Manual

# Advance Stainless Steel Unvented Hot Water Cylinders for Heat Pump Systems

## Installation and Commissioning Manual


**PLEASE RETAIN AND ENSURE SERVICE RECORDS ARE KEPT UP TO DATE.**

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## Contents Page

# 1. Safety information

Safe operation of this unit can only be guaranteed if it is properly installed and commissioned in compliance with the manufacturer's requirements. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

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Advance Appliances Ltd
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Walsall
West Midlands
WS8 7EX
Tel: 01543 377723
Fax: 01543 360620

The product is designed and constructed to withstand the conditions encountered during normal use. Use of the product for any other purpose, or failure to install the product in accordance with these Installation and Commissioning Instructions, could damage the product, will invalidate the warranty, and may cause injury or fatality to personnel.

### 1.1 Access
Ensure safe access before attempting to work on the product. Arrange suitable lifting gear if required.

### 1.2 Lighting
Ensure adequate lighting, particularly where detailed or intricate work is required.

### 1.3 Tools and consumables
Before starting work ensure that you have suitable tools and / or consumables available.

### 1.4 Handling
Manual handling of large and /or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

### 1.5 Residual hazards
Many products are not self-draining. Take due care when dismantling or removing the product from an installation.

### 1.6 Freezing
Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

### 1.7 Disposal/Decommissioning
A life time decommissioning service for this product is available. This is available on a return to base basis (carriage at users' cost).

# 2. General Product Information

This manual explains how to install and commission an Advance Stainless Steel Unvented Hot Water System with a Kensa Heat Pump.

Please note that unvented cylinders supplied with larger coils are outside the scope of the WRAS approvals but are constructed to meet all current Building Regulations.

The Advance unvented heat pump water heater is a high quality stainless steel unvented cylinder providing hot water from a cold mains water supply of between 3 bar and 12 bar. Reduced performance is available at lower pressures although the units are not suitable for pressures lower than 1.5 bar and a flow rate of less than 20 litres per minute. The indirect heat exchanger surfaces are designed to provide a rapid heat up time. The unit comes complete with all the necessary safety equipment to comply with legislation governing the installation of such systems. The Advance solar unvented heat pump water heater has been designed for use with all thermal solar panels.

The Advance solar range is available in twin coil models. Each cylinder has been specifically designed for use with a solar energy heating system and includes a large coil that provides optimum heat transfer. The Advance solar unvented water heater should only be used as part of a solar installation and configured as shown. Additional safety devices may be required if the cylinder is operated with other heat sources.

## 2.1 Equipment delivery and handling.

**Factory shipment**
Prior to shipment, the stainless steel unvented hot water storage unit is tested, calibrated and inspected to ensure proper operation.

**Receipt of shipment**
Each pallet should be inspected at the time of delivery for possible external damage. Any visible damage should be recorded immediately on the carrier's copy of the delivery slip.
Each pallet should be unpacked carefully and its contents checked for damage.
If it is found that some items have been damaged or are missing, notify the manufacturer immediately and provide full details. In addition, damage must be reported to the carrier with a request for their on-site inspection of the damaged item and its shipping pallet.

If the cylinder is not being installed immediately, it should remain in its carton with all pipe end protective caps in place to prevent damage. All cylinders must be stored vertically for indoor use only.

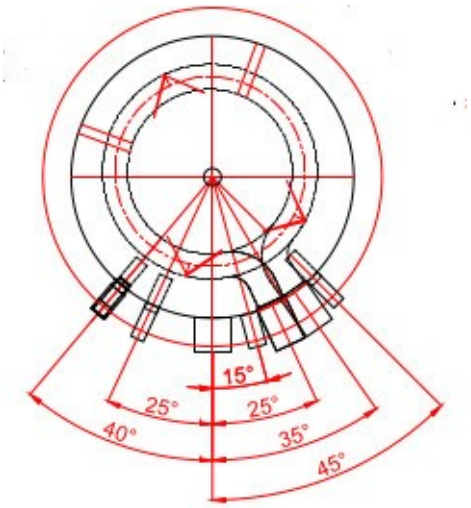
Before commencing installation check that all the components of your Advance unit are contained in the kit or fitted to the cylinder.

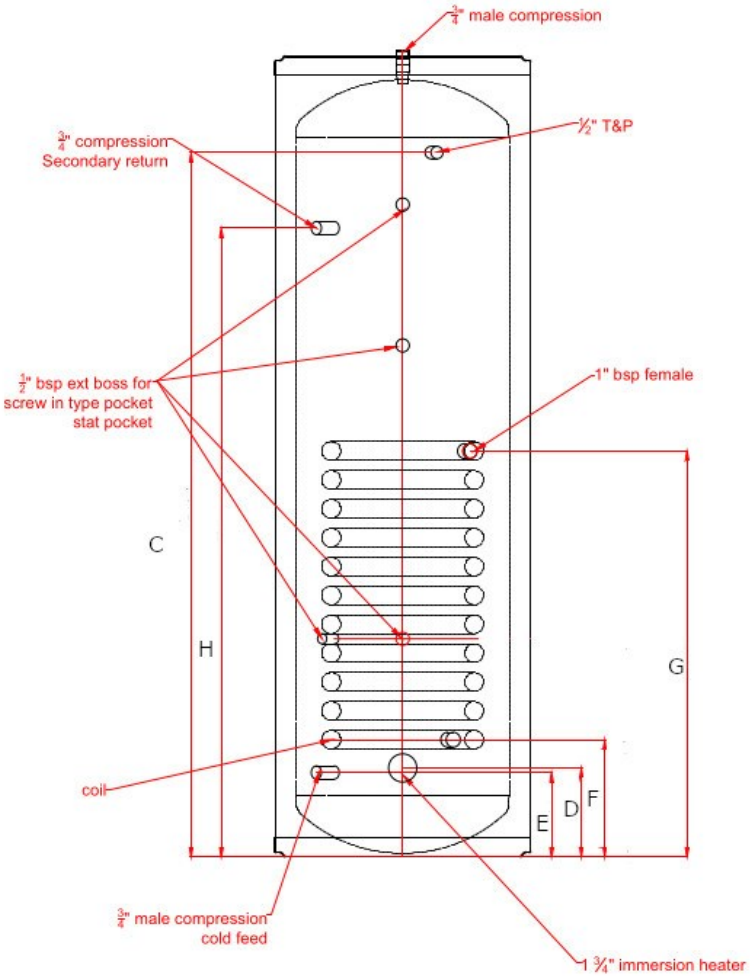
- 3kW Incoloy 825 heating element
  - incorporating thermostat 70°C and re-setable safety
- Cold water control valve
  - comprising line strainer, check valve & appropriate pressure reducing valve
- Pressure relief valve
  - with non-return valve set at 6 bar
- Tundish
  - 15mm x 22mm Female x Female up to 300L (over 300L 22mm x 28mm Female x Female)
- Temperature/Pressure relief valve
  - set at 90°C and 7 bar pressure (factory fitted)
- Motorised valve (twin coil heat pump factory fitted to indirect units
- Thermal cut-out
  - set to operate at 87°C+/-3°C
- Cylinder thermostat
- Expansion vessel
  - where required with capacity to suit vessel size

## 2.2 Single Coil Unvented Hot Water Cylinder (DN32 Heat Pump coil)

| Kensa Model No. | 95-174A | 95-175A | 95-176A | 95-177A | 95-178A | 95-179A | 95-180A |
|---|---|---|---|---|---|---|---|
| Volume (l) | 120 | 150 | 200 | 250 | 300 | 400 | 500 |
| Expansion Vessel capacity (l) | 10 | 12 | 18 | 24 | 24 | 50 | 50 |
| Heat Loss W/ hour | 50 | 55 | 68 | 71 | 83 | 91 | 96 |
| ErP Rating | B | B | C | C | C | C | C |

| | |
|---|---|
| Material | Duplex Stainless Steel EN1.4162 (Super Duplex EN1.4462 available on request) |
| Operating Pressure Tank and Coils | 3 Bar—95°C |
| P & T Valve Rating | 7 Bar—90°C |
| Pressure Reducing Valve | Max Pressure 12 Bar/ Control Pressure 3 Bar |
| Safety Relief Valve | 6 Bar |
| Expansion Vessel Charge | 3 Bar |
| Expansion Relief Valve | 6 Bar |
| Flexible Hose for Expansion Vessel | Supplied Loose |
| Bracket for Expansion Vessel | Supplied Loose |
| Immersion Heater | 13/4—240V-3kW |
| Tundish | 1/2” x 22mm |






400l and 500l vessels
1" Female Boss

| | Diameter | Height | C | D | E | F | G | H | Coil Size | Weight Full (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| 120 (2m$^2$) | 545 | 688 | | 190 | 180 | 250 | 660 | N/A | DN32 | 140 |
| 150 (2m$^2$) | 545 | 1081 | 875 | 190 | 180 | 250 | 660 | N/A | DN32 | 180 |
| 200 (3m$^2$) | 545 | 1399 | 1189 | 190 | 180 | 250 | 865 | 1028 | DN32 | 235 |
| 250 (3m$^2$) | 545 | 1711 | 1501 | 190 | 180 | 250 | 865 | 1340 | DN32 | 290 |
| 300 (3m$^2$) | 545 | 1930 | 1501 | 190 | 180 | 250 | 865 | 1340 | DN32 | 345 |
| 400 (3m$^2$) | 700 | 1525 | 1297 | 215 \927 | 205 | 315 | 780 | 1147 | DN32 | 485 |
| 500 (3m$^2$) | 700 | 1899 | 1641 | 215 \927 | 205 | 315 | 780 | 1491 | DN32 | 595 |

All Dimensions are nominal and in mm

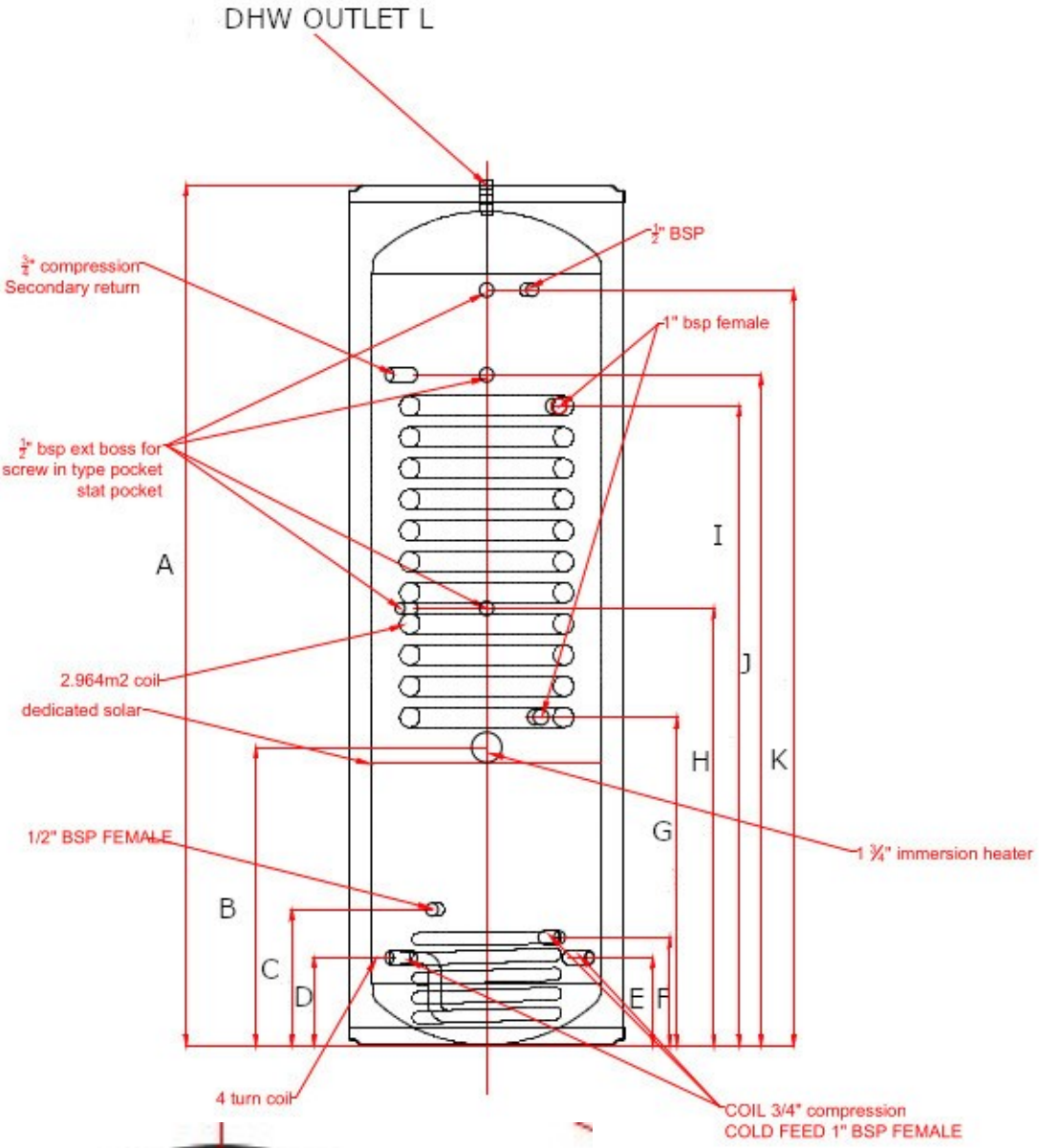
## 2.3 Twin Coil Unvented Hot Water Cylinder

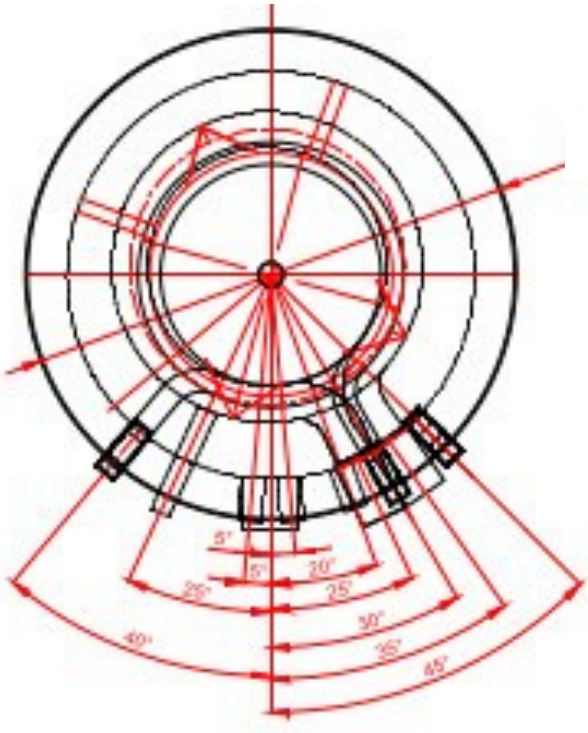
| Kensa Model No. | Volume | Weight Full | Heat Pump Coil | Expansion Vessel | Heat Loss | Heat Pump Coil Size | ErP Rating |
|---|---|---|---|---|---|---|---|
| | Litres | kg | $m^2$ | Capacity (litres) | W/ hour | | |
| 95-181A | 200 | 240 | 2.0 | 18 | 68 | DN32 | C |
| 95-182A | 250 | 295 | 2.9 | 24 | 71 | DN32 | C |
| 95-183A | 300 | 350 | 2.9 | 24 | 83 | DN32 | **C** |
| 95-184A | 400 | 490 | 2.9 | 50 | 91 | DN32 | C |
| 95-185A | 500 | 600 | 2.9 | 50 | 96 | DN32 | C |

| | Vessel Capacity (L) | | | | |
|---|---|---|---|---|---|
| | 200 | 250 | 300 | 400 | 500 |
| Solar Coil m2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Solar Connection Size | 3/4" Compres-sion | 3/4" Compres-sion | 3/4" Compres-sion | 3/4" Compres-sion | 3/4" Compres-sion |
| Diameter | 545 | 545 | 545 | 700 | 700 |
| Heat Pump Connection size | 1" BSP Female | 1" BSP Female | 1" BSP Female | 1" BSP Female | 1" BSP Female |
| Dimension | mm | | | | |
| Diameter | 545 | 545 | 545 | 700 | 700 |
| A | 1399 | 1711 | 1930 | 1525 | 1899 |
| B | 430 | 590 | 665 | 540 | 914 |
| C | 269 | 269 | 269 | 425 | 415 |
| D | 174 | 174 | 174 | 235 | 235 |
| E | 174 | 174 | 174 | 205 | 205 |
| F | 214 | 214 | 214 | 335 | 335 |
| G | 550 | 650 | 725 | 640 | 1014 |
| H | 757 | 865 | 940 | 715 | 1189 |
| I | 960 | 1265 | 1340 | 1105 | 1479 |
| J | 1015 | 1327 | 1550 | 1150 | 1524 |
| K | 1183 | 1495 | 1718 | 1297 | 1671 |
| L | 3/4" Compres-sion | 3/4" Compres-sion | 3/4" Compres-sion | 1"BSP Female | 1"BSP Female |

**Note:** the lower coil is used as the solar coil with the upper connected to the heat pump.
**Note:** The motorised valve supplied is only for use on the lower solar coil.

All Dimensions are nominal and in mm




All Dimensions are nominal and in mm

## 2.4 Components Supplied

| Description | Specification |
|---|---|
| Operating Pressure Tank and Coils | 3 bar – 95°C |
| Pressure Reducing Valve | 3.0 bar Control |
| Safety Relief Valve | 6.0 bar |
| Pressure & Temp Relief Valve | 7.0 bar/90°C |
| Immersion Heater | 1 3/4"—240V—3kW |
| Expansion Vessel up to 170 litre models | 3.0 bar charge, 12 litre capacity |
| Expansion Vessel for 200 & 250 litre models | 3.0 bar charge, 18 litre capacity |
| Expansion Vessel for 300 litre models | 3.0 bar charge, 24 litre capacity |
| Expansion Vessel for 400 and 500 litre models | 3.0 bar charge, 35 litre capacity |
| Flexible Hose for Expansion Vessel | Supplied loose |
| Mounting Bracket for Expansion Vessel | Supplied loose |
| Tundish | 1/2" x 22mm |
| Cylinder Twin Thermostat* (for solar coil) | Control & High limit |
| Motorised Valve* (for solar coil) | 240V |

* Only supplied with Twin Coil Tanks

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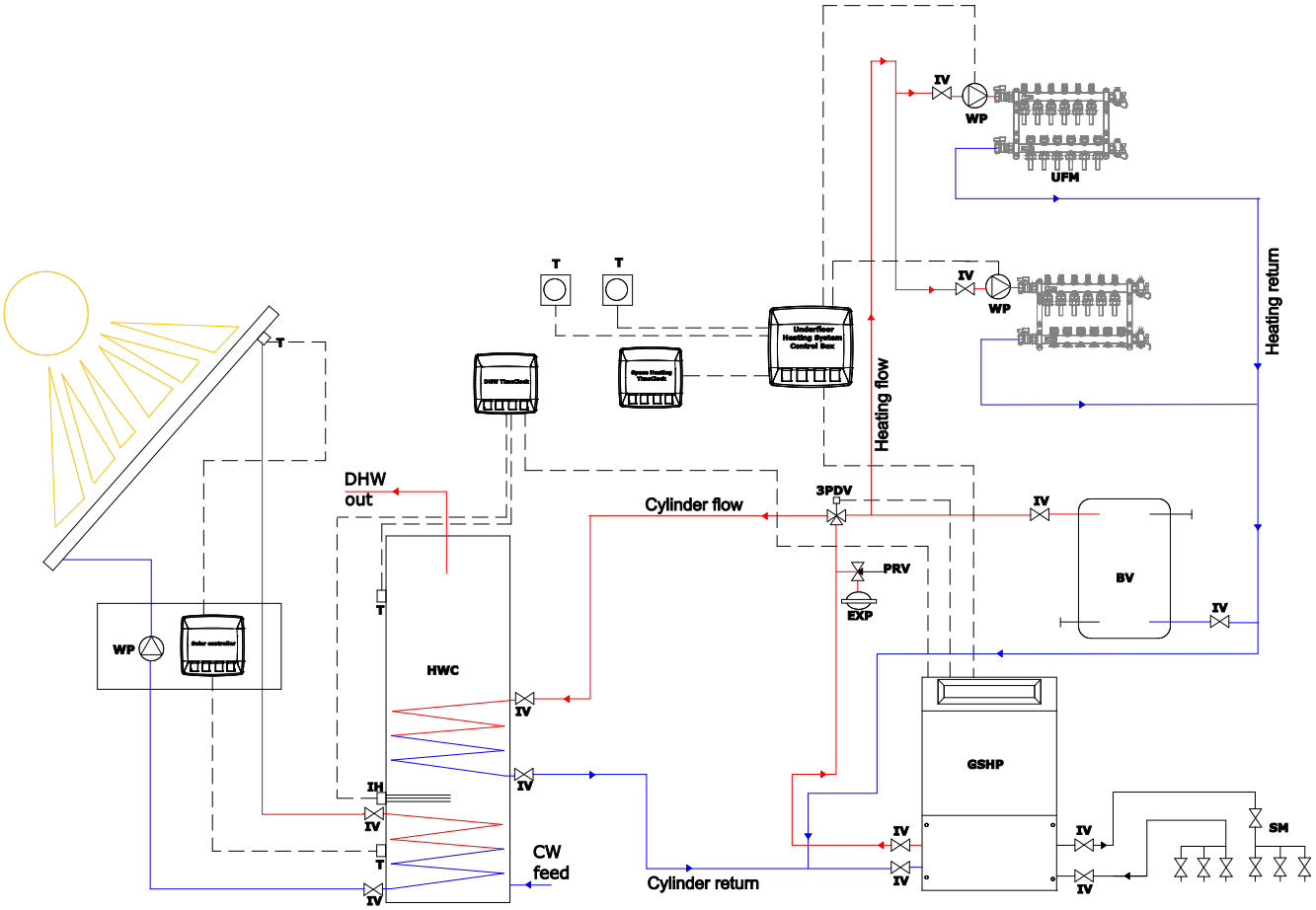
# 3.0. Typical Schematics

## 3.1 Twin Coil Cylinder with GSHP (Space Heating and DHW Production)




## Abbreviations

3PDV - 3 port diverting valve
BV - Buffer Vessel
DHW - Domestic Hot Water
CW - Cold Water
EXP - Expansion vessel
GSHP - Ground source heat pump
IH - Immersion heater
IV - Isolation valve
PRV - Pressure relief valve
SM - Slinky manifold
T - Thermostat
UFM - Underfloor manifold
WP - Water pump

The Buffer Vessel (BV) is an optional item and can be fitted to reduce short cycling of the heat pump and provide close temperature control for all zones. If 25% of the underfloor zones and radiators are left open this is not required.

**Please note:-** The above drawing is a schematic only and additional valves and fittings maybe required.

**Please note:-** Running the GSHP to produce DHW with off-peak tariffs might result in the GSHP needing to operate during peak electricity periods for space heating with higher associated running costs.

**Principle of Operation**

The Kensa heat pump is specifically designed to provide space heating and domestic hot water (DHW) at the highest efficiency possible with the simplest installation.

In space heating mode the system provides hot water into the underfloor heating system at generally a flow temperature of 35°C. For underfloor heating in a well insulated building this will provide adequate heating into the building at the heat pump's highest efficiency. If the insulation of the building is below current regulations then this flow temperature might need to be increased reducing the system's efficiency. Insulative floor coverings such as wood or thick carpets can also require higher flow temperatures.

If full zone control is required of all the underfloor areas then a buffer vessel is required to be fitted. The most efficient buffer vessel design for heat pumps is a two connection buffer vessel and fitting this will reduce short cycling while maintaining the highest efficiency of the heat pump.

The underfloor manifolds should ideally be connected using a reverse return system as this will ensure even heat flow through the underfloor zones without the use of balancing valves and the resulting increase in water pump energy.

When the DHW time clock calls for production of DHW, the three-port valve diverts the flow from the heating distribution circuit into the indirect coil within the hot water cylinder. The temperature of the water from the heat pump is raised to approximately 50°C.

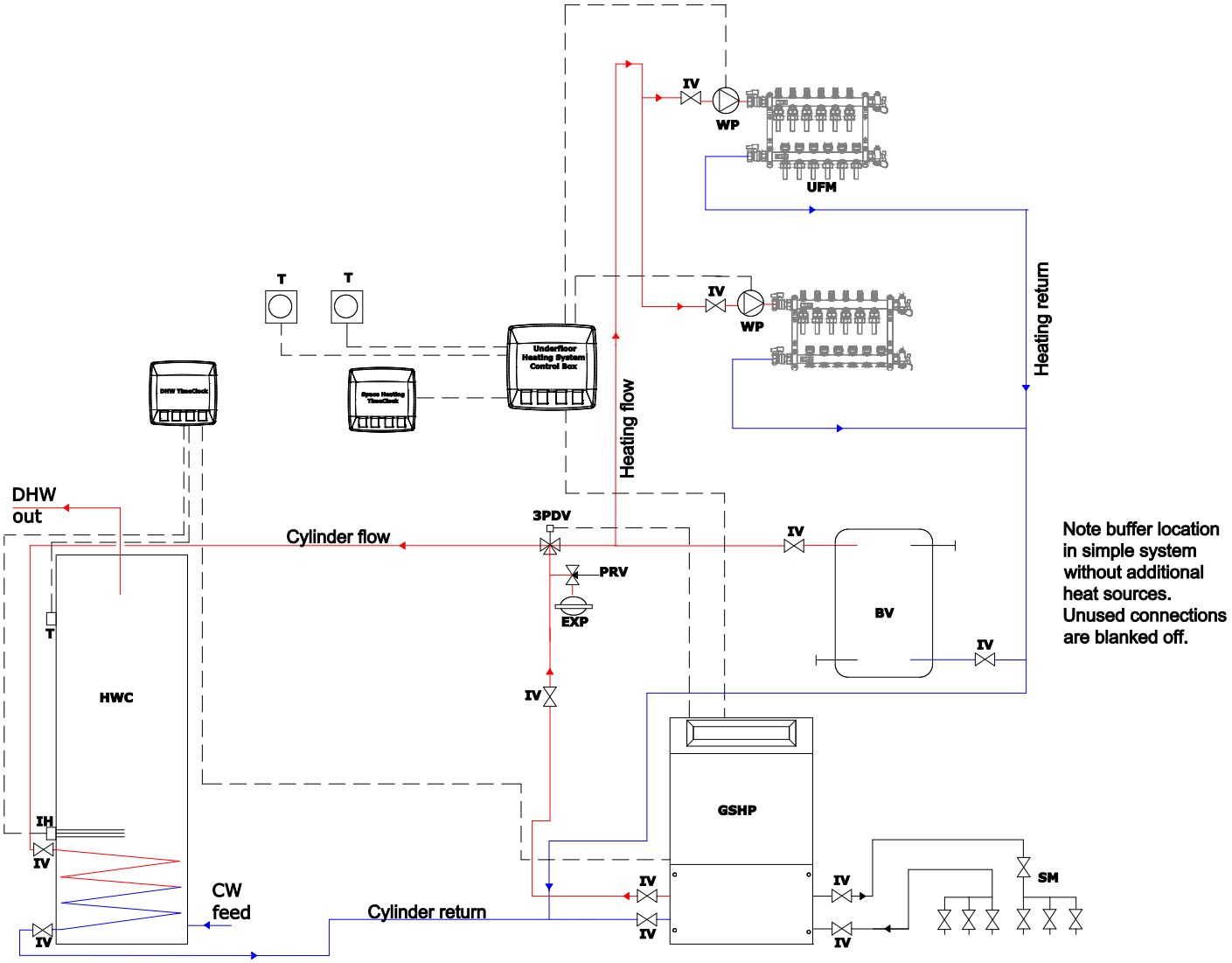
When the DHW production time period ends, the three port valve switches back to the underfloor distribution and the temperature drops back to its space heating design temperature. The heat pump then reverts to space heating mode or switches off if no zones are calling for heat.

The maximum DHW temperature that the heat pump can achieve will be approximately 50-55°C. In summer, it could be higher, due to the warmer ground conditions. If 65°C is required all year round, it is recommended that an immersion heater is linked to a second channel on the DHW timeclock and this is programmed to operate for a period immediately following the DHW production. This means that the majority of the heating load for the DHW is produced using the heat pump, as opposed to using only the direct immersion heater.

If 50°C water is acceptable, then it is recommended that the immersion heater is programmed to raise the temperature to 65°C once a week using the DHW timeclock.

The larger the coil within the tank, the better the heat transfer area and hence the better the DHW performance will be. Ideally the coil should be a minimum of 0.2 sqm per kW output from the heat pump.

### 3.2 Single Coil Cylinder with GSHP (Space Heating and DHW Production)




## Abbreviations

3PDV - 3 port diverting valve
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IV - Isolation valve
PRV - Pressure relief valve
SM - Slinky manifold
UFM - Underfloor manifold
WP - Water pump

**Please note:-** The above drawing is a schematic only and additional valves and fittings maybe required.

**Please note:-** Running the GSHP to produce DHW with off-peak tariffs might result in the GSHP needing to operate during peak electricity periods for space heating with higher associated running costs.

The buffer vessel (BV) is fitted to reduce short cycling of the heat pump while still allowing full zone control of the underfloor. If 25% of the underfloor zones are left open then this is not required.

## Principle of Operation

The Kensa heat pump is specifically designed to provide space heating and domestic hot water (DHW) at the highest efficiency possible with the simplest installation. It is designed to be easily integrated with a twin coil solar domestic hot water cylinder which will provide free DHW during the Summer, backed up with the ground source heat pump during the winter.

In space heating mode the system provides hot water into the underfloor heating system at generally a flow temperature of 35°C. If the insulation of the building is below current regulations then this flow temperature might need to be increased reducing the system's efficiency. Insulative floor coverings such as wood or thick carpets can also require higher flow temperatures.

To avoid short cycling of the heat pump it is advised that 25% of the zones on the underfloor manifolds are left hydraulically open to provide a minimum load on the heat pump. These zones are usually the bathrooms and halls. (Alternatively a buffer vessel can be used if control is required over all heating zones). Any mixing valves on manifolds should also be removed to provide maximum heat into the underfloor zones.

The underfloor manifolds should ideally be connected using a reverse return system as this will ensure even heat flow through the underfloor zones without the use of balancing valves and the resulting increase in water pump energy.

During the summer all of the DHW production is provided free by the solar thermal system, however during the winter the heat pump can be used to produce DHW. When the DHW time clock calls for production of DHW, the three-port valve diverts the flow from the heating distribution circuit into the indirect coil within the hot water cylinder. The temperature of the water from the heat pump is raised to approximately 55°C.

When the DHW production time period ends, the three port valve switches back to the underfloor distribution and the temperature drops back to its space heating design temperature. The heat pump then reverts to space heating mode or switches off if no zones are calling for heat.

Warning - when a heat pump is used for heating domestic hot water, it may not get the water hot enough to kill the dangerous Legionella that can breed in hot water cylinders. Alternative arrangements should therefore be made to ensure the cylinder is pasteurised regularly.

The maximum DHW temperature that the heat pump can achieve will be approximately 50-55°C. If 65°C is required all year round, it is recommended that an immersion heater is linked to a second channel on the DHW timeclock and this is programmed to operate for a period immediately following the DHW production. This means that the majority of the heating load for the DHW is produced using the heat pump, as opposed to using only the direct immersion heater.

If 50°C water is acceptable, then it is recommended that the immersion heater is programmed to raise the temperature to 65°C once a week using the DHW timeclock.

# 4.0 Installation

**WARNING : UNDER NO CIRCUMSTANCES MUST THE FACTORY FITTED TEMPERATURE PRESSURE RELIEF VALVE BE REMOVED. THIS WILL TOTALLY INVALIDATE ANY GUARANTEE OR CLAIM. THE COLD-WATER INLET VALVE ASSEMBLY MUST BE FITTED OR THE UNIT WILL NOT PERFORM SATISFACTORILY.**

Please read this manual carefully before installation of the product. You should be competent to install the unvented system as defined by the regulations. Please pay special attention to maintenance and service.

Please keep the unit packaged until you are ready to commence installation. The unit should be stored vertically in a dry area, and all safety components kept in the box.

IT IS A REQUIREMENT THAT THIS UNIT IS SERVICED AND MAINTAINED ANNUALLY. THE LOG BOOK MUST BE COMPLETED AND UPDATED. FAILURE TO DO SO WILL INVALIDATE GUARANTEES.

Warning - if a heat pump is used for heating domestic hot water, it may not get the water hot enough to kill the dangerous Legionella that can breed in hot water cylinders. Alternative arrangements should therefore be made to ensure the cylinder is pasteurised regularly.

The unit can be placed anywhere convenient. Since it is connected directly to the mains water supply it is equally efficient on any floor – ground, first or second. Avoid areas that may be subject to frost. Try to keep pipe runs as short as possible for maximum economy, especially hot water discharge pipes running down from the unit. The unit can be fitted into a conventional airing cupboard and does not require any additional insulation

It **MUST** be accessible for maintenance.

The water supply to the cylinder should be potable water direct from a public mains supply with any water treatment equipment functioning correctly

When first fixing take into account that the connections and controls will be front facing to facilitate access.

Mount the unit vertically on a flat even surface.

The expansion vessel is designed on the heat pump models to be fitted remotely and has a bracket and hose supplied as standard. There is no bush at the top of the unit to screw the vessel into.

**Check that the floor will support the unit when it is full of water. See page 5-7 for weights.**

If using push fit connections i.e. Speedfit, attach a piece of copper pipe initially to the vessel stainless steel connection via means of a compression fitting. The push fit connection then can be attached to this. Failure to do this may well cause any push fit connected directly onto the vessel to leak.

### 4.1 Cold Feed

Mains pipework should be a minimum of 25mm MDPE or 22mm copper. If 15mm copper or 1/2" lead is the only mains feed then the decision to install rests with the installer or specifier of the product. Flow rates may be compromised, even at appropriate pressures, ensure that you have at least 18 litres per minute at the bath tap.

Mains feed may need to be 32mm MDPE or 28mm copper if multiple bath filling or showering is required.

The unit operates at 3 bar but pressures from 2 bar upwards are suitable. Lower pressure will result in a fall in flow rate. Minimum flowrate requirement for single bath applications is 20 litres per minute and must rise proportionately for greater demands.

Please also take into account any fitting that could restrict flow such as water meters, softeners etc.

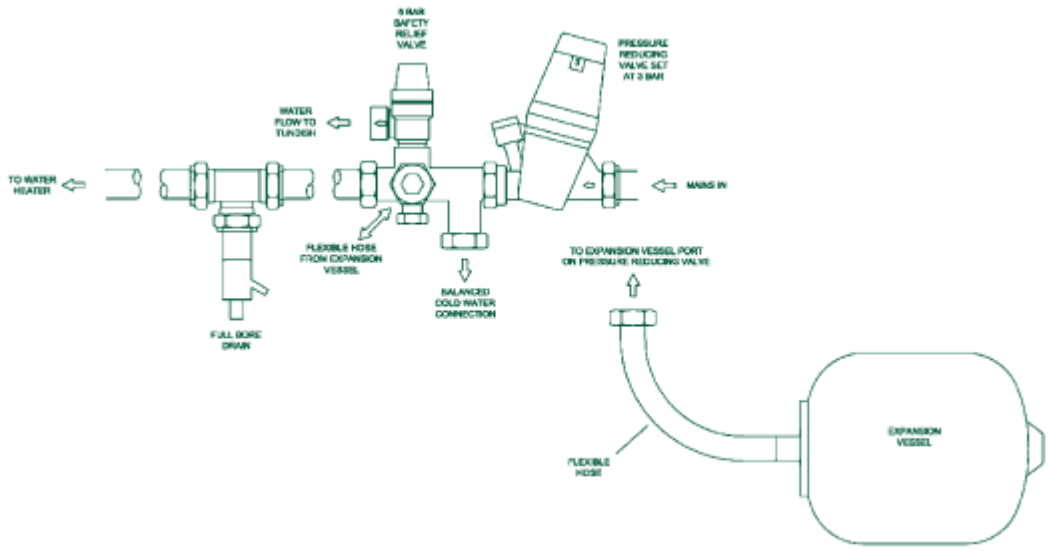
Use 22mm compression fittings for all unit connections. Use gunmetal, DZR or brass fittings, noting local water conditions.

### 4.2 Cold Mains Component Layout

The combined cold water valve (supplied) can be connected anywhere on the cold water mains prior to the unit. It can be located at a point near to where the mains supply enters the premises if this is more convenient . When installing the cold water valve, ensure that the arrow is pointing in the same direction as the mains water supply flow when connecting.

The cold water balancing port, on the valve, allows you to connect the cold water mains to the rest of the property thus giving balanced pressure throughout. If this facility is not required leave the cap on.

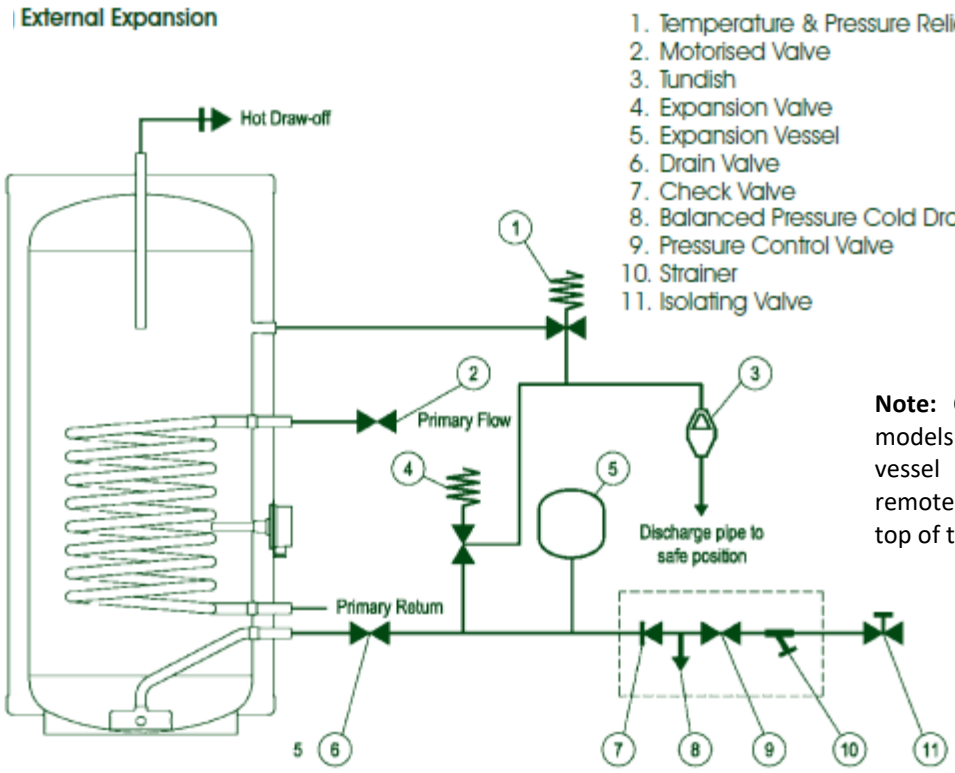
A drain tap to drain the unit must be fitted to the cold-water inlet pipe between the unit and the cold water valve assembly at it's lowest level possible.



### 4.3 Check Water Pressure and Flowrates

A 1.5 bar pressure & 20 litres/minute flow rate is the minimum requirements for satisfactory operation. Below this the unit will still operate but you will not be able to run two, or more, outlets at the same time. 85% of all UK homes have more than 2 bar pressure. The mains supply must not exceed 16 bar. If it does a special pressure—reducing valve will be required. Consideration should be given to the routing of the discharge pipe and the location of the solar panel or alternative energy source.

### 4.4 General Arrangement and Discharge




**Note:** On the heat pump models the expansion vessel is designed to be remote and not screwed on top of the vessel.

Both the pressure and temperature relief valve fitted to the unit and the expansion valve supplied loose must be arranged to comply with G3 regulations and both discharge into an open (visible) tundish.

The tundish must be fitted with a 300mm vertical drop of 22mm diameter pipe.

**NB: The tundish and drain must be positioned away from electrical devices.**

**ALWAYS CONSULT THE REGULATIONS!**

***IMPORTANT: Discharge arrangements are the responsibility of the installer and reference to current building regulations should always be made. Advance Appliances offers the foregoing as guidelines only.***

The discharge pipeworks main purpose is to allow full flow from relief valves to be accumulated and safely routed to a point outside the building at low level.

## 4.5 General Notes

### 4.5.1 Motorised Valve (Solar/twin tank only)

Advance solar cylinders are suitable for connecting to a solar collector system and, where a twin coil is present (INDIRECT) to a heat pump.
The cylinder should be installed in accordance with the solar installation instructions for connection to the primary flow and return.
The Advance solar range must only be connected to solar installations containing a hydraulic station with two non-return valves (one in the flow to the collector and one in the return. ) This will prevent thermal siphoning of the heat transfer fluid when the pump is switched off. Where two non-return valves are not present or hydraulic station is not used in the solar system, a second two-port valve must be installed into the flow of the solar coil and wired to the lower two-port valve.
The Advance solar is supplied with one two-port motorised valve which should be connected in the flow to the auxiliary coil and wired to the upper twin thermostat of the cylinder.
Solar Pump - the lower twin thermostat should be connected in line with the solar pump power supply.
The temperature and pressure relief valve (factory fitted) should not be removed from the cylinder or tampered with in any way. The valve is pre-calibrated to lift at 7 bar or 90°C and any attempt to adjust it will invalidate the warranty and could affect the safety performance of the unit.

### 4.5.2 External Expansion Vessel

This smaller tank is connected to the cold-water inlet side of the vessel. Mount the tank according to separate manufacturers instructions provided with the External Expansion vessel (see General Arrangement and Discharge).
A suitable expansion vessel with a pre-charge pressure of 3.0 bar is supplied with the cylinder.
The expansion vessel should be Tee'd off between the pressure relief valve and the cylinder (see installation diagram) and should always be positioned with the entry point at the bottom
Installation should always be by means of a standard T connector ensuring no other valve
is between this and the cylinder. Adjust the pressure to 3.0 bar.
The expansion vessel (supplied loose) is fitted remotely and has a bracket and hose supplied as standard. It is sized appropriately and includes some allowance for pipework.

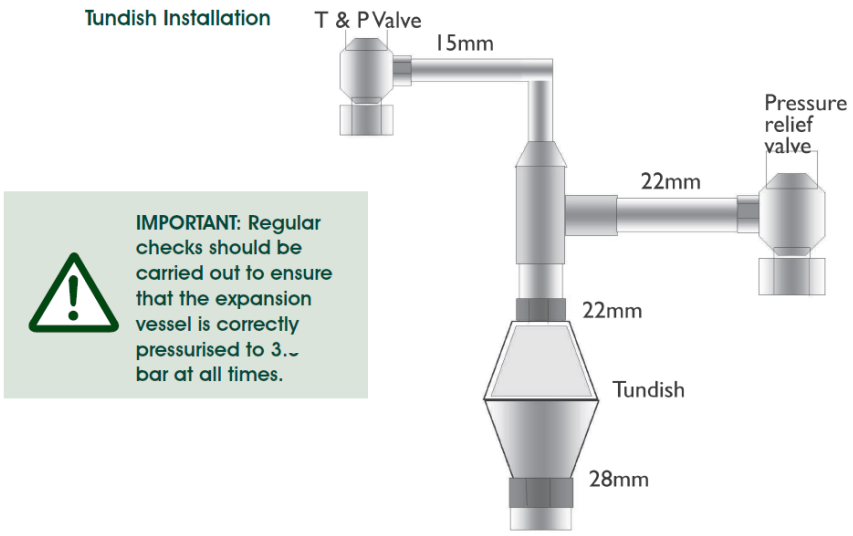
*Check the charge is at 3.0 bar before commissioning.*

### 4.5.3. Scale

In hard water areas lower water temperatures can result in less scale being deposited.
If a water softener is used it should be capable of flows of approximately. 50 lt/min, this will maintain maximum performance of the unit. If no descaler or softener is used then the heating element(s) will need descaling periodically for maximum efficiency and to prevent damage.

### 4.5.4 Tundish

The tundish supplied must be fitted so it is visible to the occupant. The discharge pipe must be 22mm copper pipe. Regulations do not permit more than 3 x 90 - degree bends between the cylinder and the outflow. Between the temperature & pressure relief valve and the first 90-degree bend there must be a fall of at least 300mm. The fall of the pipework must be continuous and the pipe should terminate in the gully or be bent backwards onto an outside wall, in a place where discharge cannot be injurious to persons.
If you need to site the cylinder in the middle of the house your discharge pipe to the tundish can be as far away as 9m, which in most cases is enough to run the final discharge point. After 9m, increase the pipe size to a greater diameter than 22mm and accordingly for subsequent 9m lengths, (Table 1).




**4.5.4.1 Tundish discharge**

**G3 Guidance Section 3.5**
The discharge pipe (D1) from the vessel up to and including tundish is generally supplied by the manufacturer of the hot water storage system. Where otherwise the installation should include the discharge pipe (s) (D1) from the safety device(s). In either case the tundish should be vertical, located in the same place as the unvented hot water storage system and be fitted as close as possible to, and lower than, the safety device, with no more than 600mm of pipe between the valve outlet and the tundish.

**The discharge pipe (D2)**
The discharge pipe (D2) from the tundish should:
**a.** have a vertical section of pipe at least 300mm long below the tundish before any elbows or bends in the pipework (see following diagram); and
**b.** be installed with a continuous fall of at least 1 in 200 thereafter.

The discharge pipe (D2) should be made of:
**a.** metal; or
**b.** other material that has been demonstrated to be capable of safely withstanding temperatures of the water discharged and is clearly and permanently marked to identify the product and performance standard (e.g. as specified in the relevant part of BS 7291-1:2006 Thermostatic pipes and fittings for hot and cold water for domestic purposes and heating installations in buildings, General Requirements).

**Termination of Discharge Pipe Sizing**
The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge.
Examples of acceptable discharge arrangements are:
a. to a trapped gully with the end of the pipe below a fixed grating and above the water seal;
b. downward discharges at low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility; and,
c. discharges at high level: e .g . into a metal hopper and metal downpipe with the end of the discharge pipe clearly visible or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastic guttering system that would collect such discharges .
The discharge would consist of high temperature water and steam roofing felt and non-metallic rainwater goods may be damaged by such. Asphalt, discharges.

**Worked Example of Discharge Pipe Sizing**

The example below is for a G1/2 temperature relief valve with a discharge pipe (D2) having 4 No elbows andlength of 7m from the tundish to the point of discharge. From table 1:

Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from G1/2 temperature relief valve is 9m. Subtract the resistance for 4 No 22mm elbows at 0. 8m each = 3.2m, therefore the permitted length equates to 5.8m. This is less than the actual length of 7m therefore calculate the next largest size .

Maximum resistance allowed for a straight length of 28mm pipe (D2) from a G1 /2 temperature relief valve equates to 18m Subtract the resistance of 4 No 28mm elbows at 1m each = 4m.

Therefore the maximum permitted length equates to 14m As the actual length is 7m a 28mm (D2) copper pipe will be satisfactory.

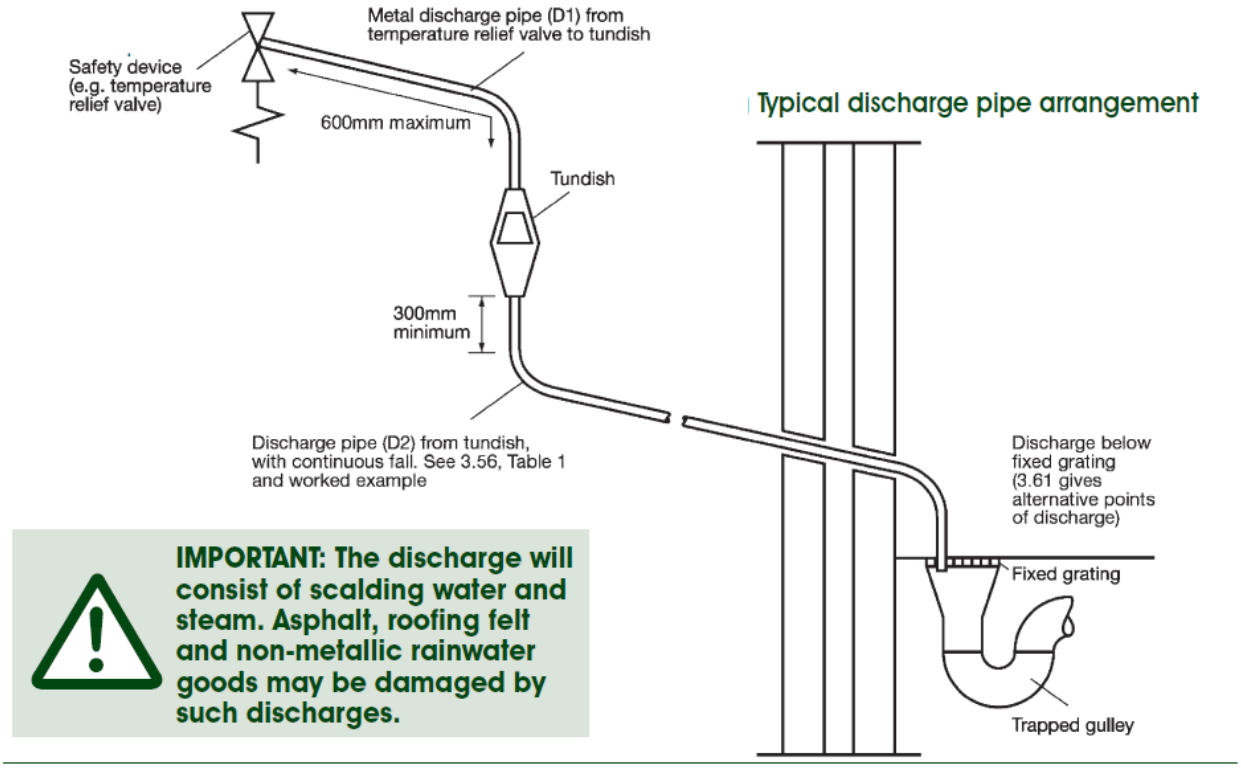



Table 1 Sizing of copper discharge pipe (D2) for common T&P relief valve sizes.

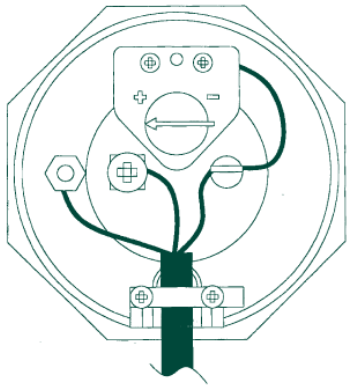
| Valve Outlet Size | Minimum Size of Discharge Pipe D1 | Minimum Size of Discharge Pipe D2 | Minimum Resistance Allowed, expressed as a Length of Straight Pipe (i.e no elbows or bends) | Resistance Created by each Elbow or Bend |
|---|---|---|---|---|
| G1/2 | 15 mm | 22mm | Up to 9m | 0.8m |
| | | 28mm | Up to 18m | 1.0m |
| | | 35mm | Up to 27m | 1.4m |
| G3/4 | 22 mm | 28mm | Up to 9m | 1.0m |
| | | 35mm | Up to 18m | 1.4m |
| | | 42mm | Up to 27m | 1.7m |
| G1 | 28 mm | 35mm | Up to 9m | 1.4m |
| | | 42mm | Up to 18m | 1.7m |
| | | 54mm | Up to 27m | 2.3m |

### 4.5.5 Immersion heaters

Immersion heaters are supplied as standard 3kW rating. An 'O' ring is supplied as the seal and must be fitted against the flange of the element **Take care not to cross thread and DO NOT use any other type of seal.**
As the heating element is Incoloy 825 and is fitted with a cut-out and thermostat for safety, a nonstandard 1¾" boss is fitted to the unit.
Replacement elements can be obtained through your authorised service agent.

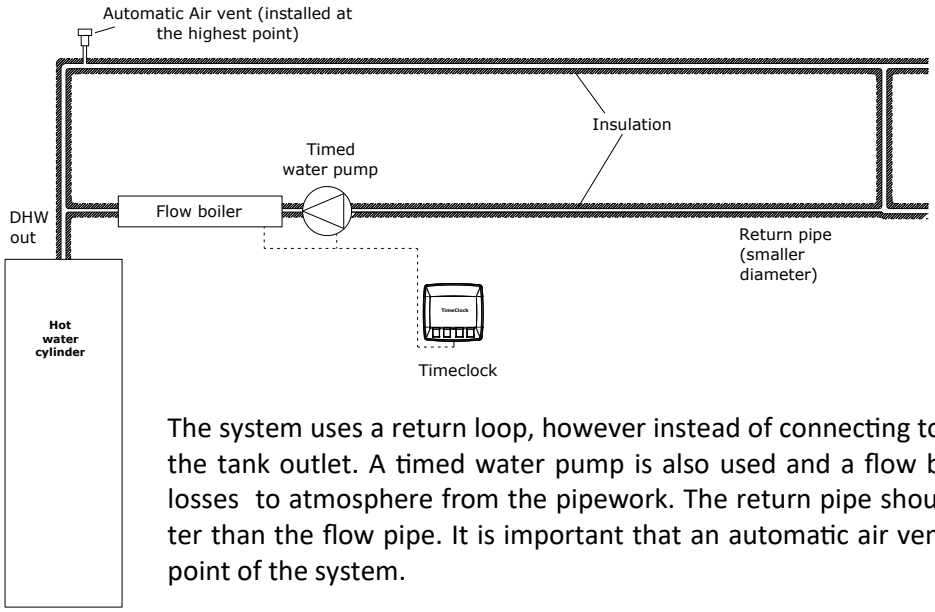
If 6 kW immersion heaters are supplied always, use contactors to switch the element as the thermostats are rated at only 3kW.

**WARNING:** ALL ELECTRICAL WIRING SHOULD BE CARRIED OUT BY A COMPETENT ELECTRICAL CONTRACTOR AND MUST CONFORM TO THE LATEST IEE WIRING REGULATIONS. DO NOT SWITCH THE POWER ON UNTIL THE UNIT HAS BEEN FILLED WITH WATER AND ALL WIRING HAS BEEN EARTHED.



### 4.5.6 Secondary Returns

In long DHW pipe runs, to avoid excessive water draw off before the water is up to temperature at the point of usage, it is common to install cylinders with a secondary return. This is not recommended for systems using heat pumps as it promotes mixing in the tank and a lower flow temperature off the cylinder.




For long pipe runs, to avoid excessive cold water draw offs it is recommend that a flow boiler is used and the pipe is well insulated.

The system uses a return loop, however instead of connecting to the tank it is connected to the tank outlet. A timed water pump is also used and a flow boiler, which makes up any losses to atmosphere from the pipework. The return pipe should also be a smaller diameter than the flow pipe. It is important that an automatic air vent is installed at the highest point of the system.

The operation of the water pump and flow boiler should be timed to a period/s around the time the most hot water is used, i.e. early morning and evening.

### 4.5.7 Hot Water Outlets

Dynamic pressure always drops across a system when more than one outlet is opened.

The unit has a working pressure of 3 bar.

Good system design should take this into consideration & pipe sizing should be in line with current good practice.
Ideally a 22mm pipe run should supply the outlets throughout the propertywith short lengths (max 1 metre) runs of 15mm going to baths, showers, and basin taps. Smaller bore pipe can be used to suit taps.
All taps and fittings incorporated into the unvented system should have a rated operating pressure of 7 bar or above.
In hard water areas a reduced operating temperature will help to prevent premature scaling.

### 4.5.8 Primary Circuits

- The maximum primary pressure is 3 bar.
- If the primary circuit is sealed, an additional expansion vessel must be fitted.
- If a secondary circuit is connected an additional expansion vessel may be required.

### 4.5.9 Electrical Connections

For Heat Pump cylinders as the heat input is low (generally below 60oc) the two port valve and overheat thermostat arrangement generally fitted on a boiler can be omitted.

For twin coil cylinders the diverter valve and overheat thermostat arrangement should be employed to provide overheat protection on the solar circuit.

Immersion heaters are rated 3kw at 240v (2.76kw at 230v), incolloy elements, with a thermal energy cut-out, and must be connected via double pole switches with a 3mm contact gap separation. Appropriate wiring for the electrical load must be used.

Do not switch on until the unit is full of water.

Order replacements using reference number on page . Do not fit an immersion heater without a high limit thermostat. Immersion heaters supplied are designed for domestic use only, either utilising low tariff electricity and occasional boost or for switched periods during the day.

- Units must be earth bonded.
- Immersion heaters must meet BS EN 60730-2-1.
- Fuse rating for 6kw loading is 25 amps, for 3kw models fuse rating is 13 amps.

Although not required by Building Regulations, it is generally advised that to provide legionella protection the tank is raised above 60$^{o}$C at least once a week. To provide this we would recommend that a 3 kW electric immersion heater is fitted with its own dedicated 7- day timeclock. If DHW is required higher than 50$^{o}$C then it is advisable that the immersion heater is programmed to operate for a period following the heat pump operation period to raise the temperature. This avoids the immersion heater taking all of the load.

## 5.0 Commissioning

Before filling, check all connections for water tightness including any factory made connections such as the immersion heater and the temperature and pressure relief valve, check expansion vessel charge is at 3.0 bar. The valve is of the car tyre (Schrader) type. The hot tap furthest away from the Advance Appliances should be opened before filling the system to let air out.
The system should be flushed before use. The remaining taps should be opened in turn to expel air.

1. Open all terminal fittings on the domestic hot water circuit. Open the main supply to the unit.
2. Flush the unit through until all air is expelled.
3. Close hot outlets and open all cold outlets connected to the tee after the pressure control valve.
4. Flush through until all air is expelled.
5. The system is now full of water. Check for any leaks on pipework or joints or components such as immersion heaters etc. It is the installers responsibility to check all fittings, including those that are fitted to the unit.
6. Switch on power and heat up via immersion heater, and/or heat pump.
7. Your system should now be ready for use.

## 6.0 Maintenance

Please ensure that the installer has fully completed the Benchmark Checklist on the inside back pages of the installation instructions supplied with the product and that you have signed it to say that you have received a full and clear explanation of its operation . The installer is legally required to complete a commissioning checklist as a means of complying with the appropriate Building Regulations (England and Wales.) All installations must be notified to Local Area Building Control either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer who should, on receipt, write the Notification Number on the Benchmark Checklist.

**Maintain annually and carry out the following checks:**

Clearly up date the Log Book at each service - **GUARANTEES ARE VOID WITHOUT SERVICE RECORDS.**

1. Check incoming pressure is controlled at 3 bar maximum. Expansion vessels must be maintained annually. The charge should be checked with an accurate pressure gauge and maintained at 3.0 bar. If the reading is less than 3.0 bar to recharge the vessel ensure that the unit is decommissioned by turning off the water supply and opening hot tap.
   Open the pressure and temperature relief valve to drain water from the top of the unit then close this valve. Leaving the hot tap open and the main supply off, pump the vessel using a schraeder valve connector via a footpump or motorised pump to 3.0 bar. Remove pump, open mains supply and close hot tap once water is running freely.
   Run a hot tap and close. If the pressure remains over 3 bar, re-calibrate the Pressure Reducing Valve and clean the strainer, replacing if necessary.
2. Open the expansion valve cap to manually discharge water to ensure that it works, making sure that it resets correctly.
3. Open the pressure and temperature relief valve cap to manually discharge water to ensure that it works, making sure that it resets correctly.
4. In both cases ensure that discharge pipework is adequate to safely carry discharged water away. If not, check for blockages etc. and clear.
5. Check that the controls of the hot water temperature do not allow the water to get hotter than 60ºc.

## 7.0 Warranty

Advance guarantee the immersion(s) and controls for a period of 1 year from the date of purchase, excluding any failure caused by lime-scale, provided that they have been installed for their intended use by a competent person and have not been modified in anyway.

In addition Advance guarantees the stainless steel inner hot water cylinder for a period of 25 years from the date of purchase against faulty material or manufacture provided that:
a) The vessel has been installed by a competent person in accordance
with this manual and all current regulations and codes of practice in place at the time of installation.
b) It has been used solely for them purpose of heating potable water that complies with current (at the time of installation) EU standards and is not fed with water from a private source.
c) It had not been modified in any way .
d) It has not been subjected to excessive pressure or electrolytic action from dissimilar materials, or attack from any salt deposits.
e) It has been installed indoors in a frost-free environment.
f) The cylinder is connected to a public water supply maintained by a local water authority.
g) The unit has been serviced annually.
h) Chlorine water content must be less than 200 ppm.
i) Water with more than 200 ppm calcium carbonate is treated.

**This warranty is not transferable and does not include claims due to frost or lime scale damage.**
**This guarantee does not cover a procedure of flushing the system not in accordance to the WRAS guidelines pertaining to B.S.6700.**
**Proof of purchase will be required against any claim. This guarantee does not affect your statutory rights.**
**Please register your cylinder warranty at [www.advanceappliances.co.uk](http://www.advanceappliances.co.uk)**

## 8.0 Servicing and Maintenance

Servicing and maintenance should only be carried out by a competent unvented hot water installer or Advance authorised personnel.
Before any work whatsoever is carried out on the installation, it must be isolated from the electricity supply.
Both the primary and secondary systems will contain very hot water that will scald, therefore care should be taken when opening any joints, seals or valves.
Only use spare parts authorised by Advance. The use of other parts will invalidate the warranty .
This product should be serviced regularly to optimise it's safety, efficiency and performance. The service engineer should complete the relevant Service Record on the Benchmark Checklist after each service.

Advance Appliances/Kensa reserve the right to alter or improve components or specification without notice.

**Advance Appliances Ltd**
Unit 4, Coppice Side Industrial Estate
Brownhills, Walsall
West Midlands WS8 7EX
**Tel: 01543 377723**
Fax: 01543 360620
www.advanceappliances.co.uk

## 9.0 Troubleshooting

**WARNING: Disconnect electrical supply before removing any electrical equipment cover.**

| Fault | Possible Cause | Remedy |
|---|---|---|
| **No hot water** | 1. Mains supply off<br>2. Strainer blocked<br>3. Pressure reducing valve (PRV) fittedthe wrong way | 1. Open stopcock<br>2. Turn water supply off, remove strainer and clean.<br>3. Re-fit with arrow pointing in direction of flow |
| **Water from hot taps is cold** | 1. Programmer set to heating only or not switched on for hot water<br>2. Central heating boiler malfunction<br>3. High limit thermostat has tripped<br>4. Pump malfunction | 1. Set programmer to call<br>2. Check boiler operation if faulty consult your boiler manufacturers instructions<br>3. Check and re-set<br>4. Check wiring and/or plumbing connections to pump |
| **Intermittent water discharge through tundish on warm-up** | 1. Expansion vessel has lost its charge pressure | 1. Turn off stopcock open a hot water tap check vessel charge pressure and recharge to 3.5 bar |
| **Continuous water discharge** | 1. Pressure reducing valve (PRV) not working<br>2. Expansion relief valve not seating correctly<br>3. Temperature and pressure relief valve not seating correctly | 1. Check pressure from PRV if greater than 3.5 bar replace cartridge<br>2. Manually lift the valve once or twice to clear any debris from the seat otherwise replace valve<br>3. Manually lift the valve once or twice to clear any debris from the seat otherwise replace valve |

## 10.0 User Instructions

Your Advance unvented hot water duplex stainless cylinder has been designed to give many years of trouble free service and is made from hygienic high grade steel. It includes a 3kWm electric immersion heater which heats the water to 60°C once pre-heating of the solar system is completed (Advance solar only) . High temperatures can cause tripping of the high limit thermostat and introduces more energy loss from the cylinder.

When a hot tap is turned on there may be a short surge of water, this is quite normal with unvented systems and does not mean there is a fault.

When you first fill a basin the water may sometimes appear milky. This is due to very tiny air bubbles in the water which will clear very quickly.

**WARNING: IF COLD/WARM WATER EXITS FROM THE TEMPERATURE AND PRESSURE RELIEF VALVE (TPV) OR FROM THE PRESSURE RELIEF VALVE (PRV) CALL YOUR INSTALLER OR THE ADVANCE CUSTOMER SERVICE CENTRE. IF VERY HOT WATER EXITS FROM EITHER VALVE SWITCH OFF THE HEAT SOURCE IMMEDIATELY AND ISOLATE THE ELECTRICITY SUPPLY TO THE CYLINDER AND SEPARATE HEAT SOURCE.**

**THE SOLAR SYSTEM IS CONFIGURED TO HEAT THE WATER TO ITS MAXIMUM ECONOMIC TEMPERATURE WHICH MAY VARY WITH OUTSIDE TEMPERATURE AND WEATHER CONDITIONS. THE IMMERSION MAY BE PROGRAMMED TO OPERATE DURING FIXED PERIODS OF THE DAY OR NIGHT.**

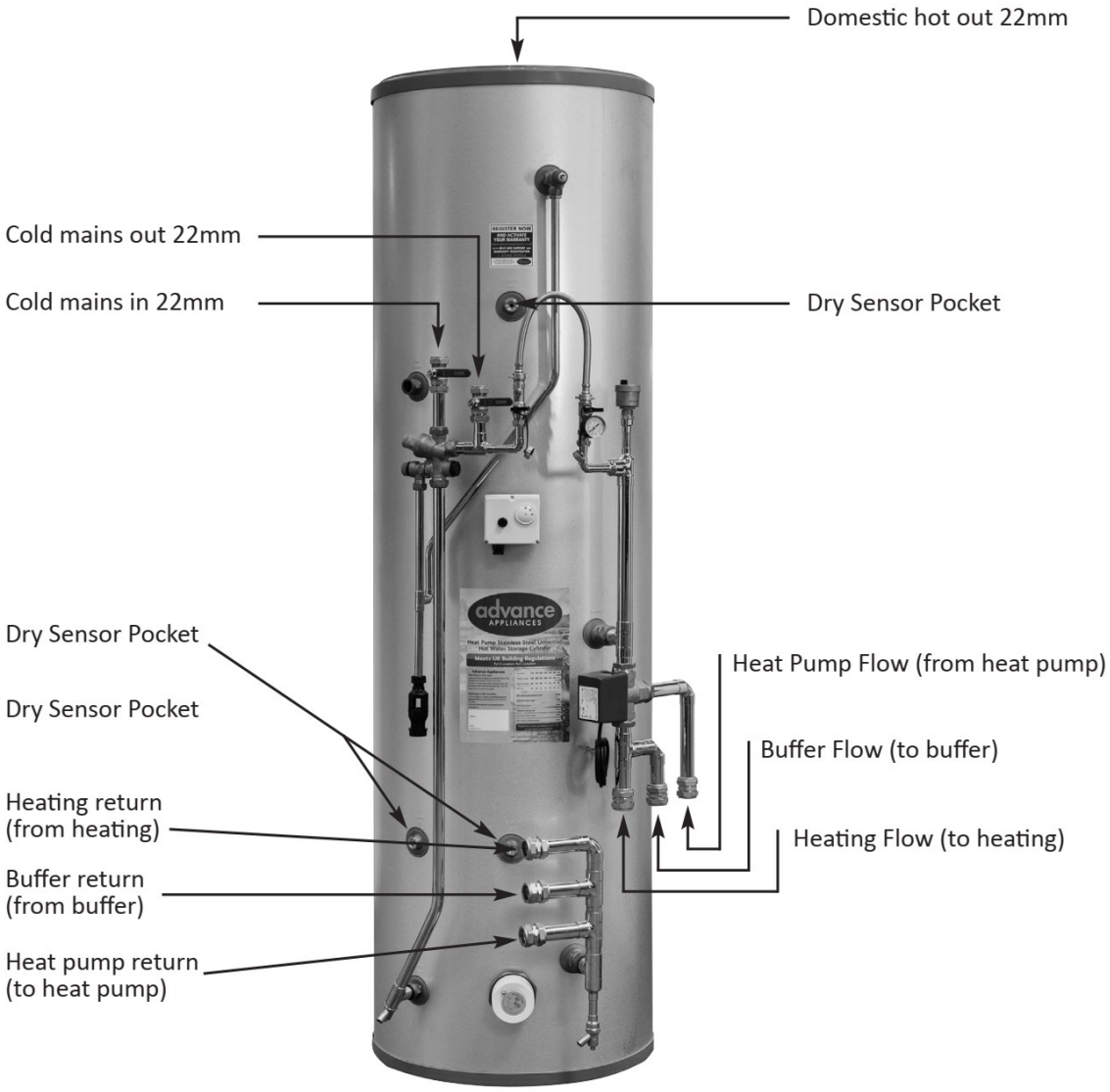
**IF THE HOT WATER RUNS COOL IT MAY BE NECESSARY TO MANUALLY SWITCH ON THE IMMERSION TO HEAT THE WATER – PLEASE SEE THE RELEVANT INSTRUCTIONS FOR YOUR ALTERNATIVE ENERGY DEVICE.**

## 11.0 Spares

The following spares for the unvented heat pump cylinders are available :

| KENSA CODE | ADVANCE CODE | COMPONENT |
|---|---|---|
| 95-501A | AA0267 | 3 BAR CONTROL INLET GROUP |
| 95-502A | AA0272 | 7BAR/95 DEGREE P&T RELIEF VALVE |
| 95-503A | AA0273 | 3KW IMMERSION HEATER C/W STAT |
| 95-210A | AA0276 | 12 LITRE EXPANSION VESSEL 3BAR |
| 95-211A | AA0277 | 19 LITRE EXPANSION VESSEL 3 BAR |
| 95-506A | AA0279 | TUN DISH 22 X 15 |
| 95-507A | AA0282 | DUAL THERMOSTAT |
| 95-508A | AA0283 | 2 PORT VALVE 22MM |
| 95-505A | AA0284 | 6KW IMMERSION HEATER C/W STAT |
| 95-506A | AA0285 | 3KW IMMERSION THERMOSTAT ONLY |

## 12.0 Pre-Plumbed Cylinder



# MAINS PRESSURE HOT WATER STORAGE SYSTEM COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the storage system as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer Name _____ Telephone Number _____

Address _____

Cylinder Make and Model _____

Cylinder Serial Number

Commissioned by *(print name)* _____ Registered Operative ID Number _____

Company Name _____ Telephone Number _____

Company Address _____

_____ Commissioning Date _____

**To be completed by the customer on receipt of a Building Regulations Compliance Certificate*:**

Building Regulations Notification Number *(if applicable)* _____

## ALL SYSTEMS PRIMARY SETTINGS (indirect heating only)

| | | |
|---|---|---|
| Is the primary circuit a sealed or open vented system? | Sealed ☐ | Open ☐ |
| What is the maximum primary flow temperature? | | °C |

## ALL SYSTEMS

| | | | |
|---|---|---|---|
| What is the incoming static cold water pressure at the inlet to the system? | | | bar |
| Has a strainer been cleaned of installation debris (if fitted)? | Yes ☐ | No ☐ | |
| Is the installation in a hard water area (above 200ppm)? | Yes ☐ | No ☐ | |
| If yes, has a water scale reducer been fitted? | Yes ☐ | No ☐ | |
| What type of scale reducer has been fitted? | | | |
| What is the hot water thermostat set temperature? | | | °C |
| What is the maximum hot water flow rate at set thermostat temperature (measured at high flow outlet)? | | | l/min |
| Time and temperature controls have been fitted in compliance with Part L of the Building Regulations? | | Yes ☐ | |
| Type of control system (if applicable) | Y Plan ☐ S Plan ☐ | Other ☐ | |
| Is the cylinder solar (or other renewable) compatible? | Yes ☐ | No ☐ | |
| What is the hot water temperature at the nearest outlet? | | | °C |
| All appropriate pipes have been insulated up to 1 metre or the point where they become concealed | | Yes ☐ | |

## UNVENTED SYSTEMS ONLY

| | | | |
|---|---|---|---|
| Where is the pressure reducing valve situated (if fitted)? | | | |
| What is the pressure reducing valve setting? | | | bar |
| Has a combined temperature and pressure relief valve and expansion valve been fitted and discharge tested? | Yes ☐ | No ☐ | |
| The tundish and discharge pipework have been connected and terminated to Part G of the Building Regulations | | Yes ☐ | |
| Are all energy sources fitted with a cut out device? | Yes ☐ | No ☐ | |
| Has the expansion vessel or internal air space been checked? | Yes ☐ | No ☐ | |

## THERMAL STORES ONLY

| | | |
|---|---|---|
| What store temperature is achievable? | | °C |
| What is the maximum hot water temperature? | | °C |

## ALL INSTALLATIONS

| | |
|---|---|
| The hot water system complies with the appropriate Building Regulations | Yes ☐ |
| The system has been installed and commissioned in accordance with the manufacturer's instructions | Yes ☐ |
| The system controls have been demonstrated to and understood by the customer | Yes ☐ |
| The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer | Yes ☐ |

Commissioning Engineer's Signature _____

Customer's Signature _____

*(To confirm satisfactory demonstration and receipt of manufacturer's literature)*

*All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

benchmark

# SERVICE RECORD

It is recommended that your hot water system is serviced regularly and that the appropriate Service Record is completed.

**Service Provider**
Before completing the appropriate Service Record below, please ensure you have carried out the service as described in the manufacturer's instructions.

**SERVICE 1** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 2** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 3** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 4** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 5** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 6** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 7** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 8** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 9** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature

**SERVICE 10** Date
Engineer Name
Company Name
Telephone Number
Comments
Signature