

Dorchester DR-SE Range of Hot Water Storage Heaters

**Open Flue, Direct Gas Fired Hot Water Storage Heaters with
Self Energised Controls and Permanent
Pilot Ignition for Domestic Hot Water Installations**

Installation, Commissioning and Servicing Instructions

DORCHESTER DR-SE 16, 19 MODELS

NATURAL GAS I_{2H} LPG I₃₊

**NOTE: THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE INSTALLING,
COMMISSIONING, OPERATING OR SERVICING EQUIPMENT.**

**THIS WATER HEATER IS FOR USE ON GROUP H NATURAL GAS (2ND FAMILY) I^{2H} OR
LPG (3RD FAMILY) I³⁺. PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN
DOCUMENT IS FOUND RELATING TO SPECIFIC GAS TO BE FIRED BEFORE FIRING
HEATER.**

THIS WATER HEATER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.

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1. GENERAL

1.1 Introduction

Construction of the Dorchester DR-SE heaters is in accordance with the European standards for gas fired water heaters for sanitary use (EN 89). The heaters comply with the European Directive for Gas Appliances and are permitted to bear the CE mark.

It is an appliance with an open flue without a fan and with combustion products discharge safety device (category B_{11BS}). The heaters are suitable for use with a working pressure of up to 8 bar but on un-vented systems this is limited to 5.5 bar due the pre-set of the un-vented kit. The cylindrical tank is made from sheet steel that contains one vertically placed flue tube.

To protect against corrosion, the inside of the tank has a glass liner. The tank is also fitted with a magnesium anode for extra protection against corrosion. A thick insulating layer between the tank and the steel jacket helps to reduce heat loss.

When the heater is completely filled with water, the system has continuous water pressure. When hot water is drained from the heater, cold water immediately enters the heater. For effective heat transfer, four flue baffles are included in the flue tube. Heat from the flue gases is transferred to the water by radiation and convection. The flue gases are discharged by natural thermal draught (see figure 1).

Dead legs on a hot water installation are undesirable. Where possible they must be avoided. Where the inclusion on the system of a dead leg is unavoidable the following restrictions apply:

- For pipes not exceeding 19 mm inside diameter; maximum length of dead leg permitted 12.0 metres;
- For pipes exceeding 19 mm but not exceeding 25 mm inside diameter; maximum length of dead leg 7.5 metres;
- For pipes with an inside diameter exceeding 25 mm; maximum dead leg 3.0 metres.

1.1.1 Delivery

All Dorchester heaters are factory assembled and delivered individually packed and wrapped in polythene on a wooden pallet. Within the packaging, wrapped separately is the draught diverter complete with the combustion products discharge safety device attached by its capillary sensor. A separate package, stuck to the pallet, contains the installers kit comprising a ½" manual gas shut off valve, a ¾" drain valve with Tee and plug, a special ¾" NPT to BSP threaded nipple and a plastic cover for the drain cut-out in the casing.

1.1.2 Options

The Dorchester DR-SE heaters can be supplied with the following additional variations, either ready fitted or for on-site assembly.

- a) LPG – The heaters can be supplied adjusted for use on propane or butane – see section 2.6. It is important that the heater is correctly adjusted for the gas to be fired.
- b) Time Clock Control – The standard heater operates automatically without the need for a connected electrical supply by a self-energised gas control valve. A conversion kit can be supplied that provides a 230 volt single phase solenoid valve between the gas control valve and the burner enabling the heater to be controlled from a time clock or interlock (i.e. fan dilution flow switch).
- c) Un-vented supply – The heaters can be supplied with a purpose designed and sized un-vented kit comprising pressure reducing valve, non-return valve, expansion vessel, expansion relief valve and temperature/pressure relief valve, to enable the heater to be coupled directly to the mains water.
- d) Top to Bottom Recirculation – In order to give enhanced temperature control to aid compliance with HSE guidance and Health Technical Memoranda, a pump circulation kit can be supplied comprising 230 volt single phase pump, pipe work and sufficient fittings to connect between the hot water flow and the bottom drain connection.
- e) Electrical Anode Protection - The electrical conductivity of water, measured in micro siemens per centimetre, is an important parameter in sacrificial anode protection. The lower the value, the less effective the magnesium anode becomes. In areas where the conductivity is likely to be less than 200 µS/cm, it is recommended that the magnesium anode be replaced with an electrically powered inert anode that requires an uninterrupted electrical supply to its control unit. A kit (normally factory fitted) can be supplied comprising anode, additional control panel and interconnecting wiring.

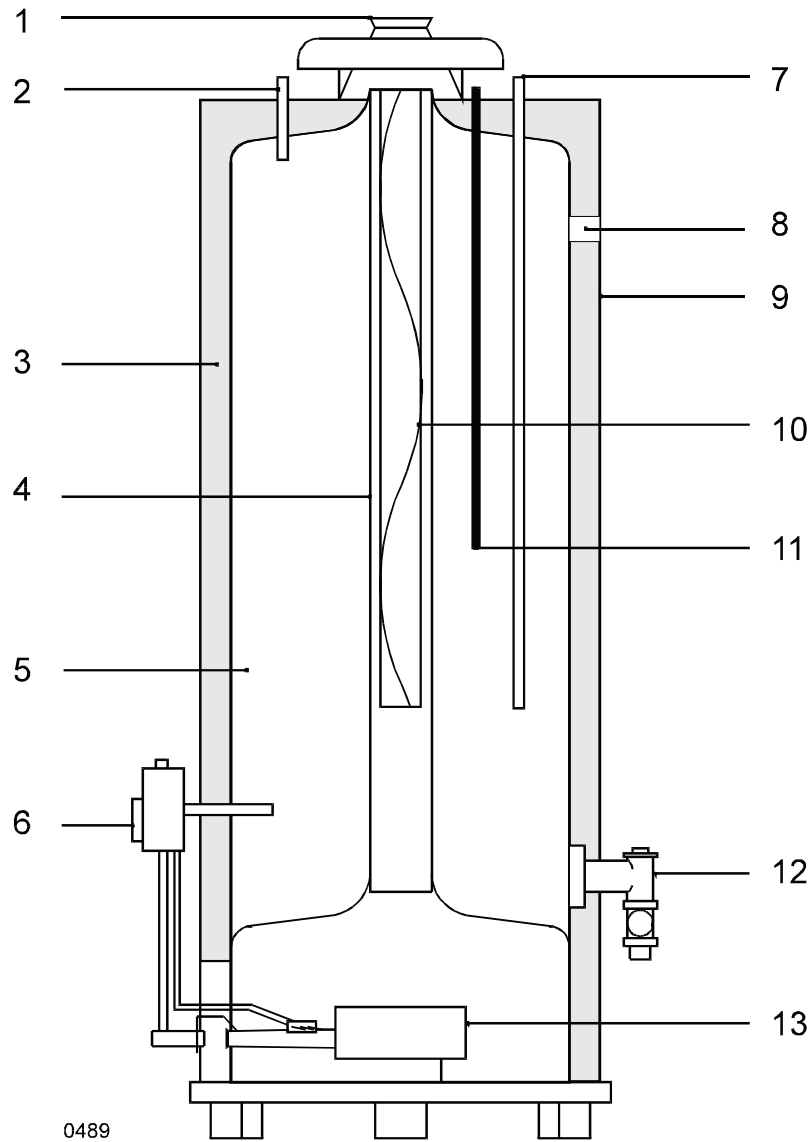


Figure 1 - Cross-section of the heater.

- | | | | |
|----|-----------------------------------|-----|---|
| 1) | Draught diverter | 9) | Outer casing |
| 2) | Hot water outlet | 10) | Flue baffle |
| 3) | Insulation | 11) | Magnesium anode |
| 4) | Flue tube | 12) | Drain valve and secondary return connection |
| 5) | Glass lined tank | 13) | Atmospheric burner |
| 6) | Gas control valve | | |
| 7) | Cold water inlet (c/w inlet tube) | | |
| 8) | T&P valve connection | | |

1.2 Technical description

1.2.1 Gas control valve

The water heater is equipped with a gas control valve consisting of a thermo-electric pilot flame safeguard, pilot flame pressure regulator, burner pressure regulator, a control thermostat (adjustable between 40 °C and 81 °C) and a safety thermostat (set at 90 °C). This simple and secure gas valve controls the supply of gas to the burner in response to the demand from the integral thermostat. The valve is suitable for second and third family gases with a maximum inlet pressure of 50 mbar.

1.2.2 Combustion products discharge safety device

The heater has been fitted with a combustion products discharge safety device. It is the function of the safety device to prevent flue gases from the water heater entering the room where the water heater has been placed, instead of passing through the flue to outside atmosphere.

The gas supply is disconnected as soon as the device reacts to hot gases flowing over the sensor. Activation causes an open circuit on the thermocouple that shuts off the pilot and closes the gas valve. After the cause of the re-entry of flue gases has been traced the device can be put back into operation by pressing its reset button. The heater will require the pilot re-lighting in order to resume operation. If this failure occurs frequently, it indicates that the flue suffers from down draught conditions. It is recommended that a competent person carry out the necessary remedial action. See figure 2.

Important

The combustion products discharge safety device must never be put out of operation. Re-entry of flue gases to the building could be harmful and cause poisoning or death.

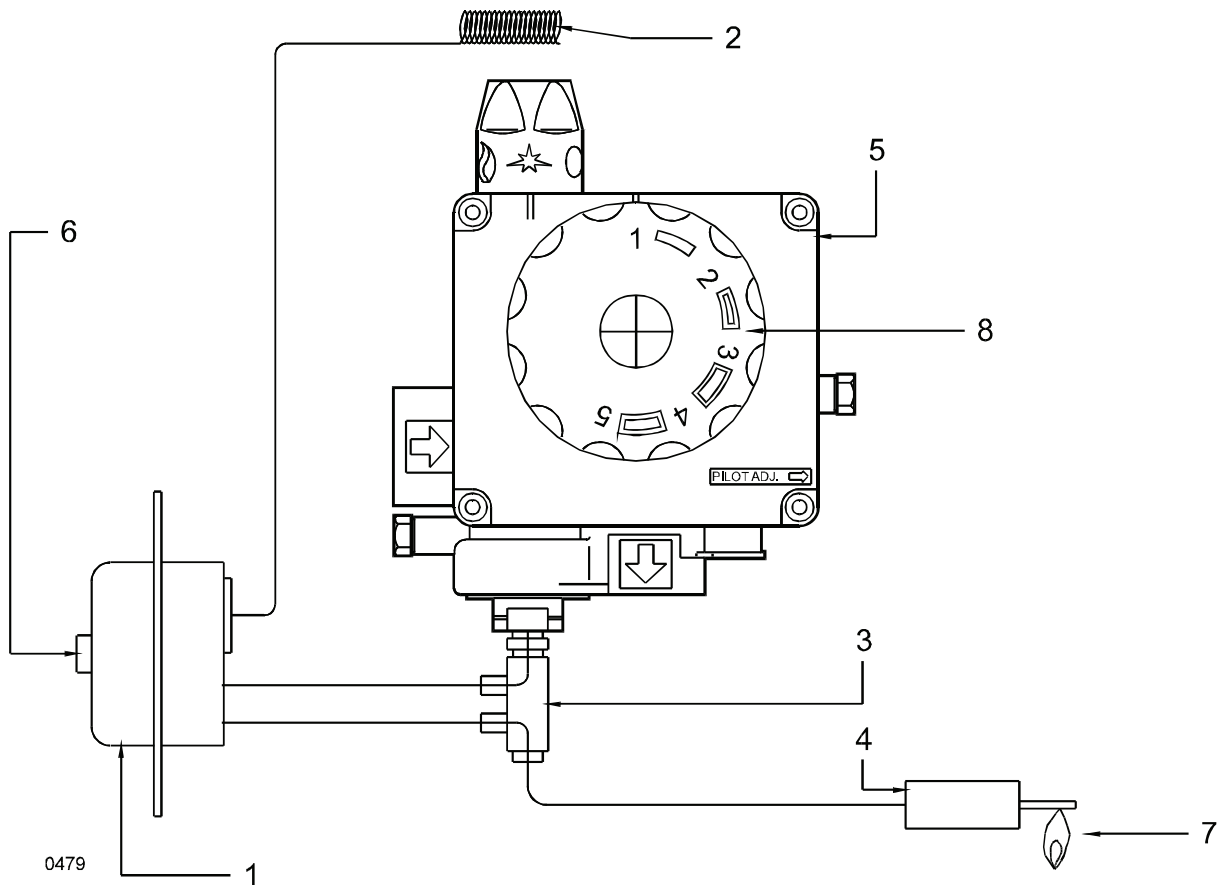


Figure 2 - Gas control block with T.R.S.

- 1) T.R.S. thermostat
- 2) Sensor T.R.S. thermostat
- 3) Thermocouple with built-in interrupter
- 4) Thermocouple
- 5) Gas control block
- 6) Reset button
- 7) Pilot burner
- 8) Temperature regulator knob

1.3 Technical information

1.3.1 Dimensions

The flue pipe, must at least have the same diameter as the spigot on the water heater (dimension G).
 All dimensions are given in mm. (rounded off to 5 mm).
 See figure 3.

Dimensions	DR-SE 16	DR-SE 19
A	1585	1780
B	1450	1640
D	645	675
E	735	765
G	130	130
K	375	375
M	1505	1685
N	1505	1685
R	285	285
S	1280	1460
1	Cold water inlet	
2	Hot water outlet	
3	Gas control valve	
4	Drain valve	
5	T&P valve tapping	

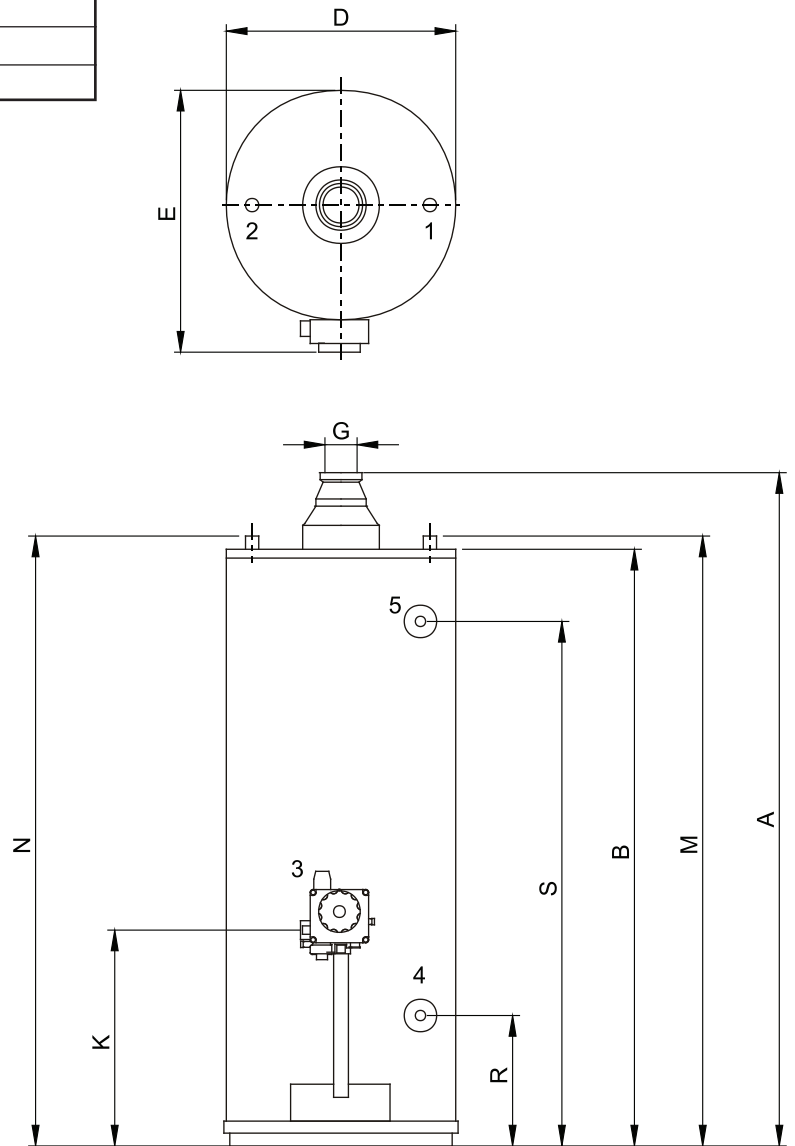


Figure 3 - Dimensions

1.3.2 Technical data

Device category II2H3+

Description	Unit	DR-SE 16	DR-SE 19
DATA G20 – 20 mbar:			
Nominal output	kW	18.9	20.1
Nominal load (gross)	kW	24.7	26.2
Supply pressure (G20)	mbar	20	20
Burner pressure (G20)	mbar	12.5	8.7
Gas consumption (G20)*	m ³ /h	2.4	2.5
Diameter main orifice (G20)	mm	3.90	4.50
Diameter pilot orifice (G20)x	mm	2x 0.27	2x 0.27
Heating time $\Delta T = 45$ K	min	43	55
DATA G30 – 30 mbar:			
Nominal output	kW	18.9	20.1
Nominal load (gross)	kW	24.1	25.6
Supply pressure (G30)	mbar	30	30
Gas consumption (G30)*	kg/h	1.8	1.9
Diameter main orifice (G30)	mm	2.30	2.35
Diameter pilot orifice (G30)	mm	2x 0.16	2x 0.16
Heating time $\Delta T = 45$ K	min	-	-
DATA G31 – 37 mbar:			
Nominal output	kW	17.6	19.1
Nominal load (gross)	kW	22.5	24.5
Supply pressure (G31)	mbar	37	37
Gas consumption (G31)*	kg/h	1.8	1.9
Diameter main orifice (G31)	mm	2.30	2.35
Diameter pilot orifice (G31)	mm	2x 0.16	2x 0.16
Heating time $\Delta T = 45$ K	min	-	-
GENERAL:			
Storage capacity	litres	278	372
Water connections **		1-11.5 NPT	1¼-11.5 NPT
Gas connection		Rp ½	Rp ½
Drain valve		¾-14 NPT	¾-14 NPT
Anode		¾-14 NPT	¾-14 NPT
T&P-plug		¾-14 NPT	¾-14 NPT
Maximum operating pressure	bar	8	8
Maximum operating pressure un-vented	bar	5,5	5,5
Nominal operating pressure un-vented	bar	3,5	3,5
Empty weight	kg	117	144

* Gas consumption at 1013,25 mbar and 15 °C

** For a leak proof connection to an NPT thread, a coupling with threads to ISO 228/1 can be used

2. FOR THE INSTALLER

2.1 Installation

This water heater must be fitted in a location that will permit the provision of an approved flue system and adequate ventilation.

A service clearance of 50 cm at the sides and rear of the unit and 100 cm at the front of the unit must be allowed for ease of servicing. Adequate distance must be allowed between the top of the unit and any obstruction or ceiling to allow the flue baffle and anode to be inspected, cleaned or, in the case of the anode, replaced if necessary.

The water heater must stand on a level heat resistant surface that has sufficient strength to support the weight of the unit when full of water and insulated in accordance with local by laws and Building Regulations. The heater must stand on its feet as supplied and the space beneath the bottom casing kept clear as this is the path for combustion air to enter the heater.

This water heater must not be installed in a bathroom, bedroom or in a cupboard opening on to such rooms. This water heater must not be installed in any area where flammable materials are used or stored.

Insufficient ventilation can give rise to a risk of fire, explosion or suffocation. If in doubt consult the national and local regulations governing the installation of gas appliances or local gas service organisation.

2.1.1 Regulations and Related Documents

Gas Safety Installations and Use Regulations 1998, (as amended). It is law that competent persons, in accordance with the above regulations install all gas appliances. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to make sure that this law is complied with. The installation of the boiler **MUST** be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, IEE Regulations and the Water Supply (water fittings) Regulations. The installation must also be in accordance with any relevant requirements of the HSE, local gas region and local authority and the relevant recommendations of the following documents: -

British Standards

BS 6891: Specification for the installation of low-pressure gas pipe work of up to 28 mm (R1) in domestic premises (2nd family gas). For larger installations see **IGE/UP/2** below.

BS 6798: Specification for installation of gas-fired boilers of rated input not exceeding 70 kW net.

BS 6644: Specification for installation of gas-fired hot water boilers of rated inputs between 70 kW and 1.8 MW (net) (2nd and 3rd family gases).

BS 6700: Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

BS EN 806-2: Specification for installations inside buildings conveying water for human consumption. Part 2: Design.

BS 5546: Specification for installation of hot water supplies for domestic purposes, using gas-fired appliances of rated input not exceeding 70 kW.

BS 5440: Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases).

Part 1: Flues. Part 2: Ventilation.

Institute of Gas Engineers and Managers Publications IGE/UP/1 Soundness testing and purging of industrial and commercial gas installations.

IGE/UP/1A Soundness testing and direct purging of small low-pressure industrial and commercial natural gas installations.

IGE/UP/2 Gas installation pipe work, boosters and compressors on industrial and commercial premises.

IGE/UP/10 Installation of gas appliances in industrial and commercial premises. **Part 1:** flued appliances.

CIBSE Publications:- “CIBSE Guide”
Section B4 : Water Service Systems.

Some chemicals produce vapours that can cause rapid failure of main and pilot burners and storage tanks if they are drawn into the combustion air supply.

Therefore if this water heater is to be used to supply hot water to:

- hairdressers,
- dry cleaners,
- industrial degreasing processes or any other area where compounds containing halogens are used and stored. Care must be taken that all primary and secondary air is drawn from outside atmosphere free of these contaminants. For further advice contact Hamworthy Heating Limited.

2.1.2 Water circulation system

Dorchester water heaters are suitable for connection to vented, un-vented and pumped pressurised systems. In each case appropriate valves and fittings must be used to make sure the system complies with the requirements of the water fittings and appropriate building regulations. When fitting it is essential the rules of 'good practice' are applied at all stages of installation.

Water quality

The water heater is intended for heating drinking water. The drinking water must comply with the regulations governing drinking water for human consumption. The table gives an overview of the specifications.

Water composition

Hardness (alkaline earth ions)	> 1.00 mmol/l: • German hardness > 5.6 °dH • French hardness > 10.0 °fH • English hardness > 7.0 °eH • > 100 mg/l CaCO ₃
Conductivity	> 125 µS/cm
Acidity (pH value)	7.0 < pH value < 9.5

Note: If the water specifications deviate from those stated in the table, then the tank protection cannot be guaranteed.

Important

Where water softeners are used on the hot water supply, make sure that the hardness remains between 60 and 100 ppm CaCO₃. In soft water areas with conductivity less than 200 µS/cm, the electrically powered anode system must be used.

Drain connection

The fittings for the drain are supplied in the installation kit stuck to the wooden pallet. Select the hexagon nipple and screw the thread nearest the groove in the nipple into the heater drain opening using suitable sealant. Fit the plastic cover over the nipple and push up tight to the heater before assembling any other parts.

Note: the hexagon nipple is a thread adapter between 3/4" NPT (nearest the groove cut into the hexagon) and 3/4" BSPT.

Arrange the tee, plug and drain as shown in figure 4. The actual orientation of the tee depends on whether a system return is required and whether a top to bottom circulator kit is to be fitted.

Vented systems (See figure 5)

If the heater is to be connected to a cold feed tank or cistern the hot water supply pipe must include an open vent. Ideally the vent pipe must be linked to a separate tundish/drain or else to discharge over the cold water feed tank. The cold feed cistern must have an actual capacity of greater volume than the hourly recovery rate of the water heater(s), which it supplies. The minimum actual capacity is 50 gallons or 227 litres.

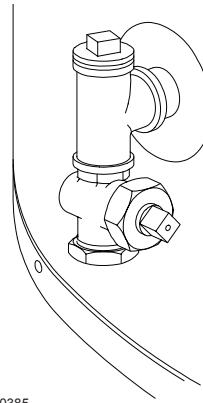


Figure 4

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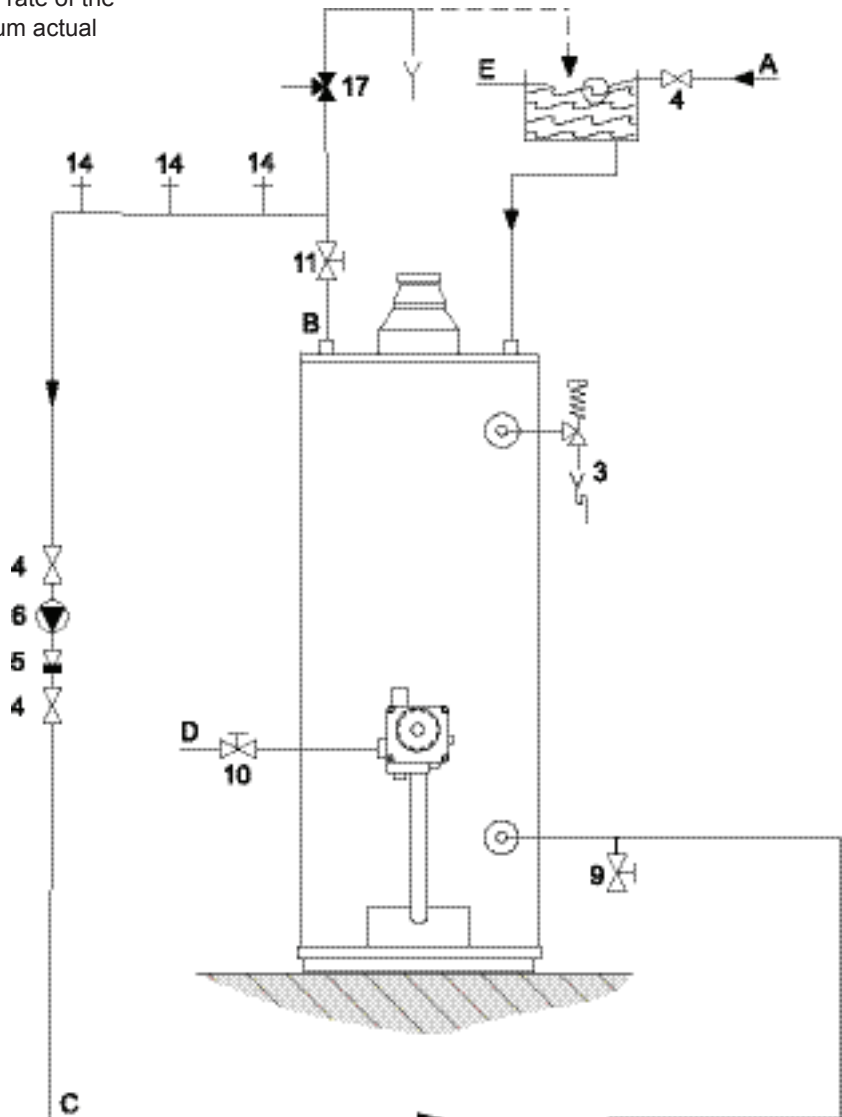


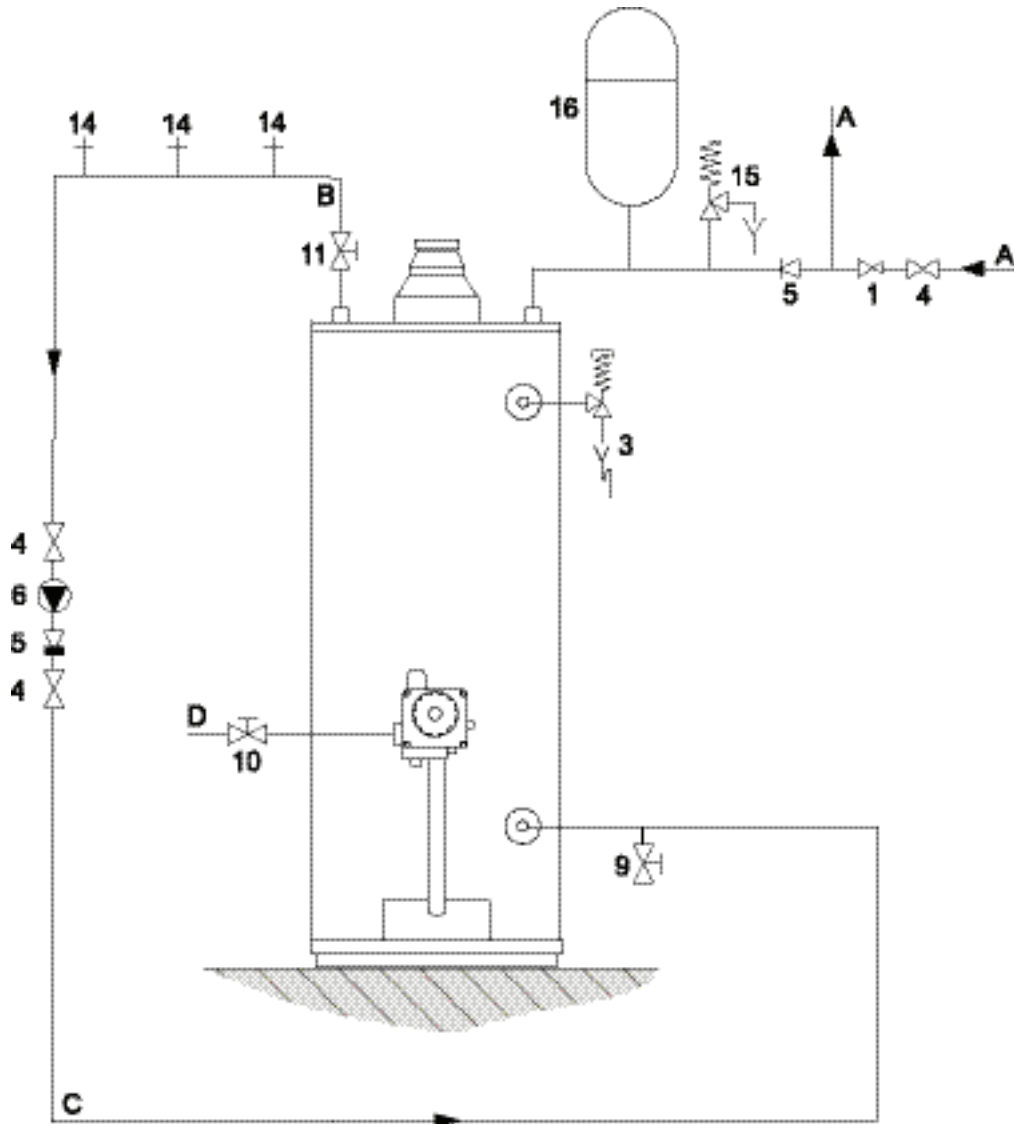
Figure 5 –
Connection diagram
vented systems

- 3) Safety valve
- 4) Stop valve
- 5) Non-return valve
- 6) Circulation pump
- 9) Drain valve
- 10) Manual Gas valve
- 11) Stop valve
- 14) Hot water draw off points
- 17) 3-way venting valve
- A) Cold water supply
- B) Hot water outlet
- C) Circulation pipe
- D) Gas supply
- E) Overflow pipe

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Un-vented system (see figure 6)

To install a Dorchester water heater on an un-vented cold water supply system a kit of valves and fittings (WRAS approved) must be used. Installation must be carried out generally as shown on figure 6.



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Figure 6 - Connection diagram un-vented systems

- | | |
|----------------------------|-------------------------------|
| 1) Pressure reducing valve | 14) Hot water draw off points |
| 3) T&P valve | 15) Expansion valve |
| 4) Stop valve | 16) Expansion vessel |
| 5) Non return valve | |
| 6) Circulation pump | A) Cold water supply |
| 9) Drain valve | B) Hot water outlet |
| 10) Manual gas valve | C) Circulation pipe |
| 11) Stop valve | D) Gas supply |

2.1.3 Gas connection

The gas supply to this appliance must be installed in accordance with BS 6891 and IGE/ UP/1,1A and 2. Fit the 1/2" manual gas shut off valve, supplied with this unit, immediately before the gas control valve. No heat or soldered joints must be applied in the vicinity of the gas control valve, as this could cause damage to the control. All connections and joints must be tested for gas soundness.

2.1.4 Draught diverter

The draught diverter, supplied separately in the delivery crate, **MUST** be fitted to the top of the heater in an unmodified condition before connecting the flue system.

The sensor of the combustion products discharge safety device is pre-fitted to the draught diverter so care must be taken not to damage the capillary and thermostat. With the sensor facing forward, place the draught diverter over the flue tube and make sure the three legs engage with the slots in the top casing.

To complete the installation of the combustion products discharge safety device, remove the two screws from the top casing, position the bracket with the pre-assembled thermostat over the holes and re-apply screws. Complete the electrical circuit by connecting the two-pin plug to its appropriate socket on the top casing. If the safety device operates, the heater will shut down and can only restart when the temperature of the sensor has dropped sufficiently for the button on the thermostat to be reset and the pilot to be re-lit.

Important

The combustion products discharge safety device must never be put out of operation.

Re-entry of flue gases to the building could be harmful and cause poisoning or death.

2.1.5 Flue system

The water heater must be fitted with a flue system connected to the draught diverter. The flue pipe must rise for at least 50 cm. vertically before the inclusion of any bends. If a horizontal run of flue is required this must be kept to the minimum length possible and incorporate a rise of 6 cm. per metre of run.

The flue system must be self-supporting and incorporate a removable section close to the heater to enable the diverter and flue gas baffle to be removed for cleaning. The materials used for the flue system must be non-combustible, mechanically robust and resistant to internal and external corrosion. Combustible materials in the vicinity of the heater and flue shall not exceed 65°C during heater operation. The flue shall not be closer than 50 mm to any combustible material, except where it passes through such material with a non-combustible sleeve when the air gap may not be less than 25 mm.

All flues must terminate in free air space approx. 1,5 metres from any vertical surface of structure i.e. chimney-stacks, roof parapets, etc. If an existing chimney or flue is to be used this must be swept clean and be free of debris before an approved liner is installed and connected to the water heater.

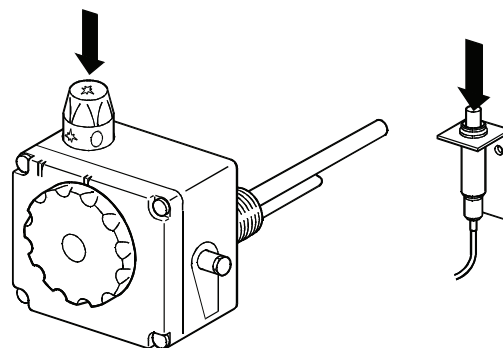
2.2 Commissioning

Filling the water heater

1. Close the drain valve.
2. Open the cold-water stop valve to the water heater and open all taps where hot water can be drained to remove air. The water heater is filled as soon as cold water flows from all taps.
3. Close all hot water taps.

Putting into operation

1. Check to see if the heater is filled with water by running a little to waste from a hot water tap connected to the system.
2. Make sure gas supply is fully purged of air and turn on manual gas valve.
3. Turn the temperature control knob fully clockwise and turn the ignition control knob, while depressing slightly, to the pilot position marked '★'.
4. Lift up and remove the outer door of the combustion chamber. This exposes the sight glass in the inner door that facilitates viewing of the pilot and main flames.
5. Press down and hold the ignition control knob whilst pressing the piezo igniter button several times. See figure 7.
6. When the pilot lights, as seen through the sight glass, the ignition control button must be held down for a further 20 seconds. When the button is slowly released, the pilot must remain alight. If the pilot extinguishes, turn the ignition control knob back to the off '●' position and wait 5 minutes before repeating the ignition procedure from step 3. The size of the pilot flame can be adjusted if necessary – see below.
7. Turn the ignition control knob, while depressing slightly, to the main flame '☛' position and turn the temperature control knob to position 3 (approx. 60 °C – see 2.4). The main flame will ignite and the heater will continue to operate automatically.
8. Replace the outer door of the combustion chamber.

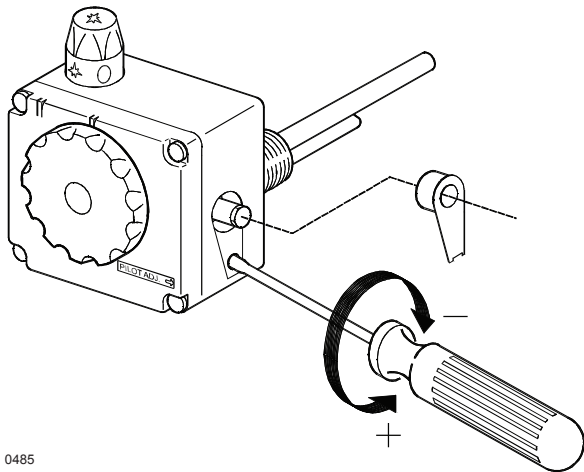


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Figure 7 - Operation of the controls

Pilot adjustment

If necessary, the pilot flame can be adjusted by means of the regulating screw located under the plastic cover on the right hand side of the gas control valve. See figure 8. Turn the screw clockwise to reduce the gas pressure and anti-clockwise to increase the pressure. Care must be taken to make sure that the pilot flame covers the thermocouple element correctly – not more than the top 8 mm of the thermocouple tip.



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Figure - 8 Adjusting the pilot flame

Shut down

Note: The water heater must only be turned off when hot water will not be required for an extended period (e.g. holidays); otherwise it must be left on.

To shut down for short periods of time turn the ignition control knob to the pilot position marked '★'. The pilot will remain alight. For longer periods turn the ignition control knob to the off position marked 'I' when the pilot will be extinguished.

2.3 Setting the gas pressure

See figure 9

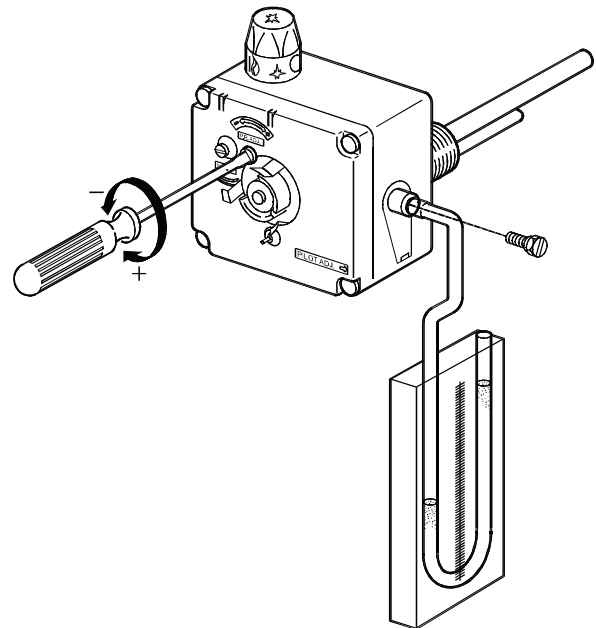
The gas pressure has been set to the correct value at the factory but it must be checked again at commissioning and during the once a year and every year maintenance by adopting the following procedure:

1. Shut down the heater by turning the ignition control knob to the pilot position '★'.
2. Locate the pressure test point at the right hand side of the gas control valve. Remove the screw and connect a manometer to measure the burner pressure.
3. Switch the heater on by turning the ignition control knob to the on position 'I' and allow the burner to ignite and stabilize. Adjust the temperature control knob to position 5.
4. Check the burner pressure, for the gas being fired, against the requirement on the data plate or see 1.3.2. If necessary, reset the pressure by gently pulling the temperature control knob off exposing the adjustment screw marked 'P.R. ADJ.'. Using a flat bladed screwdriver on this screw, turn it

anti-clockwise to reduce the burner pressure or clockwise to increase the burner pressure.

5. Shut down the heater by turning the ignition control knob to the pilot position '★', remove the manometer, replace and tighten the pressure test point screw. Replace the temperature control knob and reset to position 3.
6. Restart the heater by turning the ignition control knob to the on position 'I'.

Note: Check the gas inlet pressure with the pressure test point below the main gas inlet connection.



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Figure - 9 Setting the gas pressure

2.4 Temperature regulation

With the system operational, the amount of cold water that is added is equal to the amount of hot water used. The gas control valve automatically regulates the gas supply. The main burner will ignite as soon as the thermostat senses a reduction in water temperature. The main burner will shut down as soon as the preset temperature is achieved. The settings on the temperature control knob correspond to the following temperatures:

Position	Approx. Temperature
1	40 °C
2	50 °C
3	60 °C
4	70 °C
5	80 °C

At high water temperatures there is more scale build-up in the heater. It is recommended that the thermostat is set no higher than position 3 (60°C) to slow down the accumulation of scale.

In addition, the combined gas valve/temperature regulator contains a safety thermostat that completely shuts off the gas, including the pilot, if the water temperature exceeds approx. 90 °C. It will only reset when the temperature has dropped to below approx. 45 °C.

2.5 Removing and replacing the inner door

Warning: the door may be hot!

Removal (see figure 10)

1. Locate the holding clips and, with pliers or similar, rotate the left hand clip upwards and the right hand clip downwards.
2. Lift the door upwards and backwards.
3. Hold the door horizontally, rotate it around the gas pipe, and withdraw the door from the right hand side of the pipe.

Replacement (see figure 10)

1. Make sure the clips are in the removal position (see 1. above).
2. Hold the door horizontally with clips on top and the cutout on the left and feed into the burner opening high and to the right of the gas pipe.
3. Swing the door horizontally over the burner and drop the front edge down locating the cut out over the burner venturi. Pull the inner door against the inside of the skirt ring.
4. Rotate the clips into position using pliers or similar to hold the door firmly in place.

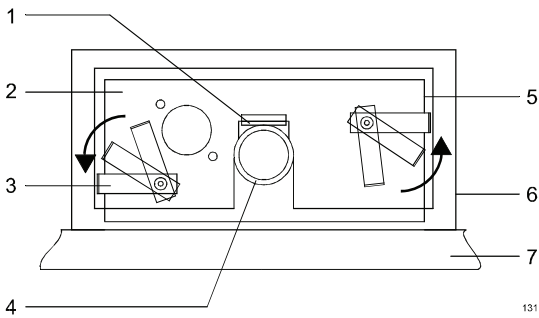


Figure 10 - Removing and replacing the inner door

- 1) Burner bracket
- 2) Inner door
- 3) Clip
- 4) Main burner
- 5) Skirt ring
- 6) Outer casing
- 7) Base tray

2.6 Converting to another type of gas

Must conversion of the heater from natural gas to LPG or vice versa be required, it must only be carried out by a qualified competent person and only items from the ap-

proved conversion kit must be used.

It will be necessary for the main and pilot injectors to be changed to those sized for the gas to be fired and for the burner pressure to be adjusted (see 1.3.2).

Adopt the following procedure:

1. Turn the heater off. Close the manual gas shut off valve and switch off the electrical supply at the local isolator if a solenoid valve is fitted (see 1.1.2 Option b) Time clock control).
2. Remove the burner assembly (see 2.7.2).
3. Replace the injectors with the correct injectors from the conversion set.
4. Replace the burner assembly and check all joints for soundness.
5. Set the correct burner pressure for the gas to be fired, see sections 1.3.2 & 2.4.

For conversion from natural gas to LPG, the pressure regulator in the control valve must be put out of operation. Pull off the temperature control knob and locate the adjustment screw marked 'NO P.R.'. Turn this screw clockwise several turns until a 'clicking' sound is heard. Cover the adjustment screw with the red LPG cap and replace the temperature control knob. See figure 11. The pilot flame may also need adjustment – see 2.2. For conversion from LPG to natural gas, the pressure regulator in the control valve must be put into operation. Pull off the temperature control knob and locate the adjustment screw marked 'NO P.R.'. Remove and discard the red LPG cover and turn the adjusting screw anti-clockwise several turns until it reaches its stop. Adjust to the required setting pressure as described in 2.3. See figure 11. The pilot flame may also need adjustment – see 2.2.

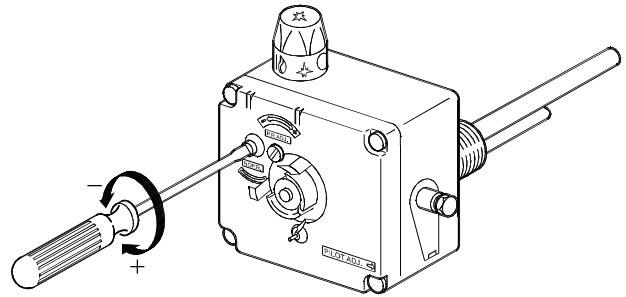


Figure 11 - Conversion to another gas

2.7 Maintenance

Important: Due to the variable chemical nature of distributed water supplies, it is recommended that, in addition to the once a year and every year internal inspection and cleaning, this heater is inspected for scale deposition and anode loss within a maximum of three months following initial commissioning and the frequency of subsequent inspections adjusted accordingly.

Failure to install in accordance with the relevant **Hamworthy Heating Installers Guides** and to carry out the above recommendations may compromise appliance warranties.

Regular once a year and every year maintenance by a qualified competent person is recommended. Although cleaning of the flue may not be necessary every year, it is important that all controls and safety features are checked for correct operation.

WARNING: Before proceeding with any maintenance, turn off the manual gas shut-off valve to the heater being serviced and isolate the electrical supply to any electrical control (if fitted).

2.7.1 Sacrificial anode

Note: On no account remove the magnesium anode without checking to make sure that the heater is fully isolated and the pressure removed.

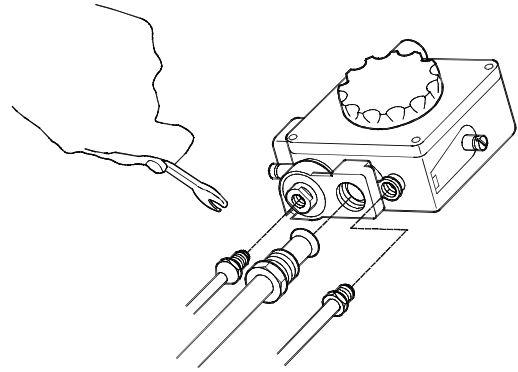
1. Close the stop valve in the cold water supply pipe.
2. Open the nearest hot water tap in order to allow the pressure to drop from the water heater and the pipes. Run a hose to a convenient drain and open the drain valve. Either drain sufficient water to enable the anode to be removed or completely drain the heater if an internal inspection is to be carried out.
3. The heater is fitted with a single magnesium anode, which hangs vertically within the vessel and is located behind the cold-water inlet. Release and unscrew the anode with a suitable socket (27mm A/F) and withdraw.
4. Check the anode and if it has been reduced in diameter by 60% or more at any point on its length it must be replaced. Always replace with an anode of the correct size and type. Quote the model and serial numbers when ordering replacements.
It is recommended that Permabond A131 WRAS approved sealant or equivalent must be used to seal the anode into the tank.
The anode must be in direct metal-to-metal contact to protect the heater tank correctly. It is recommended that electrical continuity between tank and anode be checked with an appropriate instrument immediately following replacement.
5. Check for water leaks.

2.7.2 Cleaning

WARNING: Items are hot if the heater has been firing immediately prior to disassembly.

1. Lift and remove the outer door of the combustion chamber and remove the inner front-panel, see section 2.5.
2. Disconnect the gas burner feed pipe, the pilot burner feed pipe and the thermocouple from the gas control valve and the piezo cable from the piezo igniter. See figure 12.
3. Remove the complete burner assembly.
4. Clean the burner with a soft brush.
5. Check the pilot burner, ignition electrode and thermocouple. Clean or replace as necessary.
6. Disconnect the flue adjacent to the draught diverter (a maintenance joint must have been provided for this purpose) and remove the draught diverter taking care to disconnect the combustion products discharge safety device. Withdraw the flue baffle vertically. Check the combustion chamber, flue tube and flue baffle and clean as required.
7. Re-assemble in the reverse order and check the operation. Tighten the thermocouple connection into the gas valve by hand and then use a spanner for a further ¼ turn. Overtightening could cause damage.

If necessary the burner pressure must be reset.



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Figure 12 - Disconnecting the burner from the gas valve

2.7.3 Inspection of the internal waterside surfaces

Make sure the heater is fully drained before removing outer inspection cover (two self tapping screws), insulation pad and clean out door complete with sealing gasket (6 bolts, 13 mm socket). If deposits are apparent, they can be flushed through the drain by a water jet applied through the clean out opening. The tank can also be chemically cleaned but it is advised that a reputable chemical cleaning company must carry this out.

Note: On no account must a metal scraper be used to remove deposits since this may result in damage to the glass lining.

After cleaning, replace the clean out door with new gasket if required. Refill heater and check for leaks.

Note: The maintenance of the waterside of the system may require additional cleaning and disinfecting before being placed into service. Refer to BS 6700.

2.7.4 Spare parts

To be able to order spare parts it is important to note the model number of the heater as well as the serial number. Based on this information the detailed spare parts can be determined.

2.8 Condensation

If the appliance is filled with cold water or if the hot water consumption is very high, condensation of flue gases will occur on the cold surfaces of the combustion chamber and the flue tube. The water droplets will fall on the burner and cause a sizzling noise. This is a normal phenomenon that will disappear as soon as the heater reaches its normal operating temperature.

2.9 Important warning

The heater must never be placed into operation with a closed cold water supply! Provision must always be made for expansion.

3. FOR THE USER

3.1 Instructions for use

Note: Refer to the data label to confirm for which gas the heater is adjusted.

Warning: All installations **MUST** conform to the relevant Gas Safety and Building Regulations. It is law that competent persons in accordance with the above regulations install all gas appliances.

The electrical supply to any electrical controls (Options) on the heater (if fitted) **MUST** be switched **OFF** before attempting service or maintenance.

This appliance **MUST** be suitably earthed if electrical controls are fitted.

Filling the water heater

1. Close the drain valve.
2. Open the cold water valve to the water heater and open all hot water taps. The water heater is filled as soon as cold water flows from all taps.
3. Close all hot water taps.

Lighting instructions

Warning: If the pilot flame is extinguished either intentionally or unintentionally, no attempt must be made to re-light the gas until at least 5 minutes have passed.

- 1) Check that the heater is full of water by ensuring water flows at constant pressure from a hot tap connected to the heater system.
- 2) Make sure the ignition control knob on the gas valve is in the **OFF** '●' position. If an electrically operated solenoid valve is fitted under 1.1.2 option b), make sure electrical supply is turned **OFF**.
- 3) Press the combustion products discharge safety device reset button firmly to make sure it is reset.
- 4) Make sure that the manual gas valve has been turned **OFF** for at least 5 minutes before attempting to light heater, then open valve.
- 5) Turn the temperature control knob fully clockwise and turn the ignition control knob, while depressing slightly, to the pilot position marked '★'.
- 6) Lift up and remove the outer door of the combustion chamber. This exposes the sight glass in the inner door that facilitates viewing of the pilot and main flames.
- 7) Press down and hold the ignition control knob whilst pressing the piezo igniter button several times.
- 8) When the pilot lights, as seen through the sight glass, the ignition control button must be held down for a further 20 seconds. When the button is slowly released, the pilot must remain alight. If the pilot extinguishes, turn the ignition control knob back to the off '●' position and wait 5 minutes before repeating the ignition procedure from step 5.
- 9) If an electrically operated solenoid valve is fitted under 1.1.2 option b), turn on the electrical supply. Turn the ignition control knob, while depressing slightly, to the main flame '⚡' position and turn the temperature control knob to position 3 (approx. 60 °C – see 2.4). The main flame will ignite, if heat is required, and the heater will continue to operate automatically.

- 10) Replace the outer door of the combustion chamber.

If the safety thermostat or the combustion products discharge safety device operates and shuts down the heater, investigate the cause of the fault before you re-light the pilot flame. If in doubt, contact your installer or Hamworthy Heating Ltd. for advice.

Operation

With the system operational, the amount of cold water that is added is equal to the amount of hot water used. The gas control valve automatically regulates the gas supply. The main burner will ignite as soon as the thermostat senses a reduction in water temperature. The main burner will shut down as soon as the preset temperature is achieved. The settings on the temperature control knob correspond to the following temperatures:

Position	Approx. Temperature
1	40 °C
2	50 °C
3	60 °C
4	70 °C
5	80 °C

At high water temperatures there is more scale build-up in the heater. It is recommended therefore, that the thermostat is set no higher than position 3 (60°C) as the accumulation of scale will be minimized.

In addition, the combined gas valve/temperature regulator contains a safety thermostat that completely shuts off the gas, including the pilot, if the water temperature exceeds approx. 90 °C. It will only reset when the temperature has dropped to below approx. 45 °C.

Shutting down the heater

To shut the heater off for short periods (i.e. 2 – 3 days), turn the ignition control knob to the pilot position marked '★'. The pilot will remain alight. To switch the heater off for longer periods, turn the ignition control knob to the off position marked '●' when the pilot will be extinguished, and turn the manual gas shut off valve to **OFF**. Depending on the weather conditions likely to prevail during the shutdown period, consideration must also be given to completely draining the heater.

The manual gas shut off valve must only be used for emergencies, long periods of shutdown and when servicing.

Additional safety advice

- 1) Do not block or obstruct ventilation grilles.
- 2) If at any time a gas leak is suspected, turn **OFF** gas supply – **DO NOT use a naked flame – DO NOT use electrical switches, alarms or lights – DO open windows** – contact your nearest Gas Conveyor office immediately. Generally their telephone number can be located under **GAS** in your telephone directory.
- 3) If you consider the heater to be malfunctioning, turn it **OFF** and seek expert advice.
- 4) To make sure safe and efficient operation at all times, it is essential that the heater be serviced regularly. Contact your installer or Hamworthy Heating Ltd. for advice.

3.3 Fault finding

Fault	Possible Cause	Corrective Action
Pilot flame will not ignite	No gas present	Make sure all manual gas valves between meter and heater are turned on fully. Check gas pressure at the heater.
	Gas valve not in pilot position	Make sure that the ignition control knob is turned to the pilot '★' position and depressed fully
	No spark	Check the piezo unit, cable and pilot electrode for damage/ loose connections. Replace as necessary.
	Blocked pilot burner	Clean the pilot burner.
Pilot flame ignites but will not hold in	Pilot flame incorrectly adjusted	Adjust pilot flame to cover thermocouple tip correctly
	Thermocouple incorrectly positioned or loose	Check thermocouple tip position relative to the flame and check connections for tightness.
	Thermocouple defective	Replace thermocouple
	Safety thermostat has operated	Investigate the cause (control thermostat set too high, out of calibration or not working, water circulation incorrect) and rectify. The water temperature at the gas valve needs to fall below 45 °C in order to reset the safety thermostat.
	Combustion products discharge safety device has operated	Investigate the cause (blocked flue, incorrect flue, wind conditions, incorrect ventilation) and rectify before pressing reset button on the flue thermostat.
Pilot flame regularly extinguishes	Safety thermostat is operating regularly	Investigate the cause (control thermostat set too high, out of calibration or not working, water circulation incorrect) and rectify
	Combustion products discharge safety device is operating regularly	Investigate the cause (blocked flue, incorrect flue, wind conditions, incorrect ventilation) and rectify.
	Intermittent fault on thermocouple or gas valve	Replace thermocouple and if continues to extinguish, replace gas control valve. Note: the gas control valve is not fitted in a pocket and hence the heater will need to be drained before the valve is replaced.
Insufficient or no hot water	Ignition control knob is turned to the pilot '★' position	Turn the temperature control knob fully clockwise. Turn the ignition control knob to the on '👉' position and turn the temperature control knob to the desired setting.
	Temperature set too low	Increase control thermostat setting to higher value (recommended position 3 - 60°C maximum)
	Hot water usage greater than heater output	Reduce hot water usage and allow time for heater to fully recover to set temperature.
	Water circulation system not operating correctly	Investigate the cause (pump failure, air lock, pipe blockage) and rectify. If cause not identified, seek expert advice.
Water leakage	Condensation of flue gases	Allow temperature in heater to increase (see 2.8)
	Local pipe work leaking Nearby appliance leaking Groundwater seeping Water heater leaking	Carefully investigate cause and rectify by repair or replacement.

