Manual

Heatstream

Installation & Maintenance

Harlequin® HeatStream®
HOT WATER SYSTEM

Applicable to the following models:

Direct:	HS150DI, HS200DI, HS250DI;
Indirect:	HS150IN, HS200IN, HS250IN, HS400IN, HS500IN, HS600IN;
Twin:	HS200TW, HS250TW, HS400TW, HS500TW, HS600TW;
Triple:	HS400TR, HS500TR, HS600TR.

CE

This manual must be left with the end user

Pre-Installation checklist

The Heatstream family of hot water storage tanks have been developed to suit a wide range of installations, there are however some cases where existing systems may have to be upgraded. Prior to installing a Heatstream tank, it is recommended the following checks are carried out to ensure the system meets the following requirements:

1) Incoming mains water supply should be capable of delivering a minimum flow rate of 20 litres per minute at a dynamic pressure of 1.5 bar at all times. If this cannot be achieved a cold-water booster set should be installed to achieve this. It is also possible to use a gravity fed system although flow rate performance will be significantly reduced.
2) Incoming mains water supply pressure should not exceed 3 bar. If the supply pressure is greater than this a pressure reducer must be installed.
3) The tank is designed for the use and production of potable hot water, and other usage or modifications will invalidate all guarantees. The incoming mains water supply should have a total hardness of less than 200mg/litre and a chloride content of less than 300mg/litre. The heating water should have a pH value of between 6.5 and 8.5. In instances where the water chemistry exceeds these levels a suitable and effective water treatment should be installed. This should be designed and installed in such a way as to minimise the risk of component and or system failure.
4) Any circuits supplying heat to the tank and connected to an external heat source should be fully pumped (not applicable to the direct range). Gravity circulation is only possible with the Triple range of tanks (secondary and tertiary heat supply circuits only).
5) Pipework supplying the hot taps must be capable of withstanding minimum 6 bar pressure.
6) Pipework supplying the hot taps must be capable of carrying water with a temperature of up to 95°C

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5	Mixing valve	10	Temperature probe pocket (Twin / Triple models)
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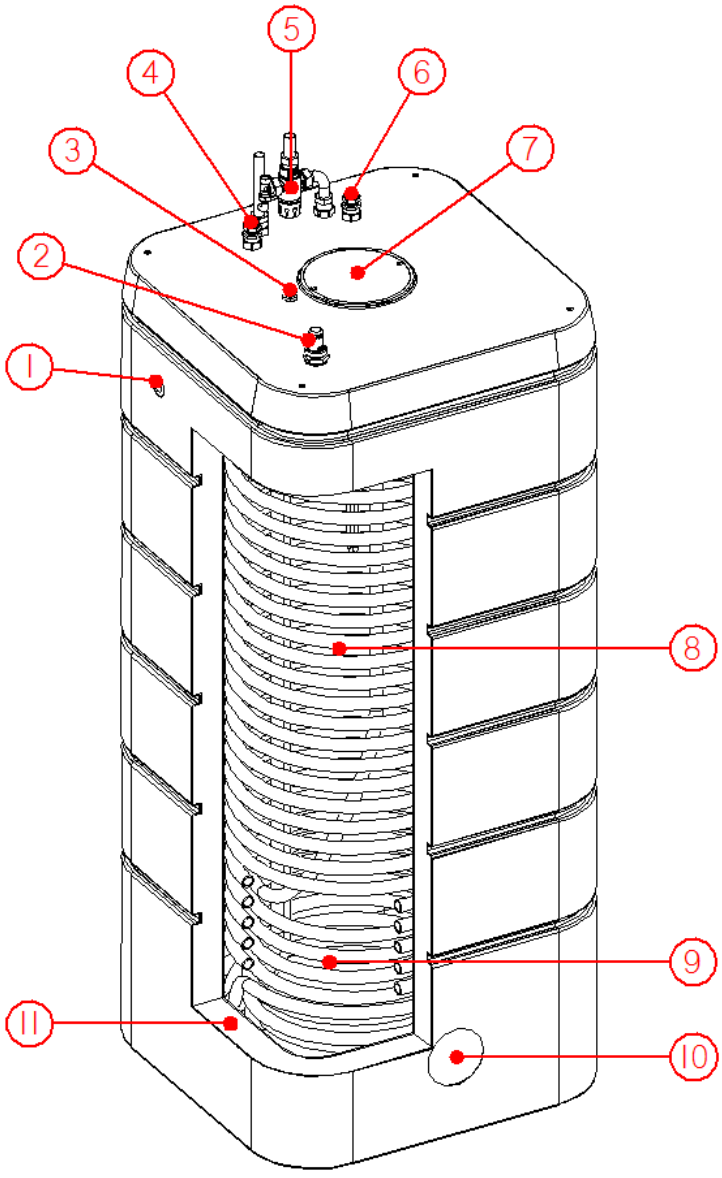

Figure 1 Key components of the Heatstream hot water storage tank

1.2 Operation Instructions

1.2.1 Thermostatic mixer

A thermostatic mixing valve (Figure 2) with an adjustment range of between 35°C (MIN) and 65°C (MAX) is supplied with all Heatstream tanks. The function of the thermostatic mixing valve is to deliver water consistently at a safe temperature. It is recommended that the mixing valve is set to nominally 45°C (#3) to achieve the best hot water output performance.

Figure 2 Thermostatic mixer valve settings

1.2.2 Top immersion heater

All Heatstream tanks are supplied with a top mounted 3kW immersion heater which acts as a boost / backup to an external heat source such as a boiler. The Direct range is electrically heated only and is supplied with an additional 3kW immersion heater positioned at the bottom of the tank. Each immersion heater is fitted with a thermostat which helps to regulate the store temperature. This is pre-set to nominally 60°C but can be adjusted by removing the immersion heater cover and adjusting the control knob (position 1≈15°C, position 5≈70°C Figure 3 and Figure 4).

Each thermostat has an integrated high limit safety stat which provides protection against the tank overheating. In the event of the high limit temperature being reached, power will be cut off to the immersion heater and will require manual resetting to restore operation, this can be reset by pressing down on the reset button (Figure 4).

Figure 3 Top thermostat and immersion compartment

Isolate the power supply before removing any protective covers. If you are unsure or need assistance seek help from a competent person.

1.3 TANK CONTROL THERMOSTAT

All indirect, twin and triple tanks are fitted with thermostats to control the supply of heat to the tank from the various heat sources. This is pre-set to nominally 65°C but can be adjusted between nominally 45°C and 75°C dependent on the heat source and desired store temperature (Figure 4).

Each thermostat has an integrated high limit safety thermostat which provides protection against the tank overheating. In the event of the high limit temperature being reached the supply of heat to the tank will be cut off and will require manual resetting to restore operation, this can be reset by pressing down on the safety reset button (Figure 4).

NOTE: Only reset the high limit trip when the tank is cold, failure to do so will irreparably damage the thermostat.

Isolate the power supply before removing any protective covers. If you are unsure or need assistance seek help from a competent person.

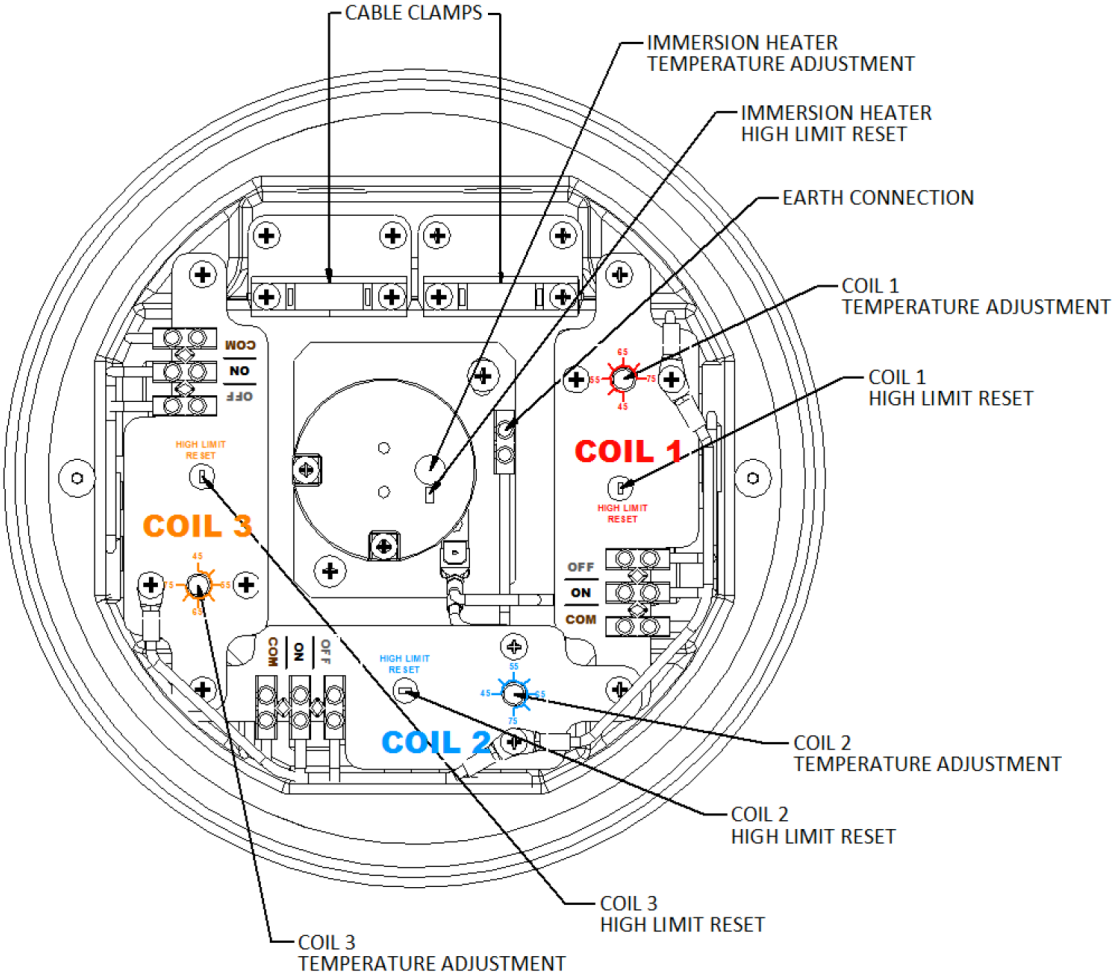

Figure 4 Location of thermostat controls

1.4 FREQUENT CHECKS

1.4.1 Low level indicator

It is important to carry out periodic visual checks via the low-level indicator to ensure the correct water level is maintained. During normal operation the red indicator should be between the MIN and MAX markings (Figure 5). If the water level is found to be below the MIN marking it can be topped up using the filling loop. When the filling loop is not in use, it should be disconnected from the system.

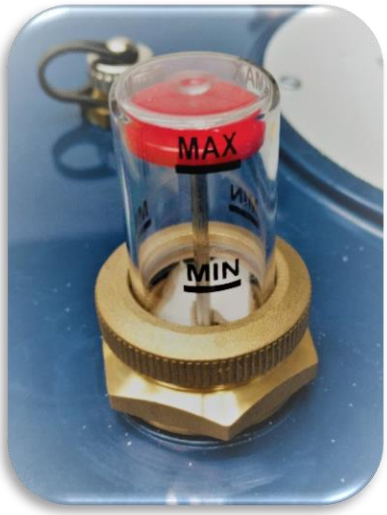

Figure 5 Water level indicator

1.4.2 Topping up the tank

If the tank level is found to be below the MIN marking it must be topped up using the filling loop. Connect the flexible hose as shown in Figure 7. Using a flat head screwdriver turn the ball valve (Figure 7) slowly clockwise through 90^0, the tank will begin filling, when the level indicator reaches MAX and water starts to flow from the overflow close the valve.

Figure 7 Filling loop connected

Figure 6 Filling loop disconnected

Ensure the filling valve is fully closed and disconnect the hose, there will be a small leakage of water so have rags handy to mop up. The caps must be screwed onto the tank and the ball valve as shown in Figure 6. Failure to replace the caps may result in steam escaping from the tank or water leaking from the ball valve.

Note: It is normal for the red indicator to drop again slightly following the first heat up cycle. There is no need at this point to top the tank up any further, unless the red indicator is below the MIN marking.

1.4.3 Tank overflow

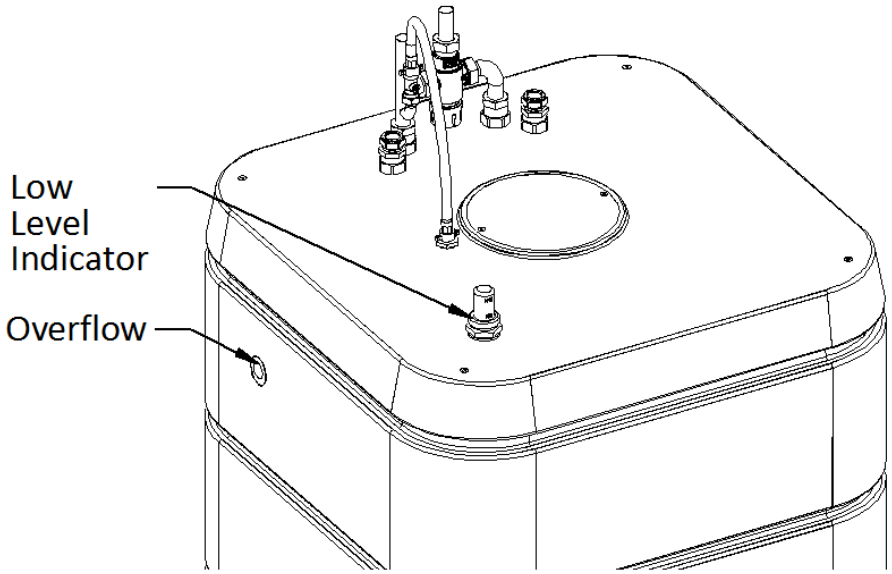

Figure 8 Location of low level indicator and overflow

All tanks have an integral safety overflow pipe. The function of the overflow pipe is to act as a vent and prevent any pressure build up if the tank was overfilled and or developed an internal fault. Regular visual checks should be carried out to ensure there are no leaks and or blockages present in the system. If water is continuously being discharged through the overflow pipe this may suggest the hot water tank has developed a fault or that the filling loop is still connected. Check that the filling loop hose is disconnected and the connections capped. If the fault persists, please contact your original installer. It is normal for a small volume of water to run off through the overflow pipe during first fill and subsequent first heat up cycle and when topping up the water inside the tank.

NOTE: If a fault is discovered switch off all heat sources, isolate the power supply and contact your installer. Wait until the storage water has sufficiently cooled before carrying out any repairs.

2 TECHNICAL SPECIFICATIONS

2.1 DIRECT

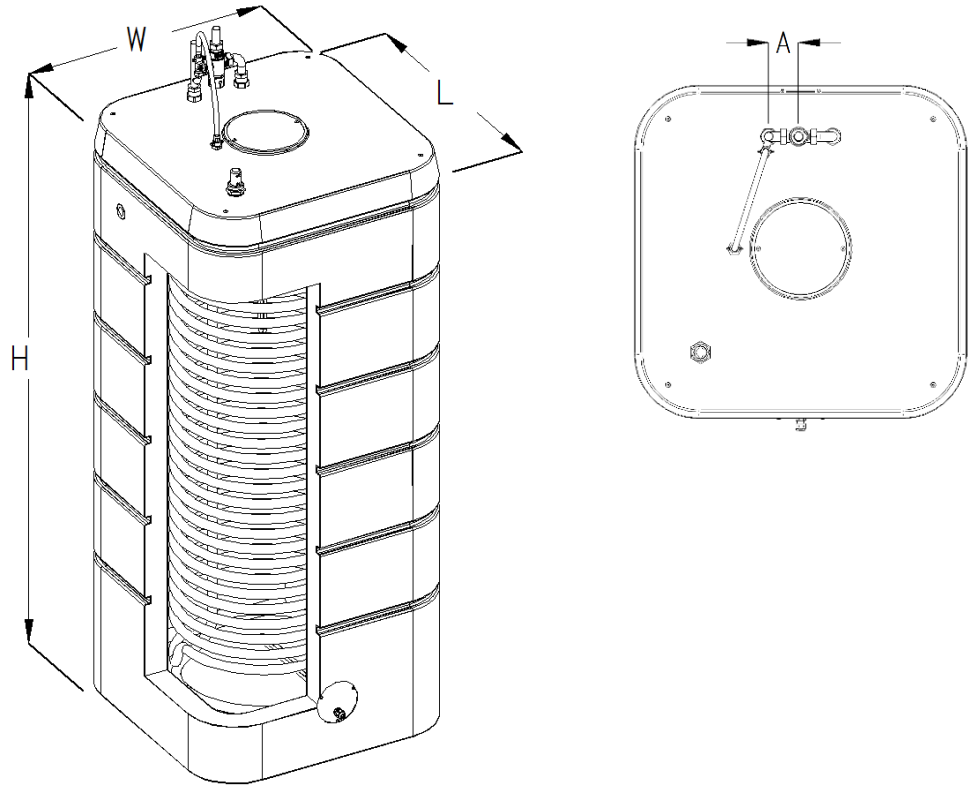

Figure 9 Heatstream Direct dimensions

Table 1 Heatstream Direct specifications

PRODUCT CODE	**HS150DI**	**HS200DI**	**HS250DI**
Dimensions, L x W x H (mm)	520 x 520 x 1315	520 x 520 x 1650	520 x 520 x 1980
Dimension, A (mm)	70	70	70
Empty weight (kg)	36	44	52
Total filled weight (kg)	188	246	304
Volume (Litres)	152	202	252

PRODUCT CODE	HS150DI	HS200DI	HS250DI
Standing heat loss (W)	47	52	65
ErP rating	B	B	B
Heat up time by lower immersion (mins)	156	210	260
Heat up time by both immersions (mins)	78	105	130
Domestic hot water coil maximum operating pressure (bar)	3	3	3
Hot water quantity without reheating at 15L/min draw off rate (L) (12°C cold water temperature)	113	188	203
Maximum permissible storage water temperature (°C)	95	95	95
Pipe connections (mm)	22	22	22
Safety overflow	G 3/4”	G 3/4”	G 3/4”

2.2 INDIRECT

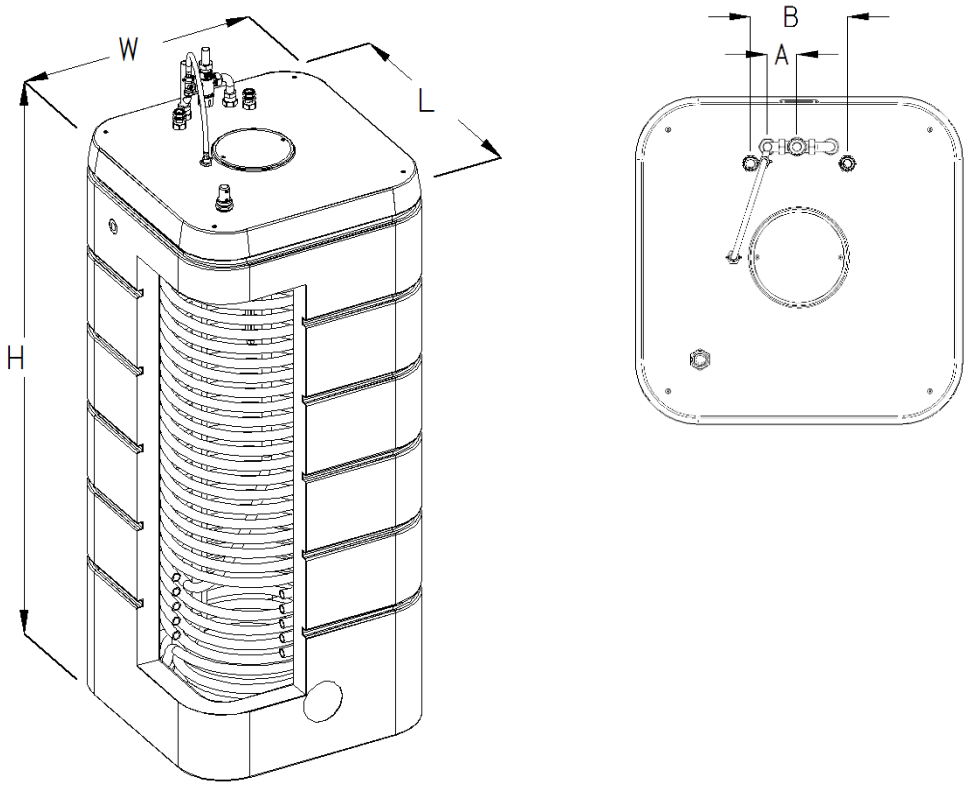

Figure 10 Heatstream Indirect dimensions

Table 2 Heatstream Indirect specifications

PRODUCT CODE	HS150IN	HS200IN	HS250IN	HS400IN	HS500IN	HS600IN
Dimensions, L x W x H (mm)	520 x 520 x 1315	520 x 520 x 1650	520 x 520 x 1980	780 x 780 x 1355	780 x 780 x 1610	780 x 780 x 1865
Dimension, A (mm)	70	70	70	70	70	70
Dimension, B (mm)	230	230	230	230	230	230
Empty weight (kg)	39	48	56	65	74	82
Filled weight (kg)	191	250	308	470	578	686
Volume (Litres)	152	202	252	405	504	604

PRODUCT CODE	HS150IN	HS200IN	HS250IN
Standing heat loss (W)	47	52	65
ErP rating	B	B	B
Primary coil maximum operating pressure (bar)	3	3	3
Primary coil pressure drop at 15L/min (mbar)	107	134	142
Primary coil heat up time at 15L/min (mins)	20	24	29
Domestic hot water coil maximum operating pressure (bar)	3	3	3
Hot water quantity without reheating at 15L/min draw off rate (L) (12°C cold water temperature)	113	188	203
Maximum permissible storage water temperature (°C)	95	95	95
Domestic water coil connections (mm)	22	22	22
Primary coil connections (mm)	22 Comp	22 Comp	22 Comp
Safety overflow	G3/4”	G3/4”	G3/4”

2.3 TWIN

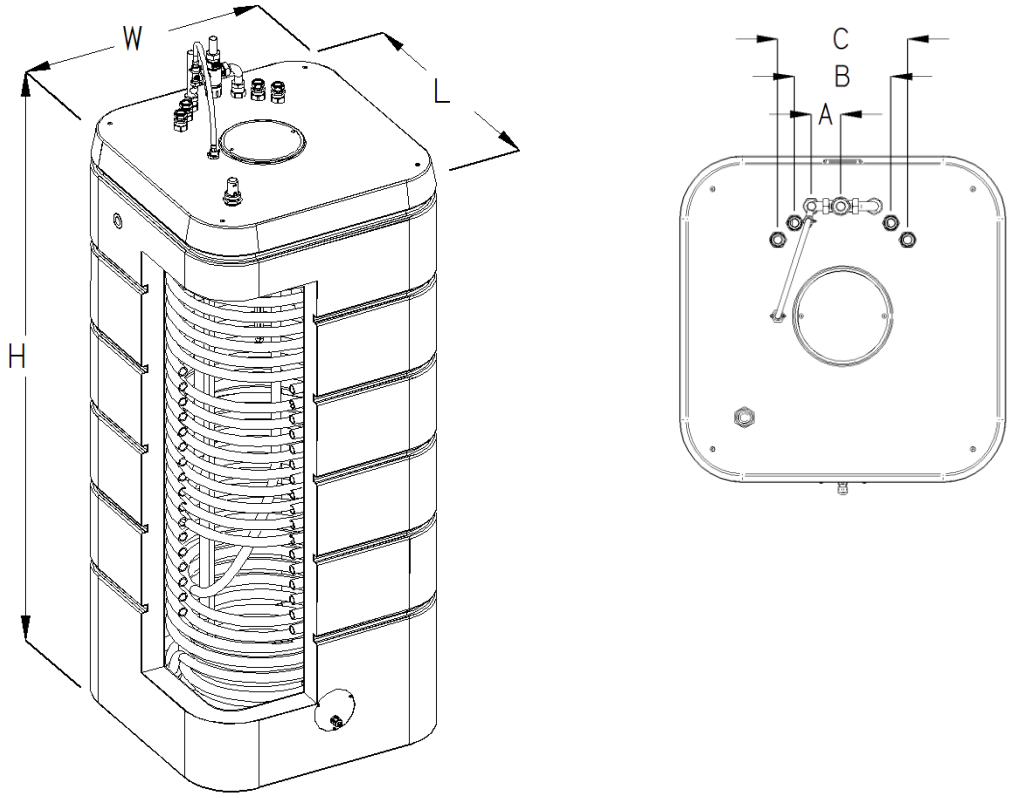

Figure 11 Heatstream Twin dimensions

Table 3 Heatstream Twin specifications

PRODUCT CODE	**HS200TW**	**HS250TW**	**HS400TW**	**HS500TW**	**HS600TW**
Dimensions, L x W x H (mm)	520 x 520 x 1650	520 x 520 x 1980	780 x 780 x 1355	780 x 780 x 1610	780 x 780 x 1865
Dimension, A (mm)	70	70	70	70	70
Dimension, B (mm)	230	230	230	230	230
Dimension, C (mm)	310	310	310	310	310
Empty weight (kg)	53	61	68	78	87
Total filled weight (kg)	255	313	473	582	691
Hot water storage tank volume (L)	202	252	405	504	604

PRODUCT CODE	HS200TW	HS250TW
Standing heat loss (W)	52	65
ErP rating	B	B
Primary coil maximum operating pressure (bar)	3	3
Primary coil pressure drop at 15L/min (mbar)	134	142
Primary coil heat up time at 15L/min (mins)	24	29
Secondary coil maximum operating pressure (bar)	3	3
Secondary coil pressure drop at 15L/min (mbar)	134	142
Secondary coil heat up time at 15L/min (mins)	19	30
Domestic hot water coil maximum operating pressure (bar)	3	3
Maximum permissible storage water temp (°C)	95	95
Dedicated renewable volume (L)	105	105
Domestic water coil connections (mm)	22	22
Primary coil connections (mm)	22 Comp	22 Comp
Secondary coil connections (mm)	22 Comp	22 Comp
Safety overflow	G3/4”	G3/4”

2.4 TRIPLE

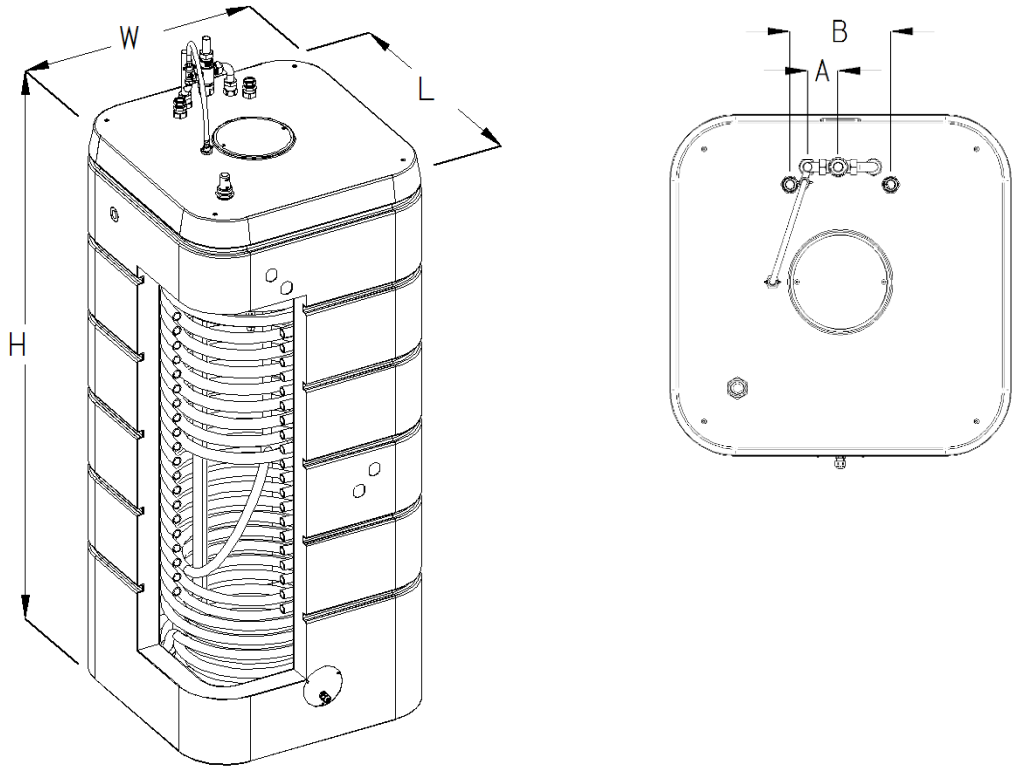

Figure 12 Heatstream Triple dimensions

Table 4 Heatstream Triple Specifications

PRODUCT CODE	**HS400TR**	**HS500TR**	**HS600TR**
Dimensions, L x W x H (mm)	780 x 780 x 1355	780 x 780 x 1610	780 x 780 x 1865
Empty weight (kg)	71	82	92
Total filled weight (kg)	476	586	696
Hot water storage tank volume (L)	405	504	604

3 INSTALLATION

The following instructions must be read prior to the installation of a Heatstream hot water storage tank and work should only be carried out by a trained heating technician. The installer should be aware of their responsibility and duty of care to ensure all aspects of the installation comply with all current regulations and legislation.

3.1 BUILDING REGULATIONS

Installation of Heatstream hot water storage tanks are subject to the Building Regulations listed below:

Table 5 Requisite building regulations for UK and Ireland

Northern Ireland	Technical Booklet P3
Republic of Ireland	Technical Guidance Document L
England and Wales	Approved Document G3

Compliance with the relevant Building Regulation is subject to the hot water storage tank being installed and commissioned following the guidance given in this manual.

3.2 ACCESSORY KITS

Before commencing installation check that all relevant parts have been supplied. Table 6 below summarises the parts supplied in kit form with each tank model:

Table 6 Accessory kit contents

	Direct	**Indirect**	**Twin**	**Triple**
Part No. and Description	**17-003-0001**	**17-003-0002**	**17-003-0003**	**17-003-0004**
CP-4001 Aramid gasket 55mm	x1	-	x1	x1
CP-4002-2 Nut immersion 2”	x1	-	x1	x1
CP-4003 Temperature probe sensor pocket	-	-	x1	x1
CP-4014 115mm earth connection	x1	-	-	-
CP-4017 Terminal block - 15Amp	x1	-	-	-
CP-4019 M16 straight cable gland	x1	-	x1	x1
CP-4031-02 Low level indicator brass ring	x1	x1	x1	x1
CP-4031-03 Low level indicator screen	x1	x1	x1	x1
CP-4031-08 Low level indicator o-ring	x1	x1	x1	x1
CP-4035 Aramid gasket 30mm	x5	x7	x9	x7
CP-4036 Union to compression fitting 22mm	-	x2	x4	x2
CP-4042 Union to compression fitting 28mm	-	-	-	x4
CP-4043 1" Thermostatic mixing valve	x1	x1	x1	x1
CP-4044 ‘T’ - pipe	x1	x1	x1	x1
CP-4046 ‘90’ - pipe	x1	x1	x1	x1
CP-4047 Straight pipe	x1	x1	x1	x1
CP-4049 Immersion - cylindrical plate 14"	x1	-	-	-
CP-4050 Rod combistat TSR - 11"	X1	-	-	-
CP-FTG-KIT-02 Filling loop	x1	x1	x1	x1

3.3 TANK INSTALLATION

3.3.1 Handling and storage

Prior to installation, the hot water storage tank should be handled with care and stored upright in a dry location. For manual handling, pay heed to the empty tank weight, refer to section 2 'Technical Specifications'.

3.3.2 Installation location

The hot water storage tank should be supported on a solid level base, free from any debris and should cover the entire base of the tank. The base must be capable of supporting the total filled tank, refer to section 2 'Technical Specifications'. The installation site should be indoors in a frost-free room and protected from continuous direct sunlight. The tank must be located a minimum of 1m away from heat sources with a heat output >90°C (electric / gas heater, open fire and flue / chimneys). When selecting a suitable location, consideration should be given with regards the relative position of the heat sources and main hot water outlets to keep pipe runs as short as possible, thus maximising efficiency. Routing of the overflow pipe should also be considered to allow it to be safely conveyed and discharged. For future servicing and maintenance requirements the tank should be positioned in such a way that allows for components to be inspected, removed and replaced if necessary as per Figure 13.

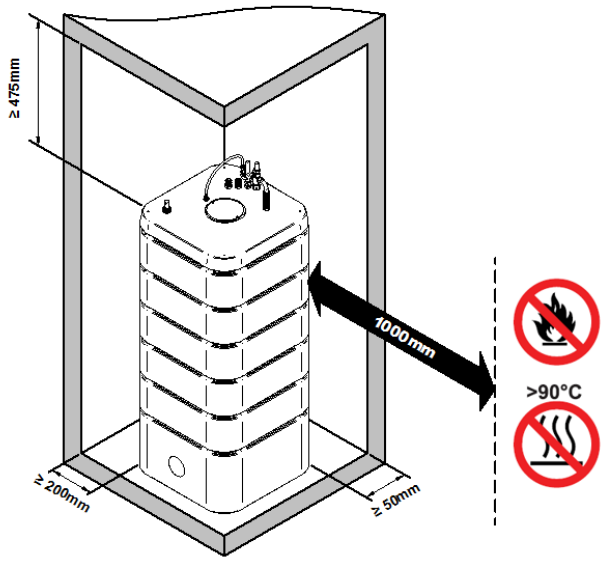

Figure 13 Recommended clearance requirements

3.3.3 Mains water supply pipework

The incoming mains water supply must be capable of delivering a minimum flow rate of 20 litres per minute at a dynamic pressure of 1.5 bar at all times. This should be sufficient for the operation of most sanitary appliances. It is recommended minimum 22mm mains supply pipework is used however, it may be necessary to use larger diameter pipe for long pipe runs. If the mains supply pressure is likely to exceed 3 bar at any time a pressure reducing valve must be installed. A full-bore isolation valve must be fitted to the incoming mains water supply to allow the tank and cold water outlet taps to be isolated when required. The incoming mains water pipework should be split to serve both the hot water storage tank and cold water outlet taps after the full-bore isolation valve. To protect the public water network from backflow contamination a double check valve must be

installed. Care should be taken to ensure the direction arrow on the side of the double check valve follows the direction of flow. To accommodate expansion of the water in the mains supply pipework it is recommended that a mini expansion vessel (1-2 litres) or shock arrestor should to be fitted. This will also help to remove the effects of water hammer. Refer to Figure 14 for typical pipework configuration.

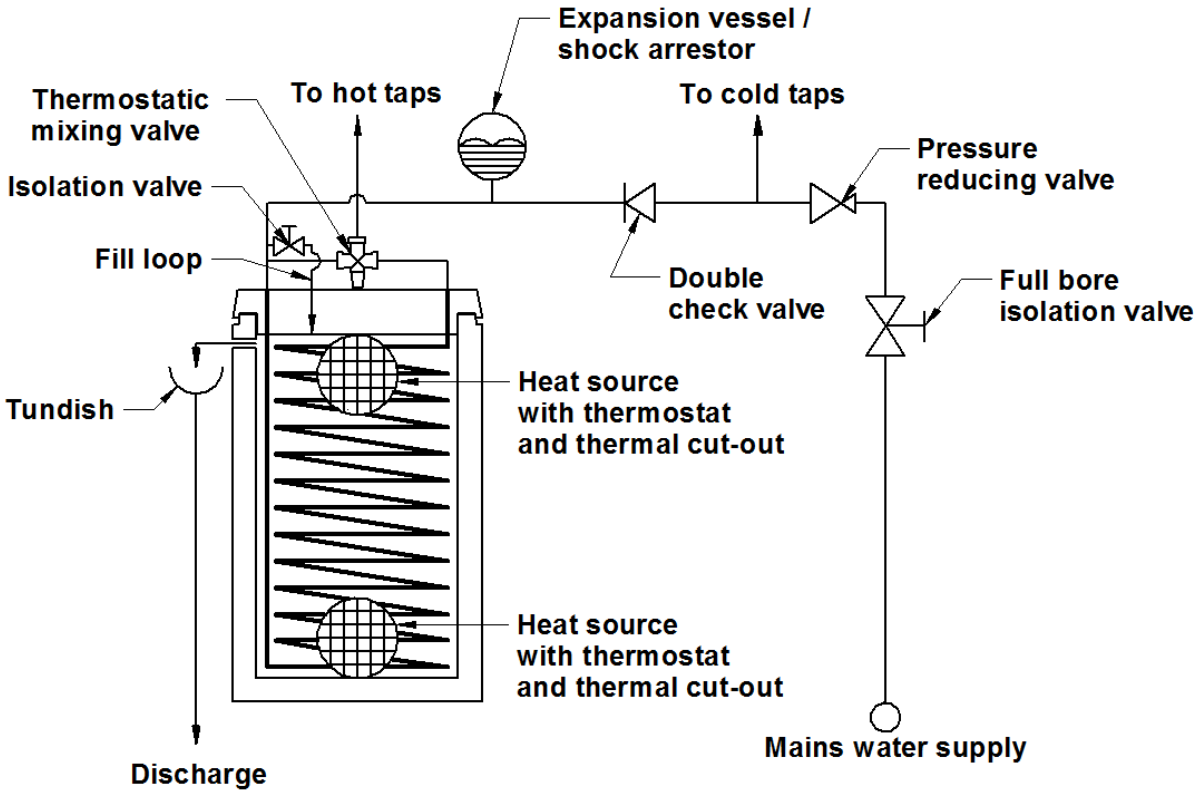

Figure 14 Mains Water Supply Pipework Configuration

3.3.4 Hot and cold water connections

The mixing valve pipe set fittings should be fitted to the hot and cold domestic hot water heat exchanger coil connections, please ensure the gaskets suppled in the kit bag are fitted. These are positioned on the top of the tank and are identified with a tap symbol, Figure 15. Once in place the thermostatic mixing valve can be connected. It is recommended that the thermostatic mixing valve be set to position 3 (nominally 45°C), see Figure 16, to achieve the best hot water output performance, this can be set during commissioning of the tank. Care should be taken to ensure the hot and cold water supplies are connected to the valve in accordance with the indications on the body of the valve. The straight pipe set fitting should be fitted to the mixed water outlet on the mixing valve. See Figure 16 for hot and cold water connection set up. The mixing valve can either be positioned in the

Figure 15 Mixer valve pipe set

vertical or horizontal position depending on the individual installation requirements, however it must be accessible to allow for maintenance, commissioning and testing of the valve. The supplied gaskets should be fitted at the point of each connection. Connections to the cold and mixed hot water pipe set fittings should be made using compression fittings.

It is recommended that the hot water discharge pipework must be insulated over its entire length, if this is not possible due to an existing installation pipework leaving the tank must be insulated to a minimum of 2m.

Figure 16 Mixer valve set to position #3

3.3.5 Distribution pipework

Distribution pipework should be designed and laid out in a way to minimise transfer time between the hot water storage system and hot water outlets. In larger installations with long pipe runs it may be necessary to install a pumped secondary hot water circuit (3.3.8 Secondary return) to circulate hot water around the property. This ensures hot water is always available on demand. It is recommended 22mm distribution pipework be used throughout the property, however it is possible that short lengths (< 1m) of 15mm pipework can be used to service baths, showers or taps where required. Any pipework and fittings used should withstand a maximum pressure of 6 bar at a temperature of 95 degrees. This should not impede safe operation or visibility of warning discharges. The hot water storage tank itself does not require any additional insulation. It is recommended that the hot water discharge pipework must be insulated over its entire length, if this is not possible due to an existing installation pipework leaving the tank must be insulated to a minimum of 2m.

3.3.6 Fill Loop Connection

With the mixing valve and pipe set in place, the fill loop including isolation valve should be fitted, Figure 17. Ensure the direction arrow on the side of the isolation valve follows the direction of flow. The fill loop and isolation valve should be accessible and unobstructed by any pipework to allow the isolation valve to be easily operated and the fill loop removed when not in use. Two ½" plugs are supplied to blank off connections labelled A and B when the fill loop is disconnected.

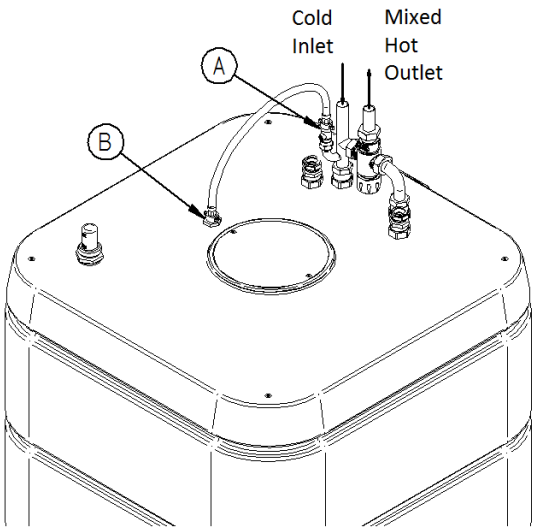

Figure 17 Hot and cold water connections

3.3.7 Heat supply circuits

Heatstream range of tanks can be served by up to three external heat sources (triple range). Coil inlets and outlets are identifiable by labels positioned at each of the connections. The maximum operating pressure for each heat supply coil is given in the Technical Specifications section of this manual. Gravity circulation is only possible with the Triple range of tanks (secondary and tertiary heat supply circuits only). For gravity circuits, it is recommended copper pipe with a minimum diameter of 28mm be used. All other circuits supplying heat to the tank should be fully pumped. Supply of heat to the tank is regulated via factory fitted coil specific thermostats which switch off the supply of heat when the required store temperature has been achieved. Each thermostat has a non-self-resetting energy cut out which when wired in series with a motorised valve and or pump (not supplied) will shut off flow to the heat source. This helps to ensure the store water never exceeds 95°C if the system malfunctions. If the hot water storage tank is to be connected to an old or existing system with steel pipework or is heated by a cast iron boiler, slurry and sludge may enter the hot water storage tank which can cause blockages and corrosion. To prevent possible damage, it is recommended the system is power flushed before filling the heat exchanger coil and a dirt filter or sludge separator is fitted. Corrosion inhibitor should also be added to the associated pipework - this will need to be checked periodically. Any pipework and fittings used should withstand a maximum pressure of 6 bar at a temperature of 95 degrees. To reduce heat loss, insulation with thickness equal to the outside diameter of the supply pipework should be used. All heat sources should be suitably constructed and installed to meet the relevant installation standards and manufacturers recommendations to ensure safe and efficient operation.

3.3.8 Secondary return

Ideally the Heatstream tank should be installed as close as possible to all hot water outlets however, where this is not possible and the pipe runs to tap outlets are excessive a secondary return may need to be fitted. Figure 18 details a typical schematic of how to fit a secondary return to the Heatstream tank, in addition to a pump suitable for sanitary hot water it is recommended that a pipe thermostat or time clock is fitted to prevent the pump running constantly. To prevent excessive heat loss the sanitary distribution pipework must be well insulated with expanded nitrile foam insulation of not less than 13mm thick. It is also essential that the check valves shown in the diagram are fitted to prevent the cold mains feed back flowing up the secondary return pipework.

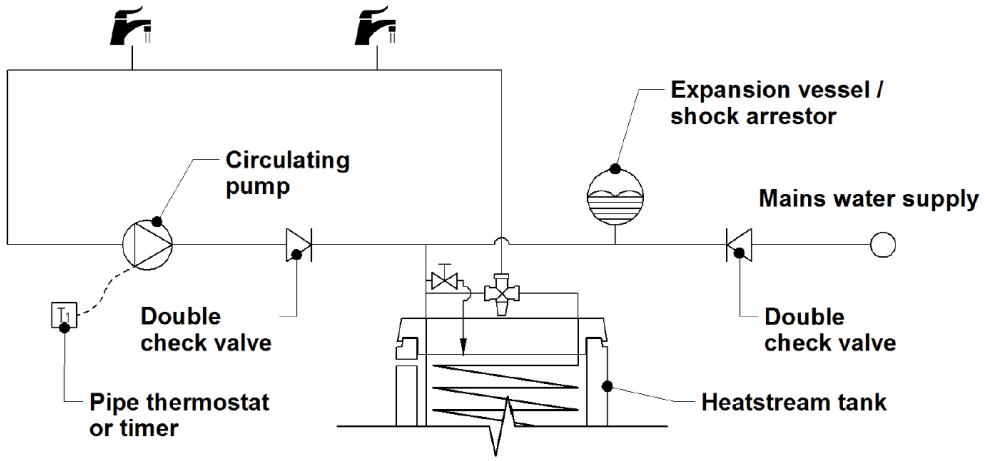

Figure 18 Secondary return schematic

3.3.9 Solid fuel installations

To help dissipate heat output from the solid fuel boiler once the store water temperature has been satisfied a heat leak radiator should be installed on the gravity circuit of an open vented system. The heat leak radiator should not have any valves as it acts as a safety to remove excess heat from the system. The heat leak radiator should be suitably sized and installed according to the appliance manufacturer's guidelines. As well as installing a heat leak radiator the coil specific thermostat should be wired to a motorised valve to shut off heat input to the tank when the set regulation temperature has been reached. The motorised valve must not interfere with the vent pipe and or heat leak radiator pipework. The overflow tank, pipework and fittings should all be capable of withstanding temperatures up to 110°C.

3.3.10 Solar installations (Twin and Triple range only)

Where a solar control system having two temperature sensors is used (i.e. one located at the solar collector and one at the hot water tank), the hot water tank sensor should be located in the dedicated temperature probe sensor pocket behind the cover plate at the bottom of the tank. The temperature probe sensor pocket can accommodate a temperature sensor with maximum diameter of 8mm. This should be securely held in place using the cable gland fitted to the cover plate. Typically, the solar fluid will only be circulated when there is a temperature difference between the solar collector and hot water tank of around 5 - 10°C. The solar controller should be wired through the factory fitted coil specific thermostat to shut off flow to the heat source in the event of the storage water overheating. Solar hot water systems operate at elevated temperatures and pressures; therefore, all components should be rated and installed as specified by the solar system manufacturer.

3.3.11 Overflow pipework

The overflow pipework should be configured in such a way as to allow any discharge from the tank to be conveyed to a safe visible position. The overflow pipe should discharge directly via a short length of pipe (<500mm) to a tundish which should be positioned lower than the overflow pipe. The tundish should have a suitable air gap so any discharge becomes apparent. The discharge pipe from the tundish should terminate in a safe place where there is no risk to persons in the vicinity.

3.3.12 Low level indicator

The sight glass, brass nut and o-ring that go on top of the low level indicator are packaged in the kit bag, to avoid damage during transportation. Remove the foam sticker from the low level indicator body, add the o-ring seal, fit the sight glass and tighten the brass nut ensuring that the sight glass markings can be read from the front of the tank and that the sight glass is tight and cannot rotate.

3.3.13 Bottom immersion heater

Install the bottom immersion heater as per Figure 19. The nut on the immersion heater is 46mm and a standard multi point socket will fit this, do not excessively tighten, it is recommended to wet the fibre gasket before fitting as this will continue to expand when fitted and form a water tight seal. Ensure the earth wire is connected and then push on the immersion thermostat ensuring that the spade connectors are fully engaged. Insert the M16 gland supplied in the kit bag and wire up the immersion fit the cover and fully tighten the gland.

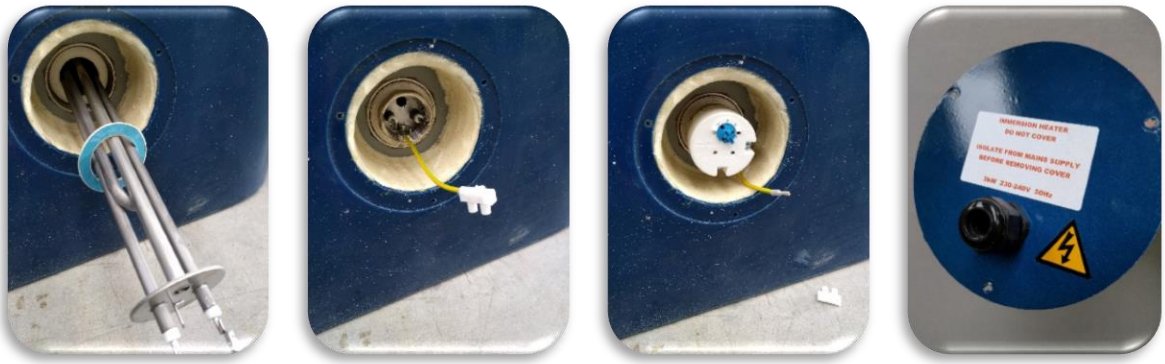

Figure 19 Installation of bottom immersion

3.4 Electrical Installation

Electrical work should only be undertaken by a competent electrician and it is their responsibility to ensure that that any work carried out is done so in accordance with the latest regulations.

3.4.1 Immersion wiring

Heatstream tanks are supplied with minimum of one 3kW immersion heater (Direct range is supplied with two; one mounted at the top of the tank and one at the bottom). The immersion heater(s) should be fully earthed and wired with suitable cable with a temperature resistance of at least 85°C. Each immersion heater is supplied with a combined regulation and high limit safety thermostat, under no circumstances must the thermal cut out be bypassed. The immersion heater(s) should be wired through a double pole isolating switch with a contact separation of at least 3mm in both poles. Care should be taken to ensure that each of the connections are securely made and that the cables are protected from accidental disconnection via the strain relief clamp / cable gland provided. Figure 20 and Figure 21 provide guidance on how the two immersion heaters should be wired. The immersion heater(s) should never be switched on unless it is fully submerged in water, dry operation of elements cause them to fail prematurely this mode of failure is not covered under warranty.

Before removing any protective covers the power supply should be disconnected, secured against unintentional restart and the fuse removed.

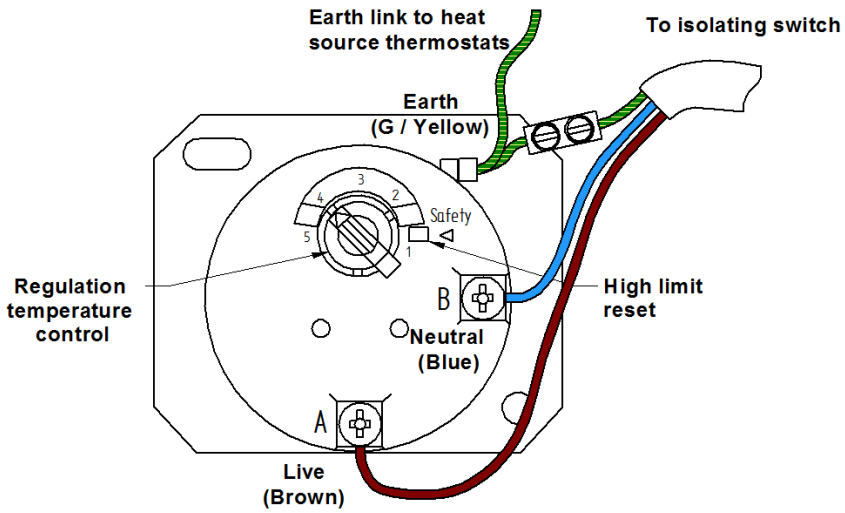

Figure 20 Top Mounted Immersion Heater Wiring

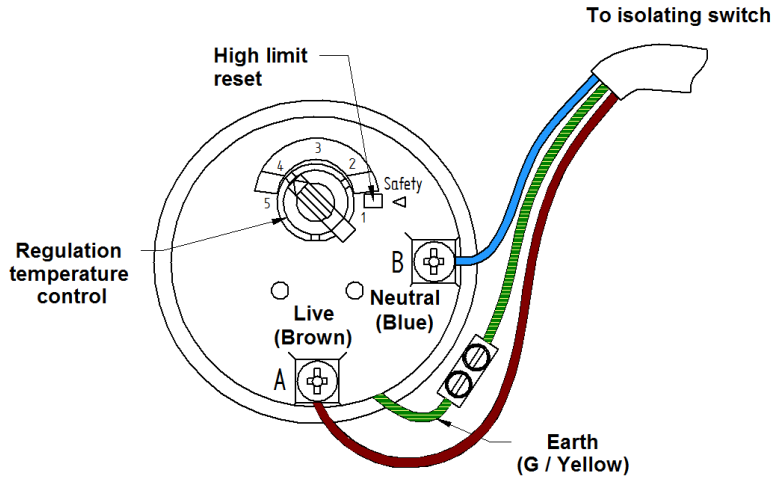

Figure 21 Bottom Immersion Heater Wiring (Direct Only)

3.4.2 Tank thermostat wiring

Each heat exchanger coil has an associated combined control and safety thermostat. The system controls must be wired in such a manner as to cut off heat supply to the tank in the event of overheating. This is typically achieved using a motorised valve wired in series with the thermostat. This allows for separate and independent control of space heating and hot water. Refer Figure 24 and Figure 25 for suggested wiring schematics. Care should be taken to ensure that the heat source is wired to the correct thermostat, each thermostat can be identified using the instructions printed on the reverse of the control compartment cover. The Heatstream tank is compatible with all heating systems and it can provide heating on or heating off signal, the live feed from the timeclock is wired into the 'COM' (Figure 23) and the switched live is available at the respective connections depending upon the thermostat set temperature.

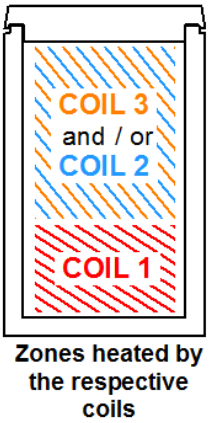

Figure 22 Tank coil zone controlled by each respective thermostat

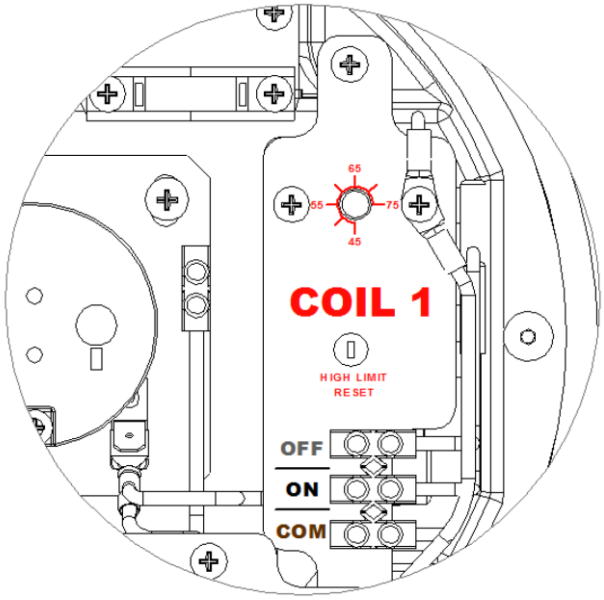

Figure 23 Close up of tank thermostat wiring

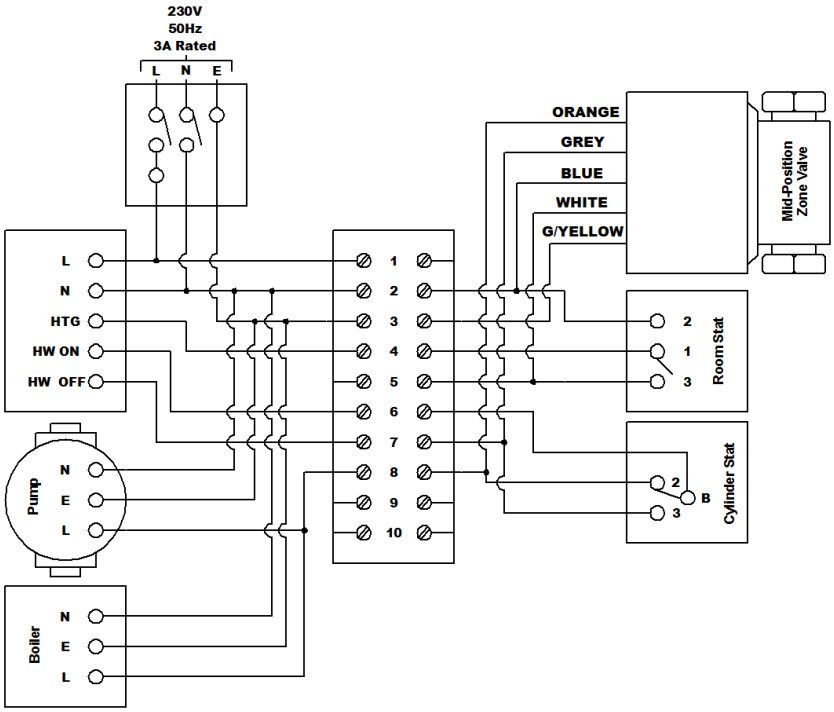

Figure 24 Y Plan (Fully Pumped System Only)

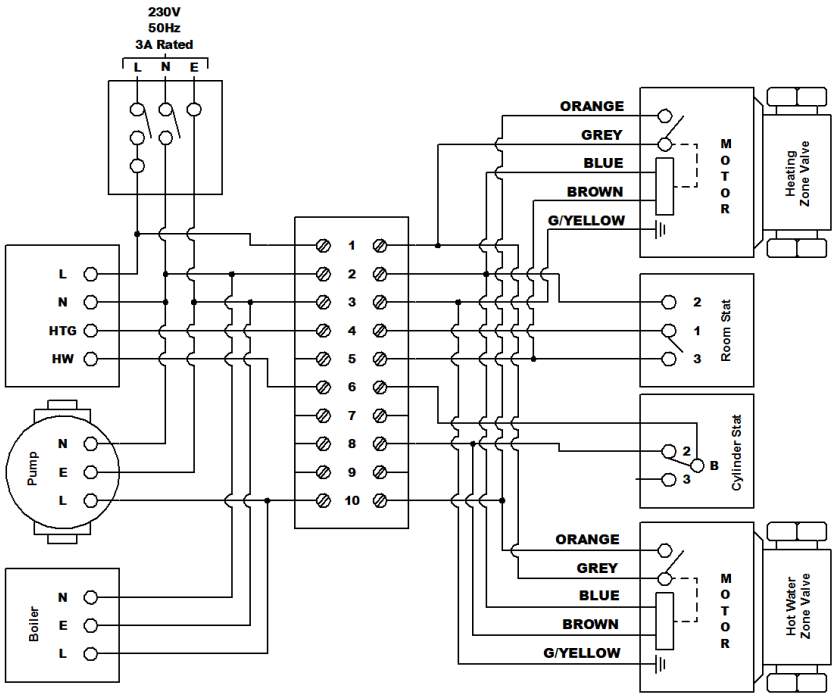

Figure 25 S Plan (Fully Pumped System Only)

4 COMMISSIONING

The following instructions must be read and understood prior to the commissioning of a Heatstream hot water storage tank. If under any circumstances there are aspects to the installation and or system which do not comply with the specification laid down, the tank MUST NOT be put into operation until the system and or installation meets all the requirements.

Unless otherwise instructed isolate all electrical supplies to the hot water storage tank before carrying out commissioning of the unit.

NOTE: Before filling ensure the overflow pipe is connected correctly, free from blockages and can discharge in a safe visible position.

4.1 FILLING THE SYSTEM

4.1.1 Filling the DHW heat exchanger coil

With the filling loop isolation valve connected and closed, open the stopcock on the mains cold water supply to the tank. Open the nearest hot tap followed by the rest in sequence to allow any trapped air to escape and flush out any debris. Leave the tap open until the system has been cleared.

4.1.2 Filling the Heatstream

With the filling loop hose connected as per Figure 26 open the isolation valve 'A'. Continue filling the tank until the low level indicator has reached the max position and water starts to flow from the overflow. When the correct store volume has been reached, shut off the isolation valve and disconnect the filling loop. Blank off connections labelled A and B in Figure 26 using the two ½" caps provided.

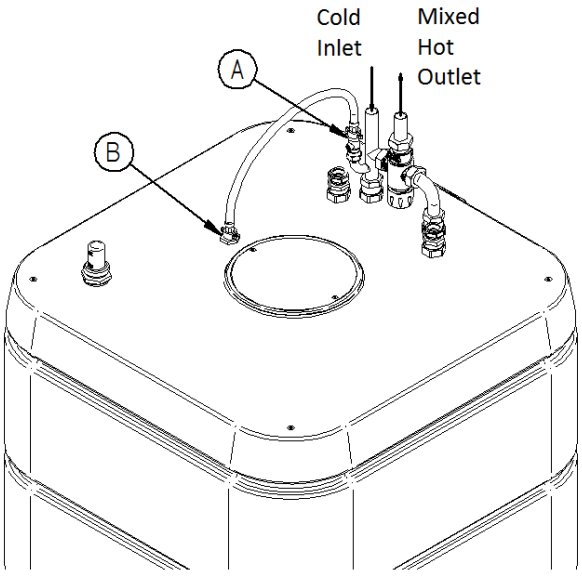

Figure 26 Heatstream filling loop location

4.1.3 Filling the heat supply coils

Following the heat source manufacturer's instructions fill each of the heat supply circuits (not applicable for Direct range). Depending on the system layout trapped air can become a problem. Consideration should be given to whether it is necessary to fit an automatic air vent.

4.2 SYSTEM CONTROLS

Check the immersion heater control thermostats are set to the desired regulation temperature. This is pre-set at 60°C (control knob pointing towards position 4). Before turning on the power supply to the immersion heater(s) ensure the correct store volume has been reached, dry running of the immersion will result in them failing in a short space of time, this is not covered under warranty. Connect the power supply and switch on the immersion heater. Once the regulation temperature has been reached check that the thermostat cuts off power to the immersion heater.

Check the heat supply control thermostats are set to the desired regulation temperature. This is pre-set at 65°C but can be adjusted to have a maximum flow temperature of up to 75°C. Once the regulation temperature has been reached check that the thermostat cuts off power to the heat source(s) and that the system controls function correctly.

When the store water has been fully charged open the nearest hot tap and using a calibrated thermometer check the mixing valve is delivering the desired temperature.

5 MAINTENANCE

The design of the Heatstream hot water storage tank means that it requires minimal maintenance, although it is still necessary that the unit is serviced annually to ensure its safe and efficient operation.

Servicing should be carried out by a trained heating technician and the details of any work carried out should be logged in the Service Record section of this manual.

Unless otherwise instructed isolate all electrical supplies to the hot water storage tank before carrying out any maintenance work.

5.1 INSPECTION ACCESS

If for any reason, inspection access is required to check the internal components of the tank access can be provided by means of removing the top immersion and using an appropriate inspection tool such as a borescope inserted through the opening in the lid.

Removing the lid assembly of the unit (to which the coils are attached) at any time will invalidate warranty.

5.2 MAINTENANCE CHECKS

1) Carry out a visual inspection of the general condition of the unit.
2) Check the overflow pipe and associated pipework for any leaks and or blockages which may affect free drainage. If necessary, replace defective parts.
3) Visually check the water store volume via the low level indicator. The red indicator should be between the MIN and MAX markings (Figure 5). If the water level is found to be below the MIN marking it should be topped up using the filling loop. When the filling loop is not in use it must be disconnected from the system and the fittings capped.
4) When the store water has been fully charged open the nearest hot water outlet tap and check the mixing valve is delivering water at a safe and consistent temperature.
5) Check that the immersion and heat supply thermostats are appropriately set.
6) Check all thermostats are functioning correctly (i.e. once the store water regulation temperature has been reached any connected heat source(s) should be disabled). If necessary replace defective parts.
7) Check the system pressure of the solar / boiler / heating system and correct pressure if necessary.
8) Check corrosion inhibitor levels in the heat supply system (Indirect, twin & triple) and top up if required.
9) Check all connections are tight and free from leaks. If necessary, carry out repairs / replace defective parts.

5.3 TROUBLESHOOTING

Table 7 Fault finding guide

Fault	Possible Cause	Solution
Cold water at the hot taps	Heat source malfunction (e.g. boiler / immersion heater)	Check for faults - Refer to manufacturer's instructions
	Motorised valve malfunction (where fitted)	Manually activate motorised valve. If hot water tank begins to heat, replace valve
	Pump malfunction (where fitted)	Check wiring and plumbing connections to the pump
	Programmer not set to demand hot water	Set programmer / timer to call for hot water
	Hot water tank / immersion thermostat high limit tripped / defective	Check and manually reset high limit thermostat / replace thermostat
Hot water at the cold taps	Check valve is hindered / not fitted	Replace / fit check valve
	Cold water pipework routed too close to hot pipework	Insulate / Re-route pipework
Fluctuating mixed water temperature	Low water or fluctuation water pressure and flow rate	Check water supply pressure and flow rate
No flow / reduced flow from taps	Mains water supply isolated	Check stop-cock is fully open
	Insufficient mains water supply pressure	Install cold water booster set
	Pipework / fittings restrictive	Fit suitably sized pipework and full bore valves
	Incorrect fitment of the check valve	Ensure direction arrow on side of valve follows direction of flow
	Debris obstructing mixing valve operation	Isolate mains water supply at stop-cock, inspect mixing valve and replace if necessary
Mixing valve does not fail safe when tested	Incorrect installation of the mixing valve	Check hot and cold water supplies are connected in accordance with indications on body of the valve
	Internal mechanism of mixing valve hindered / scaled	Isolate mains water supply at stop-cock, inspect mixing valve and replace if necessary
Continuous water discharge from overflow	Filling loop attached and valve letting 'by'	Tighten filling valve, remove the filling loop and fit the valve caps
	Leak in system coils	IMMEDIATELY isolate all power supply and heat sources. Contact installer

5.4 REPLACEMENT PARTS

Heatstream tanks have been designed with longevity and durability in mind. Whilst the tanks have been made from high quality materials, over time some parts may need to be replaced. The list below details the parts which can be purchased for the Heatstream range of tanks.

Table 8 Replacement parts

Part Number	Description
SP-4003	Temperature probe sensor pocket
CP-4031	Low level indicator - 1" Thread
CP-4043	1" Mixing valve 30 - 65°C
SP-4048	Immersion element - Rectangular plate 23" 3kW
SP-4049	Immersion element - Circular plate 14" 3kW
CP-4050	Rod combistat TSR - 11"
CP-4051	Capillary combistat BBSC
CP-FTG-KIT- 01	1" Mixing valve pipe set kit
CP-FTG-KIT-02	Filling loop kit

This list does not include standard over the counter parts including plumbing / electrical hardware or any structural parts of the tank (such as the coil assemblies).

5.5 DE-COMMISSIONING

5.5.1 Disassembly, recycling and disposal

Disassembly and removal from service should be carried out by a trained heating technician.

Disconnect and Isolate all electrical supplies and heat sources and allow the store water and pipework to cool before carrying out disassembly and or removal of the unit.

1) Close the stopcock on the mains cold water supply to the tank.
2) Drain the water in the hot water supply pipework by opening at least two hot water taps nearby.
3) Drain the water remaining in the domestic hot water coil to an open drain using a syphon fitted through the cold-water inlet connection.
4) Disconnect the heat supply pipework from the tank and using a suitable collection container drain off its contents.
5) Drain the water remaining in the heat supply coils using a syphon fitted through each of the inlet connections.
6) Solar circuits should be drained in accordance with the solar system manufacturer's recommendations.
7) Remove the low-level indicator and using a syphon, drain the contents of the tank.

The designation of the product means that it should not be disposed of together with unsorted domestic waste. It is the responsibility of the owner to properly dispose of the unit in accordance with national regulations. Further guidance should be sought from the appropriate local authorities. The packaging of the unit can however be recycled and this should be done so through a local recycling centre.

6 WARRANTY

6.1 WARRANTY STATEMENT

The Harlequin Heatstream® hot water tank ("the Unit") is supplied with the following warranties in favour of the original end user purchaser ("the Customer") from the date of purchase;

(a) a 25 year warranty on the plastic inner tank body against defects of material.

(b) a 2 year warranty on all parts and components as well as any defects that may have occurred from time to time during the normal manufacturing process of the Unit as carried out by those exercising all relevant skill and experience and complying with all relevant legislation, regulations and codes of practice relating to the manufacturing process.

1. The warranties provided are from the date of purchase and are conditional upon:

   1.1 the Unit being installed and commissioned by competent persons in accordance with the manufacturer's instructions and relevant legislation, regulations and codes of practice in force at the time;
   1.2 the Unit being registered with Harlequin Manufacturing Limited within 30 days of purchase and the warranty registration completed. Proof of purchase should be retained in the event of a claim.
   1.3 the Unit not being modified in any way, or misused or subject to neglect;
   1.4 the Unit being serviced annually by competent persons in accordance with the manufacturer's instructions and all regulations and codes of practice in force at the time;
   1.5 each service record being completed and proof of purchase and servicing being retained and made available to Harlequin Manufacturing Limited in respect of any claim;
   1.6 the Unit being used solely for the purpose of heating potable water that complies at all times with EU and local / national regulations and not fed from a private source;
   1.7 the water quality used being fully compliant with conditions outlined in the operation manual for the Unit and with EU and local / national regulations.

   Failure to comply with any of the conditions outlined in this clause will invalidate the warranty in its entirety.

2. The warranties are for the benefit of the Customer only and are not transferable or assignable by the Customer to any third party.

3. The warranties exclude:

   3.1 labour costs associated with the replacement of the Unit or its components;
   3.2 any defects that appear after the Customer makes any modification or alteration to the Unit;
   3.3 defects arising from normal deterioration;
   3.4 defects caused by the improper use or storage of the Unit and in particular (but without limitation) Harlequin Manufacturing Limited shall not be liable in the case of improper or faulty handling or processing of the Unit by the Customer;
   3.5 consequential losses however caused.

4. If within the warranty period, a material defect is discovered in the Unit:

   4.1 the Customer must send written notification following discovery giving particulars and either at its own expense and risk shall return the Unit to Harlequin Manufacturing Limited within 2 weeks of written notice being provided by Harlequin Manufacturing Limited; or (at Harlequin Manufacturing Limited's sole option) shall permit Harlequin Manufacturing Limited to inspect same; and
   4.2 such defect has arisen from faulty materials employed or workmanship carried out by Harlequin Manufacturing Limited and is existing but not reasonably discoverable upon inspection at the time of receipt, then Harlequin Manufacturing Limited shall supply such part(s) free of charge along with the costs of transporting same to the Customer;
   4.3 the manufacturer reserves the right to repair or replace the parts as deemed necessary by the manufacturer.
   4.4 the replacement parts must be fitted in accordance with the terms of the warranty set out above;

4.5 the replacement parts shall be covered for the unexpired term of the 2 year warranty;
4.6 invoices for call out and/or repair by any third party or parts supplied by a third party will not be accepted unless previously authorised by Harlequin Manufacturing Limited in writing.

5. Harlequin Manufacturing Limited's liability for defective Units is limited in all circumstances to delivery of parts for the defective Unit and the Customer shall accept same as fulfilment of Harlequin Manufacturing Limited's obligations.

6. Harlequin Manufacturing Limited disclaims all other warranties whether express, implied or statutory. Your statutory rights are not affected.

7. The warranties apply to Harlequin Heatstream® range of hot water tanks installed in the United Kingdom, Isle of Man, Channel Islands and Republic of Ireland only. Provision of warranty cover elsewhere is subject to the prior written agreement of Harlequin Manufacturing Limited.

8. The warranties are governed by and construed in accordance with the laws of Northern Ireland and the parties submit to the exclusive jurisdiction of the courts of Northern Ireland in any dispute arising out of or in connection with the warranties.

6.2 WARRANTY REGISTRATION

To get the full benefits of the harlequin Heatstream Warranty it must be registered. Registration can only be done by completing the online registration form on the Harlequin Heatstream website at the following address:

http://www.harlequinplastics.co.uk/HeatStream-Warranty.aspx

7 COMMISSIONING AND SERVICE RECORDS

It is the responsibility of the installer to complete this installation and commissioning checklist.

Installation					Tick or insert value
What is the incoming static cold water pressure on the mains supply?					bar
To what pressure is the pressure reducing valve set on the mains supply?					bar
Has a mini expansion tank / shock arrestor been fitted on the mains supply pipework?				Yes	
Is the installation in a hard water area (ie >200mg / litre)?	Yes			No	
If yes, has a suitable and effective water treatment been fitted?				Yes	
What type of hard water treatment has been fitted?					
Is the installation located a minimum of 1m away from heat sources with a heat output >90°C?				Yes	
Is the overflow arrangement piped and terminated in accordance with Building Regulations?				Yes	
Has the thermostatic mixing valve has been installed correctly?				Yes	
All appropriate pipes are insulated up to 1metre or the point where they become concealed				Yes	
Controls					
Have time and temperature controls been fitted in compliance with Building Regulations?				Yes	
What type of control system has been fitted? Y Plan		S Plan		C Plan	Other
Are all heat sources wired through the correct thermostat?				Yes	
Commissioning					
Thermostatic mixing valve set point (min - max / 1 - 7)					
Hot water temperature at the nearest outlet					°C
Maximum hot water flow rate (measured at high flow outlet)					l/min
What position is the top immersion thermostat(s) set? (1-5)					
What position is the bottom immersion thermostat(s) set (Direct range only)? (1-5)					
Handover					
The hot water system complies with the appropriate Building Regulations				Yes	
The system is installed and commissioned in accordance with the manufacturer's instructions				Yes	
The system controls have been demonstrated to and understood by the customer				Yes	
All product literature has been left with and explained to the customer				Yes	

Installation Address Details		**Commissioning Engineer Details**	
Customer Name		Engineer Name	
Address		Company Name	
		Company Address	
Tel No.			
Email Address		Tel no.	
		Mobile Number	
Heatstream Model (e.g 150DI or 250TW)		Email Address	
Heatstream Serial Number			
Customer's Signature		Engineer's Signature	
Date		Commissioning Date	

7.1 SERVICE RECORD

SERVICE 1

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
_____
Signature _____

SERVICE 2

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
_____
Signature

SERVICE 3

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
_____
Signature

SERVICE 4

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
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Signature

SERVICE 5

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
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SERVICE 6

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
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Signature

SERVICE 7

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
_____
Signature

SERVICE 8

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
_____
Signature

SERVICE 9

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
_____
Signature

SERVICE 10

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____
_____
Signature

SERVICE 11

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

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Signature

SERVICE 12

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

_____
Signature

SERVICE 13

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

_____
Signature

SERVICE 14

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

_____
Signature

SERVICE 15

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

_____
Signature

SERVICE 16

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

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Signature

SERVICE 17

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

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Signature

SERVICE 18

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

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Signature

SERVICE 19

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

_____
Signature

SERVICE 20

Service Date _____
Engineer Name _____
Company Name _____
Telephone Number _____
Comments _____

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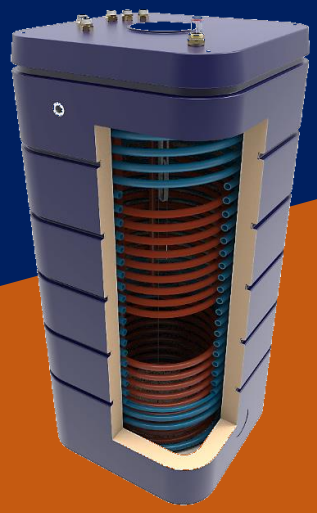
Signature

About Harlequin

Harlequin have been at the forefront of manufacturing development in the rotationally moulded plastic storage products industry for over 35 years. From its base in Northern Ireland Harlequin now sell to over 25 countries worldwide with an unrivalled reputation for quality, backed up with its 9001, 14001 and 18001 Management System Certifications.



Harlequin Manufacturing Ltd.
21 Clarehill Road
Moira, Co Armagh
BT67 0PB
Northern Ireland
harlequin-heatstream.com
info@harlequin-mfg.com
T: +44 (0)28 9261 1077
F: +44 (0)28 9261 2672

Harlequin® HeatStream®
HOT WATER SYSTEM

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