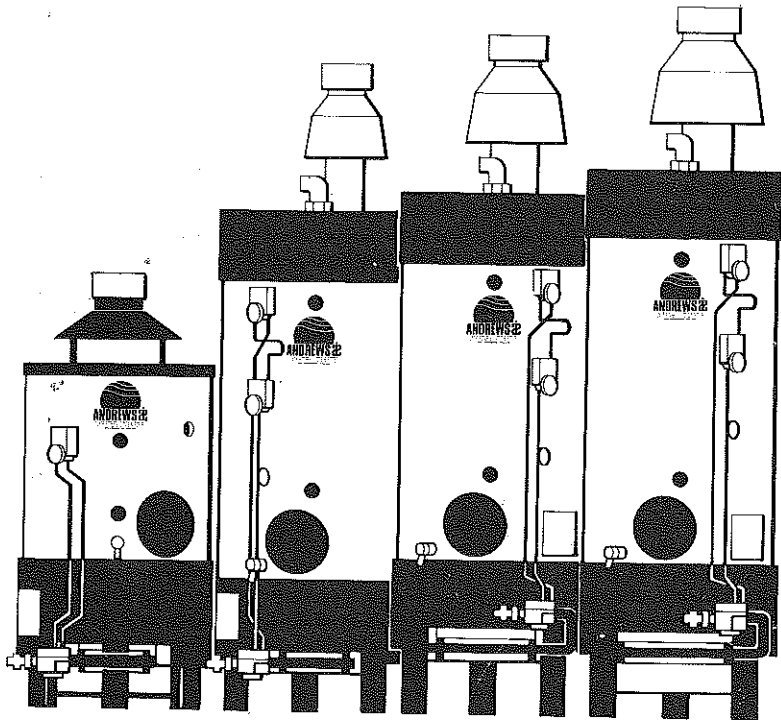


ANDREWS & SIKES® WATER HEATER

Natural Gas Fired
Water Storage Heaters
Hi-Flo Range

Models 29/120, 69/179
63/321 & 55/435

'E' Series



Installation, Operation
and Servicing Manual

Part No. 30 19 500

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Introduction

The Andrews Storage Water Heaters are tested and certified by British Gas plc for use with natural gas only in open-vented commercial water heating systems and have not been tested for domestic use. The optional flue damper kit has not been tested by British Gas plc. British Gas Certification does not cover any form of time control, including controls that reduce the thermostat setting at set times.

The Andrews Water Heater has been designed and built to give efficient and reliable service. Like any other piece of mechanical equipment, however, the Heater will only operate at maximum efficiency if the correct installation and servicing procedures are followed.

The purpose of this manual is to provide up to date information necessary to the user for installing, operating and servicing the Heater, together with technical data and spare parts list.

IT IS THE LAW THAT THE INSTALLATION BE CARRIED OUT BY A COMPETENT PERSON.

THE HEATER SHOULD BE INSTALLED IN ACCORDANCE WITH THE BRITISH STANDARDS AND CODES OF PRACTICE REFERRED TO IN THIS MANUAL, THE GAS SAFETY (INSTALLATION & USE) REGULATIONS 1984, BUILDING REGULATIONS, MODEL WATER BYE-LAWS AND ANY REQUIREMENTS OF THE LOCAL GAS UNDERTAKINGS, LOCAL AUTHORITY, WATER AND FIRE AUTHORITIES.

This water heater is for use with NATURAL GAS only.

Health and Safety at Work Act, 1974

Under Section 6 of the above Act, it is the duty of manufacturers and suppliers of products for use at work to ensure, so far as it is reasonably practicable, that such products are safe and without risk to health when properly used and to make available to users of such products adequate information about their safe and proper operation.

Andrews Heaters should only be used in the manner and purpose for which they were intended, and in accordance with the recommendations detailed in this Manual. Our Heaters have been designed, produced and inspected with safety in mind, but there are certain basic precautions, which should be taken by the user and, in particular attention is drawn to the safety precautions in this Manual and to the Operating Instructions on the heater.

It is imperative, therefore, that all persons who may make use of our Heaters have all the information and instruction they require to ensure that they are fully aware of any hazards, and that they know both the purpose and the correct manner of use of our Heaters.

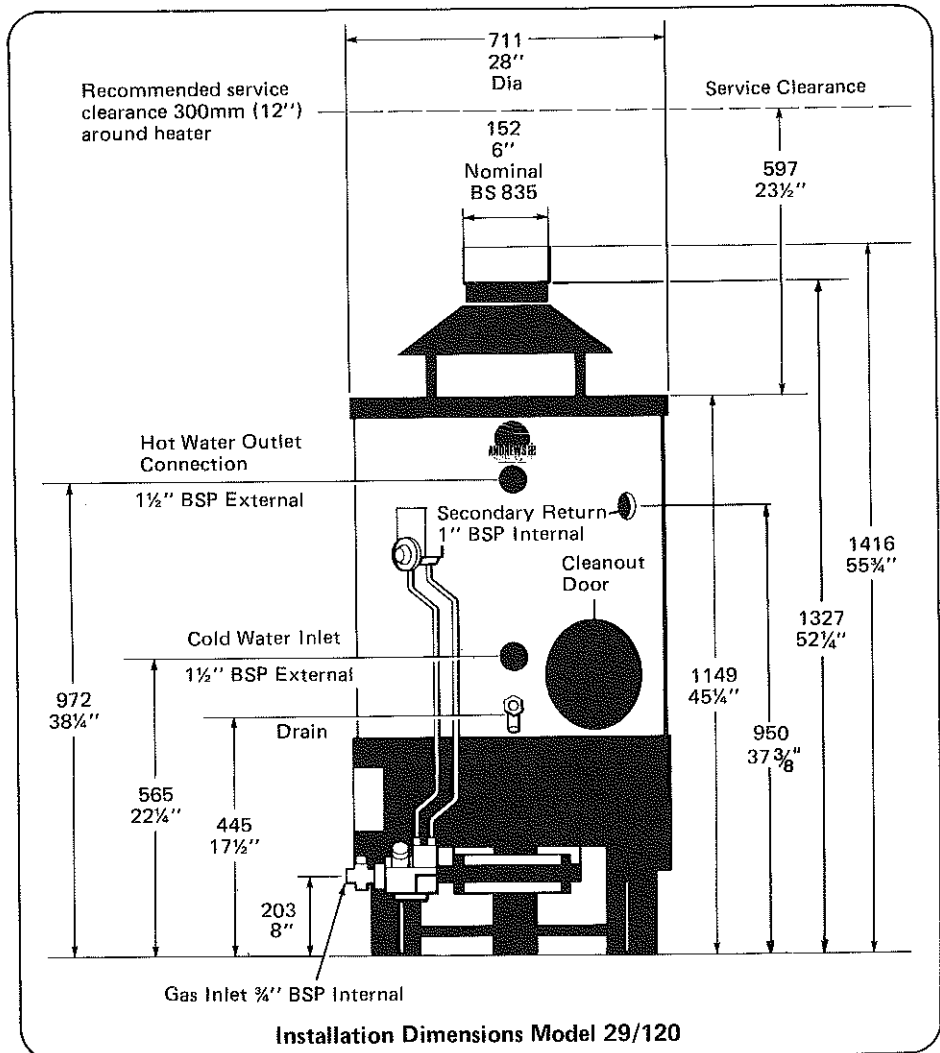
The Andrews storage water heater is supplied for use on an open vented system. When required for use with an unvented system the water heater is supplied by Andrews Industrial Equipment with an Unvented System Kit.

It is important that in the design of the installation the water heaters are not undersized.

The Andrews Hi-Flo Water Heaters are gas fired natural draught water heaters. The heat inputs range from 37.5 kW (128,000 Btu/hr) to 136.0 kW (464,000 Btu/hr).

The heater is floor mounted and intended for supplying hot water in commercial or industrial premises and is fitted with an atmospheric burner. The heater is supplied with a loose draught diverter which is fitted as detailed in the installation instructions. An individual open flue system or, in multi-heater installations, a common flue system may be fitted.

Technical Data



Technical Data

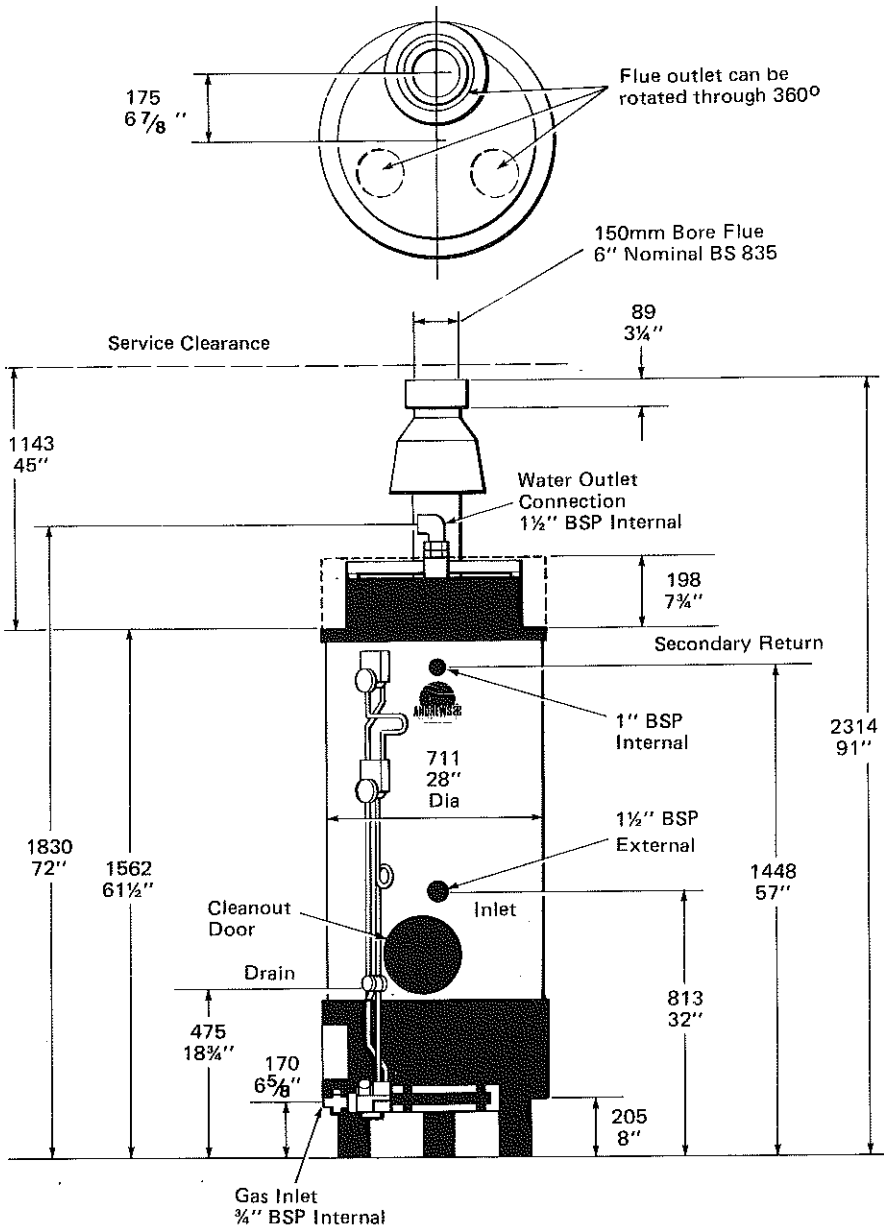
Andrews Model No. Gas Council No.	29/120 5503612	
	S I Metric	Imperial
Storage Capacity	133.5 litres	29.4 gallons
Recovery Rate vol/hr thru 44.4°C (80°F)	545.5 litres	120.0 gallons
Flue Size (BS 835 nominal)	150 mm	6"
Heat Input	37.5 kW	128.000 Btu/hr
Gas Rate	0.058 m ³ /min	2.06 ft ³ /min
Flow Connection	R 1½	1½" BSP T/Ext
Inlet Connection	R 1½	1½" BSP T/Ext
Minimum Cold Feed Size	19 mm	¾"
Return Connection	Rp 1	1" BSP P/Int
Minimum Open Vent Size	25 mm	1"
Weight Empty	144.2 kg	318 lbs
Weight Full	277.6 kg	612 lbs
Hydraulic Working (max) Pressure	3.5 bar (36 m)	51.5 psi (119 ft)
Hydraulic Working (min) Pressure	1.5 m	5 ft
Safety Valve Size (min)	∅ 19 mm (284mm ²)	∅ ¾" (0.442in ²)
Safety Valve Max Specified Rating	4.2 bar	61 lbs in (140 ft)
Gas Family	Natural	
Burner Pressure	9.5 mbar	3.81 in Wg
Gas Connection	Rp¾	¾" BSP Int
Injector Size (Quantity x Size)	3 x 2.92 mm ∅	3 x No. 33
Natural Ventilation (High/Low)	270cm ² /540 cm ²	41.85in ² /83.70in ²
Shipping Weight	157.8 kg	348 lbs
Shipping Crate Size (H x W x D)	1346 x 726 x 914mm	53 x 28½ x 36 in
Fittings Carton Weight	4 kg	9 lbs
Fittings Carton Size (H x W x D)	203 x 559 x 559mm	8 x 22 x 22 in
Divertor Carton Weight	Fittings Carton Includes	
Divertor Carton Size (H x W x D)	Draught Diverter	

Sizes quoted are based on single unit installations only. See Section 1 for further details.

Maximum gas control test pressure 35 mbar (14 in Wg)

THE SAFETY VALVE IS NOT SUPPLIED.

Technical Data



Installation Dimensions Model 69/179

Technical Data

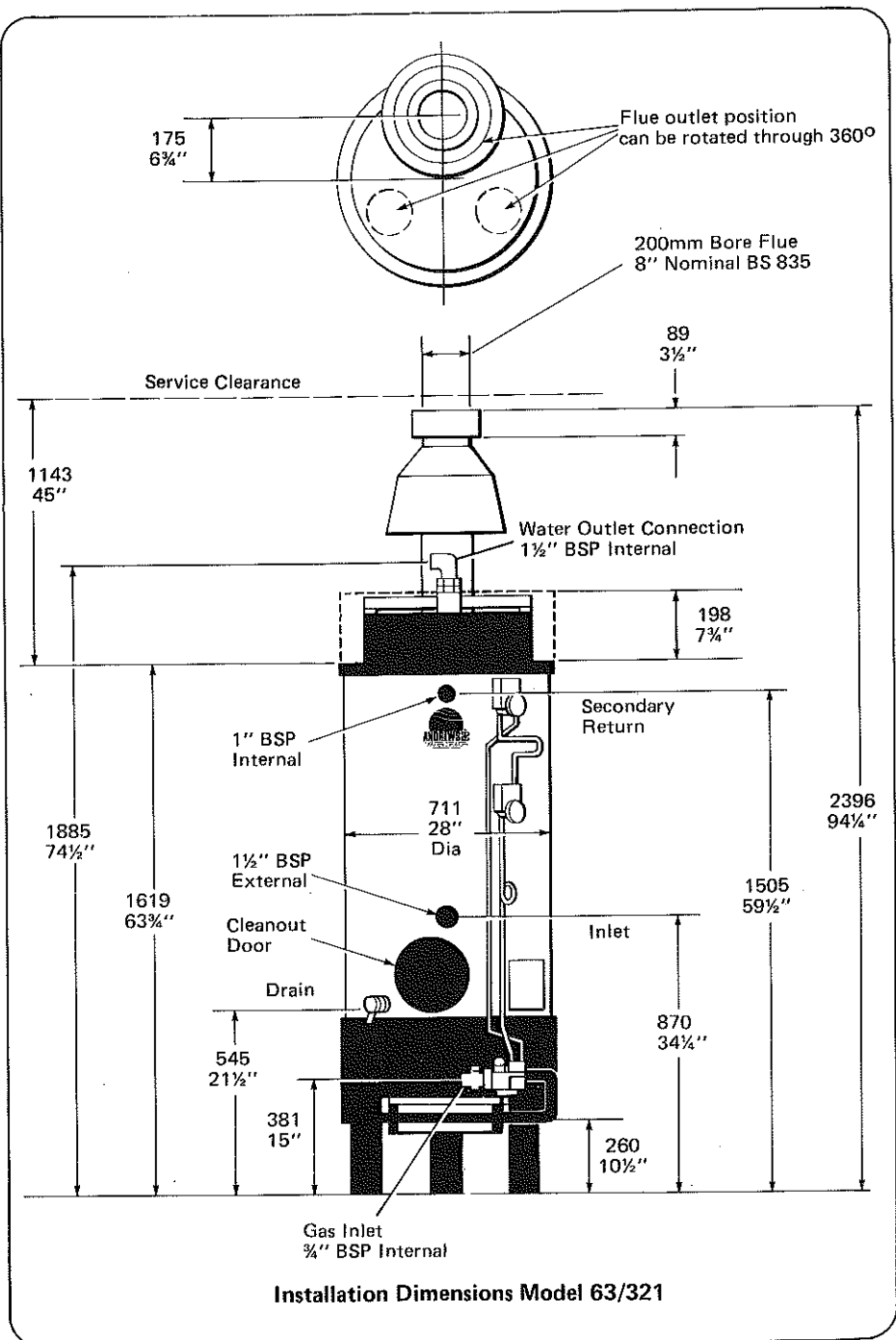
Andrews Model No. Gas Council No.	69/179 5503606	
	SI Metric	Imperial
Storage Capacity	312.8 litres	68.8 gallons
Recovery Rate vol/hr thru 44.4°C (80°F)	812.3 litres	178.7 gallons
Flue Size (BS 835 nominal)	150 mm	6"
Heat Input	57.4 kW	195,800 Btu/hr
Gas Rate	0.090 m ³ /min	3.15 ft ³ /min
Flow Connection	Rp 1½	1½" BSP P/Int
Inlet Connection	R 1½	1½" BSP T/Ext
Minimum Cold Feed Size	19 mm	¾"
Return Connection	Rp 1	1" BSP P/Int
Minimum Open Vent Size	25 mm	1"
Weight Empty	189 kg	417 lbs
Weight Full	502 kg	1105 lbs
Hydraulic Working (max) Pressure	3.5 bar (36 m)	51.5 psi (119 ft)
Hydraulic Working (min) Pressure	1.5 m	5 ft
Safety Valve Size (min)	∅ 19 mm (284mm ²)	∅ ¾" (0.442in ²)
Safety Valve Max Specified Rating	4.2 bar	61 lbs in (140 ft)
Gas Family	Natural	
Burner Pressure	11.2 mbar	4.5 in Wg
Gas Connection	Rp¾	¾" BSP Int
Injector Size (Quantity x Size).	4 x 3mm ∅	4 x No. 31
Natural Ventilation (High/Low)	270cm ² /540 cm ²	41.85in ² /83.70in ²
Shipping Weight	212 kg	468 lbs
Shipping Crate Size (H x W x D)	1765 x 765 x 914mm	69½ x 30½ x 36 in
Fittings Carton Weight	15 kg	33 lbs
Fittings Carton Size (H x W x D)	220 x 610 x 610mm	8¾ x 24 x 24 in
Divertor Carton Weight	5 kg	11 lbs
Divertor Carton Size (H x W x D)	560 x 385 x 385mm	22 x 15¼ x 15¼ in

Sizes quoted are based on single unit installations only. See Section 1 for further details.

Maximum gas control test pressure 35 mbar (14 in Wg)

THE SAFETY VALVE IS NOT SUPPLIED.

Technical Data



Installation Dimensions Model 63/321

Technical Data

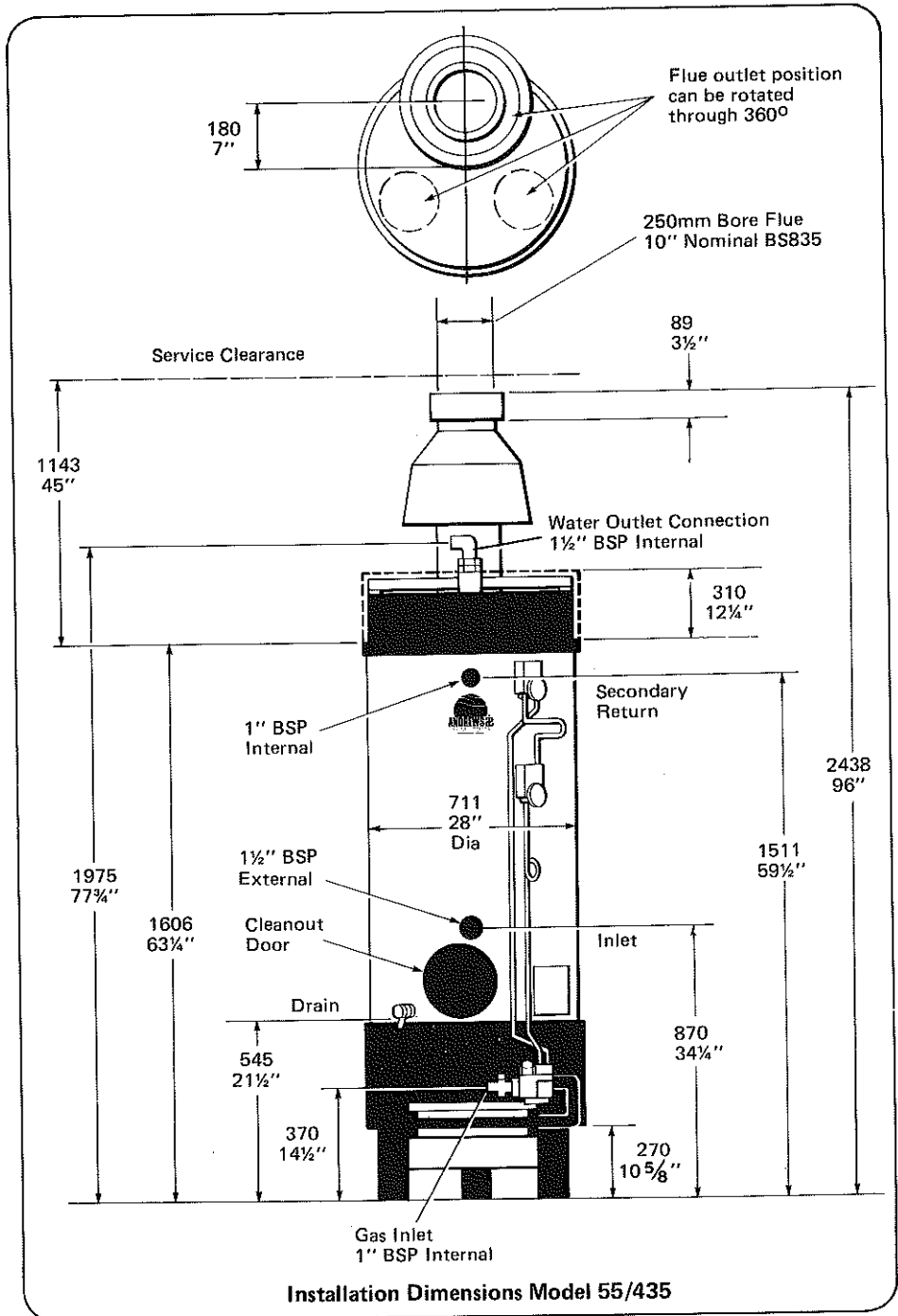
Andrews Model No. Gas Council No.	63/321 5503607	
	S I Metric	Imperial
Storage Capacity	286.4 litres	63.0 gallons
Recovery Rate vol/hr thru 44.4°C (80°F)	1451.4 litre/hr	320.6 gal/hr
Flue Size (BS 835 nominal)	200 mm	8"
Heat Input	104.8 kW	357,830 Btu/hr
Gas Rate	0.160 m ³ /min	5.65 ft ³ /min
Flow Connection	Rp 1½	1½" BSP P/Int
Inlet Connection	R 1½	1½" BSP T/Ext
Minimum Cold Feed Size	25 mm	1"
Return Connection	Rp 1	1" BSP P/Int
Minimum Open Vent Size	32 mm	1¼"
Weight Empty	213 kg	470 lbs
Weight Full	500 kg	1100 lbs
Hydraulic Working (max) Pressure	3.5 bar (36 m)	51.5 psi (119 ft)
Hydraulic Working (min) Pressure	1.5 m	5 ft
Safety Valve Size (min)	Ø 19 mm (284mm ²)	Ø ¾" (0.442in ²)
Safety Valve Max Specified Rating	4.2 bar	61 lbs in (140 ft)
Gas Family	Natural	
Burner Pressure	13.1 mbar	5.25 in Wg
Gas Connection	Rp¾	¾" BSP Int
Injector Size (Quantity x Size)	7 x 3mm Ø	7 x No. 31
Natural Ventilation (High/Low)	371cm ² /742 cm ²	57.5in ² /115 in ²
Shipping Weight	218 kg	548 lbs
Shipping Crate Size (H x W x D)	1816 x 768 x 914mm	71½ x 30½ x 36 in
Fittings Carton Weight	15 kg	33 lbs
Fittings Carton Size (H x W x D)	220 x 610 x 610mm	8¾ x 24 x 24 in
Divertor Carton Weight	6 kg	13 lbs
Divertor Carton Size (H x W x D)	580 x 485 x 485mm	23 x 17½ x 17½ in

Sizes quoted are based on single unit installations only. See Section 1 for further details.

Maximum gas control test pressure 35 mbar (14 in Wg)

THE SAFETY VALVE IS NOT SUPPLIED.

Technical Data



Andrews Model No. Gas Council No.	55/435 5503611	
	SI Metric	Imperial
Storage Capacity	248.0 litres	54.6 gallons
Recovery Rate vol/hr thru 44.4°C (80°F)	1977.5 litre/hr	435.0 gal/hr
Flue Size (BS 835 nominal)	250 mm	10"
Heat Input	136.0 kW	464,000 Btu/hr
Gas Rate	0.210 m ³ /min	7.46 ft ³ /min
Flow Connection	Rp 1½	1½" BSP P/Int
Inlet Connection	R 1½	1½" BSP T/Ext
Minimum Cold Feed Size	25 mm	1"
Return Connection	R1	1" BSP P/Int
Minimum Open Vent Size	32 mm	1¼"
Weight Empty	310 kg	684 lbs
Weight Full	558 kg	1230 lbs
Hydraulic Working (max) Pressure	3.5 bar (36 m)	51.5 psi (119 ft)
Hydraulic Working (min) Pressure	1.5 m	5 ft
Safety Valve Size (min)	∅ 19 mm (284mm ²)	∅ ¾" (0.442in ²)
Safety Valve Max Specified Rating	4.2 bar	61 lbs in (140 ft)
Gas Family	Natural	
Burner Pressure	10.3 mbar	4.4 in Wg
Gas Connection	Rp 1	1" BSP Int
Injector Size (Quantity x Size)	9 x 3.25 mm ∅	9 x No. 30
Natural Ventilation (High/Low)	441 cm ² /882 cm ²	68.60in ² /136.7in ²
Shipping Weight	333 kg	734 lbs
Shipping Crate Size (H x W x D)	1816 x 768 x 914mm	71½ x 30½ x 36 in
Fittings Carton Weight	26 kg	57 lbs
Fittings Carton Size (H x W x D)	445 x 730 x 730mm	17½ x 28¾ x 28¾ in
Divertor Carton Weight	Fitting Carton Includes Draught Diverter	
Divertor Carton Size (H x W x D)		

Sizes quoted are based on single unit installations only. See Section 1 for further details.

Maximum gas control test pressure 35 mbar (14 in Wg)

THE SAFETY VALVE IS NOT SUPPLIED.

IT IS THE LAW THAT THE INSTALLATION MUST BE CARRIED OUT BY A COMPETENT PERSON.

Install in accordance with Gas Safety (Installation and Use) Regulations 1984, Building Regulations, Model Water Bye-Laws and any requirements of the Local Gas undertaking, Local Authority, Water and Fire Authorities and current British Standards and Codes of Practice:-

- IM/2 : Purging procedures for non-domestic gas installations.
- IM/5 : Soundness testing procedures for industrial and commercial gas installations.
- IM/11 : Flues for commercial and industrial gas fired boilers and air heaters.
- IM/16 : Notes on installations of gas pipework (excluding 25mm and below).
- BS 6644 : Installation of gas fired hot water boilers over 60 kW.
- CP 342 Pt 2 : Centralised Hot Water Supply, other than individual dwellings.
- BS 6891 : Installation of low pressure gas pipework up to 28mm.

The water heaters 69/179, 63/321 and 55/435 are supplied as three units, whilst the heater 29/120 is supplied as two, i.e.

a) all units, the crated water heater complete with burner and controls.

b) units 69/179, 63/321 and 55/435, the large carton contains:-

- 1 - Flue collector hood.
- 1 - Flue collector hood seal.
- 1 - Flue collector hood clamp.
- 1 - Flue collector hood guard, comprises:-
 - 1) guard top
 - 2) guard skirt
 - 3) 6 off M4 pozi driv screws.
- 1 - Non-asbestos gasket.
- 2 - Large steel washers.
- 1 - Hot outlet connector 1½" NPT/1½" BSP.
- 1 - Cold inlet connector 1½" NPT/1½" BSP.
- 2 - Clamp nuts.
- 1 - 1½" BSP elbow.
- 1 - 1½" BSP backing nut.
- 1 - Coupler socket ¾" BSP
- 1 - Barrel nipple ¾" NPT/¾" BSP
- 1 - Gas cock.
- 1 - Drain cock.
- 1 - Hot outlet insulating muff.

c) units 69/179, 63/321 and 55/435, the small carton contains:-

- 1 - Draught diverter.
- 1 - Installation and service manual.
- 1 - Users instructions leaflet.
- 1 - Warranty card.

- d) unit 29/120, the small carton contains:-
- 1 - Installation and service manual.
 - 1 - Users instructions leaflet.
 - 1 - Warranty card.
 - 1 - Hot outlet connector 1½" NPT/1½" BSP.
 - 1 - Cold inlet connector 1½" NPT/1½" BSP.
 - 1 - Coupler socket ¾" BSP.
 - 1 - Barrel nipple ¾" NPT/¾" BSP.
 - 1 - Gas cock.
 - 1 - Drain cock.
 - 1 - Flue adaptor socket.

NOTES:

Cold inlet connectors and drain cock connectors are marked 'N' at one end, this thread must be used at the tank tapping.

The lugs welded to the top of the pressure vessel are fitted solely for use during manufacture and must not be used to move the heater.

A. Assembly Instructions

Models 69/179, 63/321 and 55/435 (See Figs. 1 & 2)

Fit the flue collector hood to the water heater as shown in the sketch overleaf, using the method described.

- Screw the outlet tubular (1) into the tapping on top of the heater using a suitable jointing compound, NB! short thread into heater tapping. Discard the transit tubular already fitted to the unit.
- Place the insulating muff (2) over the tubular, so that it rests on the heater tank top.
- Screw the clamp nut (3) onto the tubular and down the thread until it is 12mm (½") from the muff. Add on top of the clamp nut the first steel washer (5) and the non-asbestos gasket (6).
- Fit flue collector hood seal (7) around the inside of the top casing spigot.
- Slide the flue collector hood (8) over the tubular and onto its bottom seal. The collector hood can be rotated through 360°, select the most convenient position for connection to the flue.
- Fit the flue collector hood clamp (9) over the tubular, followed by the top of the flue hood guard (10), orientate the guard to align the cut-out for the flue centrally over the collector hood spigot.
- Add the second steel washer (11) to the tubular, followed by the second clamp nut (4).
- Tighten (4) until the bottom seal is compressed to about half its normal thickness. Screw up the internal clamp nut (3) until it touches the inside of the collector hood.
Tighten the external clamp nut (4) a further quarter turn.
- Fit the guard skirt (12) using four screws provided, to the guard top. Secure the split joint of the guard skirt using two screws provided.

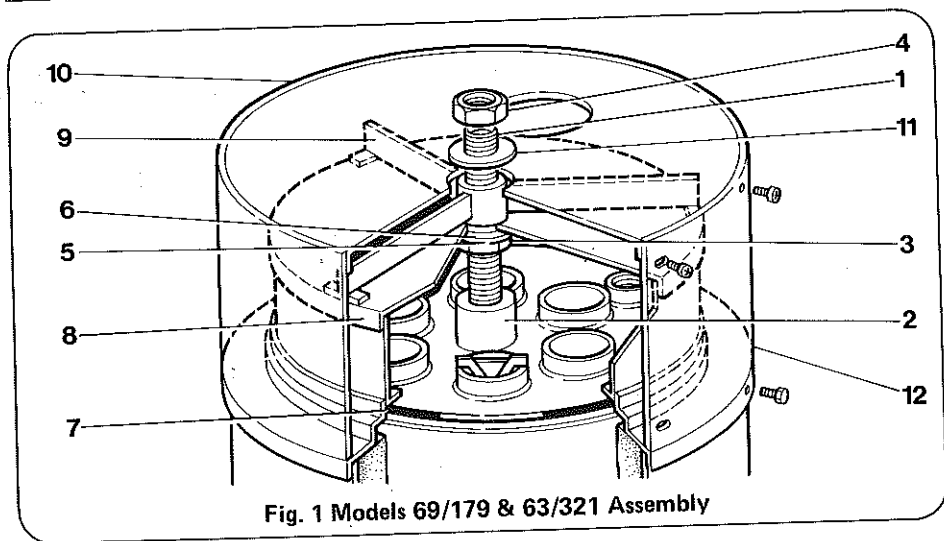


Fig. 1 Models 69/179 & 63/321 Assembly

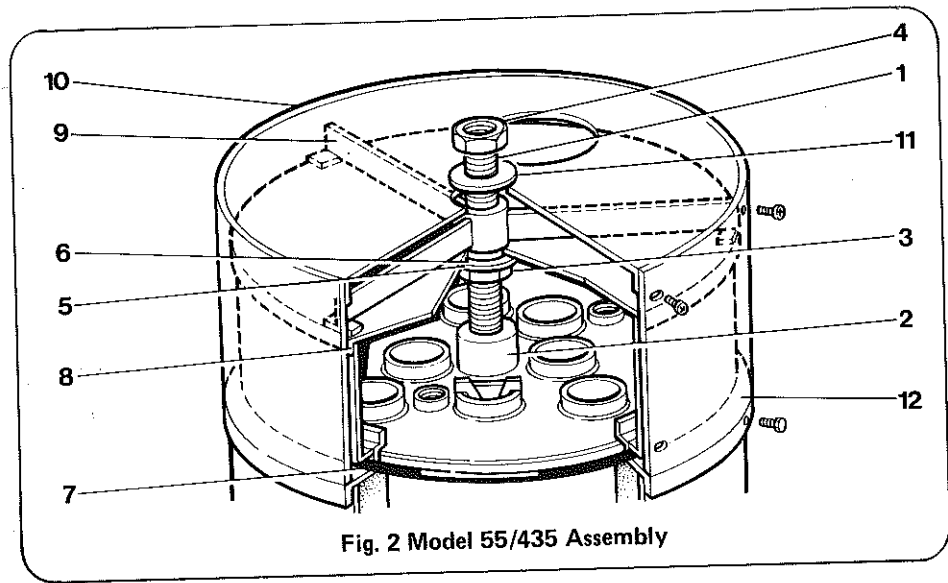


Fig. 2 Model 55/435 Assembly

Model 29/120

- Fit the draught diverter (1) to the water heater as shown in Fig. 3 using the screws provided.
- Fit the adaptor socket (2) and caulk into the draught diverter as shown in Fig. 3.

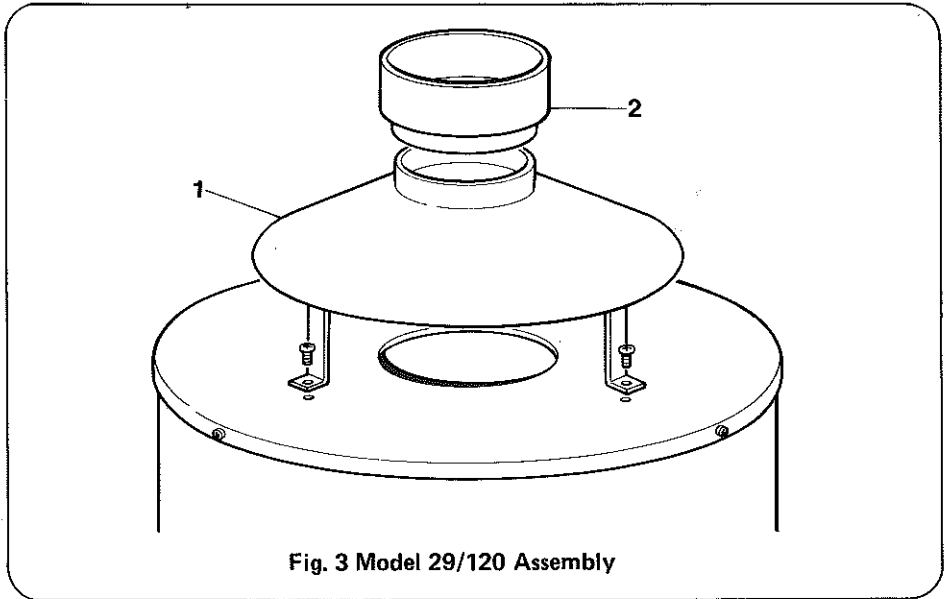


Fig. 3 Model 29/120 Assembly

B. Location

The location chosen for the heater must permit the provision of a satisfactory flue, adequate air supply and drain facilities. It shall be well lit. Preferably a purpose constructed room/compartment shall be prepared.

A manual valve for boiler room isolation shall be fitted in the gas supply. It shall be clearly identified and readily accessible for operation. If a purpose designed boiler room is not available, measures should be taken to protect the heater from damage and to prevent extraneous matter from storage on/around the heater. See BS 6644 Clauses 4, 5 and 6 for further details.

The heater must not be installed in a garage or any room which contains a bed, bath or shower. There must be easy access to the boiler room and heater at all times. A clearance of 800mm (31½") should be left at the front of the heater for removal of the burner and the service clearances of pages 2, 4, 6 & 8 as appropriate above the heater for removal of the anodes and the flue baffles. Clearances at the sides and rear of the heater should be at least 305mm (12").

The floor on which the heater is installed must be non-combustible, flat, level and of sufficient strength to withstand the weight of the heater filled with water and should satisfy the requirements of the Local Authority and Building Regulations.

C. Flue System

Detailed recommendations for flueing are given in BS 6644 and British Gas publication IM/11 "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters".

Fit the draught diverter (already screwed to the unit for model 29/120) as described in Assembly Instructions into the socket of the collector hood using an approved caulking compound. An approved flue of the following type can then be fitted to the socket top of the diverter.

The flue connection is designed for BS 835 type heavy duty flue, but light quality flue pipe, mild steel or stainless steel sheet may be used using the appropriate adaptor. Flue pipes etc shall be fitted socket-up to keep any condensate within the flue and appliance. Flues up to 200mm (8") diameter should be fitted with a suitable British Gas Certified terminal. Terminal position is most important and must be at least 1000mm (40") above roof surfaces or at least 600mm (24") above any parapet and clear of any adjacent obstruction as well as being away from any openable windows, ventilators or features which could allow re-entry of flue products into the building. Pressure areas should also be avoided to prevent blowdown. See recommendations in BS 6644. BS5440 Part 1 also provides useful additional advice.

Flue materials, including jointing materials and fittings shall be asbestos free, robust, durable, corrosion resistant and non-combustible and shall comply to BS 5854 and BS 715 or BS 4076 as appropriate, as well as being of a type accepted by the local gas region.

When passing up through or adjacent to combustible materials, measures shall be taken to prevent the temperature of the combustible material from exceeding 65°C (150°F). The flue shall not be closer than 50mm (2") to any combustible material except when passing through, when it must be enclosed by a non-combustible sleeve and separated from the sleeve by not less than 25mm (1") air space.

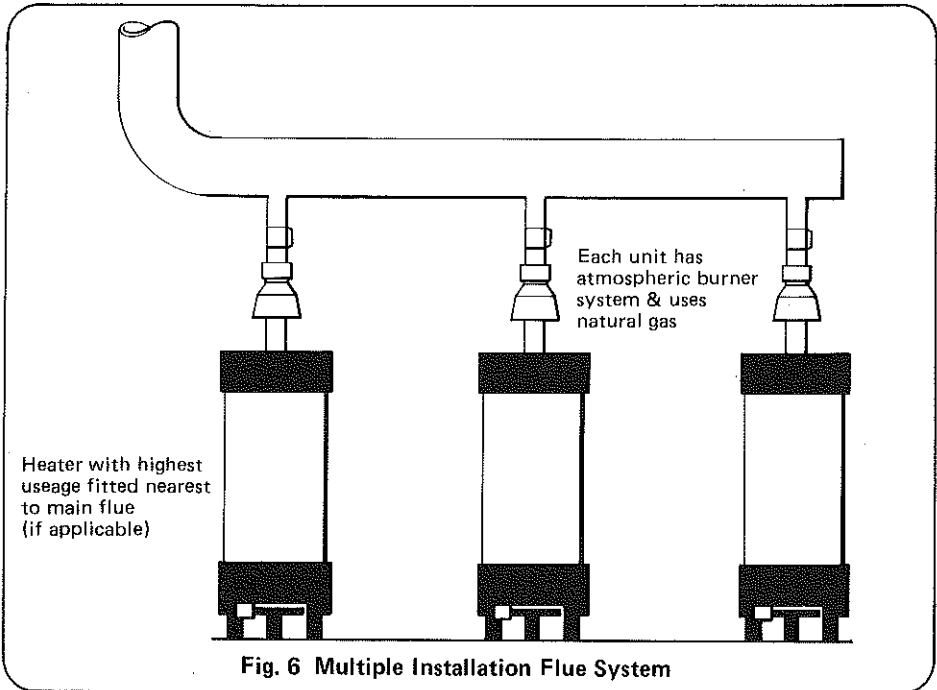
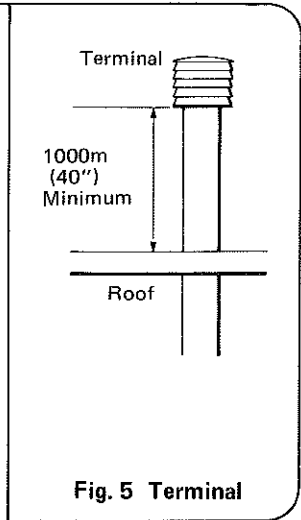
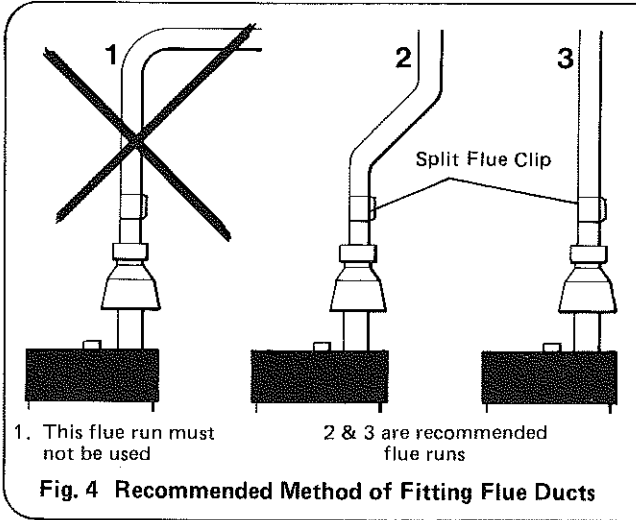
Flues shall be of a size not less than that specified in the Technical Data Tables (ie nominal flue size) and fitted so that there is no risk to persons in the building or from accidental damage.

If using an existing brick chimney it should be swept and checked for soundness before connecting the flue and should take the shortest possible route and rise continuously to the terminal avoiding the use of 90° bends where a change of direction is required. Horizontal and very shallow runs of flue should be avoided since they impede the flow of gases and increase local cooling, see Fig. 4.

Common flues may be used on multiple installations only if all the heaters are of the same burner system and fuel type and should be of a size to ensure complete evacuation of the flue products from the installation.

Where one is likely to be used more regularly or for longer periods than the others in the group, it should be connected at the point nearest to the main flue, see Fig. 6. See BS 6644 Clause 20 for further information and recommendations on this as well as general flue requirements.

Fit a split flue clip or flange joint close to the diverter so that it is secure but can be disconnected for servicing purposes. The weight of the flue must be borne by securing clips etc and not by the heater.



D. Air Supply and Ventilation

See Technical Data Tables (pages 3, 5, 7 & 9) for minimum free areas at high and low level, in addition to any other requirements. For multiple installations see table below for calculating requirements. Detailed recommendations for air supply and ventilation are given in BS 6644 Clause 19.

The following notes are intended to give general guidance.

Ventilation shall prevent the heater environment from exceeding 32°C (90°F).

The purpose provided space housing the heater(s) must have permanent air vents **communicating directly** with the outside air, at high and low level. Where communication with the outside air is possible only by means of high level air vents, ducting down to floor level for the lower vents should be used.

For an exposed building air vents should be fitted preferably on all four sides, but on at least two sides.

Air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked or flooded or in any position adjacent to an extraction system which is carrying flammable vapour.

Grilles or louvres should be so designed that high velocity air streams do not occur within the space housing the heater(s).

The grilles should have a total minimum free area for the water heater(s) in addition to any other requirements as follows:-

Low-Level (inlet)	540cm ² plus 4.5 cm ² per kilowatt in excess of 60 kW total rated input
High-Level (outlet)	270 cm ² plus 2.25 cm ² per kilowatt in excess of 60 kW total rated input

IMPORTANT:

1. The effective area requirements specified in the table are related to the maximum heat input of the heater(s) and are equivalent to those specified in BS 6644.
2. The free area of the grilles should not be less than the size of the recommended ventilation opening.
3. The supply of air to a space housing the heater(s) by mechanical means should be:-
 - (a) Mechanical inlet with natural extraction.
 - (b) Mechanical inlet with mechanical extraction.

NB!! Natural inlet with mechanical extraction must not be used.

Where a mechanical inlet and mechanical extraction system is used the design extraction rate must not exceed one third of the design inlet rate.

All mechanical ventilation systems must be fitted with automatic gas shut off safety systems which cut off the supply of gas to the heater(s) in the event of failure of either the inlet or extract fans.

The requirements for air supply by mechanical ventilation are given in BS 6644 Clause 19.3.

The permanent air vents shall be sited away from any extract fans. Where an extract fan is fitted, check for spillage at the draught diverter as set out in BS 5440 Part 1 Appendix B. It may be necessary to increase the ventilation area to compensate for the extractor fan.

4. Some halogen containing compounds can cause rapid corrosion of the Gas Burner, Thermocouple and Storage Vessel if drawn into the combustion air.

Therefore, if heaters are to be installed in any of the following locations or in any applications where the above compounds are present they should be sealed off from atmospheres which may contain these compounds, and all ventilation air must be taken completely from outside.

- (i) Hairdressing salons and adjoining rooms or basement.
- (ii) Establishments where dry-cleaning solutions are used.
- (iii) Industrial use near chemical de-greasing processes or where solvents are used or stored.
- (iv) Installations where refrigerant gases are used or stored.

E. Water Connections

Vented Systems (see Figs. 7 to 12), Refer to Water Bye Law 30

The water heater must be fed from a cold water feed cistern or static water tank.

A safety valve shall be fitted as specified in BS 6644 Clause 9 (see Technical Data Tables).

The safety valve shall be fitted either directly to an upper tank tapping or not further than 1 metre along the outlet flowpipe of size not less than the safety valve. There shall be no valve separating the heater from the safety valve. The size of the discharge pipe shall be not less than the nominal size of the safety valve outlet. It should be self draining and any water discharged shall be visible and create no hazard to persons in or about the building.

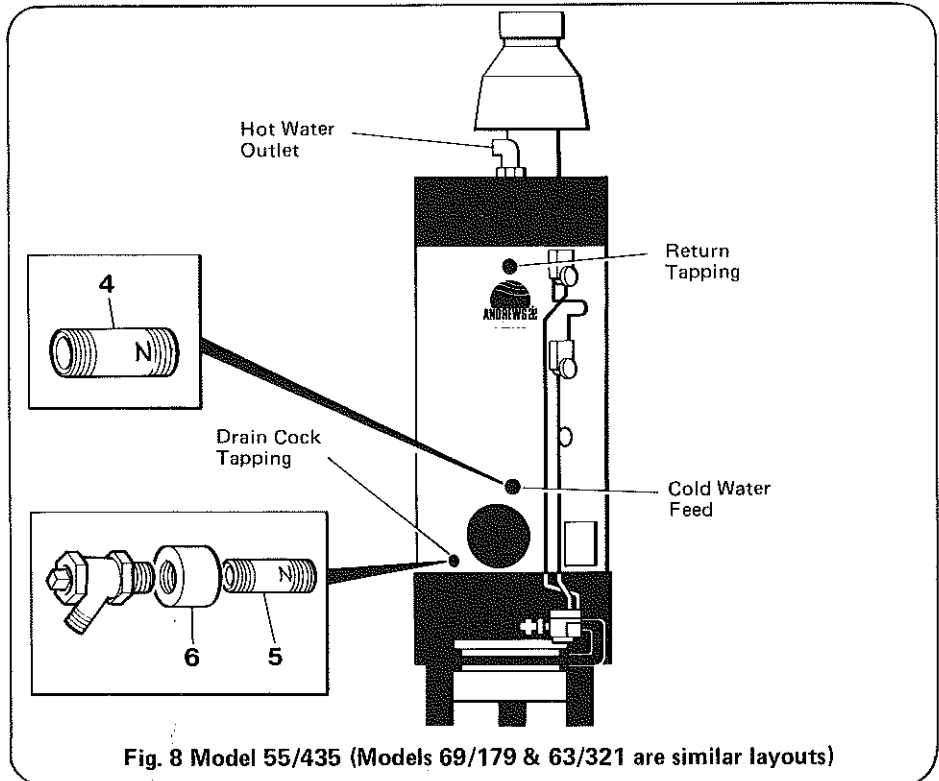
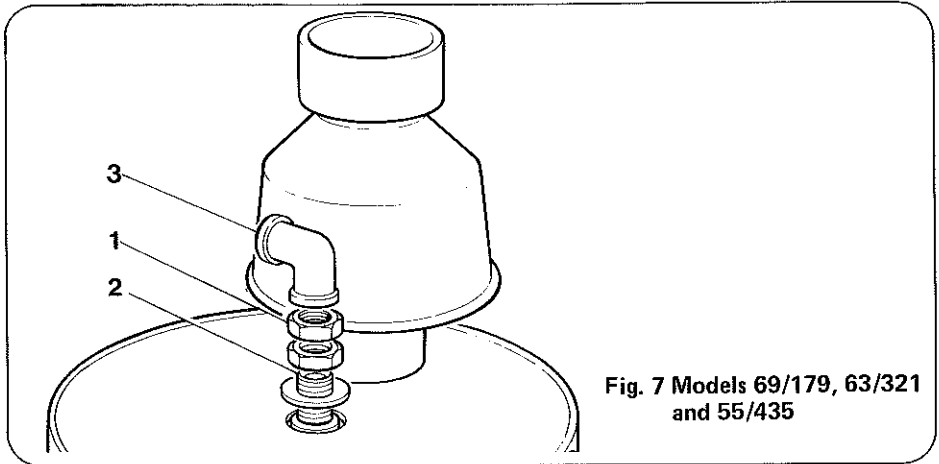
A low pressure open vented system can be used or where the natural circulating pressure is insufficient, pumped circulation can be employed.

The heater must be fitted with an open vent pipe which is not valved and which rises continuously to the open vent. It should be sized with reference to the Technical Data Tables (pages 3, 5, 7 & 9), BS 6644 Clauses 9 and 10 and CP 342. Local Regulations and Bye-laws must be observed when installing the system but typical water services layouts are shown in Figs. 10, 11 and 12.

Models 69/179, 63/321 and 55/435 with reference to Figs 7 and 8.

- Fit the 1½" BSP backnut (1) to the outlet tubular (2), assemble the 1½" BSP elbow (3) and using a suitable jointing medium, fashion a gland for the backnut. Orientate the outlet elbow to its desired position (but avoid passing across the draught diverter) and tighten the backnut against the elbow to form a watertight connection. Connect the hot water supply pipe to the 1½" BSP elbow.
- Using a suitable jointing compound, connect the cold water feed adapter (4) to the 1½" NPT tank tapping ensuring that the mark 'N' is towards the tank and connect the 1½" BSP thread of the adapter to the cold water feed pipe.

- Using suitable jointing compound connect the drain tapping adapter (5) to the $\frac{3}{4}$ " NPT tank tapping ensuring that the mark 'N' is towards the tank. Assemble onto the $\frac{3}{4}$ " BSP thread of the adapter the $\frac{3}{4}$ " BSP coupler socket (6) and the drain cock.



Model 29/120 with reference to Fig. 9.

- Using a suitable jointing compound, connect the cold water adapter (1) to the 1½" NPT tank tapping ensuring that the mark 'N' is towards the tank and connect the 1½" BSP thread of the adapter to the cold water feed pipe.
- Repeat above step for the hot water feed connector and connect the 1½" BSP thread of the adapter to the hot water feed pipe.
- Using a suitable jointing compound, connect the drain tapping adapter (2) to the ¾" NPT tank tapping ensuring that the mark 'N' is towards the tank. Assemble onto the ¾" thread the ¾" BSP coupler socket (3) and the drain cock.

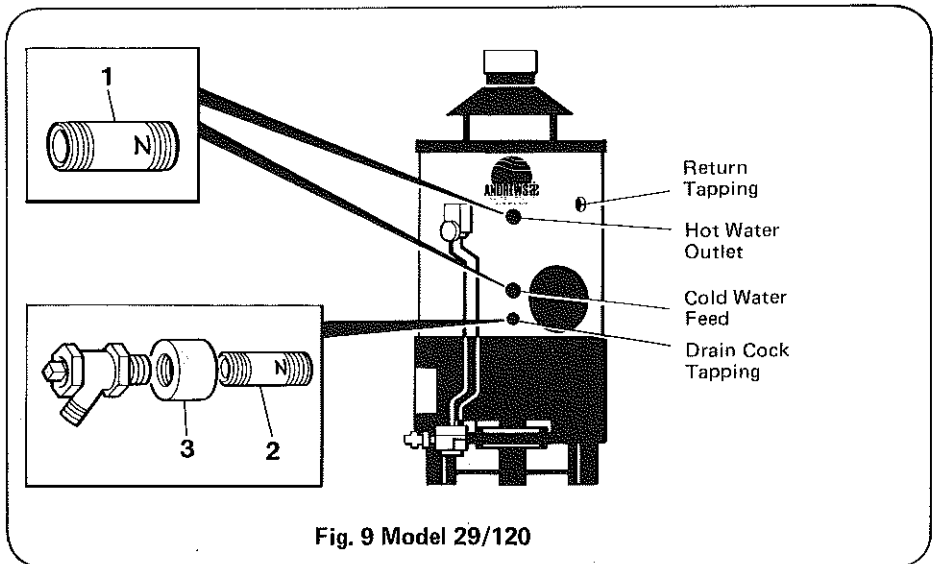
Water draw-off dead legs should comply with CP 342 Part 2 Table 1 and BS 6700.

NOTE:

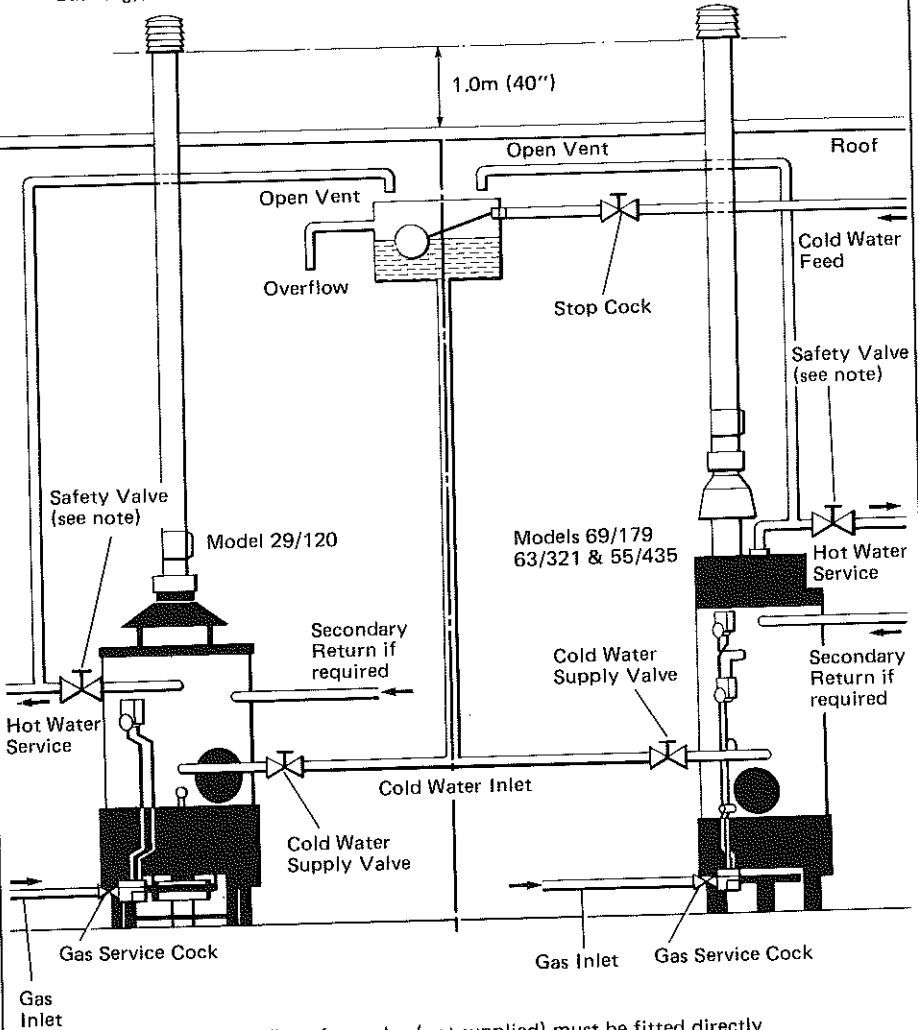
When using a secondary return circuit the locations of the return tappings are shown in Figs. 8 and 9.

It is recommended that all water connections be made to the heater(s) using union fittings for ease of servicing. Pipe support intervals should comply with CP 342 Part 2 Table 4.

After installation of the water system open the main water supply valve, flush the system and fill the heater. Open the hot taps to allow air to escape from the system. When the system is free of air, close the taps and check for leaks at the gas control thermostats, drain cock and pipe connections on the heater.

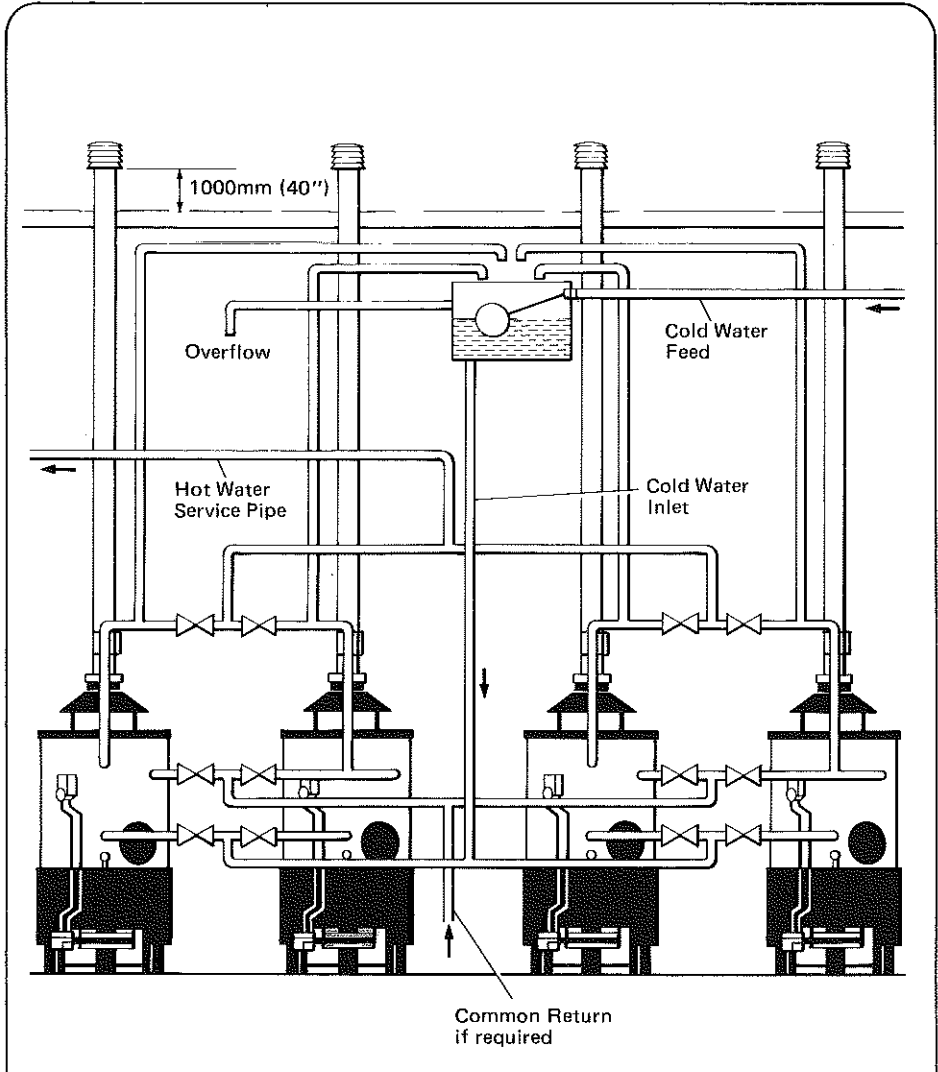


Terminal (away from any obstructions or any openings or features that may allow products re-entry into the building).



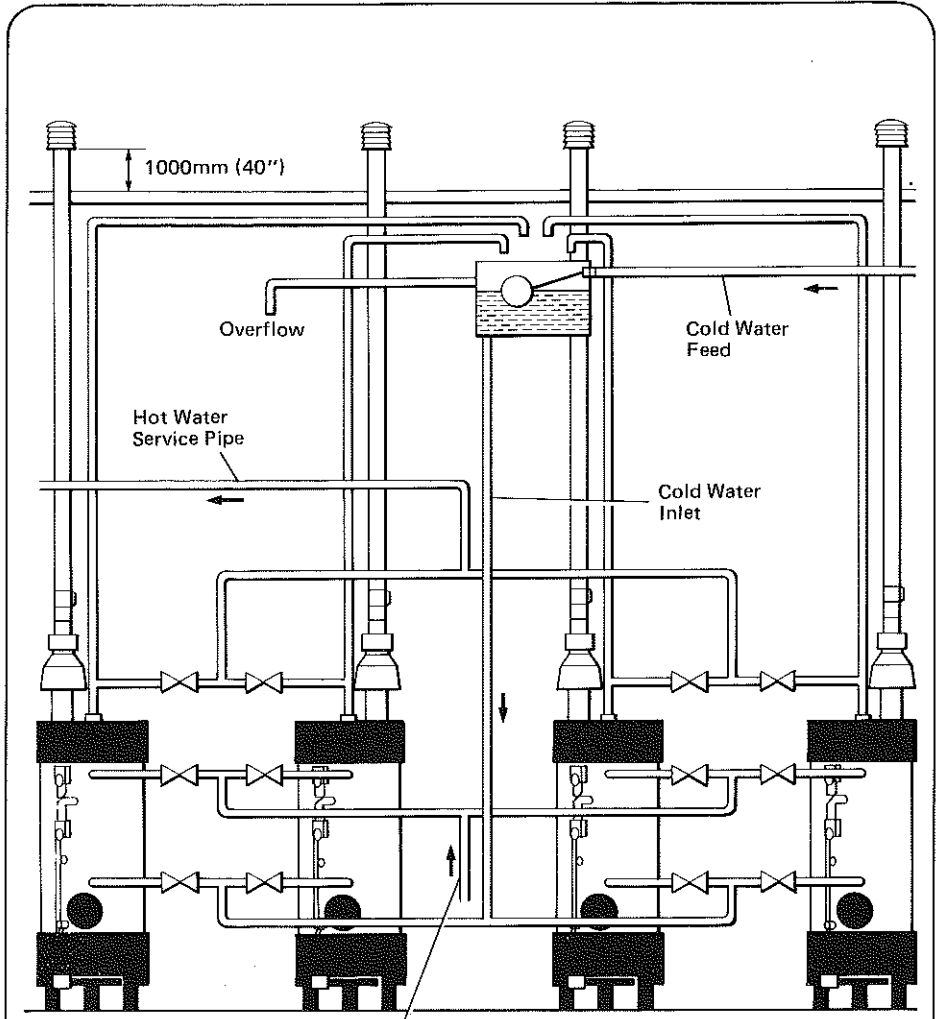
Note: The safety valve (not supplied) must be fitted directly to the heater or not more than 1000mm along the flow pipe from the heater. No valve must separate the heater from the safety valve.

Fig. 10 Single Installation, Vented System



NB. In all multiple installations exact balance is essential for proper operation. The pipe lengths from the common tee to the heater connections must be equal. The Water Heaters used must be the same models

Fig. 11 Multiple Installation, Model 29/120, Vented System
(see BS6644 Clauses 8, 9.2, 10.1.2, 10.2.2, 20.10)



Common Return
if required

NB. In all multiple installations exact balance is essential for proper operation. The pipe lengths from the common tee to the heater connections must be equal. The Water Heaters used must be the same models

Fig. 12 Multiple Installation, Models 69/179, 63/321 & 55/435, Vented System (See BS6644 Clauses 8, 9.2, 10.1.2, 10.2.2, 20.10)

Unvented Systems

When used in an unvented system, the Andrews water storage heater will supply hot water at a pressure of 3.5 bar (50.8 psi) provided that this pressure is available at the mains feed. During conditions of no flow, whilst the burner is operating, the pressure of the system will rise to a maximum of 5 bar (72.5 psi).

When testing the system it is recommended that a maximum test pressure of 10.34 bar (150 psi) be employed.

The Andrews range of storage water heaters can be used on unvented hot water storage systems with the addition of an "Unvented Systems Kit" Part No. 80 000 106 obtainable from the Water Heater Division of Andrews Industrial Equipment Limited.

All fittings and materials used must be suitable for use with potable water and listed in the current Water Research Centre "Materials and Fittings Directory".

Installation of unvented hot water storage systems must comply with The Building Regulations 1985 Section G3.

Models 29/120, 69/179, 63/321 and 55/435 with reference to Figs. 13, 14, 15 & 16.

The kit comprises the following items (see Fig. 13).

- a) Line strainer
- b) Pressure limiting valve
- c) Check valve
- d) Expansion valve
- e) Expansion vessel
- f) Temperature/Pressure relief valve
- g) Two Tundishes

Items a, b and c are "in line" fittings and are threaded Rp 1 (1" BSP female).

Items d and e are threaded R $\frac{3}{4}$ ($\frac{3}{4}$ " BSP male) and should be connected into suitable "Tee" fittings.

Item f **must** be fitted into the "return" port tapping (Figs. 14, 15 & 16).

If a secondary return is required, it should be connected into the drain port tapping using a suitable "Tee" fitting.

When assembling the line strainer (a), pressure limiting valve (b) and check valve (c) care must be taken to ensure that the flow indicator arrows marked on the units are in the correct direction of flow.

The cold water for services may be drawn off via a "Tee" fitting between items (b) and (c), the pressure of which will be similar to the hot water supplied by the water heater.

If higher flow rates are required for the cold water services a "Tee" should be added before item (a). If required, an additional pressure limiting valve can be fitted in this line to give balanced pressure.

The pipework fitted to both tundishes should be 35mm diameter and terminated at a suitable drain.

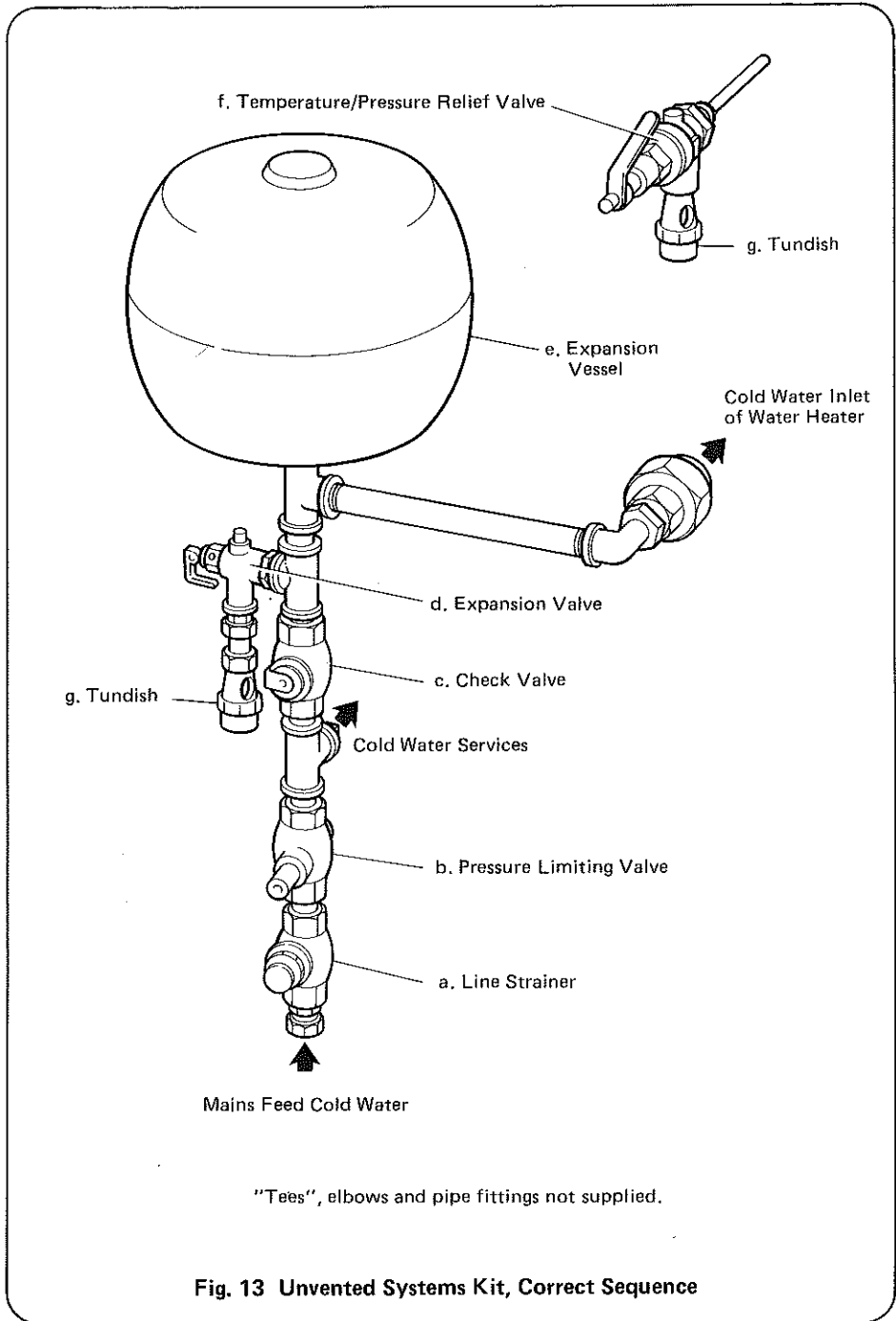


Fig. 13 Unvented Systems Kit, Correct Sequence

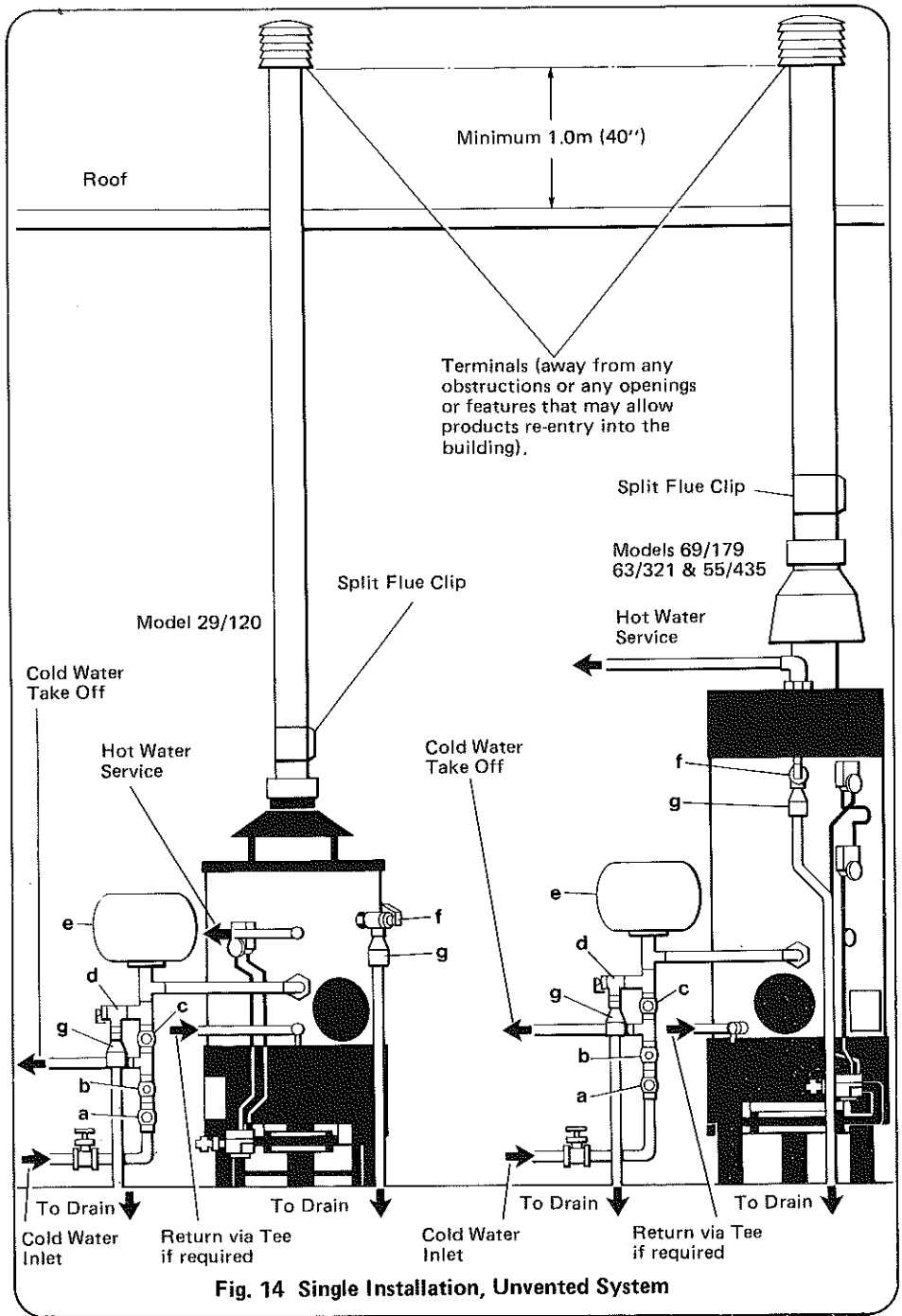
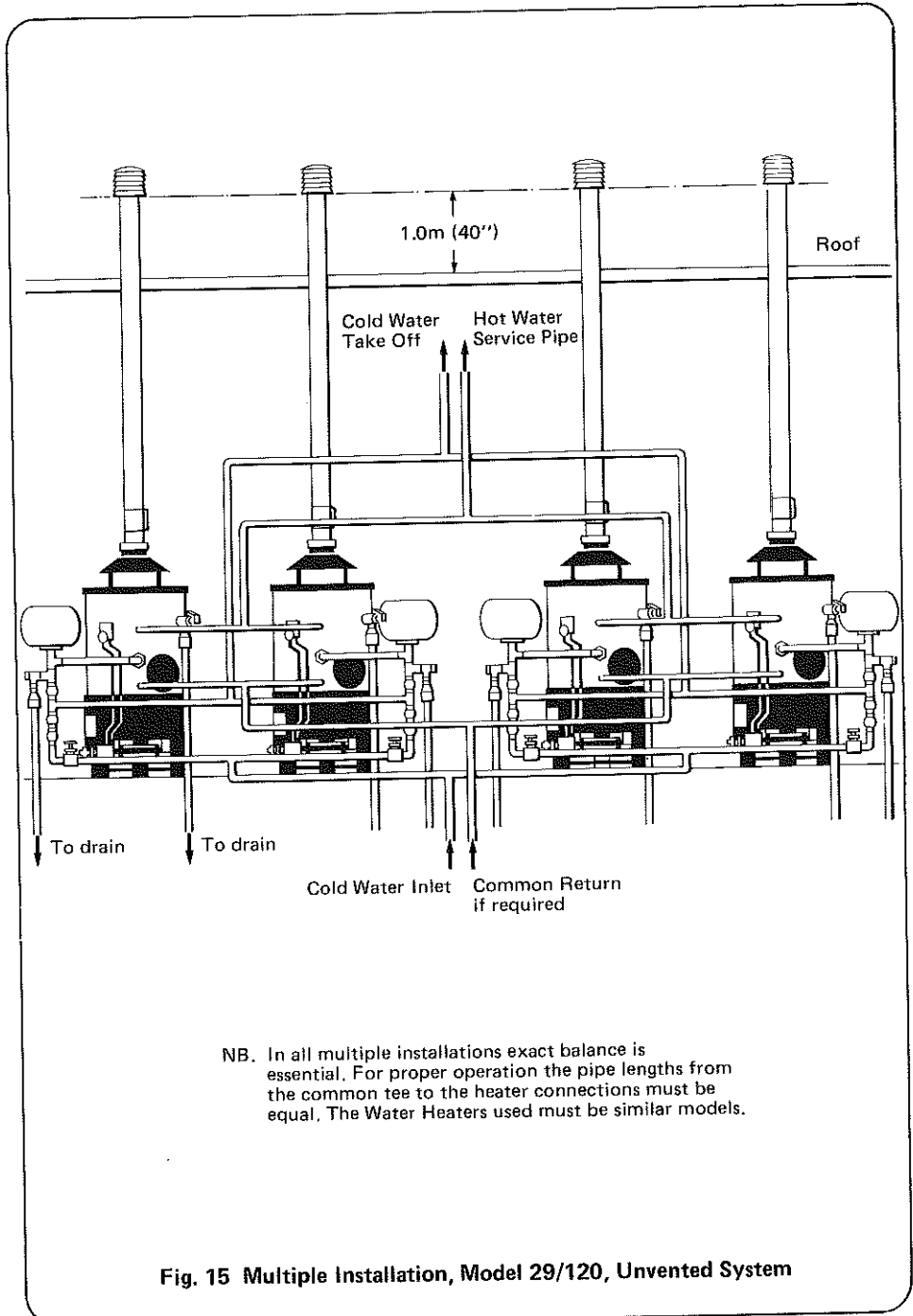
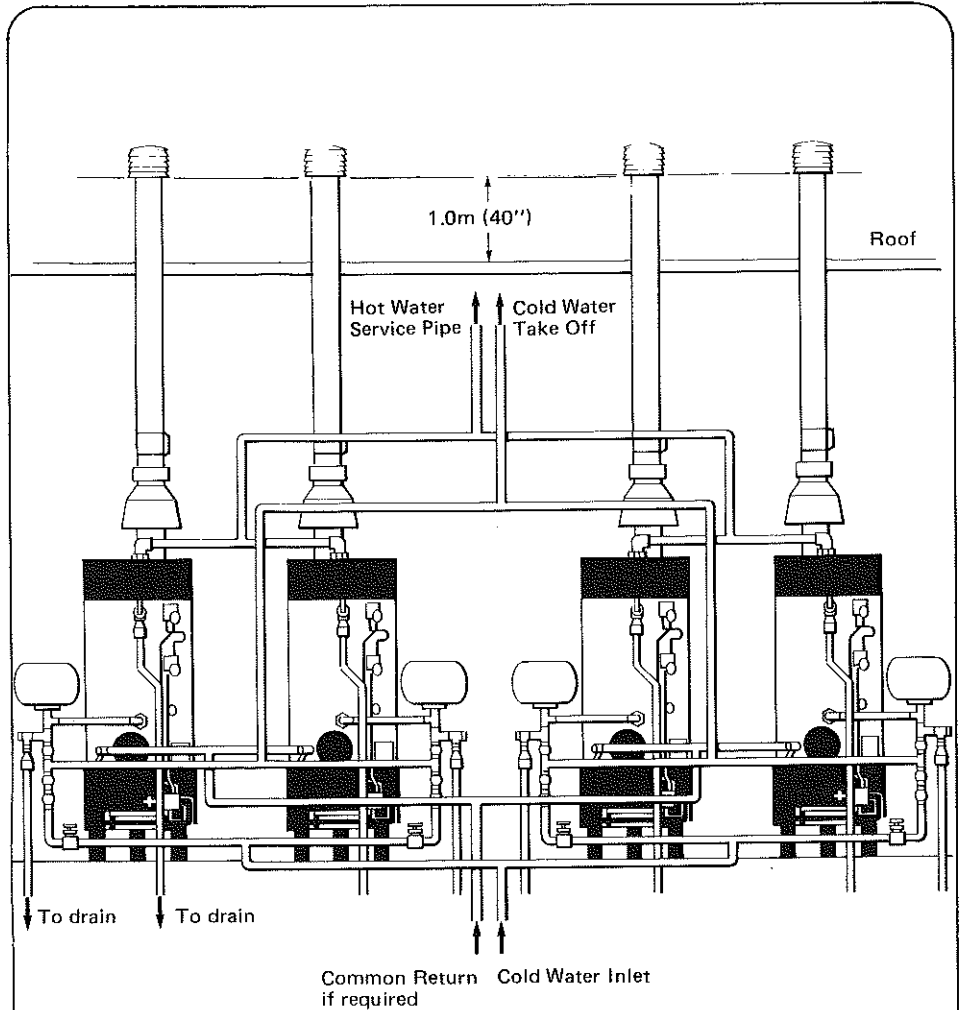


Fig. 14 Single Installation, Unvented System



NB. In all multiple installations exact balance is essential. For proper operation the pipe lengths from the common tee to the heater connections must be equal. The Water Heaters used must be similar models.

Fig. 15 Multiple Installation, Model 29/120, Unvented System



NB. In all multiple installations exact balance is essential. For proper operation the pipe lengths from the common tee to the heater connections must be equal. The Water Heaters used must be similar models.

Fig. 16 Multiple Installation, Models 69/179, 63/321 & 55/435, Unvented System

Water Treatment

Where extreme conditions of water hardness exist scale can form in any water heating equipment especially when the equipment is working under conditions of constant heavy demand, at high temperature.

This problem can be minimised by reducing the water temperature in the heater and by fitting suitable water pre-treatment plant.

If doubt exists contact a water treatment specialist or the manufacturer for further advice.

Gas Connections

THE APPLIANCE MUST ONLY BE USED WITH NATURAL GAS

The installation of the gas supply should conform, depending on its size, to the requirements of British Standard 6891 and/or British Gas Publications as set out on page 10. A gas meter is connected to the service pipe by British Gas Plc or its contractor. The meter and service pipe should be checked by British Gas Plc to ensure that they are adequate to deal with the gas supply to the water heater(s) in addition to any existing/other requirements.

Fit the $\frac{3}{4}$ " (1" for 55/435) gas cock/union immediately upstream of the gas control valve using a suitable jointing compound and connect to the gas supply. It is recommended that a pressure test point be fitted to the input to the gas supply cock. Where the water heater(s) is (are) fitted in a boiler house or specially designed compartment, a manually operated valve for boilerhouse isolation shall be fitted in accordance with the Gas Safety (Installation and Use) Regulations 1984. The valve should be easily identified and be easily accessible. Pressure test the gas installation for soundness and purge the installation according to BS 6891 (or IM/2 and IM/5) as appropriate.

CAUTION: DO NOT OPERATE THE WATER HEATER UNTIL THE STORAGE VESSEL IS COMPLETELY FILLED, WITH WATER RUNNING FROM ALL HOT TAPS.

Open the main gas cock after all connections to the gas control are completed and test all connections, using a manometer, up to the gas control inlet. Purge the pipework of any air. Check there are no loose connections to the burner, weep lines or pilot pipe.

NOTE 1: The gas control will be damaged if the inlet pressure exceeds 35 mbar (14 in Wg).

NOTE 2: To test the connection at the pilot for soundness the pilot assembly must be disconnected and re-fixed outside the heater, as follows:

- Disconnect pilot and thermocouple connections at the gas control valve.
- Remove two screws securing the deposit tray to the burner tray and lower the deposit tray, 69/179 and 63/321 only (see Figs. 21 and 22).
- Remove the screw securing the pilot assembly to the burner assembly. Push the pilot pipe/assembly towards the rear of the heater until the peg above the securing screw is out of the hole. Lower and withdraw the pilot assembly.
- Re-fix the pilot connection only to the gas control valve with the pilot outside the heater.
- Ensure that the gas supply to the appliance is on.
- If the control knob is 'ON', turn the control knob clockwise to 'PILOT' position, partially depress knob and turn clockwise to 'OFF'. (See Fig. 18).
- Pull out adjustment dial on the control thermostat and turn anti-clockwise to its stop position.
- Turn the control knob to 'PILOT' position.
- Apply a lighted taper to the pilot burner and push in the control knob.
- Keep the knob pressed in and test the connection at the pilot for soundness using proprietary leak detection fluid. Release the button on the gas control valve, seal any leakage and re-test. Re-fix the pilot assembly (and deposit tray for Models 69/179 and 63/321).

DO NOT CONNECT THE THERMOCOUPLE TO CARRY OUT THIS TEST.

A. To Light the Burner: SEE DIAGRAM OF GAS CONTROL KNOB (Fig. 18).

1. Test connection at pilot for soundness as in Note 2 above.
2. Ensure that the gas supply to the appliance is on.
3. If the control knob is 'ON', turn the control knob clockwise to 'PILOT' position, partially depress knob and turn clockwise to 'OFF'.
4. Pull out adjustment dial on the control thermostat and turn anti-clockwise to its stop position.
5. Turn the control knob to 'PILOT' position.
6. Apply a lighted taper to the pilot burner and push in the control knob.
7. Keep the control knob pressed in a further 20 seconds after the pilot lights, then release and check that the pilot remains alight. If the pilot goes out, turn off. Wait 3 minutes and repeat from step 5.
8. Turn the control knob to the 'ON' position and turn the control thermostat dial clockwise to the desired water temperature. The burner will now light.
9. Check the weep lines, pilot and gas connections at the gas control valve and thermostats for soundness with leakage detection solution whilst the burner is alight. Turn off, seal any leakages and re-test.

WARNING:

If the pilot should become extinguished for any reason, no attempt should be made to re-light the gas until at least 3 minutes have elapsed.

B. To Shut Off the Burner

For long periods only, eg. holidays or periods of 7 days or more, turn the control knob to 'PILOT' position, partially depress the knob and turn clockwise to 'OFF'. Turn off the gas service cock.

For shorter periods, eg. less than 7 days, leave the heater under the control of the thermostat.

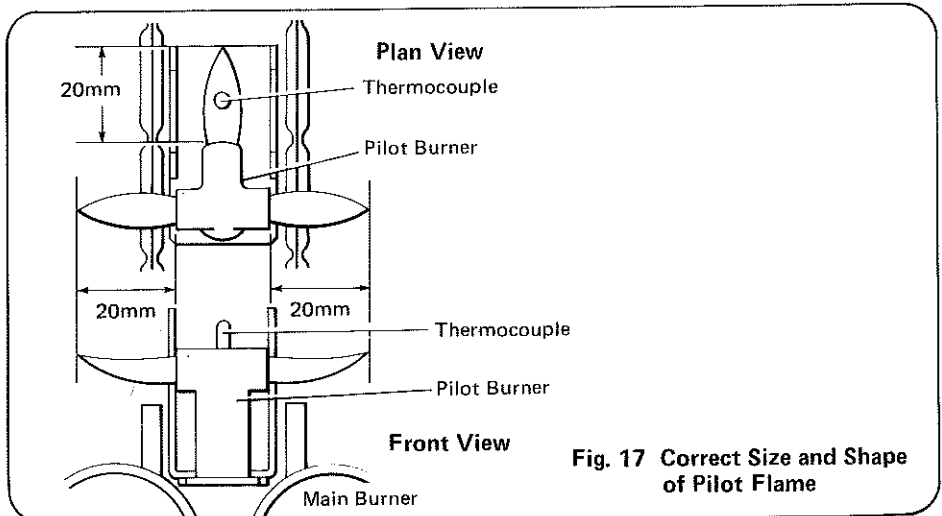
C. To Check Main Burner Pressure

1. Turn the gas control knob clockwise to 'OFF' position.
2. Release bleed screw 'A' (see Fig. 19a) and connect the pressure gauge tube.
3. Light the burner according to the preceding instructions.
4. Remove the gas control valve cap 'B' (see Fig. 19a) and adjust the burner pressure, at the screw now exposed, in accordance with the data plate. Turn the screw clockwise to increase and anti-clockwise to decrease pressure. If possible check the gas rate (see Technical Data Tables) with meter and watch. Replace cap 'B' on the gas control valve.
5. Turn gas control to 'PILOT' position. Remove pressure gauge tube and tighten bleed screw 'A'.
6. Turn gas control knob to 'ON' and light the burner as above.

D. Check Correct Shape and Size of Pilot Flame

No adjustment is provided for the pilot. The restrictor 'C' of the multi-functional control should be fully opened (turned anti-clockwise).

When viewed from the front of the heater the pilot flame should appear as in Fig. 17.



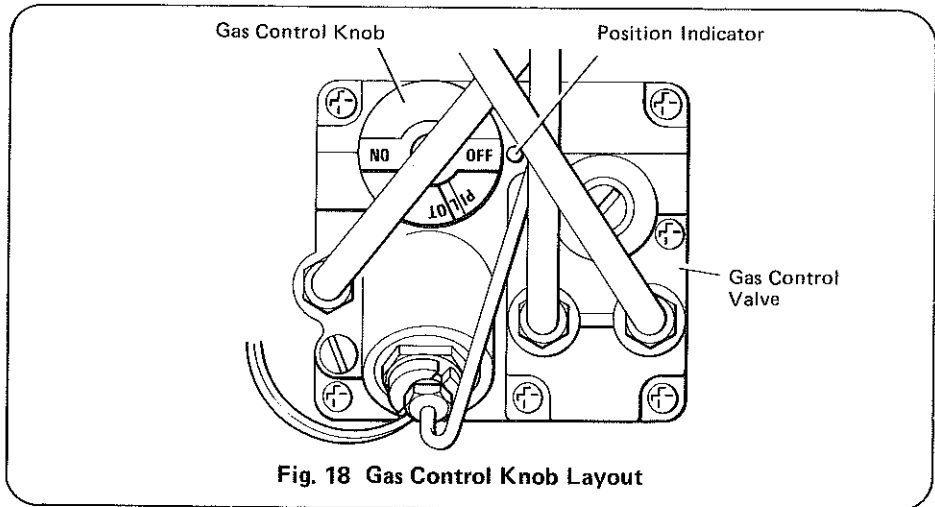


Fig. 18 Gas Control Knob Layout

E. Check for Spillage at the Draught Diverter

If an extract fan is fitted (refer to page 16), carry out a spillage check as set out in PS 5440 Part 1, Appendix B. If spillage does occur increase the ventilation area until the products clear well. If an openable window is in the boiler-house or room containing the heater(s), turn on the extract fan and (all) the heater(s), open the window fully and using stiff card, gradually reduce the opening until the appliance(s) just spills. Then increase the opening just till the products clear well. Measure the opening for the additional area required.

F. Instructing the User

Upon satisfactory completion of commissioning and testing, hand the 'User Instructions' to the user or purchaser and explain the method of economic and efficient operation of the system.

Explain That:

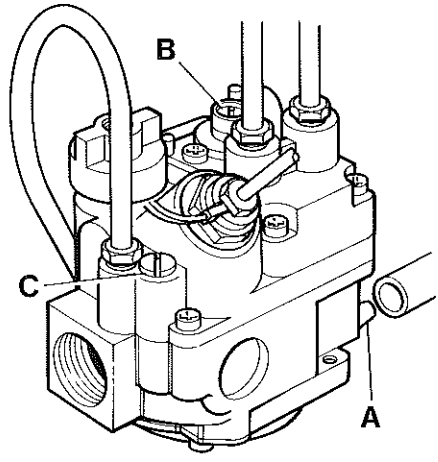
1. Other than for long periods of shut-down, the water heater must be left operating normally.
2. It is important that the control thermostat is set at the lowest temperature consistent with the users' needs.
3. Timers of any sort must not be fitted to the appliance.

Ensure that the user or purchaser is fully conversant with the lighting, shut-down and general operational procedure including the emergency procedure.

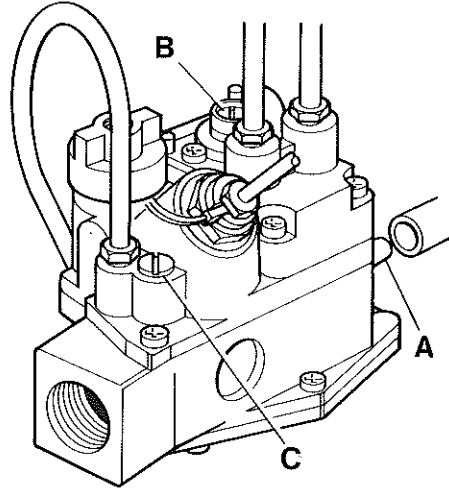
Advise that any air vents must be kept clear and items must not be placed or stored in the vicinity of the heater.

Advise of precautions necessary to prevent damage to the heater(s) and systems in the event of the system remaining in-operative during frost conditions.

Advise the user or purchaser that for continued efficient and safe operation of the heater(s), it is important that adequate servicing is carried out at regular intervals by the installer or by the local gas region.



Models 29/120 , 69/179 & 63/321



Model 55/435

Fig. 19a Burner Pressure Adjustment

Note: ECO is Energy Cut Off at overheat temperature.

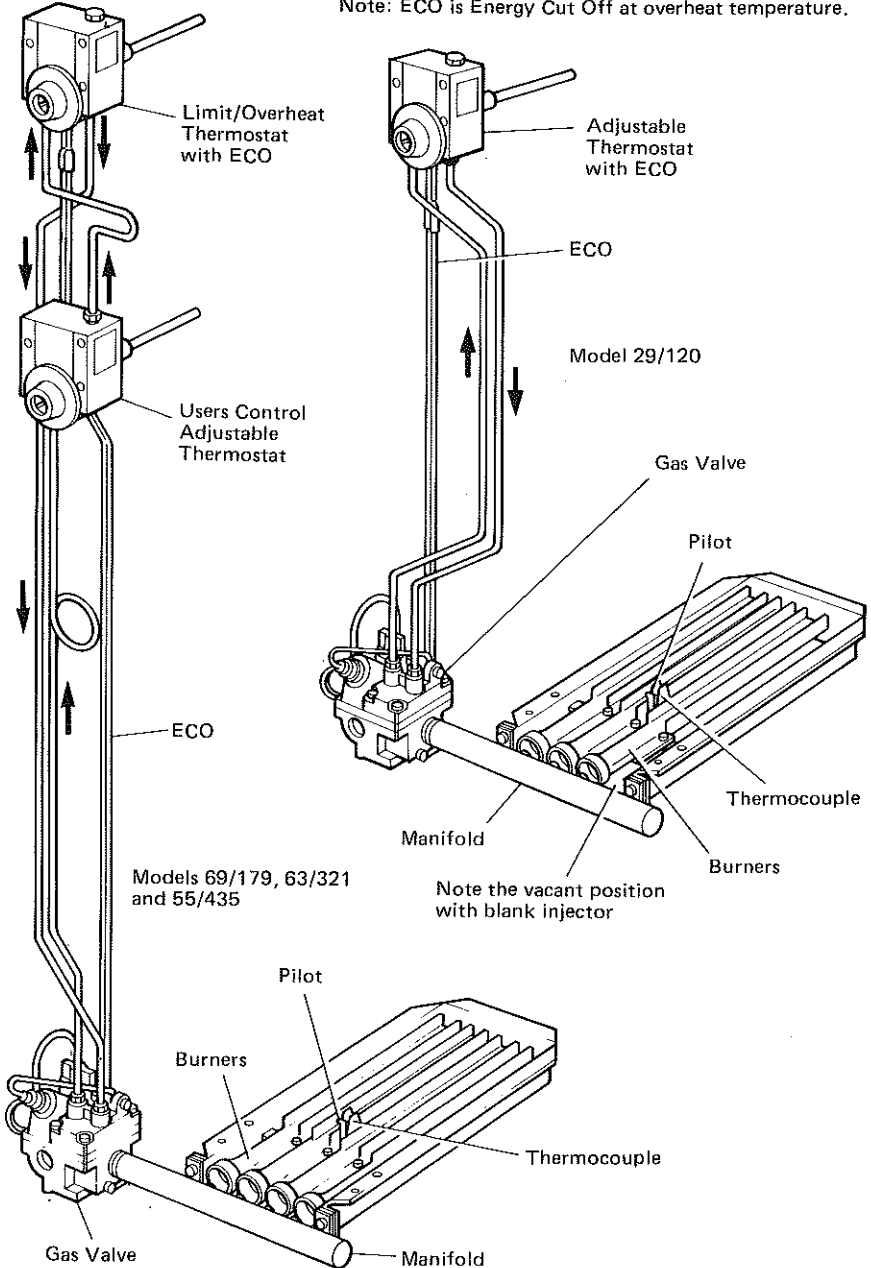


Fig. 19b Layout of Controls

Sequence of Operation

1. With pilot lit, solenoid coil holds inlet gas port open on gas valve.
2. Control knob on gas valve is set to the 'ON' position.
3. Control thermostat is set to desired water temperature 43°C - 82°C (110°F - 180°F).
Adjustment dial is marked with two temperatures ie. 110°F and 180°F and the dial is calibrated with unmarked notches. Each notch gives a 5°F increase or decrease in temperature. To adjust thermostat pull out dial and turn to required temperature notch then release dial.
4. Thermostat(s) should now be in the open position allowing gas to flow through tubing and controls in direction of arrows shown in Bleed Gas Control Systems Fig. 19b.
5. This flow of gas allows the main burner valve to open. A slow opening feature is incorporated in the gas valve. Burners will light several seconds after setting thermostat.
6. Burners will continue to heat water until the temperature setting is reached. With the thermostat closed, flow of gas is blocked through bleed tubing. This drop in pressure causes the main burner valve to close, shutting off burners.

ECO (Energy Cut-Off)

All Andrews commercial gas water heaters are equipped with a fusible link ECO (Energy Cut-Off) device. In the case of 29/120 the ECO is fitted to the control thermostat. This is a temperature sensitive switch fitted to the upper limit thermostat which opens on high temperature. Its function is to shut off all gas to the burners, including pilot, in case of an overheat condition. If the pilot goes out and is associated with high water temperature, the ECO is probably operating and the cause of overheating should be sought. In this case a new limit thermostat must be fitted.

Temperature Stratification (Stacking)

When small amounts of hot water are drawn repeatedly the thermostat responds to each inrush of cold water and brings the main burners on. Each time this occurs, more heat may be put back in the tank than was drawn off. As this continues, water in the upper level of the tank gets hotter than the thermostat setting. This higher temperature water does not completely mix with the cold incoming water but rises, in a 'chimney effect', to the top of the tank. Many repetitions of this, over a short period of time, result in an accumulation of excessively hot water in the upper portion of the tank, even when the thermostat control is within limits. This is known as 'stacking'.

To counteract this situation an upper limit thermostat (N/A Model 29/120) with a fixed setting (Factory set at 82°C (180°F)) senses this rise in temperature and closes, interrupting the flow of bleed gas and shutting down the burners.

Most present day commercial piping installations include a circulating pump which keeps hot water moving continuously through the heater. This tends to stabilize temperatures in the water heater tank and throughout the piping system.

IMPORTANT:

THE HEATER MUST BE LEFT UNDER THE CONTROL OF THE GAS CONTROL THERMOSTAT AT ALL TIMES. THE USE OF ANY FORM OF TIME CONTROL, INCLUDING THERMOSTATIC TIME CONTROL, IS NOT RECOMMENDED AND IS NOT COVERED BY BRITISH GAS Plc CERTIFICATION.

NB: Servicing should be carried out by a competent person.

Whilst giving the following instructions for the care of the Andrews Water Heater, we would recommend that the user arranges with his local gas region or installer to carry out checks of the appliance at least every 12 months to ensure trouble free operation and continued satisfaction.

Check the area around the heater to ensure that ventilation is maintained, that the heater is free of any extraneous materials and clear of dust and lint. Keep piping, flue and tops of heaters clear of towels, dust rags, mops and any other combustibles. In hard water areas commercial heaters should be supplied water through a softener or lime inhibitor. Without a softener or lime inhibitor the heater should be opened and inspected through the hand hole cleanout every 12 months. If lime or silt has accumulated the deposits should be removed. Failure to do so will shorten the life of the heater and may void the warranty.

NB: The cleanout hole sealing gasket must be renewed whenever the cleanout cover is removed.

These checks will cover the anodes, safety valve, flueway, control and burner.

Before Servicing:

- Turn off the gas service cock.
- Turn off the cold water supply valve to the heater.
- Turn on the hot water draw off taps served by the water heater or (for multiple installations) turn off the hot water outlet connection valve and secondary return valve.
- Drain down using the drain valve on the heater.

A. Burner Assembly

The burner assembly should be cleaned and checked annually as follows (see Figs 20 to 23, referring to the burner assembly).

NB: The pilot assembly must be removed before removing the burner assembly and replaced after re-fitting the burner assembly as the pilot assembly will otherwise foul the baseplate.

1. Turn the gas control valve knob to "OFF" and disconnect the union joint on the gas service cock.
2. Disconnect from the gas control valve the weep lines, pilot tube, thermocouple and thermocouple interrupter block.
3. (Models 69/179 and 63/321 only) Remove the two bolts securing the deposit tray to the burner tray. Lower the front edge of the deposit tray to rest on the floor.
4. Remove the screw securing the pilot assembly to the burner assembly. push the pilot pipe/assembly towards the rear of the heater until the peg above the securing screw is out of the hole. Lower and withdraw the pilot assembly.
5. Remove the two front fixing bolts and slide out the burner assembly.
6. Disconnect the manifold from the burner tray by removing the four fixing screws.
7. Clean the burners by brushing internally and externally and also by blowing through with air. Do not remove individual burners from the burner tray.
8. Remove the burner and pilot injectors and clean in a suitable solvent, eg. acetone (see Figs. 20 to 23). **DO NOT ATTEMPT TO CLEAN BY PUSHING SHARP METALLIC ITEMS INTO ORIFICES. IF NECESSARY, USE A WOOD SPLINTER TO CLEAR.**

9. Re-assemble in the reverse order but note:-
 - i) The flue-ways and combustion chamber must be cleaned first.
 - ii) When re-fitting the burner injectors, use a suitable approved jointing compound.
 - iii) Re-assemble the pilot assembly and connect the pilot pipe only to the gas control valve with the pilot assembly outside the heater. Turn on the gas service cock. Turn the gas control valve knob to 'PILOT' and press the knob whilst testing the pilot connection at the pilot assembly for soundness with a leak detection solution. Seal any leakages and re-test. Turn the gas control valve and gas service cock to 'OFF'.
10. Re-assemble the pilot assembly to the burner tray and re-fit the thermocouple interrupter block and thermocouple. **DO NOT OVER TIGHTEN THE THERMOCOUPLE CONNECTION. SCREW IN FINGER TIGHT AND TIGHTEN A FURTHER 1/4 TURN USING A SPANNER.**
11. Light the heater according to the lighting instructions. All gas joints must be checked for soundness using leakage detection solution. Turn off and seal any leakages. **DO NOT SEARCH WITH A NAKED FLAME.**
12. Re-light the heater. Check that the pilot flame is correct, see Fig. 17. When the thermocouple is fully heated, turn the gas control valve to 'OFF' and check that the flame failure valve drops out (an audible click) in less than 60 seconds after turning off.
13. Re-light the heater and set the thermostat to the users requirements.

B. Gas Control Valve

The gas control valve should be cleaned and checked. Remove any debris etc. from the control valve entry filter using a soft brush or by blowing with **low pressure** air.

Following servicing check:

1. Soundness of any gas joints broken or disturbed and seal any leaks.
2. Burner pressure/gas rate at maximum thermostat setting.
3. All water joints and seals for water tightness.
4. Operation of the heater is correct. Reset the controls to the customers requirements.

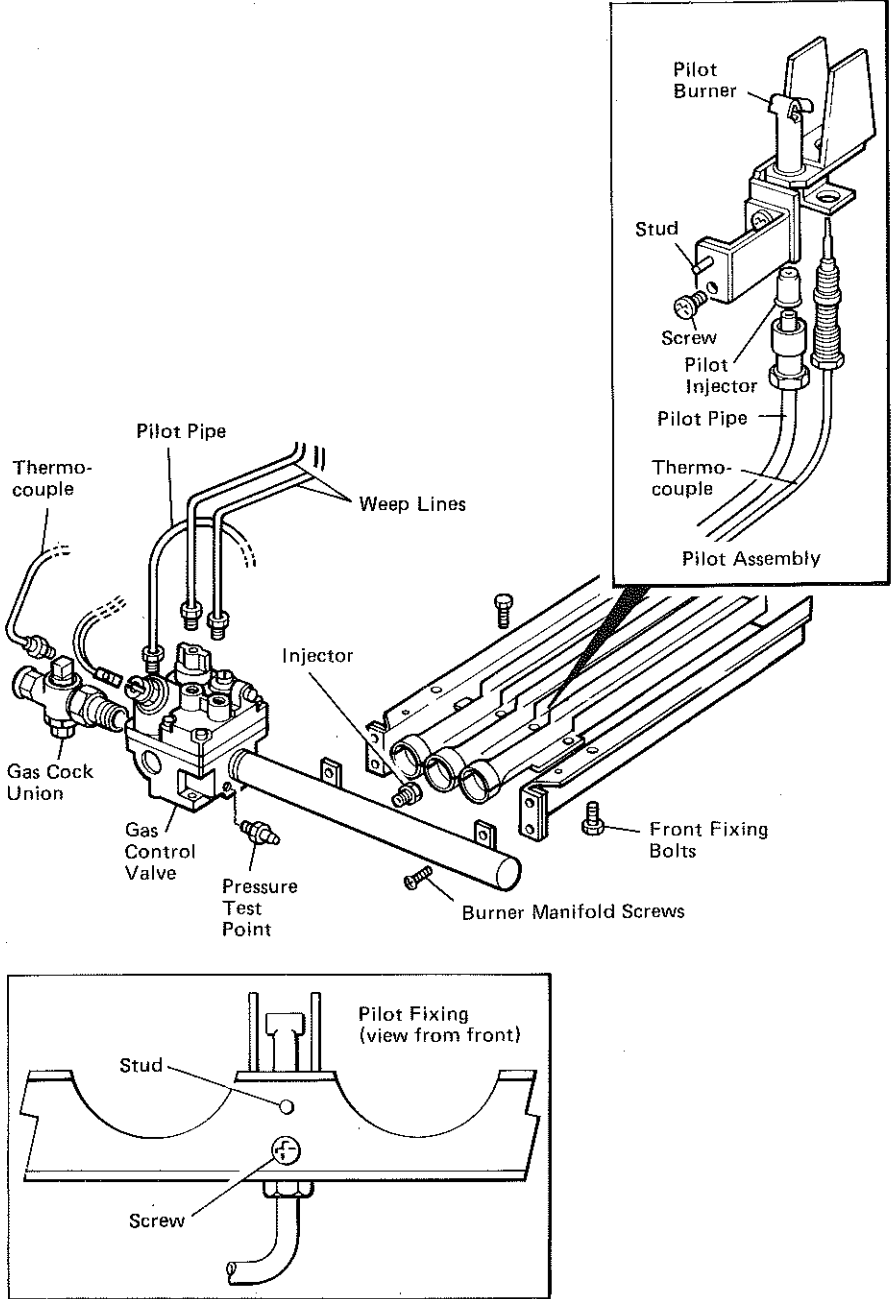


Fig. 20 Burner Assembly - Model 29/120

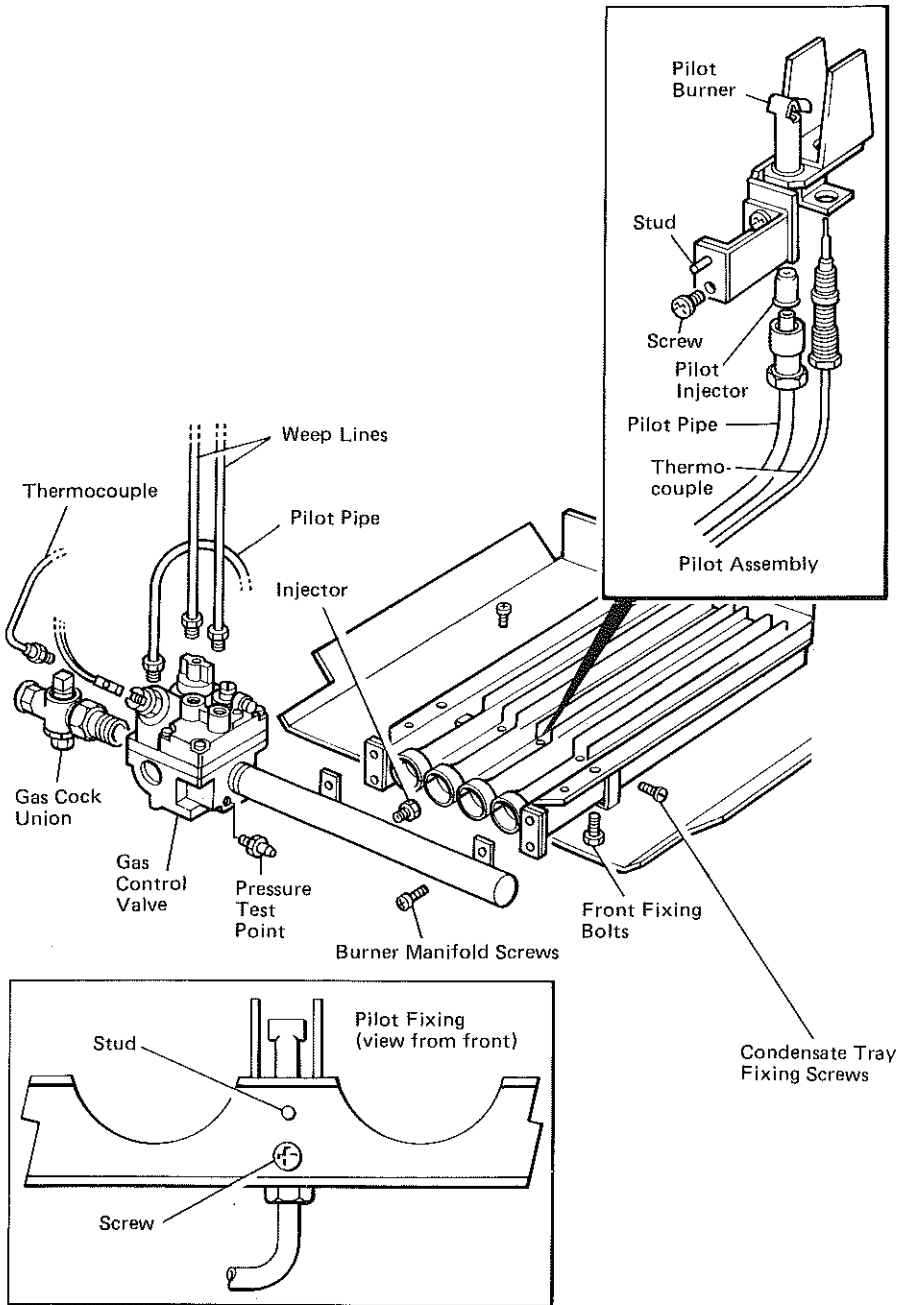


Fig. 21 Burner Assembly - Model 69/179

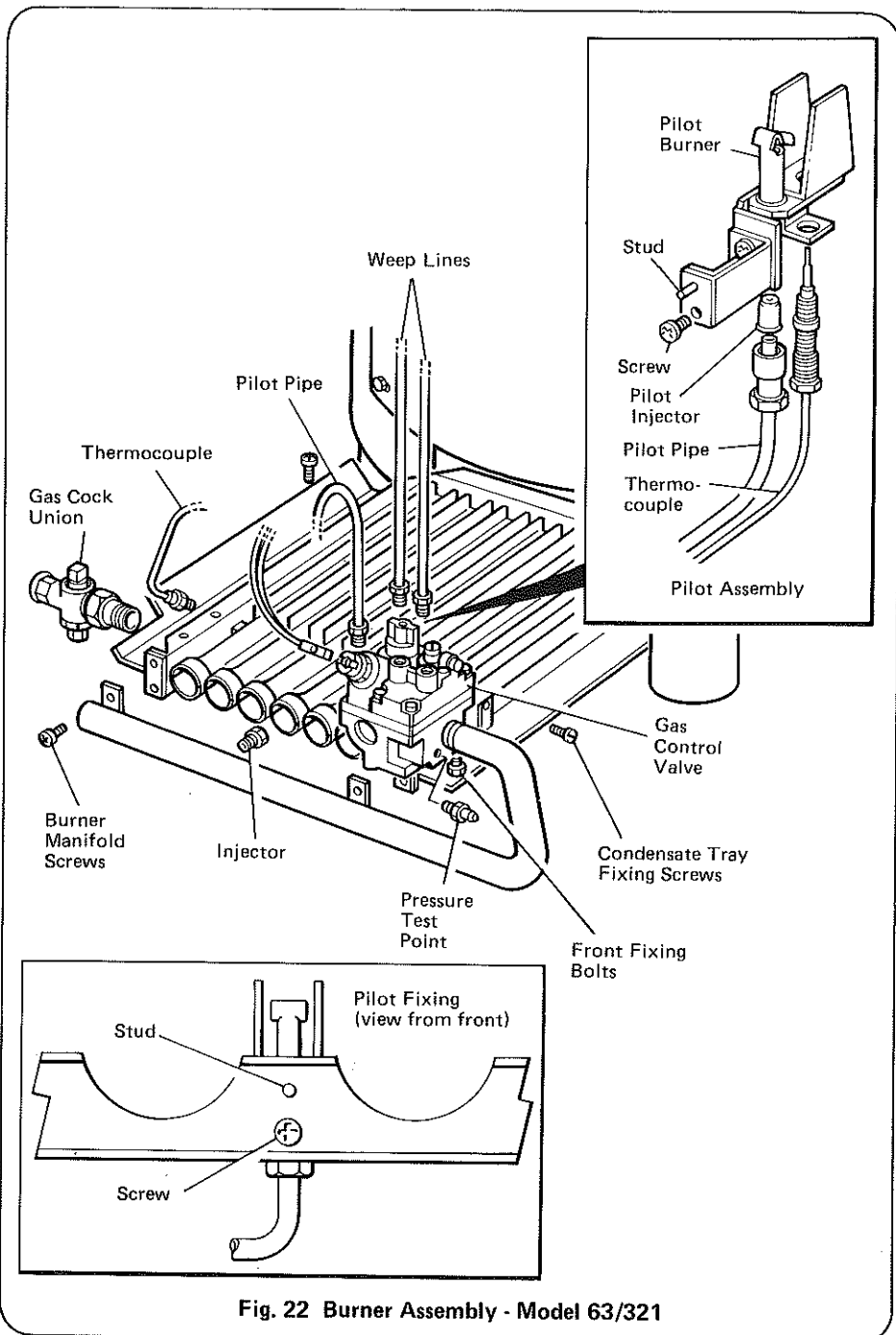


Fig. 22 Burner Assembly - Model 63/321

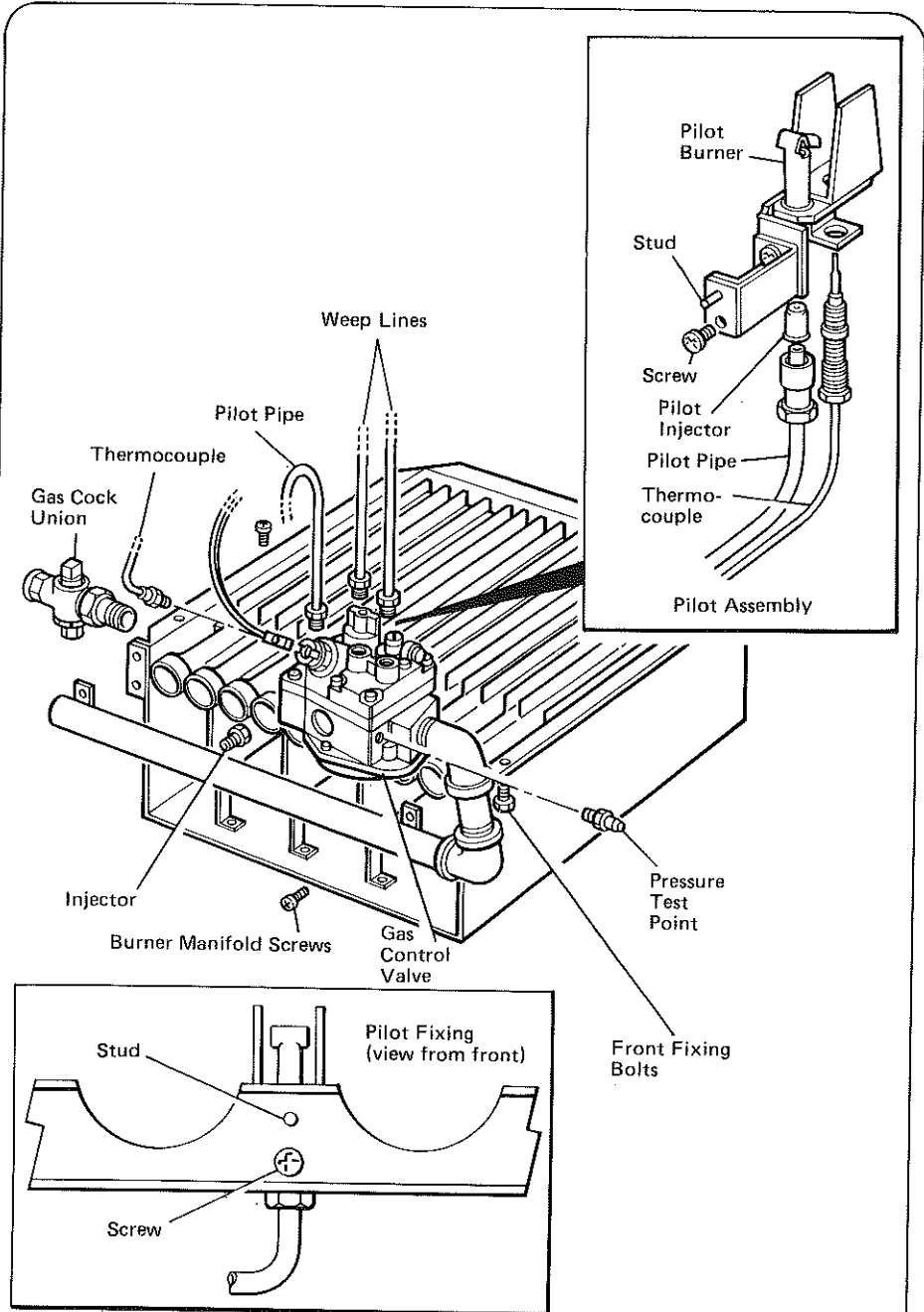


Fig. 23 Burner Assembly - Model 55/435

C. Flue-Ways

NB: THE FLUE BAFFLE OF THE 29/120 IS DIFFERENT FROM AND SHOULD NOT BE CONFUSED WITH THE FLUE BAFFLES OF THE 69/179, 63/321 AND 55/435 WHICH ARE NOT THE SAME LENGTH, NOR THE SAME PATTERN.

The flue-ways should be checked annually and cleaned as follows:

MODELS 69/179, 63/321 and 55/435 (see page 12 for diagrams).

1. Remove the burner assembly as described in Section A.
2. Remove the skirt from the temperature guard by withdrawing 6 screws (see Figs. 1 and 2).
3. Remove the split clip and lift off the draught diverter.
4. Slacken the clamping nut securing the temperature guard top and the flue collector hood (see Fig. 7) as far as possible. This must be slackened to its full extent to avoid damage to the flue collector hood seal when rotating the hood.
5. Turn the flue collector hood and guard top to give access to each flue-way in turn. Through the flue socket, remove each flue baffle and clean each flue-way with a suitable brush. The brush should be 75mm (3") diameter, with a minimum handle length of 1.4m (55") (not supplied).
6. Remove any deposits from the top of the water vessel and the flue baffle and replace before turning to the next flue-way.
7. After cleaning all flue-ways and baffles, inspect visually the flue hood seal (Figs. 1 and 2) by lifting the rim of the flue hood. If the seal is seen to be damaged, it must be replaced.
8. Re-commission the heater as described in Section II checking burner pressure, gas soundness and correct operation of all components.
9. Remove deposits from the deposit tray or bottom of the appliance.
10. Re-assemble the burner.

MODEL 29/120 (see Fig. 24).

1. Remove the burner assembly as described in Section A.
2. Remove the split flue clip.
3. Remove the casing top cover (with draught diverter attached) by removing four fixing screws.
4. Remove carefully the exposed top insulation pad.
5. By withdrawing the four holding down bolts remove the collector hood top plate and seal (see Fig. 24).
6. Remove each flue baffle and clean the flue-way with a suitable brush. The brush should be 75mm (3") diameter with a minimum length of 700mm (27½").
7. Remove any deposit from the top of the storage vessel and the flue baffle before proceeding to the next flue-way.
8. After cleaning all flue-ways and baffles, inspect visually the flue hood seal (Fig. 24). If the seal is seen to be damaged it must be replaced.
9. Re-fit the collector hood tightening the four fixing bolts evenly and progressively.
10. Replace the insulation pad and replace the top cover/draught diverter assembly. Check that the insulation pad is in good condition before replacing.
11. Remove deposit from the radiation tray at the base of the appliance.

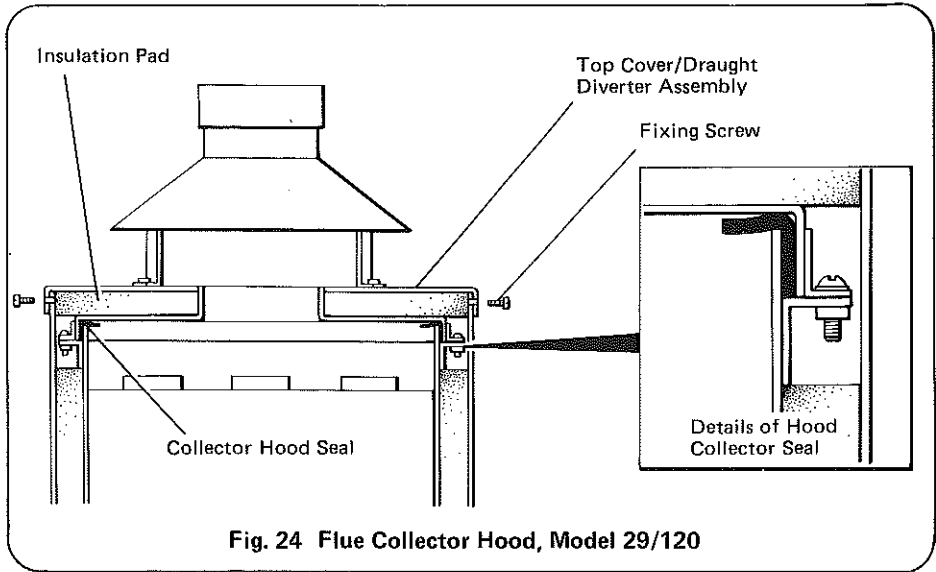


Fig. 24 Flue Collector Hood, Model 29/120

D. Cleaning the Storage Vessel

Scale formation in the base area of the pressure vessel may occur in hard water areas and is usually associated with high usage and high water temperatures. It is characterised by a rumbling noise (kettling) when the main burner is lit and should be rectified by chemical descaling.

Equipment Required

- 1 — 25 litre heavy plastic drum complete with drain valve.
- 1 — hose of sufficient length to reach from the heater to a suitable drain, internal bore 20mm to suit the drain valve of the water heater.
- 1 — 2 metre length of hose internal bore 25mm.
- 1 — 3/4" BSP gate valve with Rp3/4" inlet and fitted with R3/4" nipple about 100mm long at its outlet.

Also required are various hose clips and 10 litres of Andkem Descale Fluid.

1. Turn the gas control knob and gas service cock to 'OFF'.
2. Turn off the cold water supply valve to the heater.
3. Turn on the hot water draw off taps served by the water heater or (for multiple installations) turn off the hot water outlet connection valve and secondary return valve.
4. Drain down using the drain valve on the heater.
5. Slacken a water union on the heater (to allow displaced air to escape whilst descaling).
6. Remove the heater drain valve and fit the 3/4" BSP gate valve complete with 3/4" BSP nipple to the drain port nipple of the heater.
7. Connect the 2 metre length of hose between the gate valve nipple and the drain valve of the 25 litre plastic drum using suitable hose clips.

8. Ensuring that both the gate valve at the heater and the drain valve of the plastic drum are closed, add 10 litres of the descale fluid to the plastic drum. **BEWARE! THE FLUID IS CORROSIVE.**
9. With the plastic drum resting on the floor, open both the gate valve and the drain valve.
10. Raise the plastic drum so that the solution runs into the heater tank.
11. Close both the gate valve and the drum drain valve, and leave to soak.
12. After about one hour (not before), restore the gas supply and light the pilot. Turn on the main burner for **ONE MINUTE MAXIMUM.**
13. Turn the gas control knob and gas service cock to "OFF".
14. Allow 30 minutes for the descale fluid to cool. With the plastic drum at floor level, open both gate valve and drum valve to allow the descale fluid to drain back into the drum.
15. Remove the gate valve from the drain port nipple and re-fit using a suitable jointing compound, the heater drain cock in the closed position.
16. Turn off all hot water draw off taps served by the water heater(s) and open all valves to fill the heater tank.
17. Fit the 20mm bore hose between the drain valve and a suitable drain. Open the drain valve fully and allow the tank to flush for a minimum of 30 minutes. Turn on all hot water draw off taps served by the heater(s) and allow to run for 5 minutes, after the drain valve is turned off.
18. Restore the gas supply and re-light the heater.

NOTE! DUE TO THE CORROSIVE NATURE OF THE DESCALE FLUID, IT IS ESSENTIAL THAT EYE PROTECTION AND PROTECTIVE CLOTHING ARE WORN. IF CONTACT IS MADE WITH THE SKIN WASH OFF IMMEDIATELY IN COLD WATER.

E. Magnesium Anodes

Two sacrificial anodes (three in the 55/435), are fitted through the top of the water vessel. These anodes are to prevent corrosion of the storage vessel. Their condition should be checked at least every 12 months.

For access to the anodes, follow the dismantling procedures described in Section C for flue baffle inspection. If partially draining the system, ensure that all water above the level of the top of the tank is removed.

Withdraw each anode using a 1 1/16" AF socket spanner. The anodes when new are 21mm dia. An anode should be replaced if at any point along its length the diameter is reduced to half, or less, of the original. Particular attention should be paid to the ends.

If the anode is encrusted with limescale it should be either cleaned or replaced.

F. Safety Valve

Check the condition and operation of the safety valve.

During Servicing

Examine the safety valve for deposit/let-by. Clean or replace as necessary (See Technical Data Tables for specification if replacing).

When Re-commissioning

Operate the safety valve ensuring no let-by when the valve is re-set and re-seated.

NB: For adjustable valves, reduce the rating until the valve operates and gives about full-bore flow. Re-set the valve and check for let-by.

For valves with lever operation, operate the lever and check for let-by when re-seated.

G. Restart

Operate the safety valve and ensure no let-by when the valve is seated (see F page 43).

Re-light and carry out commissioning checks, see Section III.

Set the thermostat control to the desired setting.

A. Gas Control Valve (See Figs. 20 to 23)

1. Turn gas control knob and gas service cock to "OFF".
2. Disconnect thermostat weep lines, pilot feed pipe, thermocouple and ECO connector block.
3. Disconnect the union joint of the service gas cock.
4. Withdraw the four fixing screws located at each end of the burner manifold and withdraw the gas control/burner manifold as a unit.
5. Unscrew the control valve from the burner manifold noting the orientation of the parts.
6. Remove the service gas cock union fitting from the control valve.
7. Re-assembly is the reverse of the above. The joints between the gas cock union fitting and the control valve to burner manifold must be made using an approved jointing compound suitable for natural gas. The gas valve must be replaced so that it is square relative to the centre line of the injectors.
8. Re-commission the heater as described in Section II checking burner pressure, gas soundness and correct operation of all components.

B. Thermostats, Upper Limit/Overheat Thermostats and Lower User Control Thermostat, Models 69/179, 63/321 and 55/435 (See Fig. 26)

NB: Model 29/120 is fitted with a single limit/overheat/User Control Thermostat (See Fig. 25)

1. Turn gas control knob and gas service cock off.
2. Drain down the heater (see instruction at the start of servicing section).
3. Disconnect the thermostat weep lines and the wires connecting the ECO in the case of the 29/120 or if the limit thermostat is being changed.
4. Rotate the thermostat anti-clockwise using a smooth jaw spanner and withdraw.
5. Re-assembly is the reverse of the above. The joint between the thermostat and the tank must be made using an approved jointing compound.
6. Re-commission the heater as described in 'Commissioning' and check for gas and water leakage at any broken/disturbed joints. Turn off and seal any leakage.

C. ECO Overheat Thermostat

This is integral with the User Thermostat on the 29/120 Model and with the limit thermostat on the other models.

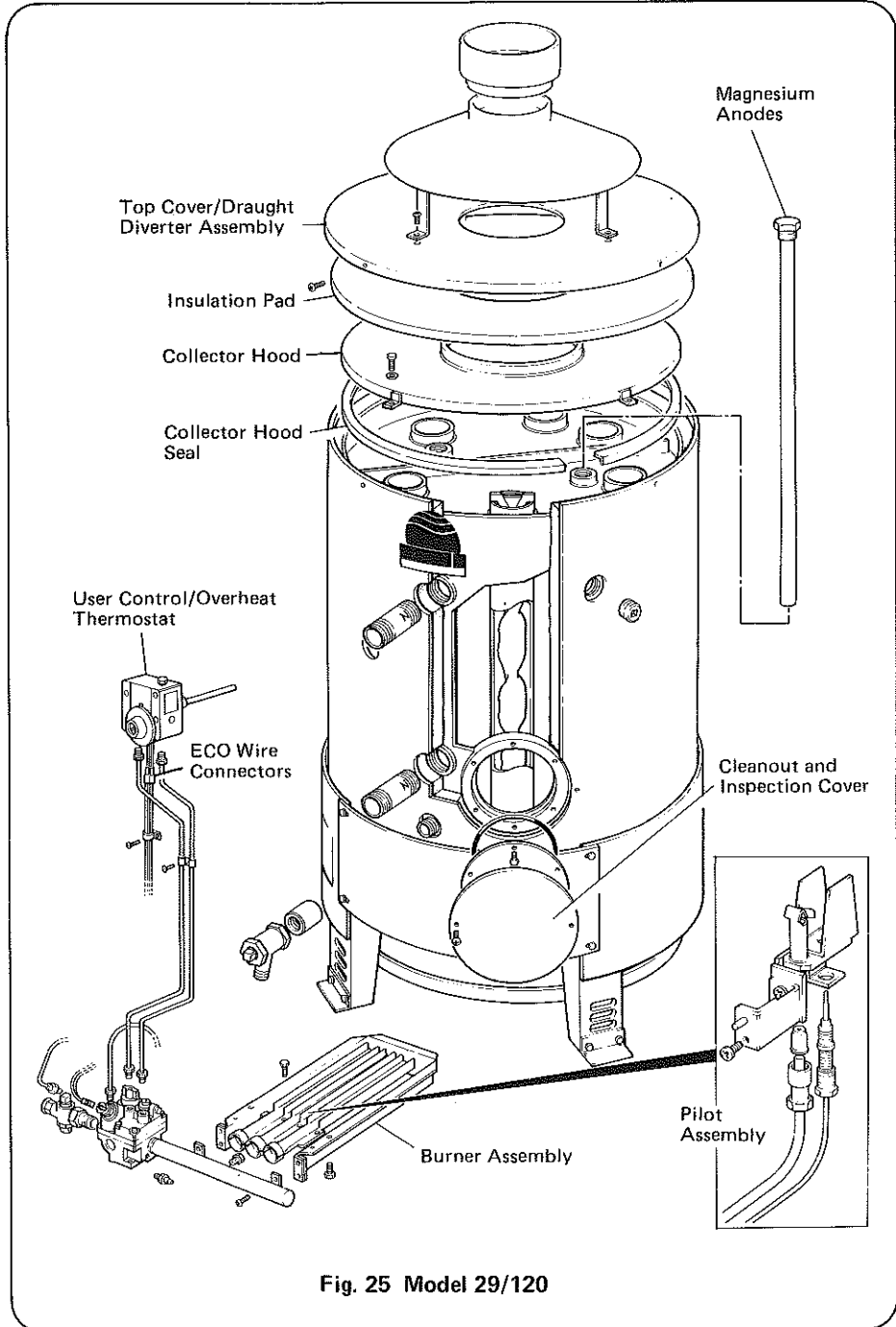


Fig. 25 Model 29/120

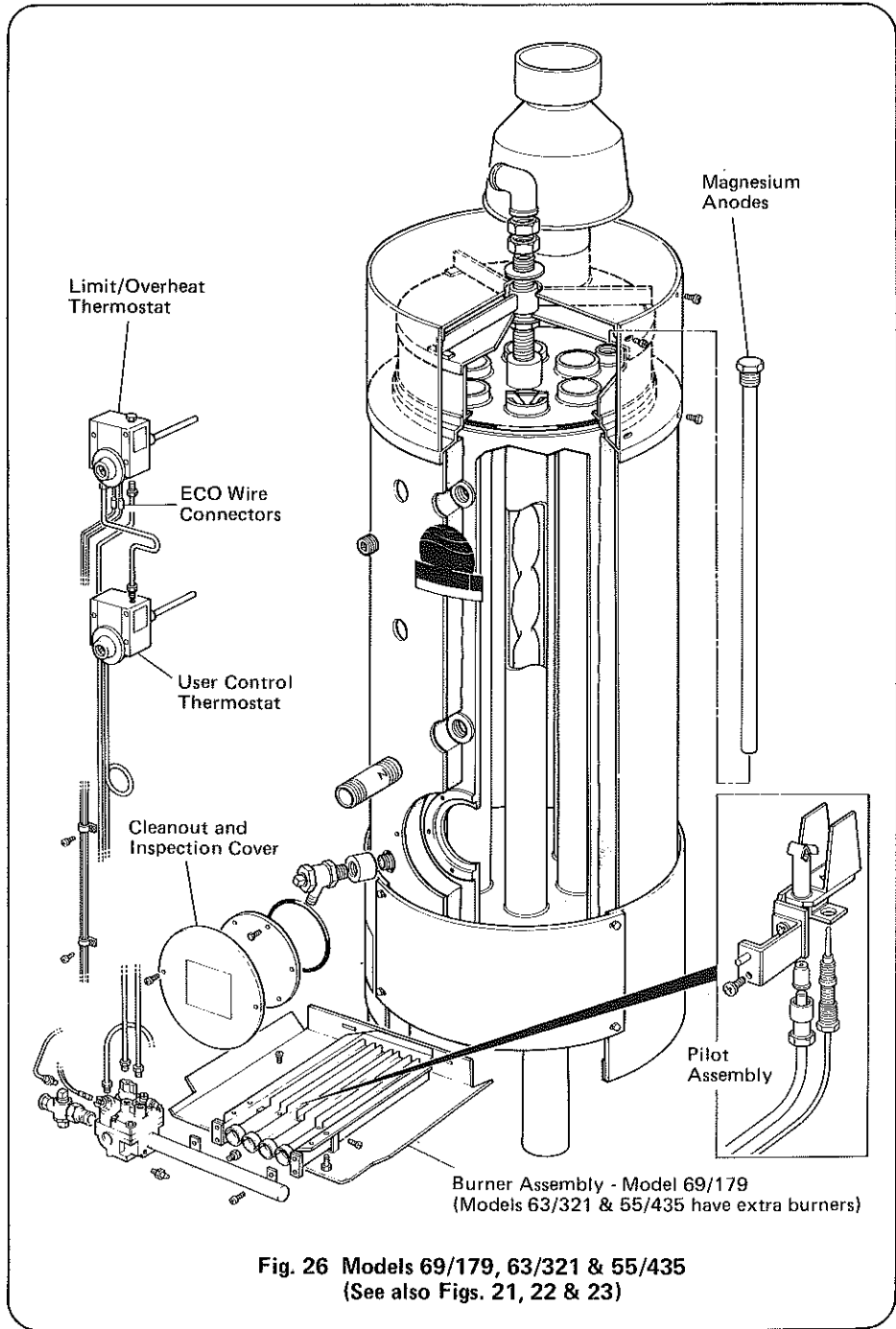


Fig. 26 Models 69/179, 63/321 & 55/435
(See also Figs. 21, 22 & 23)

D. Thermocouple/Pilot Burner/Pilot Restrictor (See Figs. 20 to 23)

1. Turn gas control knob and gas service cock to off.
2. Disconnect the thermocouple and pilot supply pipe from the gas control valve.
3. Disconnect the screws securing the deposit tray to the burner (69/179 and 63/321) and lower the tray to the floor.
4. Remove the screw securing the pilot assembly to the burner box. Push back and lower the pilot burner/thermocouple assembly clear and withdraw.
5. Unscrew the gland nut securing the thermocouple to its bracket and withdraw.
6. Unscrew the pilot feed pipe nut and withdraw the pilot pipe. The pilot injector will be left in the pilot burner and may be withdrawn by inverting the burner and allowing it to fall out.
7. Re-assemble the pilot assembly and connect the **pilot pipe only** to the gas control valve with the pilot assembly outside the heater. Turn on the gas service cock. Turn the gas control valve knob to PILOT and press the knob, whilst testing the pilot connection at the gland nut joint for soundness, with a proprietary leak detection solution. Seal any leakages and re-test. Turn the gas control valve and gas service cock to "OFF".
8. Re-assembly is the reverse of steps 2 to 4 but when replacing the thermocouple to the gas control the thread should be finger tightened plus a further 1/4 turn with a spanner. **DO NOT OVER TIGHTEN.**

Gas joints must be checked for soundness with leakage detection solution. Turn off and seal any leakages. **DO NOT SEARCH WITH A NAKED FLAME.**

Check that the pilot flame is the correct size and shape (see Fig. 17). When the thermocouple is fully heated, turn the gas control valve to "OFF" and check that the flame failure valve drops out (an audible click) in less than 60 seconds after turning off. Re-light the heater and set the thermostat to the users requirements.

E. Burner (See Figs. 20 to 23)

NB: The pilot assembly must be removed before removing the burner assembly and replaced after re-fitting the burner assembly as the pilot assembly will otherwise foul the baseplate.

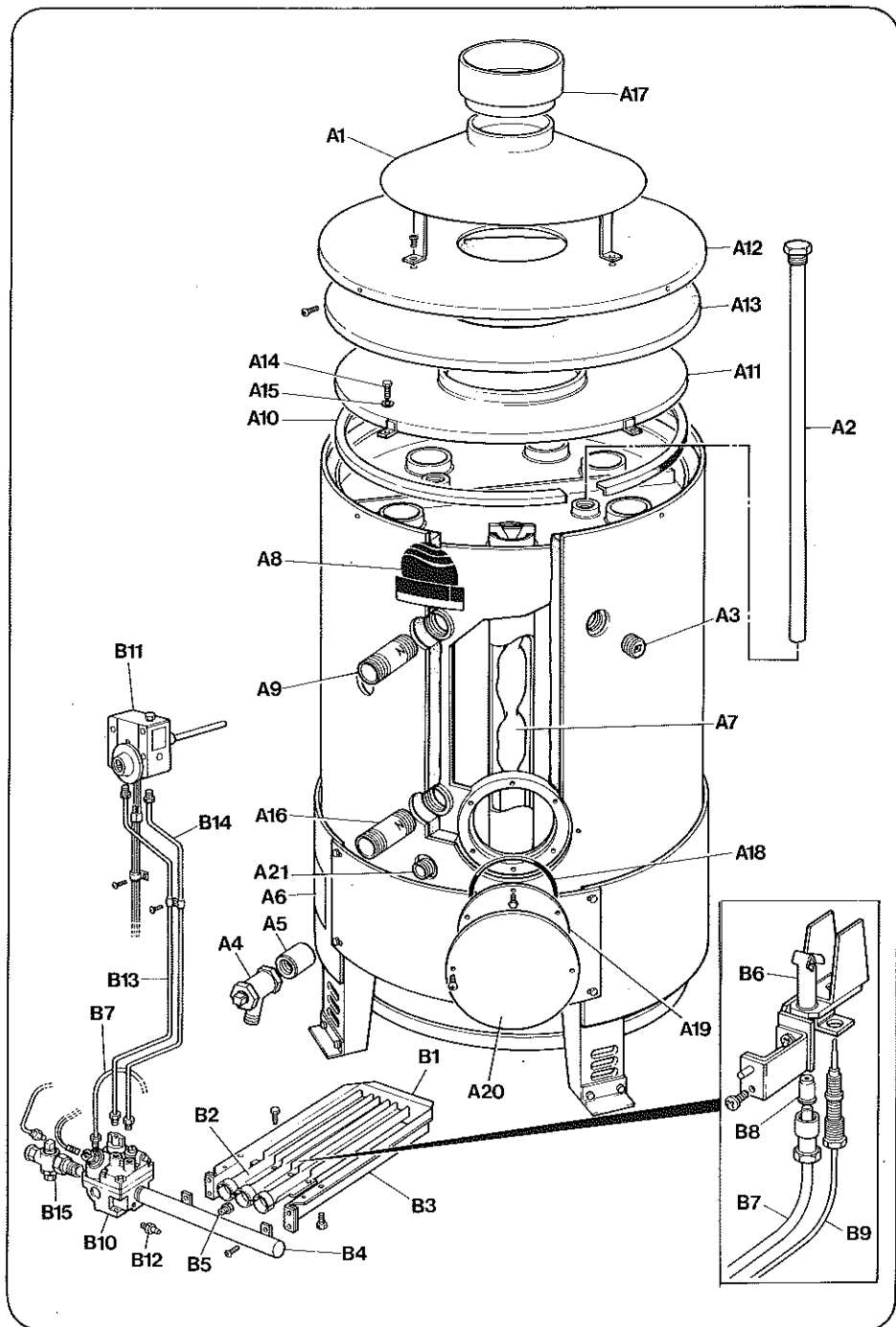
1. Turn the gas service cock and control valve knob to "OFF" and disconnect the union joint on the gas service cock.
2. Disconnect from the gas control valve the weep lines, pilot tube, thermocouple and thermocouple interrupter block.
3. (Models 69/179 and 63/321 only) Remove the two bolts securing the deposit tray to the burner tray. Lower the front edge of the deposit tray to rest on the floor.
4. Remove the screw securing the pilot assembly to the burner assembly. Push the pilot pipe/assembly towards the rear of the heater until the peg above the securing screw is out of the hole. Lower and withdraw the pilot assembly.
5. Remove the two front fixing bolts and slide out the burner assembly.
6. Remove the single burner fixing screw and draw the burner forward to clear its rear location hole.
7. Fit the new burner and secure with its single fixing screw.

8. Re-assemble in the reverse order but note:-
Re-assemble the pilot assembly and connect the pilot pipe only to the gas control valve with the pilot assembly outside the heater. Turn on the gas service cock. Turn the gas control valve knob to 'PILOT' and press the knob; whilst testing the pilot connection at the pilot assembly for soundness with a leak detection solution. Seal any leakage and re-test. Turn the gas control valve and gas service cock to "OFF".
9. Re-assembly is the reverse of steps 2 to 5 but -
DO NOT OVER TIGHTEN THE THERMOCOUPLE CONNECTION. SCREW IN FINGER TIGHT AND TIGHTEN A FURTHER 1/4 TURN USING A SPANNER.
10. Light the heater according to the lighting instructions. All gas joints must be checked for soundness using leakage detection solution. Turn off and seal any leakages.
DO NOT SEARCH WITH A NAKED FLAME.
11. Re-light the heater. Check that the pilot flame is correct, see Fig. 17. When the thermocouple is fully heated, turn the gas control valve to "OFF" and check that the flame failure valve drops out (an audible click) in less than 60 seconds from turning off.
12. Re-light the heater and set the thermostat to the users requirements.

FAULT	ACTION
<p>1. WATER DOES NOT GET HOT</p>	<ul style="list-style-type: none"> (a) Check gas service cock is open. (b) Check water valves are open. (c) Check that pilot is alight. (d) Check thermostat setting. (Reset to higher temperature). (e) Check gas pressures at burner and at gas inlet to appliance. (See below).
<p>2. PILOT FLAME FAILURE</p>	<ul style="list-style-type: none"> (a) Try to light burner as detailed in lighting instructions. (b) Pilot will not light wait 3 mins and try again then see below.
<p>NOTE: IF THE PILOT FLAME HAS FAILED AND THE WATER HAS BEEN AT HIGHER THAN NORMAL TEMPERATURE IT IS POSSIBLE THAT THE ECO HAS OPERATED IN WHICH CASE DETERMINE THE REASON FOR OVERHEATING.</p>	
<p>3. PILOT WILL NOT STAY LIT</p>	<ul style="list-style-type: none"> (a) Check gas available. (b) Check thermocouple and ECO connections. Replace if necessary. (c) Check inlet gas pressure as this may be too high or too low. Inlet gas pressure to heater multifunctional control should be 17.5 mbar (7" Wg) to 25 mbar (10" Wg). (d) Pilot jet blocked. Clean or replace pilot jet. (e) Faulty magnet coil. Replace control valve. (f) ECO safety thermostat operating at too low a temperature. Replace faulty control.
<p>4. BURNER WILL NOT LIGHT – PILOT ESTABLISHED</p>	<ul style="list-style-type: none"> (a) User thermostat setting too low. (b) Gas control knob not set to "ON". (c) Check thermostats for failure to open and gas bleed control lines for blockage. (d) If solenoid valve fitted in bleed pipe, check external controls. (e) Check gas control valve.
<p>5. THERMOCOUPLE BURNS OUT FREQUENTLY</p>	<ul style="list-style-type: none"> (a) Check pilot connection for loose joints. (b) Check that correct amount of fresh air ventilation is available. (c) Check that flue is clear and is correctly designed and that the British Gas Approved flue terminal is correctly positioned. (d) Check for presence of halogen compounds.

FAULT	ACTION
6. HEATER SOOTING, YELLOW FLAME (POOR COMBUSTION)	(a) Check gas burner pressure and injector sizes if possible, check heat input with meter and watch. (b) Clean burners and injectors. (c) Flue obstruction, clean flueways. (d) Check flue design and termination position. (e) Ventilation inadequate. Turn heater "OFF" and advise user.
7. WATER TEMPERATURE TOO HIGH	(a) Reset thermostat to lower temperature. (b) Thermostat faulty, check and replace if necessary. (c) Leak in bleed gas line. (d) Relay valve not closing, clean or replace gas valve.
8. WATER TEMPERATURE TOO LOW	(a) Reset thermostat to higher temperature. (b) Check gas pressures at burner and at gas inlet to appliance. (c) Thermostat faulty, check and replace.
9. NOT ENOUGH HOT WATER	(a) Check gas pressures at burner and at gas inlet to appliance. (b) Check amount of water being used against recovery rate given on data plate. (c) If usage is too great advise user of need for more heating capacity.
10. WATER DRIPPING FROM BASE OF HEATER	(a) Check if water stops dripping when water in heater is hot. If water stops problem is condensation caused by incorrectly designed flue or by tank cooling excessively i.e. more hot water being used than recovery rate of the heater. If so, advise user of need for more heating capacity. (b) If water continues to drip when heater is hot. Problem is a leaking joint or storage vessel.
11. RUMBLING NOISE (KETTLING)	(a) Scale formation in heater, consult water treatment specialist, heater must be descaled and suitable water treatment provided, to avoid problem re-occurring.

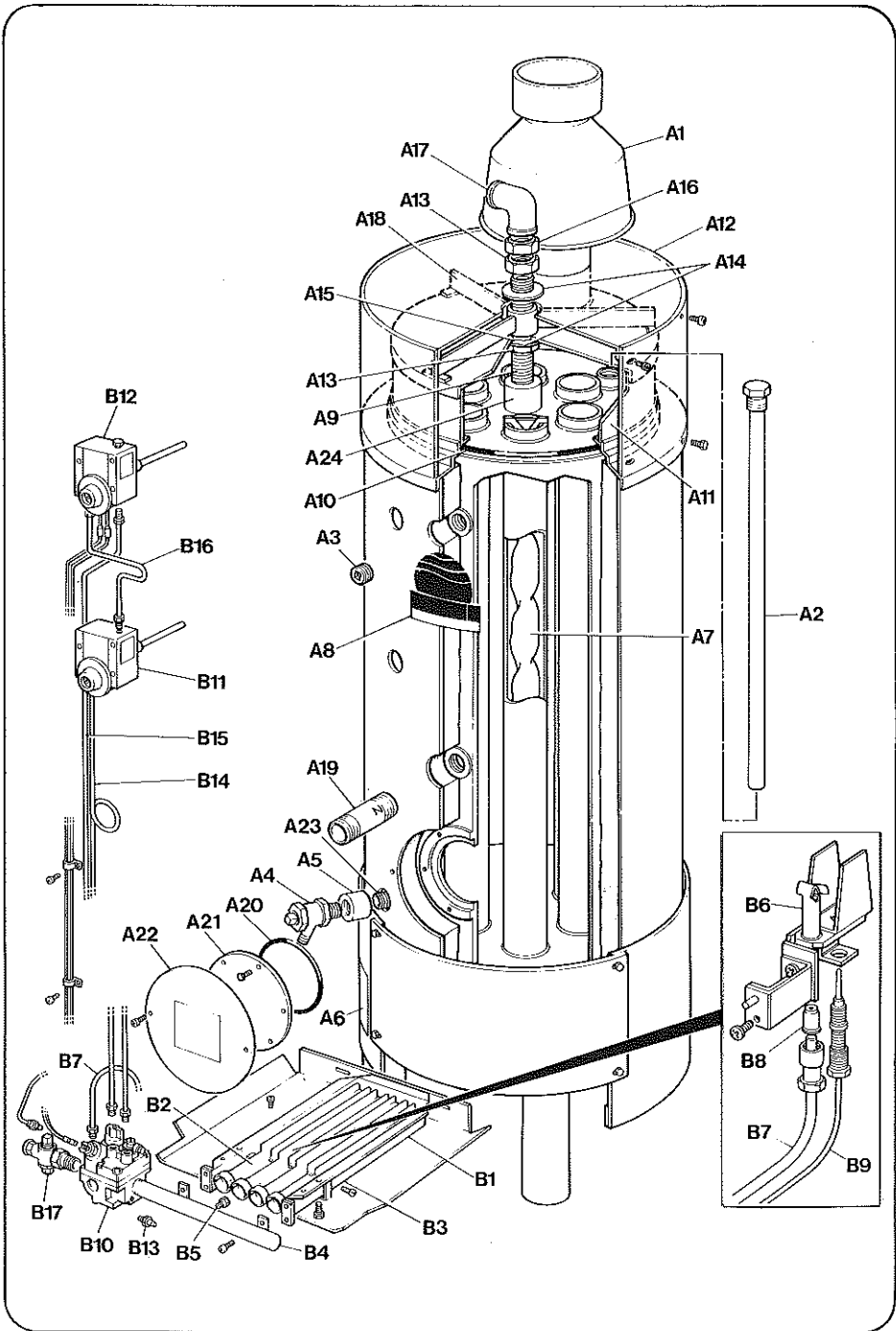
Parts Illustration - 29/120 Model



Parts List- 29/120 Model

Ref.	Part No.	Description	Qty
A1	30 19 382	Draught Diverter	1
A2	30 19 384	Sacrificial Anode	2
A3	30 19 003	Plug Return Connection	1
A4	30 19 461	Drain Cock, BS2879, 3/4"	1
A5	23 08 018	Socket Coupler 3/4"	1
A6	30 19 473	Data Badge	1
A7	30 19 387	Flue Baffle	6
A8	30 19 044	Andrews Label	1
A9	30 19 483	Hot Outlet Connection	1
A10	30 19 562	Flue Box Seal	1
A11	30 19 405	Flue Box	1
A12	30 19 406	Top Cover	1
A13	30 19 404	Insulation Pad	1
A14	01 37 053	Clamping Bolts No. 10 UNF	4
A15	03 01 003	Washer	4
A16	30 19 483	Cold Water Feed	1
A17	30 19 365	Draught Diverter Socket	1
A18	30 19 224	Cleanout Pad Seal	1
A19	30 19 225	Cleanout Pad	1
A20	30 19 226	Cleanout Pad Cover	1
A21	30 19 062	Drain Tapping Connector	1
B1	30 19 390	Burner Assembly Comprising Items B2, B3, B4 B5 and B6	1
B2	30 19 392	Burner Bar	3
B3	30 19 393	Burner Support Tray	1
B4	30 19 394	Burner Manifold	1
B5	30 19 396	Injector 2.92mm (No. 33)	3
B6	30 19 187	Pilot Assembly c/w Injector	1
B7	30 19 398	Pilot Supply Pipe	1
B8	30 19 078	Pilot Injector	1
B9	24 00 346	Thermocouple	1
B10	24 00 134	Multifunctional Control Robertshaw 7000 BGOR57CL	1
B11	24 00 301	Control Thermostat/Overheat/Limit Robertshaw CWH3LTS8 - 110 to 180°F	1
B12	24 00 528	Pressure Test Nipple	1
B13	30 19 400	Control Thermostat Pipe to Gas Control	1
B14	30 19 401	Limit/Overheat Thermostat Pipe to Gas Control Valve	1
B15	30 19 463	Gas Cock/Union 3/4" BSP	1

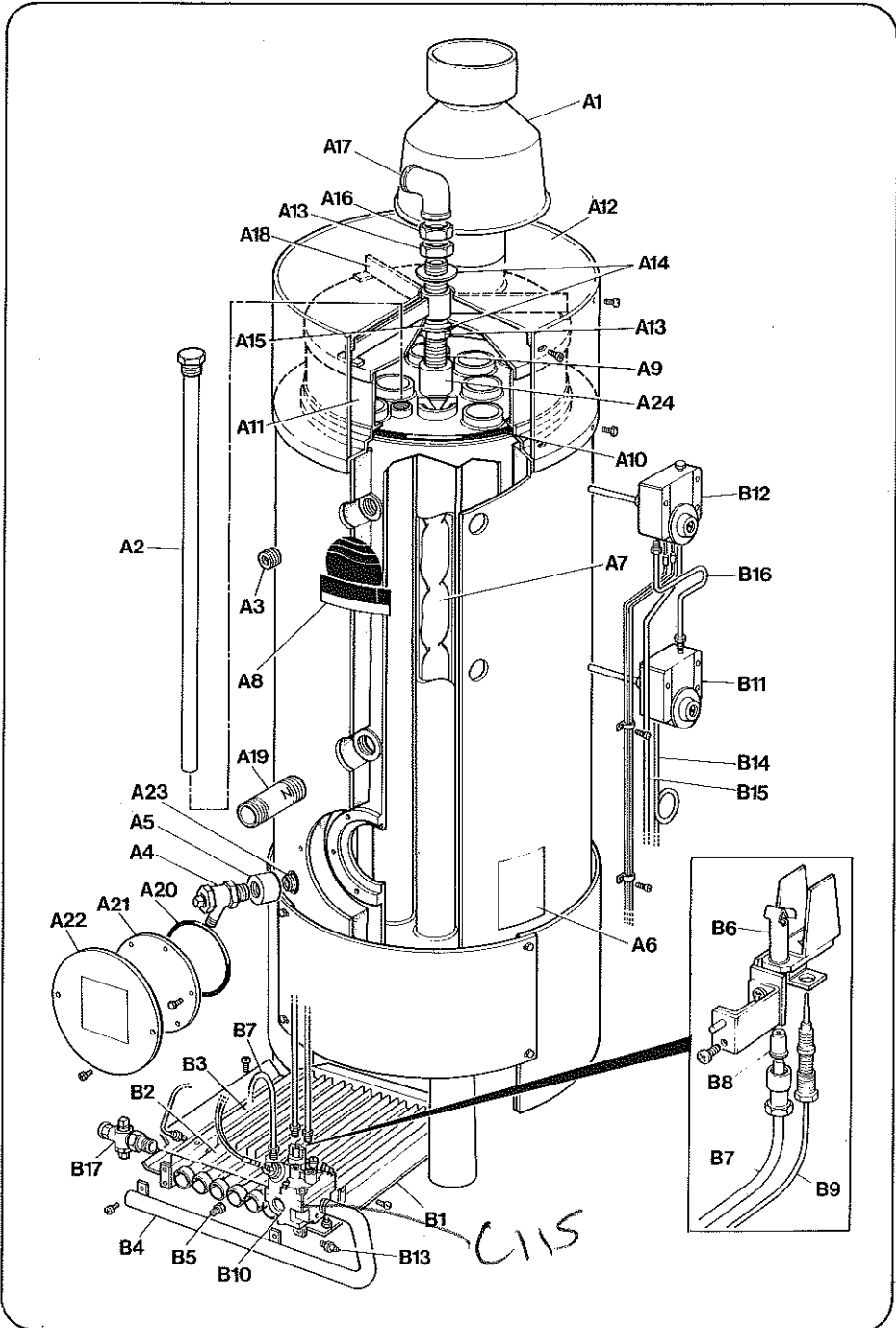
Parts Illustration - 69/179 Model



Parts List- 69/179 Model

Ref.	Part No.	Description	Qty
A1	30 19 172	Draught Diverter	1
A2	30 19 174	Sacrificial Anode	2
A3	30 19 003	Plug Return Connection	1
A4	30 19 461	Drain Cock, BS2879, 3/4"	1
A5	23 08 018	Socket Coupler 3/4"	1
A6	30 19 466	Data Badge	1
A7	30 19 574	Flue Baffle	6
A8	30 19 044	Andrews Label	1
A9	30 19 177	Hot Outlet Connection	1
A10	30 19 481	Flue Box Seal	1
A11	30 19 178	Flue Box	1
A12	30 19 479	Temperature Guard Top	1
A13	30 19 182	Clamp Nut	2
A14	30 19 495	Steel Washer	2
A15	30 19 489	Gasket Washer	1
A16	23 08 055	Backing Nut	1
A17	23 02 026	Bronze Elbow	1
A18	30 19 181	Flue Box Clamp	1
A19	30 19 483	Cold Water Feed	1
A20	30 19 224	Cleanout Pad Seal	1
A21	30 19 225	Cleanout Pad	1
A22	30 19 226	Cleanout Pad Cover	1
A23	30 19 062	Drain Tapping Connector	1
A24	30 19 490	Insulating Muff Assembly	1
B1	30 19 228	Burner Assembly Comprising Items B2, B3, B4 B5 and B6	1
B2	30 19 392	Burner Bar	4
B3	30 19 230	Burner Support Tray	1
B4	30 19 184	Burner Manifold	1
B5	30 19 274	Injector 3.00mm (No. 31)	4
B6	30 19 187	Pilot Assembly c/w Injector	1
B7	30 19 232	Pilot Supply Pipe	1
B8	30 19 078	Pilot Injector	1
B9	24 00 346	Thermocouple	1
B10	24 00 134	Multifunctional Control Robertshaw 7000 BGOR57CL	1
B11	24 00 136	Control Thermostat Robertshaw CWH3L 110 to 180°F	1
B12	24 00 137	Limit/Overheat Thermostat Robertshaw CWH3LTS8 180°F	1
B13	24 00 528	Pressure Test Nipple	1
B14	30 19 234	Control Thermostat Pipe to Gas Control	1
B15	30 19 235	Limit/Overheat Thermostat Pipe to Gas Control Valve	1
B16	30 19 529	Connecting Pipe Control to Limit/Overheat Thermostat	1
B17	30 19 463	Gas Cock/Union 3/4" BSP	1

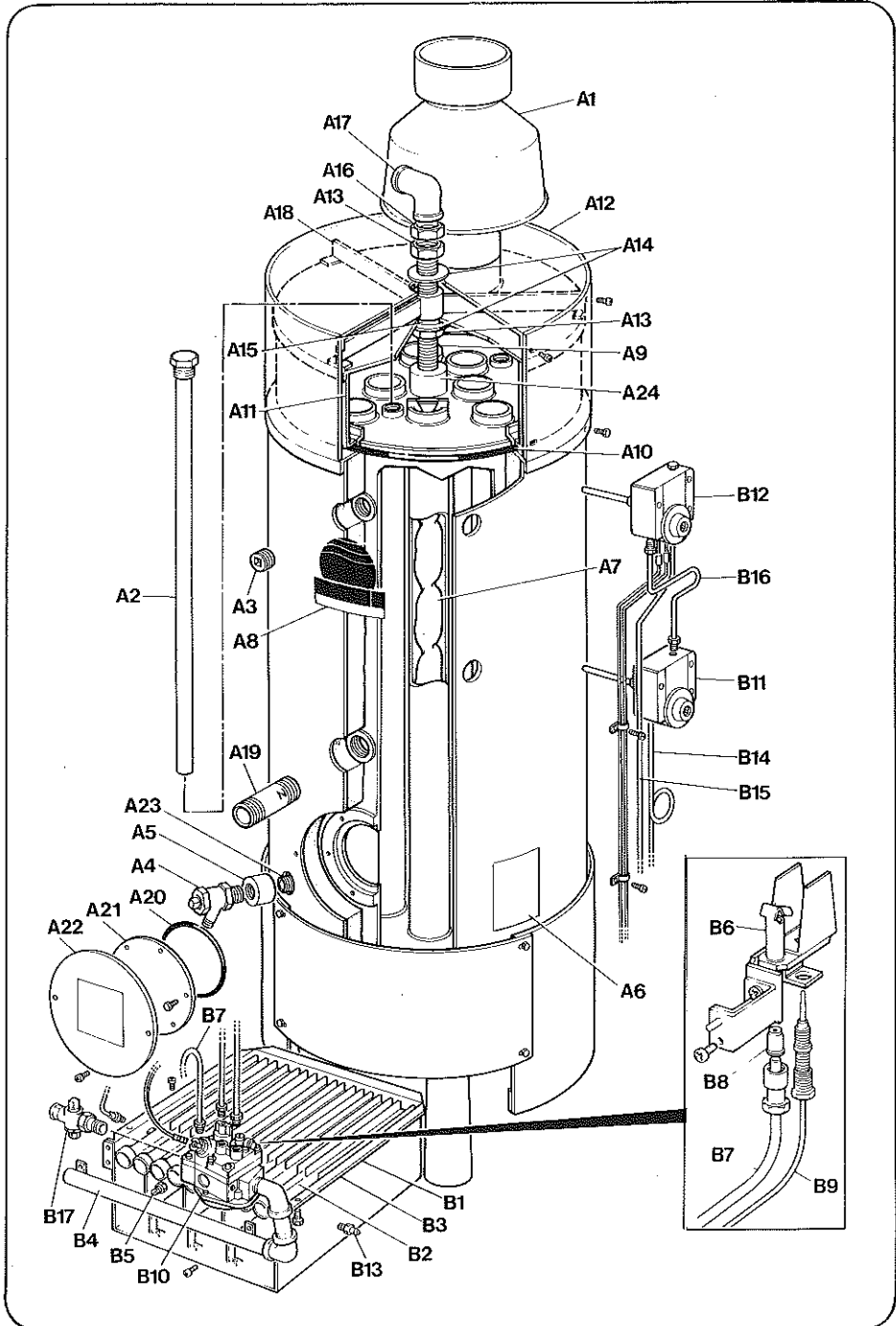
Parts Illustration - 63/321 Model



Parts List-63/321 Model

Ref.	Part No.	Description	Qty
A1	30 19 173	Draught Diverter	1
A2	30 19 174	Sacrificial Anode	2
A3	30 19 003	Plug Return Connection	1
A4	30 19 461	Drain Cock, BS2879, 3/4"	1
A5	23 08 018	Socket Coupler 3/4"	1
A6	30 19 472	Data Badge	1
A7	30 19 574	Flue Baffle	11
A8	30 19 044	Andrews Label	1
A9	30 19 177	Hot Outlet Connection	1
A10	30 19 481	Flue Box Seal	1
A11	30 19 179	Flue Box	1
A12	30 19 477	Temperature Guard Top	1
A13	30 19 182	Clamp Nut	2
A14	30 19 495	Steel Washer	2
A15	30 19 489	Gasket Washer	1
A16	23 08 055	Backing Nut	1
A17	23 02 026	Bronze Elbow	1
A18	30 19 181	Flue Box Clamp	1
A19	30 19 483	Cold Water Feed	1
A20	30 19 224	Cleanout Pad Seal	1
A21	30 19 225	Cleanout Pad	1
A22	30 19 226	Cleanout Pad Cover	1
A23	30 19 062	Drain Tapping Connector	1
A24	30 19 491	Insulating Muff Assembly	1
B1	30 19 229	Burner Assembly Comprising Items B2, B3, B4 B5 and B6	1
B2	30 19 392	Burner Bar	7
B3	30 19 231	Burner Support Tray	1
B4	30 19 185	Burner Manifold	1
B5	30 19 274	Injector 3.00mm (No. 31)	7
B6	30 19 187	Pilot Assembly c/w Injector	1
B7	30 19 233	Pilot Supply Pipe	1
B8	30 19 078	Pilot Injector	1
B9	24 00 346	Thermocouple	1
B10	24 00 134	Multifunctional Control Robertshaw 7000 BGOR57CL	1
B11	24 00 136	Control Thermostat Robertshaw CWH3L 110 to 180°F	1
B12	24 00 137	Limit/Overheat Thermostat Robertshaw CWH3LTS8 180°F	1
B13	24 00 528	Pressure Test Nipple	1
B14	30 19 237	Control Thermostat Pipe to Gas Control	1
B15	30 19 236	Limit/Overheat Thermostat Pipe to Gas Control Valve	1
B16	30 19 529	Connecting Pipe Control to Limit/Overheat Thermostat	1
B17	30 19 463	Gas Cock/Union 3/4" BSP	1

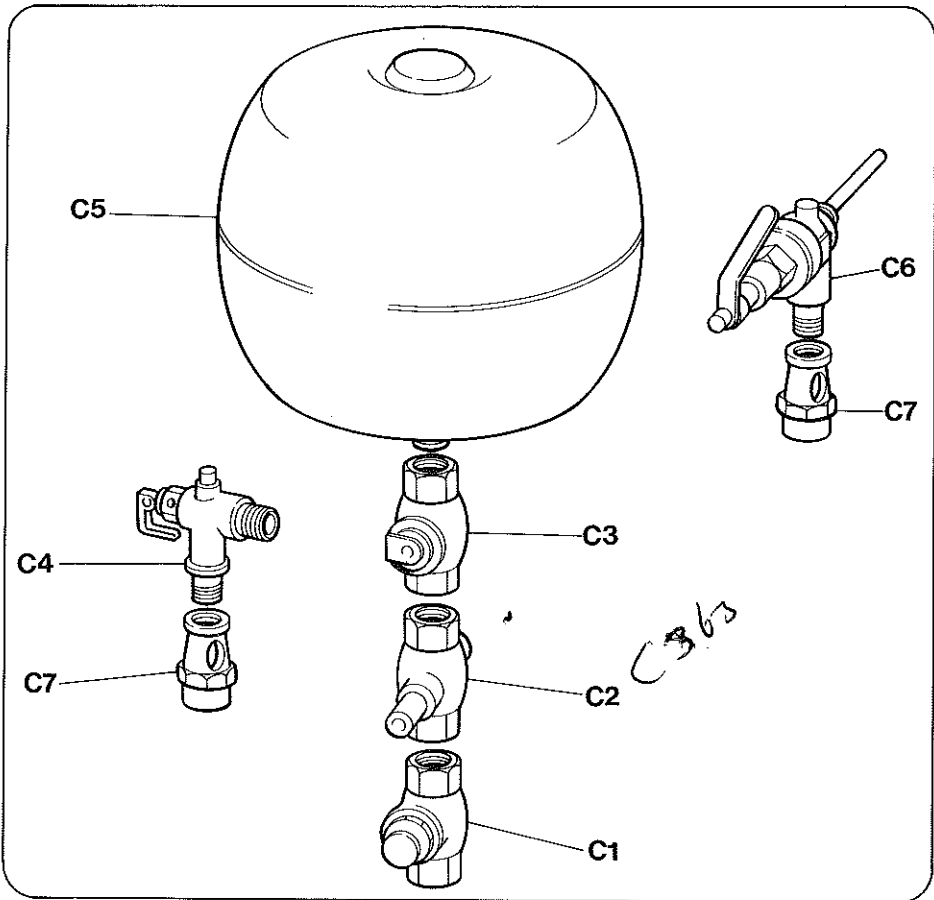
Parts Illustration - 55/435 Model



Parts List-55/435 Model

Ref.	Part No.	Description	Qty
A1	30 19 487	Draught Diverter	1
A2	30 19 174	Sacrificial Anode	3
A3	30 19 003	Plug Return Connection	1
A4	30 19 461	Drain Cock, BS2879, 3/4"	1
A5	23 08 018	Socket Coupler 3/4"	1
A6	30 19 467	Data Badge	1
A7	30 19 574	Flue Baffle	16
A8	30 19 044	Andrews Label	1
A9	30 19 482	Hot Outlet Connection	1
A10	30 19 480	Flue Box Seal	1
A11	30 19 532	Flue Box	1
A12	30 19 475	Temperature Guard Top	1
A13	30 19 182	Clamp Nut	2
A14	30 19 495	Steel Washer	2
A15	30 19 489	Gasket Washer	1
A16	23 08 055	Backing Nut	1
A17	23 02 026	Bronze Elbow	1
A18	30 19 484	Flue Box Clamp	1
A19	30 19 483	Cold Water Feed	1
A20	30 19 224	Cleanout Pad Seal	1
A21	30 19 225	Cleanout Pad	1
A22	30 19 226	Cleanout Pad Cover	1
A23	30 19 062	Drain Tapping Connector	1
A24	30 19 492	Insulating Muff Assembly	1
B1	30 19 371	Burner Assembly Comprising Items B2, B3, B4 B5 and B6	1
B2	30 19 392	Burner Bar	9
B3	30 19 377	Burner Support Tray	1
B4	30 19 395	Burner Manifold	1
B5	30 19 186	Injector 3.25mm (No. 30)	9
B6	30 19 187	Pilot Assembly c/w Injector	1
B7	30 19 399	Pilot Supply Pipe	1
B8	30 19 078	Pilot Injector	1
B9	24 00 346	Thermocouple <i>2 133</i>	1
B10	24 00 295	Multifunctional Control Robertshaw 7000 GORHC 57A	1
B11	<i>C123</i> 24 00 136	Control Thermostat Robertshaw CWH3L 110 to 180°F	1
B12	24 00 137	Limit/Overheat Thermostat Robertshaw CWH3LTS8 180°F	1
B13	24 00 528	Pressure Test Nipple	1
B14	30 19 237	Control Thermostat Pipe to Gas Control	1
B15	30 19 236	Limit/Overheat Thermostat Pipe to Gas Control Valve	1
B16	30 19 529	Connecting Pipe Control to Limit/Overheat Thermostat	1
B17	30 19 464	Gas Cock/Union 1" BSP	1

Parts Illustration - Unvented Systems Kit



Parts List - Unvented Systems Kit

Ref.	Part No.	Description	Qty
	80 000 106	Complete Unvented Systems Kit Comprising Items C1 to C7	1
C1	30 19 430	Line Strainer 1" LS100	1
C2	30 19 432	Pressure Limiting Valve 1" PS100	1
C3	30 19 431	Check Valve 1" NR100	1
C4	30 19 270	Expansion Valve 3/4"	1
C5	30 19 276	Expansion Vessel 3/4"	1
C6	30 19 460	Temperature/Pressure Relief Valve 1" 500T	1
C7	30 19 465	Tundish 1"/1 1/2"	2