's convenience – refer to Fig. 8.

Isolating valves in both the central heating flow and return connections.

An isolating valve in the cold water inlet connection.

A drain screw for the central heating.

A spring-loaded gas inlet valve.

N.B. As the SD123C and SD135C boilers do not provide domestic hot water, there are no cold water inlet or hot water outlet connections on the jig connecting plate.

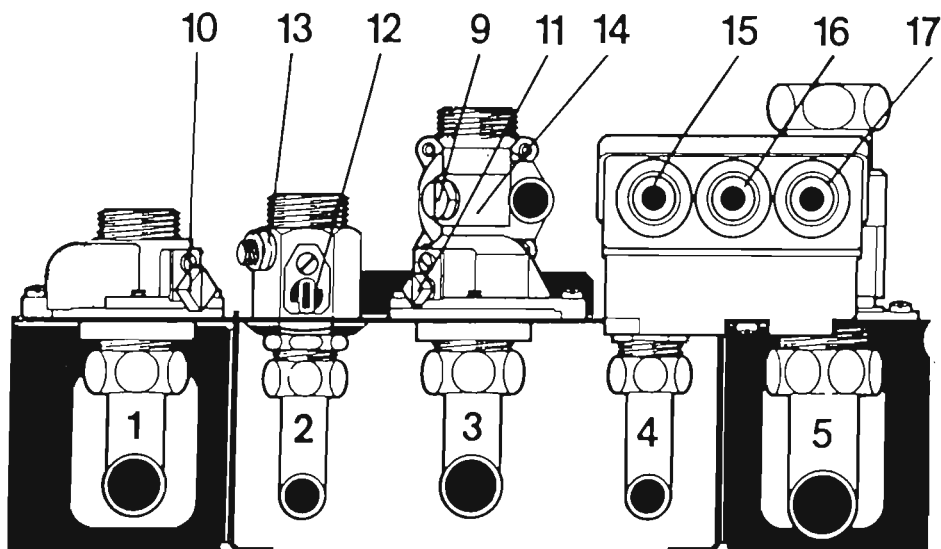


Fig. 8

	Pipe diameters	
1 Heating return	22mm	11 Isolating tap for the central heating – flow
2 Cold water main inlet	15mm	12 Isolating tap for domestic hot water
3 Heating flow	22mm	13 Fitting for expansion vessel
4 Domestic hot water out	15mm	14 Pressure relief valve
5 Gas supply	22mm	15 Cable entry
9 Drain screw for the central heating		16 } to electrical
10 Isolating tap for the central heating – return		17 } connection box

6.6.3 A small expansion vessel is supplied with the fixing jig. This must be fitted to the 1/4in BSP nipple on the cold inlet connection using the cranked copper connecting pipe provided. Refer to Fig. 9.

Important: Do not touch the schrader valve on this expansion vessel. This is not an air vent, or bleed valve. The vessel is pressurised at the factory to accept any expansion of the domestic hot water.

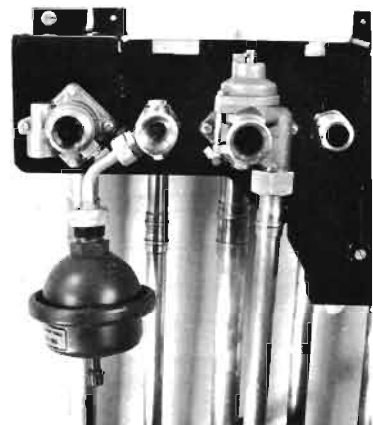


Fig. 9

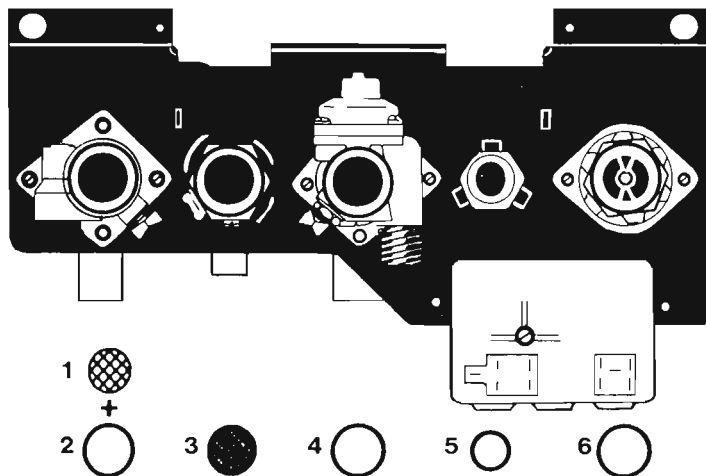


Fig. 10

- 1 Metal filter
- 2 Green fibre washer
- 3 White plastic filter

- 4 Green fibre washer
- 5 Black fibre washer
- 6 Green fibre washer

6.6.4 Sealing washer and filters are provided with the boiler. These **MUST** be used when making the connections between boiler and connecting plate. Fig. 10 identifies and gives the correct location of the filters/washers required.

Any items provided, other than those mentioned above, may be discarded as they are not required for use with this boiler.

6.6.5 A discharge pipe should be connected to the 1/2in BSP threaded pressure relief valve discharge – on the central heating flow connection.

This pipe should be of suitable metal and its size should be same as the discharge outlet size.

The discharge should be via an air-break to a run dish, and the pipe should be laid with a continuous fall with a maximum length of 9 metres, unless the pipe size is increased.

The pipe should discharge in a visible but safe place, such as a gully, where there is no risk of contact with the hot water by persons using the building.

Important: No stop taps, or shut-off valves, of any type should be installed in the discharge pipe.

6.7 Installation procedure

6.7.1 Position the wall fixing jig in the required location, after considering *all* aspects relating to boiler siting. Check that hanging hook and connection plate are level.

Mark fixing hole centres for hook.

Drill and plug holes, fix hook to wall.

With template flat to the wall, mark fixing hole centres for connecting plate.

Drill and plug holes, fix connecting plate to wall.

Check again that both hook and connecting plate are level.

6.7.2 Install flue system in accordance with BS5440: Part 1: 1978 – and the guidance given in 5.5.

6.7.3 Remove the five pipe connection elbows from the rear of the connecting plate before making the pipe connections.

Important: Do not solder pipework with these connections in position as damage to the joints, isolating valves and gas inlet valve may result.

6.7.4 Make all electrical connections to boiler connection box – refer to 5.4 and Section 7.

Connect the 240V 50Hz supply.

Connect the room thermostat and/or time-switch (if fitted).

6.7.5 Thoroughly flush through the heating system pipework to ensure that all foreign matter is removed before the boiler is installed.

N.B. Any such foreign matter (e.g. swarf, grit, flux residues, etc.) will eventually cause boiler operating problems, and may result in damage to internal boiler components such as the pump, heat exchanger or reversing valve.

6.7.6 Unpack the boiler, and remove any plastic caps protecting the pipe connections.

Important: Before hanging the boiler on the fixing jig, check the operation of the gas inlet valve operating rod by pushing in the white (start) button on the front of the boiler.

As a result, the operating rod, located at the back of the gas valve, will be pushed out. Check that the rod is central in the gas valve inlet, then push it *fully* back into the gas valve after pressing the red (stop) button.

Failure to do the above may result in the gas inlet valve not being opened when the start button is pressed – preventing the gas from reaching the boiler.

6.7.7 Lift the boiler and engage the fixing jig hook in the slotted bracket above the expansion vessel (refer to Fig 11). Lower the boiler until it rests on the outward lip of the connecting plate.

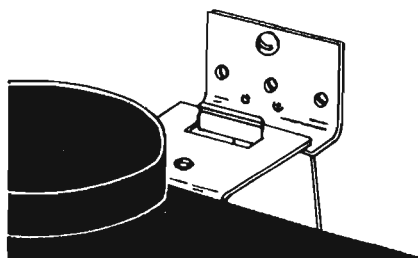


Fig. 11

Using the sealing washers and filters provided, make the connections between the boiler and connecting plate.

The sealing washer provided must be used when making this gas connection.

Important: Always make the gas connection *first* as this is not flexible.

6.7.8 Connect the boiler to the electrical connection box – refer to 7.3.8.

6.7.9 Connect the flue to the boiler using the flue collar provided.

6.8 Boiler casing

The boiler is supplied with all casing panels fitted. However, during installation it will be necessary to remove these panels – to do so proceed as follows:

6.8.1 Control panel fascia

Remove white aquastat knob by pulling off spindle.

Remove the two self-tapping screws holding fascia to underside of boiler.

Remove fascia panel by pulling forwards and off two retaining studs.

6.8.2 Front panel and louvred grille

Having removed the control panel fascia, unscrew the two retaining studs holding the bottom of the panel to the boiler frame.

Pull bottom edge of panel forwards, and lift panel upwards and off the two retaining lugs on the top of the boiler.

To remove louvred grill simply remove the two fixing screws and lift grille away.

N.B. The louvred grille cannot be removed with the front panel in place.

6.8.3 Side panels

Remove the two panel retaining screws from the underside of the boiler.

Pull bottom edge of panel away from boiler, until bottom flange is clear of boiler frame.

Lift panel upwards and off the two retaining lugs on the top of the boiler.

Repeat procedure for other side panel.

N.B. Side panels can be removed with the front panel and control panel fascia in place.

6.8.4 To replace panels – reverse the removal procedure described.

7 ELECTRICAL WIRING

7.1 Safety

Important. Always isolate the appliance from the electrical supply before removing the boiler and connection box covers. The appliance *must* be earthed and protected by a 3 amp fuse – refer to 5.4.

7.2 General

7.2.1 The 240V 50Hz electrical supply must be *maintained* at all times in order that the boiler can produce domestic hot water when required.

Do not interrupt the mains supply to the appliance with a timeswitch or programmer.

7.2.2 In the interests of energy conservation, the central heating function of the boiler can be controlled using a room thermostat with an accelerating shunt resistance and/or simple four-wire time-switch.

7.2.3 As it is not possible to program instantaneous domestic hot water, the use of a programmer with a combination boiler is unnecessary – although it may be possible to use a programmer as a 'time-switch' for the central heating function only – depending on the type.

7.3 Electrical connection box

7.3.1 The electrical connection box is situated at the right hand end of the connecting plate.

7.3.2 All external wiring connections, including the mains supply, can be made prior to the hanging/connection of the boiler.

7.3.3 Remove connection box cover.

7.3.4 Connect mains supply live and neutral to centre left and upper left terminals respectively.

7.3.5 For use *without* timeswitch and/or room thermostat: link together terminals 1, 2 and 3 using the brass bridging pieces provided.

7.3.6 For use with timeswitch and/or room thermostat. Connect room thermostat and/or timeswitch switching contacts in series between terminals 1 and 2 (leaving brass bridge between 2 and 3).

N.B.: The time switch should be of the four-wire type – having an independent power supply to the clock motor and 'voltage free' switching contacts. The neutral from the anticipatory resistance (shunt heater) of the room thermostat must be connected to terminal 4 (neutral connection) in the connection box.

7.3.7 Front protection thermostat. This should be connected with its switching contacts between terminals 1 and 2 in the connection box. A frost protection thermostat *must* be used in conjunction with a room thermostat and/or timeswitch – the frost thermostat being connected in *parallel* with the other controls between terminals 1 and 2 in the connection box. Refer to external wiring connection diagrams.

Important: This appliance must be wired according to these instructions. Any fault arising from incorrect wiring cannot be rectified under the terms of the Saunier Duval product guarantee.

7.3.8 After the boiler has been hung and connected to the fixing jig:

Unscrew the crosshead screw and remove the connection box from the connecting plate.

Plug the two flying leads from the boiler wiring loom into the sockets at the rear of the connection box.

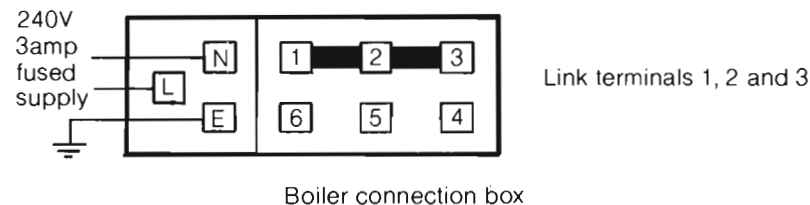
Check that the plugs are fully pushed home into the sockets.

Check that the terminals have not been pushed through by the plugs.

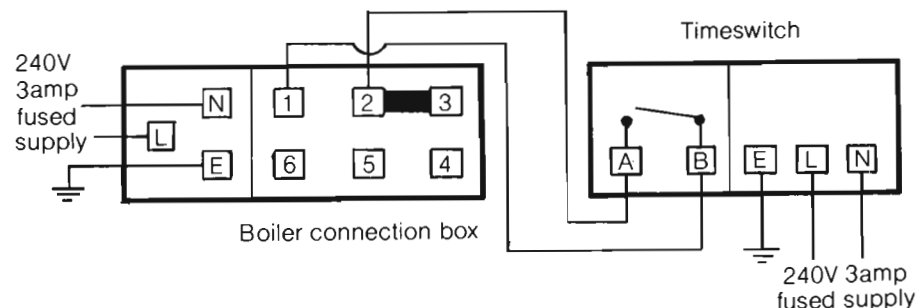
Using the crosshead screw re-fix connection box to the connecting plate. Replace the cover on the box.

7.4 External wiring connection diagrams

I Boiler with no external controls



II Boiler with timeswitch



III Boiler with timeswitch and room thermostat

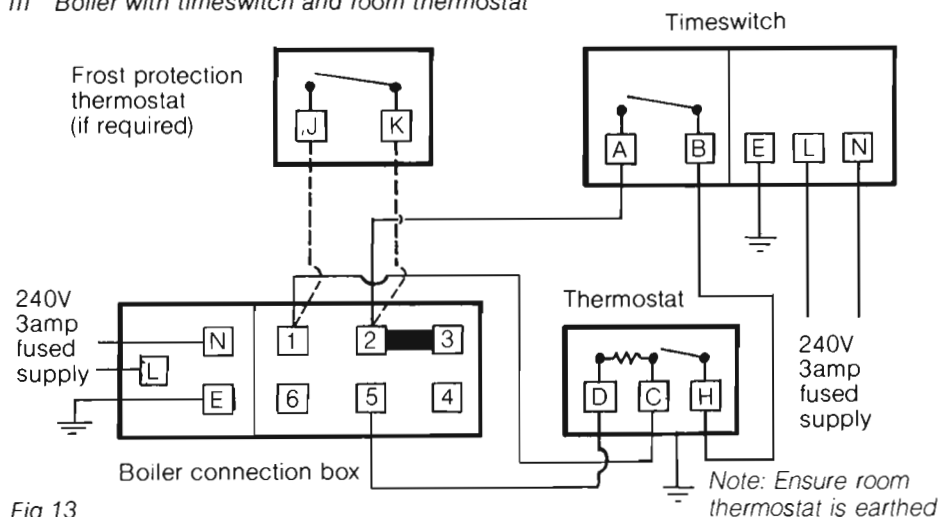


Fig 13

Connect timeswitch and room thermostat using terminals shown below:

Timeswitch type	A	B	L	N	Comments
Randall 103	1	3	6	5	Fit NO links
Randall 911	5	6	L	N	Fit NO links
Switchmaster 300	1	4	L	N	Remove link between L and 4
Towerchron T2001C	4	7	L	N	Fit NO link between L and 4
Horstmann 425 Coronet	4	5	L	N	Fit NO link between L and 5
Landis & Gyr RWB30	2	4	L	N	Fit NO link between L and 2
Potterton EP2000	5	4	L	N	Fit NO link between L and 5
Potterton EP3000	5	4	L	N	Fit NO link between L and 5
ACL Lifestyle LS111	1	3	L	N	Fit NO link between L and 1
ACL Lifestyle LS711	1	3	L	N	Fit NO link between L and 1
Sangamo SET 1	5	4	L	N	Fit NO link between L and 5
Sangamo E1	2	1	4	5	Fit NO links
Smiths ERS1	L	1	-	-	Connect N to neutral

Thermostat type	C	D	H
Saunier Duval TA.2	2	4	1
Honeywell T.6160 B	3	2	1

Frost thermostat type	J	K
Honeywell 4160A	3	1
Sopac TA.340.06	3	1

7.5 Internal wiring diagrams

7.5.1 SD223C – SD235C Electrical Schematic

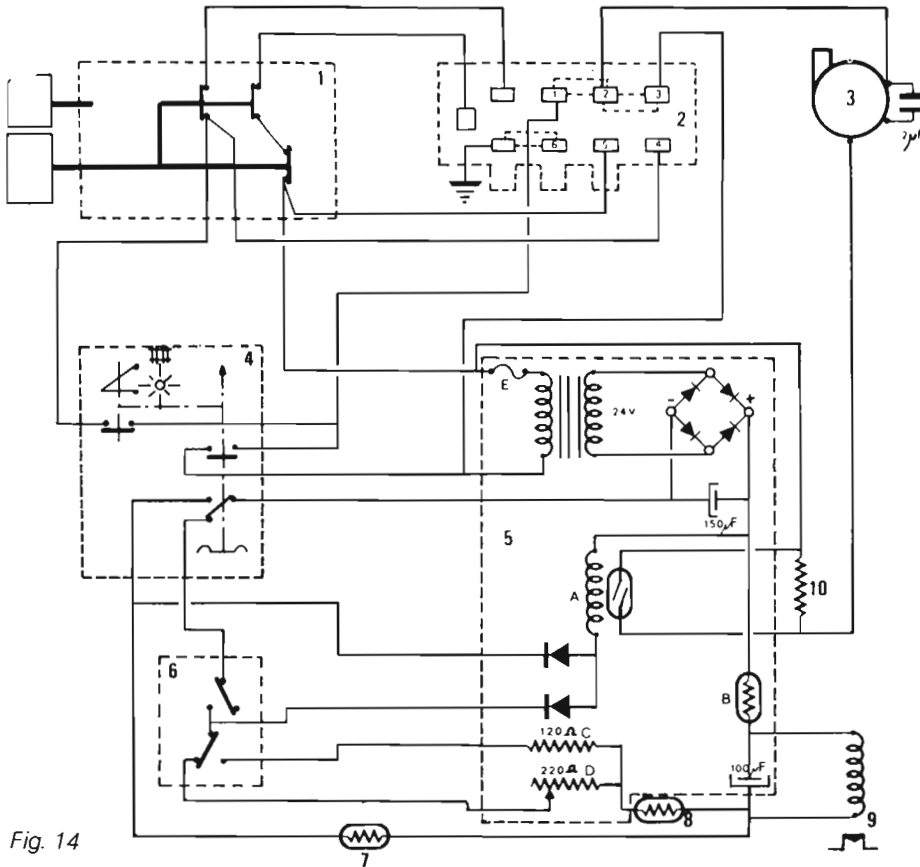


Fig. 14

7.5.2 SD123C – SD135C Electrical Schematic

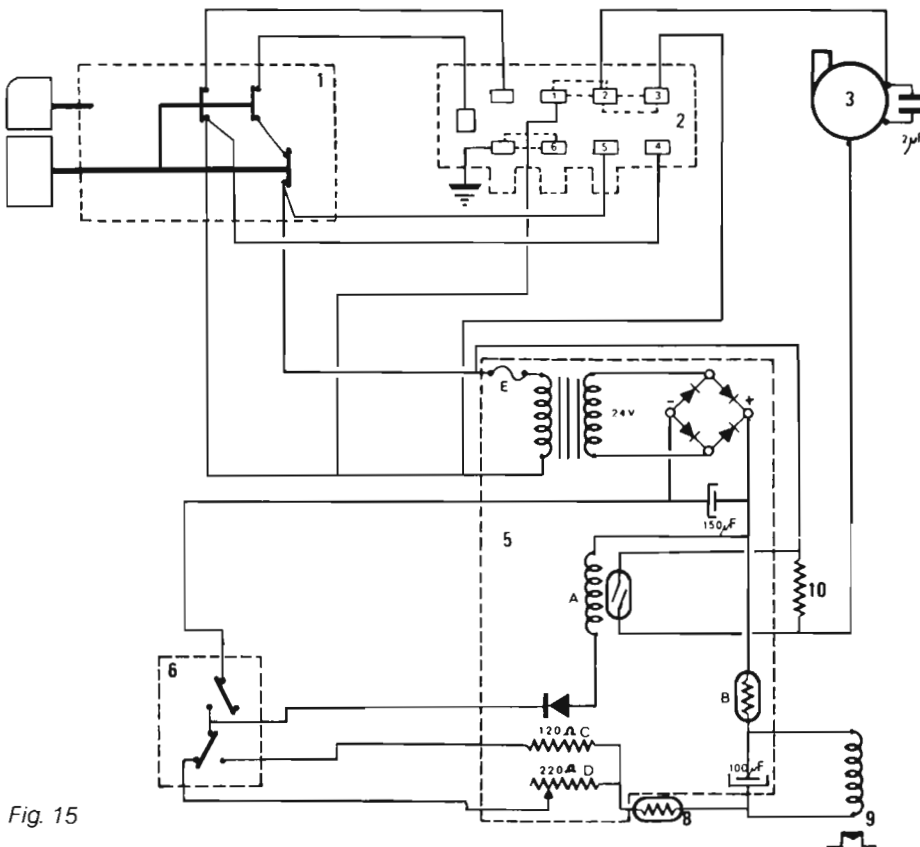


Fig. 15

- 1 Push button box.
- 2 Electrical connection box.
- 3 Pump.
- 4 Microswitches – diverter valve
- 5 Printed circuit.
- 6 Aquastat.
- 7 DHW thermistor.
- 8 Limit thermistor.

- 9 Gas valve coil.
- 10 Half speed resistor (pump).
- A Reed relay (pump).
- B Thermistor – slow ignition.
- C Resistor.
- D Potentiometer.
- E Fuse.

8 COMMISSIONING

8.1 Gas installation

8.1.1 The complete gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of BS6891: 1988.



Fig. 16

8.1.2 It is recommended that the air be purged from the gas supply pipe at the pressure test point on the inlet to the gas valve (refer to Fig 16).

After ensuring that the boiler is isolated from the electrical supply:

Remove the screw from the test point. Push in white (start) button on the front of the boiler, and hold in until gas is present at test point.

Replace screw and, while holding white button in, test for gas soundness.



Fig. 17

8.1.3 It is also recommended that the air be purged from the pilot gas supply pipe (small diameter aluminium pipe). After ensuring that the boiler is isolated from the electrical supply:

Disconnect the supply pipe from the pilot injector tube by unscrewing nut, using a 10mm spanner (refer to Fig. 17). Carefully pull end of supply pipe downwards from the tube.

Push in and hold white (start) button until gas is present at the end of the pipe. Immediately release white button, and reconnect pipe to pilot injector tube. **Do not overtighten nut.**

Push in white button again and check around connection for gas soundness.

8.2 Electrical installation

8.2.1 All checks to ensure electrical safety should be carried out by a competent person.

8.2.2 In the event of an electrical fault after installation, preliminary system checks must be carried out as described in the British Gas Multimeter Instruction Book.

8.3 Heating system

8.3.1 With the boiler mounted on the fixing jig, and all the connections tight, move the summer/winter selector lever to the right hand (winter) position.

N.B. No summer/winter selector lever is fitted to the SD123C and SD135C boilers. Fill the heating system – as per 6.5 – until the pressure gauge indicates a pressure of approximately 1.5 bar. Vent any air from the boiler.

8.3.2 Briefly operate the boiler, thoroughly checking the heating system pipework and fittings for leaks. Check all boiler hose connections and, if necessary, *slightly* tighten the hose clips.

Upon reaching maximum temperature the boiler should be shut down and the complete system drained to remove any residues from the pipework. Re-fill the system and vent as before.

8.3.3 Re-start the boiler and operate until maximum temperature is reached. Shut-down the boiler and vent the heating system.

If necessary, top up the heating system to ensure that a pressure of 1 bar is indicated on the gauge when the system is cold.



Fig. 18

8.3.4 To vent air from the boiler. Unscrew the cap on the pump automatic vent outlet 1–2 turns, and leave (refer to Fig. 18).

Unscrew the knurled brass cap on the end of the heat exchanger vent pipe (on right hand side of boiler, between heat exchanger and side panel) 1–2 turns. When a consistent jet of water is obtained from this vent, screw the cap back tight (refer to Fig. 19).

N.B. Do not unscrew this cap completely as the small ball located inside may fall out and be lost!

Important: When venting air from the boiler, do not touch the schraeder valve on each of the expansion vessels – these are **NOT** air vents.

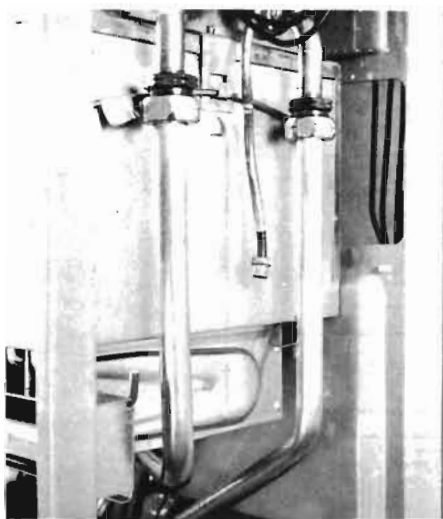


Fig. 19

8.3.5 It is recommended that the cap on the automatic air vent outlet, on the pump, is left unscrewed for at least 2–3 days, to ensure that any air in the system is purged out.

8.4 Domestic hot water system – SD223C and SD235C only

8.4.1 To fill the domestic hot water circuit in the appliance:

Open the isolating valve in the cold main inlet connection.

Open a hot water tap, connected to the boiler, and draw off water.

Shut the hot water tap.

8.4.2 Using the isolating valve in the cold main inlet connection, adjust the flow of cold water through the boiler to give 11 litres per minute with the **SD223C**, and 16.5 litres per minute with the **SD235C** (refer to Fig. 20).

N.B. The tap at which this measurement is made should be fully open.



Fig. 20

With the boiler running, check that the temperature rise of the water, at the above flow, is 30°C.

8.4.3 Finally, adjust the water flow, as before, to give hot water to the customer's requirements.

8.4.4 Thoroughly check all domestic hot water pipework for leaks.

8.4.5 Due to the design of the heat exchanger, i.e. the domestic hot water coil is situated *inside* the central heating heat

exchanger, *water must be present in the central heating circuit* for the boiler to produce domestic hot water.

8.4.6 The boiler can be used to provide domestic hot water only (i.e. if, say, the heating system is to be installed or connected at a later date) as follows:

Connect the central heating flow and return connections together, incorporating a 'valved tee' as filling point in this connecting pipe.

Fill and vent the heating circuit of the boiler – as per the instructions given in 8.3.

Set the summer/winter selector lever to the left hand (summer) position.

8.5 Starting the boiler

Caution: The first firing of the boiler should be carried out by a qualified installer/gas service engineer only.

He should also give clear verbal instructions to the user on how to operate the boiler, and its associated system controls.

8.5.1 Before starting the boiler, rotate the pump impeller to ensure it is not stuck:

Unscrew black cap on front of pump. Place a screwdriver in slot of spindle. Push in spindle and rotate pump impeller 3–4 times to ensure free rotation. Replace black cap.

8.5.2 Start the boiler using the method described in the 'User Instructions' supplied with the boiler.

8.6 Gas soundness

Important: With the boiler running, test for gas soundness around *all* boiler gas components – using sense of smell and leak detection fluid (or soapy water).

8.7 Flue

Check that there is no spillage of combustion products from the boiler draught diverter by conducting a spillage test in accordance with BS 5440: Part 1 – checking if there is any type of extract fan fitted in the room containing the appliance.

8.8 Burner gas pressure

8.8.1 The gas valve, incorporated in the boiler, is factory set and requires no adjustment during commissioning.

8.8.2 The main burner pressure should be checked during commissioning to ensure that full boiler output is obtained: Shut down the boiler by pressing the red button on front of the boiler.

Remove screw from test point on the main burner (refer to Fig. 21).



Fig. 21

Connect U-tube pressure gauge to test point using rubber tube.
Set summer/winter switch to right hand (winter) position.

Check that aquastat knob is set to maximum, i.e. turned fully clockwise.

Check that all external heating controls are 'calling' for heat, i.e. room thermostats and timeswitches.

Start the boiler (as per the 'User Instructions').

Check that the reading on the U-tube pressure gauge matches that given in 4.2 for the type of gas being used.

Move summer/winter lever to left hand (summer) position, remove rubber tube and replace screw in test point.

Re-set lever to winter position and check test point for gas soundness with boiler operating.

N.B. If measured burner pressure differs significantly from the specified figure check the gas inlet pressure to the boiler – see 8.9.

8.8.3 The central heating output of the boiler can be adjusted by the installer, if required, as follows:

Connect U-tube pressure gauge to test point on main burner supply pipe (as per 8.2).

Un-wind seal and wire from small plastic slide on side of aquastat housing (refer to Fig. 22), and remove slide.

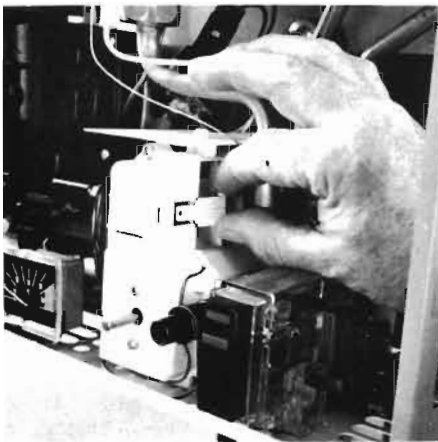


Fig. 22

Using a screwdriver, rotate the black potentiometer knob inside the aquastat housing (refer to Fig. 23) anti-clockwise as far as possible – approximately three-quarters of a turn.

Set aquastat knob to maximum.

Check that all external controls are 'calling' for heat.

Start the boiler (as per the 'User Instructions').

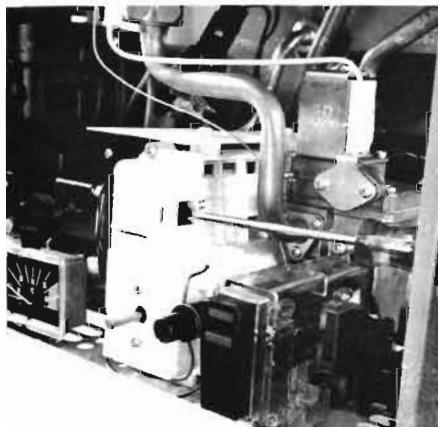


Fig. 23

Slowly rotate aquastat control anti-clockwise until *first* click is heard – then turn aquastat back to maximum.

With the boiler operating, slowly rotate the black potentiometer knob clockwise until the burner gas pressure on the U-tube gauge corresponds to the required central heating output (see 4.3).

Move summer/winter lever to summer position, remove rubber tube and replace screw in test point.

Re-set lever to winter position and check test point for gas soundness with boiler operating.

Replace plastic slide into aquastat housing and re-fit wire and seal.

N.B. This adjustment does not affect the heat output for the domestic hot water.

8.9 Inlet gas pressure

To check the gas inlet pressure (gas flow pressure) to the boiler.

Shut down the boiler by pressing red button on front of boiler.

Remove screw from test point on inlet to gas valve at rear of boiler (refer to Fig. 16).

Connect U-tube pressure gauge to test point using rubber tube.

Start the boiler (as per the 'User Instructions').

Check that the reading on the U-tube pressure gauge matches that given in 4.2 for the type of gas being used.

Shut down boiler, remove rubber tube and replace screw in test point.

Re-start boiler and check test point for gas soundness.

N.B. If inlet gas pressure is below that specified the gas supply pipework/meter must be checked, and the condition rectified.

In the case of an LPG installation check the storage tank (or cylinder), regulator and pipework.

8.10 Boiler/system controls

8.10.1 After operating the boiler briefly on heating to bring it up to temperature, check the operation of the boiler aquastat, with the summer/winter selector in the winter position, and with external controls 'calling' for heat.

Turn aquastat control knob fully anti-clockwise: the burner should go out.

Slowly turn the aquastat knob clockwise; the burner should first light and run on low flame.

Continue turning the knob until the burner fires on high flame.

8.10.2 With the summer/winter switch in the winter position, and the aquastat set to maximum (full clockwise), manually operate the room thermostat and/or the time-switch to check that they switch the burner off and on when required.

8.10.3 Check the operation of the flame failure thermocouple, to ensure that it will shut off the gas to the boiler within 60 seconds.

8.10.4 Finally, set all central heating controls to the customer's requirements.

8.11 Draining of system or boiler

8.11.1 Draining the heating circuit

Open the drain tap situated at the lowest point of the system.

Finish draining by removing drain screw from the central heating flow connection on the connecting plate.

8.11.2 Draining the hot water circuit (SD223C and SD235C)

Shut off water at stop cock.

Open one, or more, hot water taps.

Finish draining by removing small expansion vessel connection (or drain screw) fitted to cold water inlet connection on connecting plate.

8.11.3 Draining the boiler – heating

Close isolating valves in the flow and return connections on connecting plate.

Lift spindle of pressure relief valve to drain boiler.

Finish draining by removing drain screw from central heating flow connection on connecting plate.

8.11.4 Draining the boiler – hot water (SD223C and SD235C)

Close isolating valve on cold water inlet.

Open one, or more, hot water taps.

Finish draining by removing small expansion vessel connection (or drain screw) fitted to cold water inlet connection on connecting plate.

Important. Shut down boiler by depressing stop button *before* commencing any draining operation.

9 FAULT FINDING

9.1 Pilot does not light

Check that sparking occurs at the electrode.

If not, check position of thermocouple in relation to electrode. Spark should jump between electrode and pilot *not* to thermocouple.

Check that gas cock at meter is open.

Air may be present in piping; purge via test point on gas valve.

If no gas present at test point; disconnect boiler from jig and check that inlet valve operating pin is correctly positioned (refer to **6.7.6**).

9.2 Pilot will not remain alight

Check position of thermocouple in relation to pilot flame.

Check that thermocouple is tightly connected to the solenoid; and that the solenoid is fully screwed into the gas valve assembly.

Check that the screw holding the stop/start push button box to front of gas valve is tight.

Check the connections to overheat protection (klixon) device if fitted.

N.B. The pilot flame should burn steadily in a V shape with two sharp points. Each leg of the V should be approx. ½in long. If the flame has a 'limp' or rounded appearance then the pilot burner tube is dirty. Remove it by pushing the spring clip aside, and blow through the pipe to clear it. Refit pipe to boiler.

9.3 Pilot flame alight – but boiler will not start

Check power supply to the boiler; ensure that both rubber plugs are correctly fitted to the electrical connection box (refer to **7.3.8**).

If burner lights up and then goes out; check that the pump is free to rotate (refer to **8.5.1**).

Also, check that central heating flow and return valves (on connecting plate) are open.

9.4 Hot water is O.K. – but no central heating

Check that summer/winter selector switch is set to WINTER (right hand) position.

Check that room thermostat (if fitted) has not been set too low.

Check that timeswitch (if fitted) is not in an OFF position.

Check that boiler thermostat (Aquastat) has not been set too low.

Check that right hand rubber plug is correctly fitted to the electrical connection box (refer to **7.3.8**).

Check that room thermostat and/or timeswitch is correctly connected to the boiler (refer to **7.4**).

9.5 Central heating is O.K. – but no hot water

Check that valve on cold water inlet to boiler is not closed; set valve to give required flow (refer to **8.4.2**).

Check that at least 3 litres/min (5.5 pints/min) of water is being drawn off at the tap.

Check that the supply water pressure is sufficient (refer to **4.4.4**).

9.6 Hot water not hot enough

Check that water flow at tap is not too much.

Check that temperature rise is 30°C at the flowrate specified in **4.4.2**. If it is, then boiler is operating correctly.

Check the burner gas pressure when maximum flow is being drawn at tap – compare value obtained with that specified in **4.2**.

If burner pressure is low; check inlet pressure to the boiler *when* maximum flow is being drawn at tap – compare the value obtained with that specified in **4.2** (refer to **8.9**).

More detailed fault finding information is available on request, from Saunier Duval Limited.

10 SPARE PARTS

10.1 General

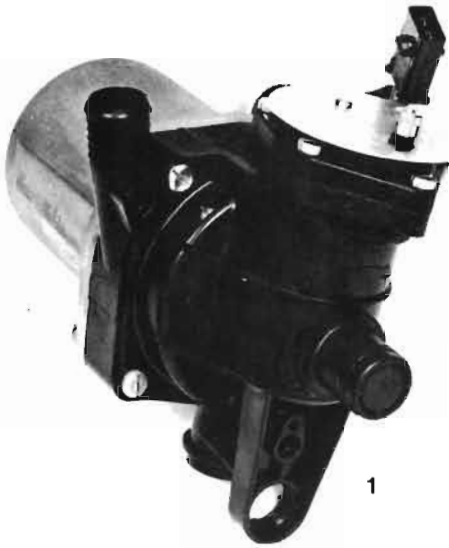
10.1.1 The following is a 'short' parts list covering the more commonly used components.

10.1.2 Use the item key number to identify each part shown in Fig. 24.

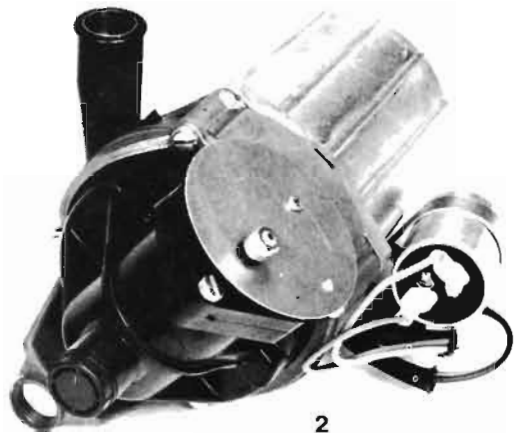
10.1.3 When ordering spare parts, please quote the part number and description – stating the full model number (from the data badge).

10.2 Short parts list

No.	Description	Part No.	No.	Description	Part No.
1	Pump – SD223C / SD123C	52365	11	High limit thermistor	52332
2	Pump – SD235C / SD135C	52467	12	Pressure/temperature gauge	52342
3	Thermocouple	52159	13	Microswitch assembly	52338
4	Thermocouple with interruptor	52664	14	Jig/boiler washer/filter kit	52128
5	Thermocouple solenoid	52798	15	Hoses – SD235C / SD135C pump (pack of 5)	54251
6	Printed circuit board	52671	16	Hoses – reversing valve/pump/heat exchanger (pack of 5)	5459 ^r
7	Aquastat	52916	17	Hose clips (pack of 10)	5425
8	Piezo	52920	18	Gas washer kit (not shown)	7507
9	Water valve – diaphragm kit	52519	19	Water washer kit (not shown)	7506
10	Domestic hot water thermistor	52908			



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These instructions are accurate at the date of printing but due to a continuous policy of product improvement they may be superseded and should be disregarded if specification and/or appearances change.