Dorchester DR-SA Range of Hot Water Storage Heaters

Open Flue, Direct Gas Fired Hot Water Storage Heaters with Automatic Ignition for Domestic Hot Water Installations

Installation, Commissioning and Servicing Instructions

DORCHESTER DR-SA 16, 19 MODELS

NATURAL GAS I_{2H} LPG I_{3+}

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) I^{3+}. 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 Description

Construction of the Dorchester DR-SA 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 open-flue appliance 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 to the pre-set of the un-vented kit. The cylindrical tank is made from sheet steel containing one vertically placed flue tube.
For protection against corrosion, the inside of the tank is glass lined. The tank is also fitted with one 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 is under 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 means of 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 must be applied:
- 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 shrouded 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 is included that contains the installers kit, 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-SA heaters can be supplied with 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 2.7. It is important that the heater is correctly adjusted for the gas to be fired.

b) 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.

c) 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.

d) 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 ¼ μ/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.

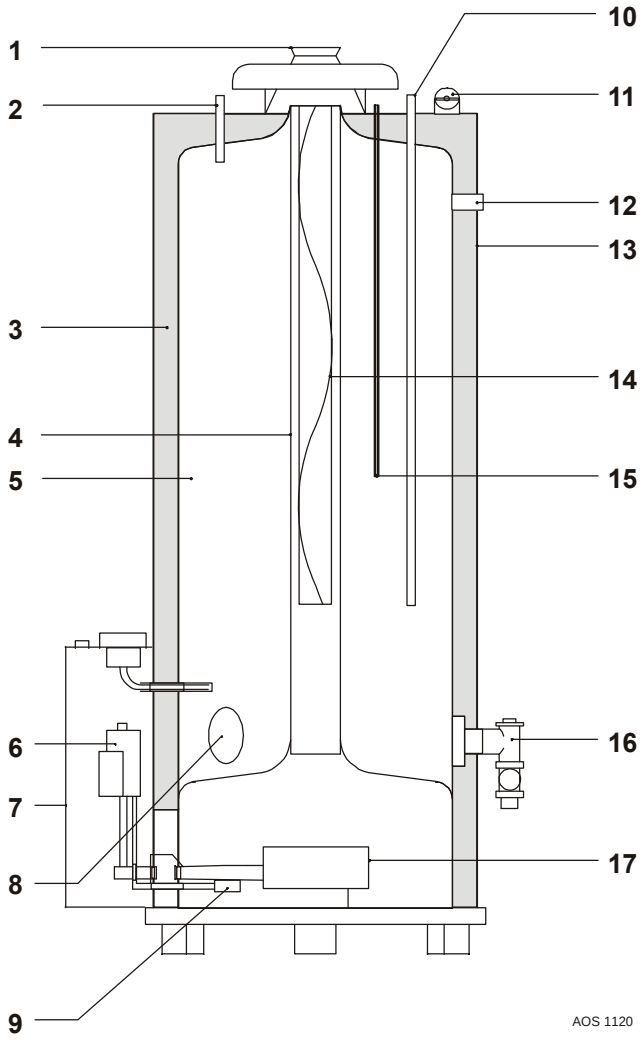


Figure 1 - Cross-section of the heater

1) Draught diverter
2) Hot water outlet
3) Insulation
4) Flue tube
5) Glass lined tank
6) Gas control valve
7) Control panel
8) Inspection cover plate
9) Intermittent pilot burner and flame probe
10) Cold-water inlet (c/w inlet tube)
11) Combustion products discharge safety device.
12) T&P valve connection
13) Outer casing
14) Flue baffle
15) Magnesium anode
16) Drain valve and secondary return connection
17) Main burner.

1.2 Technical description

1.2.1 Gas control valve

The water heater is equipped with a gas control valve c/w burner control that regulates the flow of gas to the burner. To improve ignition the opening mechanism of the gas control valve is fitted with a delay (softlite). The gas control valve is suitable for gases of the second and third family. The maximum inlet pressure is 60 mbar. The pilot system has an automatic spark ignition that make sure that the burner ignites consistently when there is a demand for hot water.

1.2.2 Control panel

The temperature control for the water heater is housed in the control panel (See figure 2). For safety reasons, heaters are fitted with two thermostats: a control thermostat is adjustable between 40°C and 80°C and a safety thermostat is pre-set to 90°C. The control panel is also fitted with an ON/OFF switch (I/0). At setting “I”, the gas control is activated on the basis of heat demand from the control thermostat. At setting “0” the heater is switched off.

1.2.3 Operation of the water heater

Normal operation

When there is a demand for heat a waiting period of about 1 second elapses before the built-in spark generator and pilot gas valve are switched on. The ignition spark lights the pilot burner and the flame probe detects the resulting flame. Almost immediately after the pilot flame is detected, sparking stops and the main gas valve is opened. The pilot flame lights the main burner. The unit is now in operation. When the water in the unit reaches the set temperature the thermostat switches the burner off.

Ignition failure

If the flame is not established within the safety period of 25 seconds the automatic ignition controller locks out. The lamp on the reset button in the control panel shows a lockout when lit. Pushing the reset button must manually reset the heater. If the flame is lost during normal run, the automatic ignition controller repeats the start sequence.

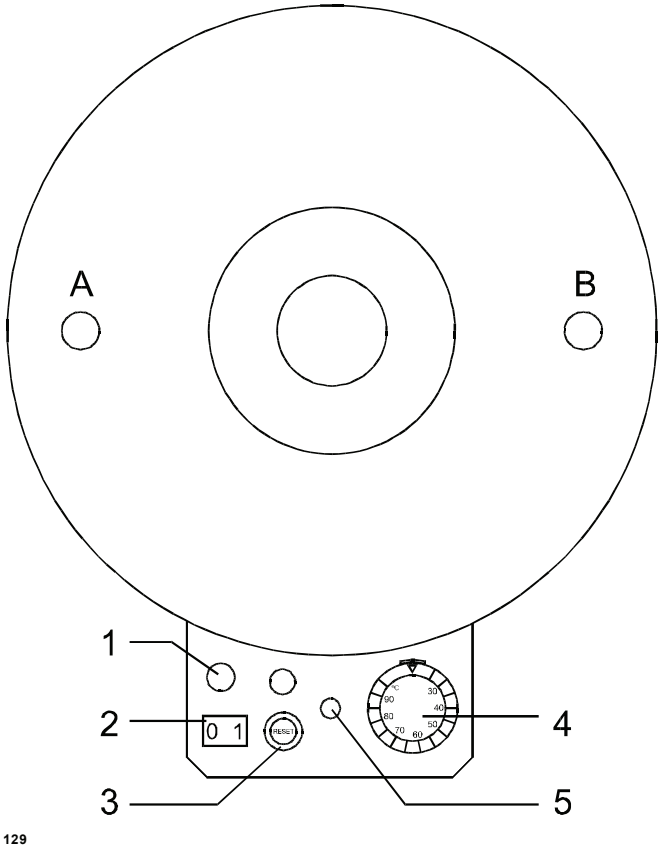


Figure 2 - Top view of the heater

A) Hot water outlet
B) Cold water inlet
1) Electrical connection
2) ON/OFF switch
3) Ignition controller reset button
4) Control thermostat knob
5) Safety thermostat reset button.

1.2.4 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 hot gases flowing over the sensor activate the device. 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. If this failure occurs frequently, this indicates that the flue suffers from down draught conditions. It is recommended that a competent person carry out the necessary remedial action.

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.

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).

Dimensions	DR-SA 16	DR-SA 19
A	1585	1780
B	1450	1640
D	645	675
E	770	775
G	130	130
K	340	340
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	
6	Access door opening	

All dimensions are given in mm. (rounded off to 5mm). See figure 3.

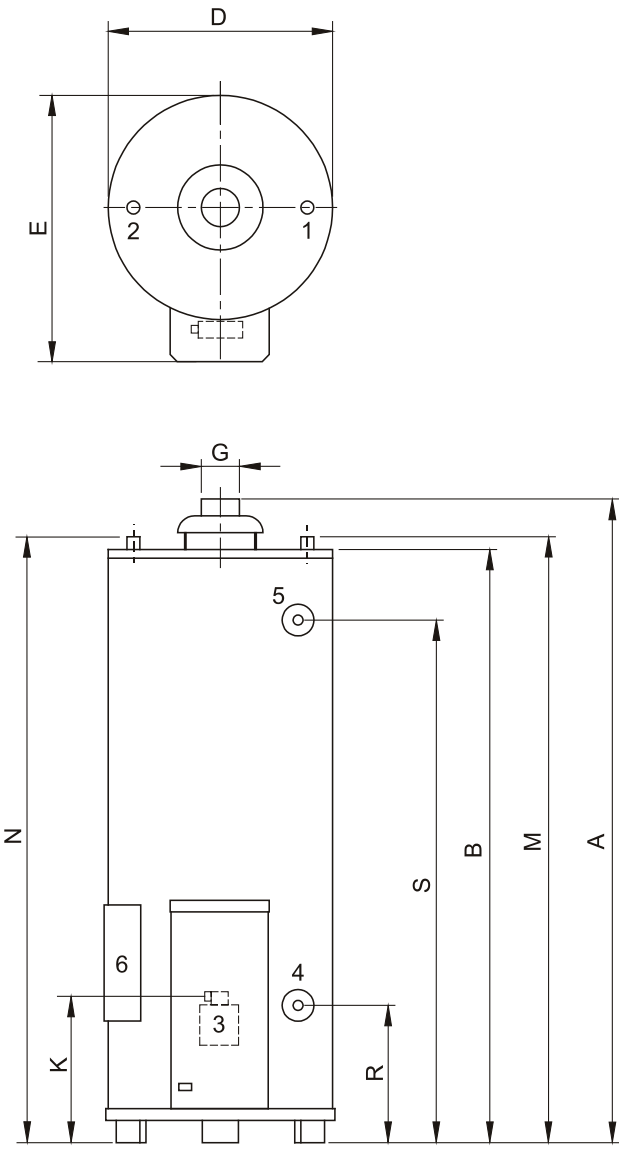


Figure 3 - Dimensions

1) Cold water inlet
2) Hot water outlet
3) Gas control valve
4) Drain valve
5) T&P valve tapping
6) Access door opening

1.3.2 Technical data

Device category II2H3+

Description	Unit	DR-SA 16	DR-SA 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	12.0	7.9
Gas consumption (G20)*	m^3/h	2.4	2.5
Diameter main orifice (G20)	mm	3.90	4.50
Diameter pilot orifice (G20)	mm	0.56 / 0.41	0.56 / 0.41
Heating time ΔT = 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	0.23	0.23
Heating time ΔT = 45 K	min	43	55
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	1.6	1.8
Diameter main orifice (G31)	mm	2.30	2.35
Diameter pilot orifice (G31)	mm	0.23	0.23
Heating time ΔT = 45 K	min	43	55
GENERAL:			
Storage capacity	litres	278	372
Water connections **		1-11.5 NPT	1¼-11.5 NPT
Gas connection		Rp $^1/_2$	Rp $^1/_2$
Drain valve		¾"-14NPT	¾"-14NPT
Anode		¾"-14NPT	¾"-14NPT
T&P-plug		¾"-14NPT	¾"-14NPT
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	122	149

** 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*

Electrical connenction

Electrical supply	Frequency	Fuse
230 V AC	50 Hz	5 A

Ionisation current
The minimum ionisation current is 0.9 micro-Amperes DC. Below this current the burner controller will assume no flame is present. When in normal operation, the ionisation current will be about 1.2 to 1.3 micro-Amperes DC when only the pilot flame is burning.
(Adjust the main burner pressure to zero to be able to measure under this condition).
With pilot and main burner in operation, the ionisation current will be approx. 6.0 to 6.3 micro-Amperes DC.
Ionisation current can be measured by connecting a universal meter in series with the connection to the flame probe. Make sure meter is set for Direct Current. Alternating Current gives no information about the system's behaviour.

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 surface resistant to heat, insulated in accordance with local by laws and Building Regulations and with sufficient strength to support the weight of the unit when full of water.
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 may 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 CaCO3
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.

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

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 ¾" NPT (nearest the groove cut into the hexagon) and ¾" BSPT. Arrange the tee, plug and drain as shown in figure 4. The actual orientation of the tee may depend on whether a system return is required and whether a top to bottom circulator kit is to be fitted.

Vented systems (See figure 5)

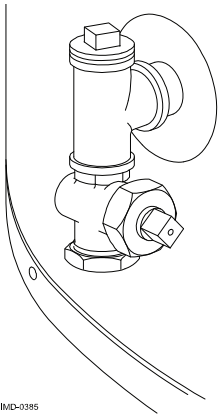
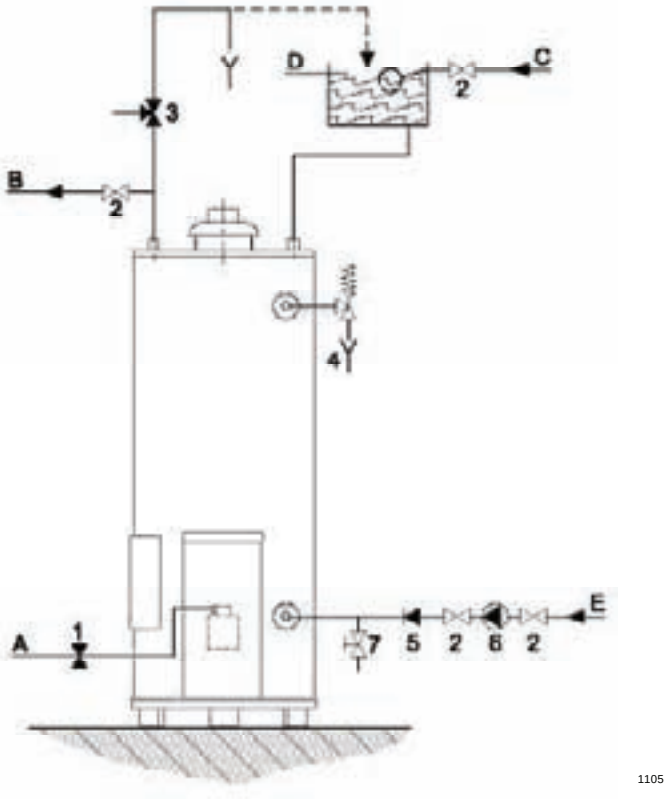


Figure 4

If the water 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) that it supplies.
The minimum actual capacity is 50 gallons or 227 litres.



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.

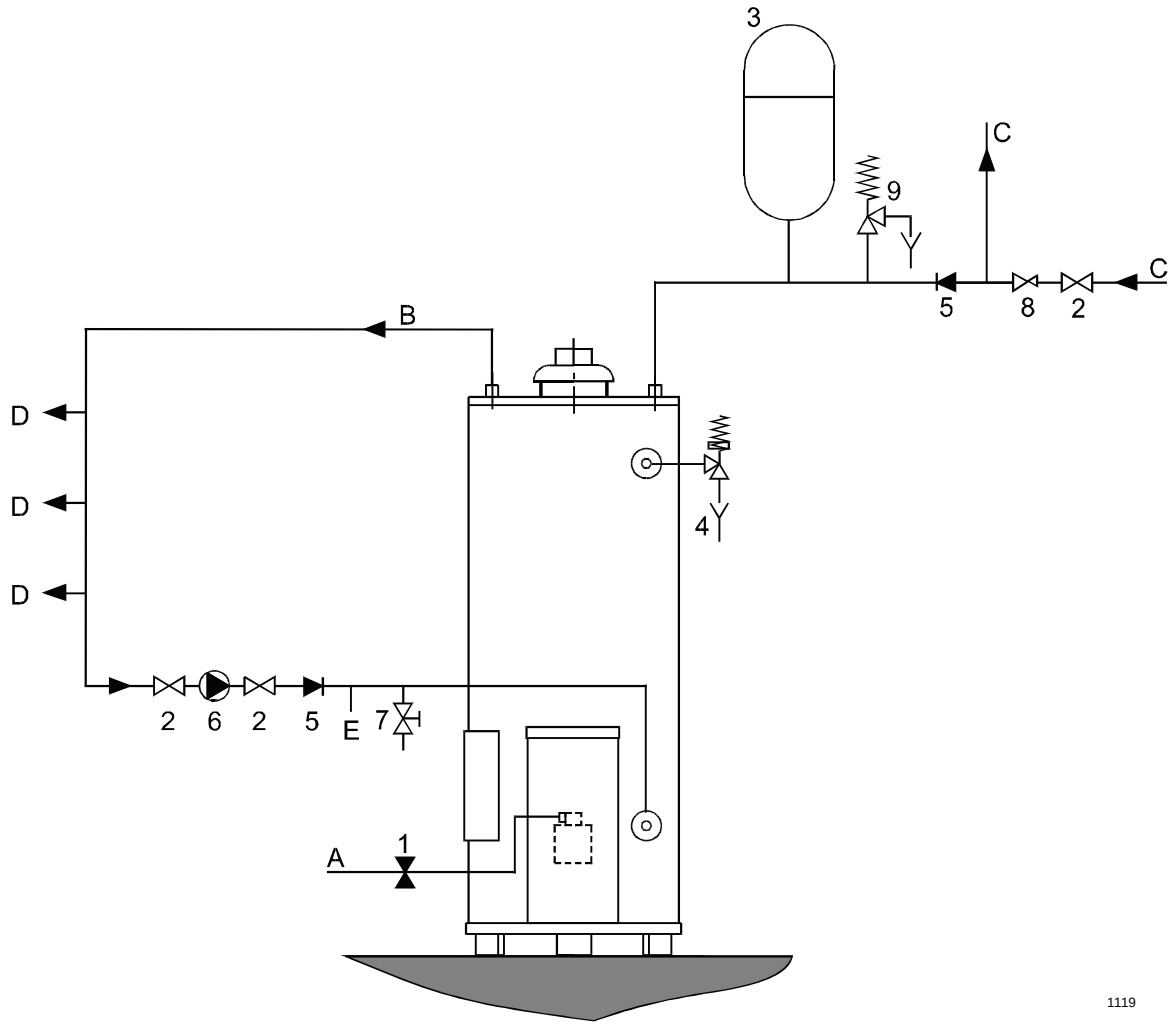


Figure 6 - Connection diagram un-vented systems

1) Manual gas valve
2) Stop valve
3) Expansion vessel
4) T&P safety valve
5) Non return valve
6) Circulation pump
7) Drain valve
8) Pressure reducing valve
9) Expansion valve

A) Gas supply
B) Hot water delivery
C) Cold water inlet
D) Hot water taps
E) Return circulation

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 only restart when the temperature of the sensor has dropped sufficiently for the button on the thermostat to be reset.

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. chimneystacks, 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.

2.1.6 Electrical connection

An accredited electrical installation company must carry out all electrical connections in accordance with IEE regulations. The appliance must be connected to the mains by means of a permanent electrical connection.
A Fused isolator must be fitted between the permanent connection and the water heater. The cable must have 3 cores of at least 1.0 mm^2. The connecting terminals for the electrical supply are indicated by the symbol for earth, N for neutral and L for live. Always check with a voltage tester that the live and the neutral have been connected correctly in the electrical supply. The electrical supply must comply with the requirements below:

Electrical supply	Frequency	Fuse
230 V AC	50 Hz	5 A

The maximum power consumption is 25 W.
See appendix 1 electrical diagram for more information.

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 that the ON/OFF switch is in OFF position.
3. Make sure gas supply is fully purged of air and turn on manual gas valve.
4. Switch the mains isolator to 'ON'. Make sure that power is correctly supplied to the unit. Use a voltage tester to check that the live is to "L" and neutral to "N". (Flame detection is phase sensitive).
5. When first starting, the controller can be in the 'lock out' condition: depress the reset button to free the control. (After manual reset, an extended pre-purge/ waiting time will occur).
6. Switch the ON/OFF switch into ON position. If the pilot fails to ignite within 25 seconds the controls will go to lock out and the reset button will need to be reset (wait 15 seconds before attempting reset). It may be necessary to repeat the lighting sequence a number of times if all the air has not been purged from the gas supply.
7. The main burner pressure must be checked once the heater has operated for 10 to 20 minutes (see 2.4).
8. Set the temperature regulator to the required setting (60°C is maximum recommended).
   Note: If, during normal use, the reset button is pressed, the gas valves will close and the automatic ignition controller will start a new sequence after the reset button is released.

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 put the ON/OFF switch into OFF position.

2.3 Removing and replacing the control panel front cover

Removing the cover (see figure 7)

1. Remove the screw at the top centre of the control panel.
2. Push the cover upwards until the hooks at the lower end clear the burner access opening and base tray.
3. Pull the lower end of the cover slightly forward.
4. Pull the cover down until the top edge is clear of the control panel and then remove.

Replacing the cover (see figure 7)

1. Place the top of the cover inside the rim of the control panel and push it up as far as possible.
2. Position the bottom hooks inside the burner access opening and over the rim of the base tray.
3. Push the cover downwards until the lower hooks engage and the top screw holes align.
4. Replace the screw in the top centre of the cover.

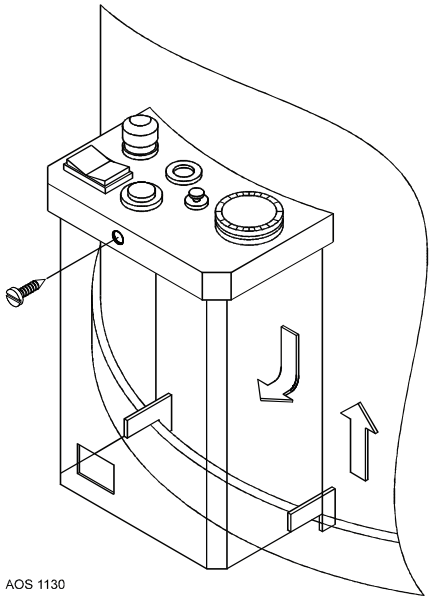


Figure 7 - Removing and replacing the control panel front cover

2.4 Setting the gas pressure

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 switching the ON/OFF switch to OFF.
2. If the control panel front cover is in place, remove it (see 2.3).
3. Locate the lower pressure test point at the right hand rear of the gas control valve. Loosen the screw a turn and connect a manometer to measure the burner pressure.
4. Switch the heater ‘ON’ and allow the burner to ignite and stabilize.
5. 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 means of the burner pressure adjusting screw located under the metal cover screw adjacent to the pressure test points. Turning it anti-clockwise reduces burner pressure. Turning it clockwise increases burner pressure.
6. Shut down the heater, remove the manometer, tighten the pressure test point screw, and replace the adjustment screw cover and the control panel front cover.
7. Restart the heater.

2.5 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. 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 60°C as the accumulation of scale will be minimised.

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 approved 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.
2. Remove the burner assembly (see 2.8.2).
3. Replace the injectors with the correct injectors from the conversion set.
4. 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 burner pressure adjusting screw on the gas control valve must be screwed in clockwise as far as it will go.
   For conversion from LPG to natural gas, the burner pressure adjusting screw must be backed off anti-clockwise until the correct burner pressure is obtained.

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 is not necessary every year, it is important that all controls and safety features are checked for correct operation.

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

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 that 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. When ordering replacements always quote model and serial numbers.
   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 with the heater tank to protect it. It is therefore 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: some of these items will be hot if the heater has been firing immediately prior to disassembly.

1. Remove the control panel front cover, see section 2.3 and the inner front panel, see section 2.5,
2. Disconnect the gas burner feed pipe, the pilot burner feed pipe and the two electrical cables (HT and flame probe) from the gas control valve.
3. Remove the complete burner assembly.
4. Clean the burner with a soft brush.
5. Check the pilot burner, ignition electrode and flame probe. 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. If necessary the burner pressure must be reset.

2.7.3 Inspection of the internal waterside surfaces

Make sure the heater is fully empty. Remove the outer inspection cover (two self tapping screws), the insulation pad and clean out the 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 carries this out.

Note: Do not use a metal scraper to remove deposits. You will damage 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 the heater **MUST** be switched **OFF** before attempting service or maintenance.
This appliance **MUST** be suitably earthed.

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

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. Switch the mains electricity supply to the heater **OFF.**
3. Turn the heater thermostat to the lowest setting.
4. Press the safety thermostat reset button firmly to make sure it is reset.
5. Press the combustion products discharge safety device reset button firmly to make sure it is reset.
6. Make sure the manual gas shut off valve is open.
7. Switch the mains electricity supply to the heater **ON**. Set the on/off switch on the heater to **ON** (1) and adjust the control thermostat to the desired setting.
8. If the ignition controller rest button is illuminated, wait 30 seconds before pressing the reset button.
9. The heater will now light if heat is required.

If the safety thermostat or the combustion-products discharge safety-device operates and shuts down the heater, find the cause of the fault before you press the reset button. If in doubt, contact your installer or Hamworthy Heating Ltd. for advice.

Operation

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. 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 60 °C as the accumulation of scale will be minimised.

Shutting down the heater

To shut the heater off for short periods (i.e. 2 – 3 days), turn the heater control thermostat to minimum. Wait 2 to 3 minutes and switch the on/off switch to **OFF**. To switch the heater off for longer periods, repeat the above and turn both the local electrical isolator and 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 not be used except in emergencies, for long periods of shutdown or during servicing.

Additional safety advice

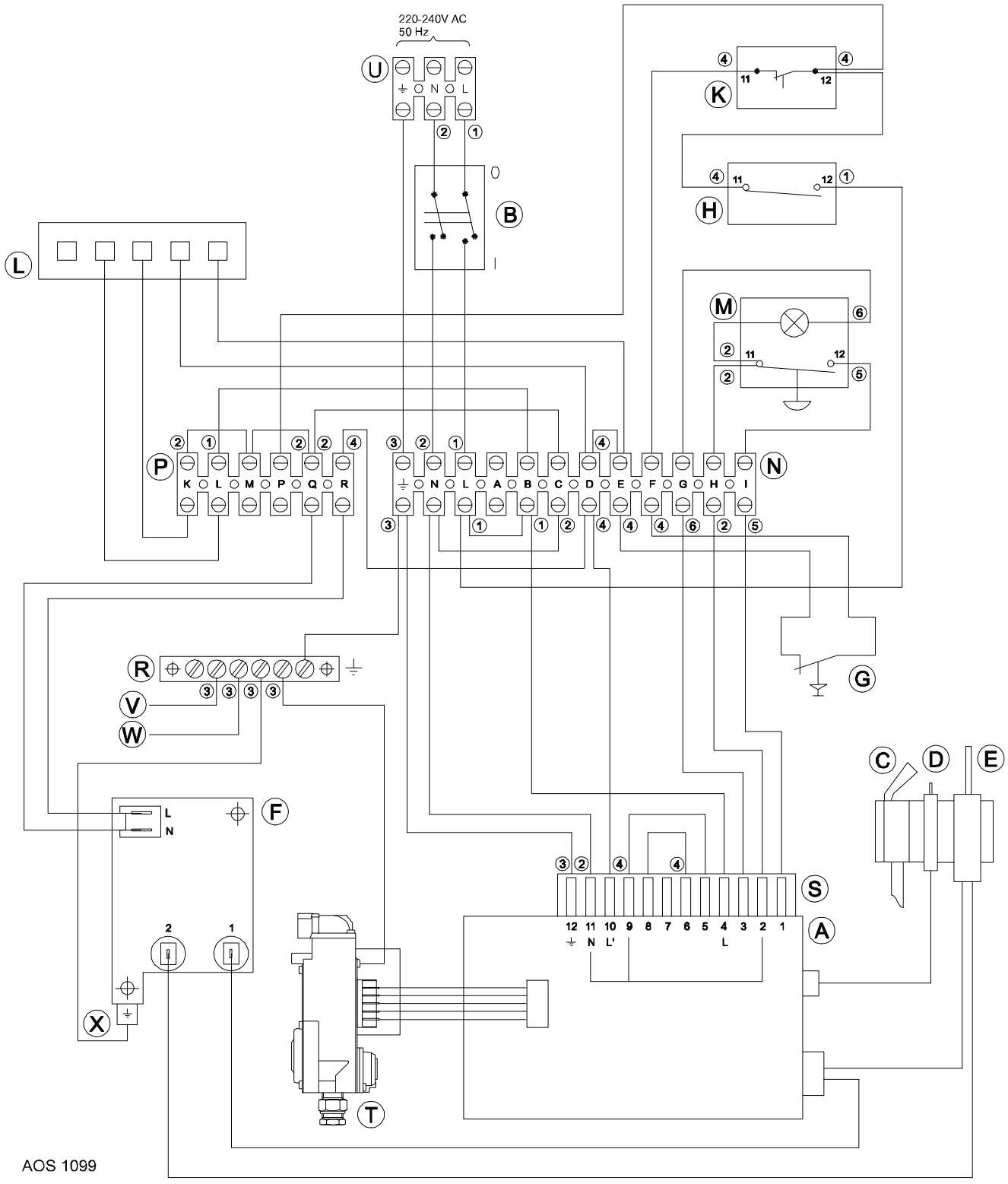
1. Do not block or obstruct ventilation grilles.
2. If at any time a gas leak is suspected, turn **OFF** gas supply – **DO NOT use a naked flame – DO NOT use electrical switches, alarms or lights – DO open windows** – contact your nearest Gas Conveyor office immediately. Generally their telephone number 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.

3.2 Fault finding

Fault	Possible Cause	Corrective Action
Heater is off or does not ignite	Control thermostat satisfied	None – heater will light up when hot water temperature drops.
	No electrical power	Make sure electrical supply is turned on at local isolator and heater on/off switch. Check 230v supply is present at the heater.
	No gas	Make sure all manual gas valves between meter and heater are turned on fully. Check gas pressure at the heater.
	Burner ignition controller is in lock-out	Press the illuminated reset button on the control panel. If repeated lock-out occurs, expert investigation is required
	Safety thermostat has operated	Investigate the cause (control thermostat set too high, out of calibration or not working, water circulation incorrect) and rectify before pressing reset button on control panel
	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.
Insufficient hot water	Temperature set too low	Increase control thermostat setting to higher value (recommended 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.
Noisy Ignition and/or poor flame shape	Incorrect gas supply pressure or burner pressure	Check and set correct pressures
	Dirty pilot and/or main injectors	Clean injectors
Water leakage	Condensation of flue gases	Allow temperature in heater to increase (see 2.11)
	Local pipe work leaking Nearby appliance leaking Groundwater seeping Water heater leaking	Carefully investigate cause and rectify by repair or replacement.

APPENDIX 1

Connection diagram Dorchester DR-SA 16 & 19



1 = brown
2 = blue
3 = yellow/green
4 = black
5 = white
6 = red

A = Ignition controller
B = ON/OFF switch
C = Pilot burner
D = Spark electrode
E = Flame probe
G = Combustion products discharge safety device
H = Control thermostat
K = Safety thermostat
M = Reset button
N = Terminal block
P = Terminal block
R = Earth terminals
S = Connector to ignition controller
T = Gas control valve
U = Mains terminal block
V = Tank earth
W = Casing earth
X = Control panel base plate earth