

TORRENT STAINLESS

OPEN VENTED STAINLESS STEEL
THERMAL STORE PROVIDING HEATING
AND MAINS PRESSURE HOT WATER



INSTRUCTION MANUAL DESIGN, INSTALLATION & SERVICING

ONE NAME. EVERY SOLUTION.

WWW.GLEDHILL.NET

These instructions should be read in conjunction with the installation/servicing instructions issued by the manufacturer of the heat source being used.

Any installation must be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Wiring Regulations and the Water Fitting Regulations (England and Wales) or Water Byelaws (Scotland). It should be read in accordance with the relevant recommendations of the following:
BS 6798; BS 5549; BS 5546;
BS 5440:1; BS 5440:2; CP 331:3
BS 6700: BS 5258 and BS 7593: 1993 and BS7671

It must be installed by a competent person as defined by the relevant regulations. Manufacturers notes must NOT be taken as over-riding statutory obligations.

This product overcomes Part G Building Regulation discharge requirements for unvented cylinders but the installation is notifiable to building control unless it is carried out under an approved competent person self-certification scheme.

Although the secondary supply (domestic) is at mains pressure, it is not necessary to fit an expansion chamber, pressure or temperature relief valve, the plumbing should allow any unusual build up of pressure to be relieved at the ball valve.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised at all times to ensure they do not play with the appliance.

This information is provided to assist generally in the selection of equipment. Responsibility for selection and specification of our equipment must however remain that of our customer and any experts or consultants concerned with the installation(s).

PLEASE NOTE: THAT WE DO NOT THEREFORE ACCEPT ANY RESPONSIBILITY FOR MATTERS OF DESIGN SELECTION OR SPECIFICATION, FOR THE EFFECTIVENESS OF AN INSTALLATION OR SYSTEM CONTAINING ONE OF OUR PRODUCTS UNLESS SPECIFICALLY REQUESTED TO DO SO IN WRITING.

All goods are sold subject to our Conditions of Sale which are set out at the rear of this specification. In the interest of continuously improving the Torrent Stainless range, Gledhill Building Products Limited reserve the right to modify the product without notice, and in these circumstances this booklet, which is accurate at the time of printing, should be disregarded. An updated set of Instructions will be produced and supplied with new appliances and will be made available for other appliances on request.



Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturers instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hot Water Industry Council who manage and promote the Scheme. Visit www.centralheating.co.uk for more information.

For information on the HWA Charter Statement, go to the HWA website hotwater.org.uk.

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Manufacturer: Gledhill Building Products Ltd

Max. mains inlet water pressure	5.0bar
Max. working pressure - Primary heat exchanger (Indirect models)	3.0bar
Max. working pressure - Solar heat exchanger (Solar models)	6.0bar
Max. working pressure - Open vented thermal store (All models)	10.0m (1.0bar)
Max. working pressure - Open vented central heating system	10.0m (1.0bar)
Max. working pressure - Sealed heating system	3.0bar
Max. flow rate - Measured by flow sensor	32 l/min
Min. flow rate - Measured by flow sensor	1.8 l/min
Immersion heater rating	3kW@230Vac,50Hz

The Torrent Stainless comes complete with plate heat exchanger. This has a very small volume of water held within it, therefore any minimal expansion will be accomodated in the supply pipe.

Handling Before Installation

The Torrent Stainless must be handled with care and stored the correct way up in a dry place. Any manual handling/lifting operations will need to comply with the requirements of the Manual Handling Operations Regulations issued by the H.S.E. The appliance can be moved using a sack truck on the rear face although care should be taken and the route should be even. In apartment buildings containing a number of storeys we would recommend that the appliances are moved vertically in a mechanical lift. If it is proposed to use a crane, expert advice should be obtained regarding the need for slings, lifting beams etc. A specific manual handling assessment is shown in Appendix B at the rear of this manual.

Maintenance

Modifications should not be made to this product. Replacement parts, including immersion heaters, should be purchased from Gledhill Building Products Limited, or agents approved by them. The manual must always be left with the Torrent Stainless.

The Environment

This product has been manufactured using many recyclable materials, including the approved HCFC/CFC free polyurethane foam insulation. At the end of its useful life, it should be disposed of at a Local Authority Recycling Centre, to maximise the products full environmental benefits.

Note:

The thermal store is supplied with either one or two immersion heaters. These incorporate a thermostat (XB081) which cuts the electricity supply to the immersion heater if the control thermostat fails - a thermal cut out. Under no circumstances fit an immersion heater which does not incorporate a thermal cut out.

Why use a thermal store?

a) Alternative energy fuel sources are typically low grade, inherently unpredictable and are often available in plentiful supply but not when the heat energy is needed! A thermal store provides the means to harness the energy when it is available for later conversion into both hot water AND heating.

Being open vented, they provide a simple and inherently safe way to produce high-performance mains pressure hot water.

Multiple heat sources feed into the thermal store. This means that the energy available from solar panels or a wood burning stove, for example, can be used to provide energy into the heating circuit to decrease the use of fossil fuel based boilers, and hence reduce household running costs.

It is very problematic and inherently unsafe to connect wood burning stoves or other uncontrolled heat sources to an unvented cylinder, and not easily possible to combine alternative energy heat sources to provide energy to the heating circuit, hence the unique advantages of a thermal store.

b) The Torrent Stainless is the ideal product to use as the heart of an alternative energy system as it will take energy input not only from a conventional boiler but also from a wide variety of alternative energy sources, including but not limited to:

- solar panels
- wood burning stoves and other uncontrolled heat sources
- electricity from renewable or low carbon sources

If the system is configured appropriately the heat from the alternative energy source will be available for both hot water AND heating.

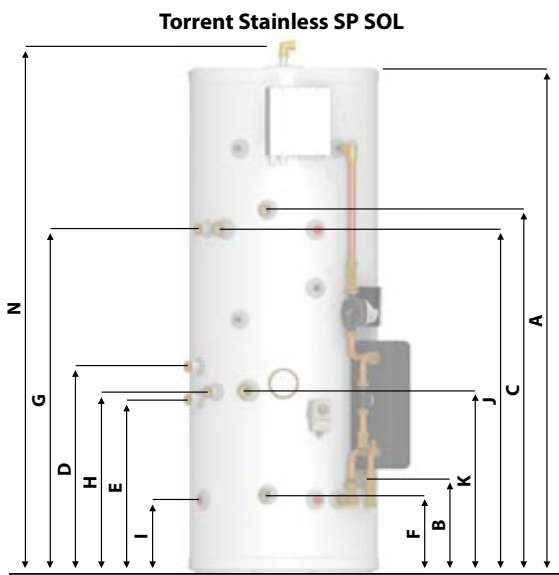
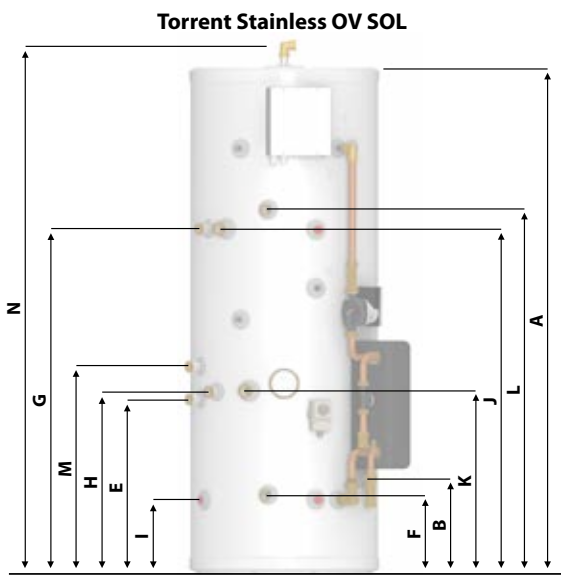
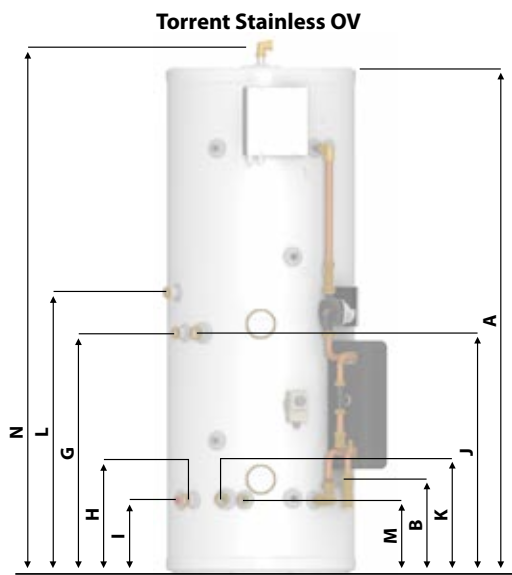
c) The Torrent Stainless becomes the neutral point in any open vented system because the open vent and cold feed pipes are connected to it. The benefit of this is that another device to enable different systems to be joined together at a neutral point is not required, which would be required in other systems. In multiple fuel systems, the Torrent Stainless acts as a low loss header.

d) Alternative energy supplies cannot be relied upon to raise the temperature of the stored water above 60 degrees every time they operate. This is not a problem with a thermal store because the store water is not the water that comes out of the tap. The water that comes out the hot tap is mains cold water run through a plate heat exchanger on the outside of the thermal store. This water heats very quickly and the volume of stagnant water in the heat exchanger is very small so there is virtually no legionella risk.

e) The thermal store is open vented and therefore does not require additional safety devices such as temperature and pressure relief valves or an inlet control group and expansion vessels.

f) The running costs of this cylinder are greatly reduced by not being required to have an annual safety inspection where as an unvented cylinder does.

DESIGN

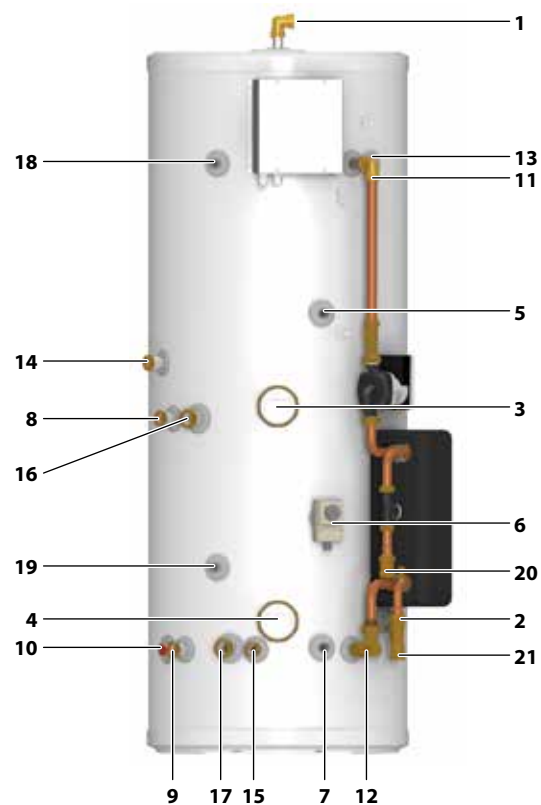


NOTES

- 1. The diagrams shown are generic. For exact product specification refer to the table eg. the number of immersion heaters varies depending on model.
- 2. All connections are within 120°.
- 3. The domestic hot water volume shown is based on one heat up, and the store is fully charged to 75°C.
- 4. Domestic hot water volume shown in solar cylinders will reduce where the solar input reduced or unavailable (potentially up to 40%).

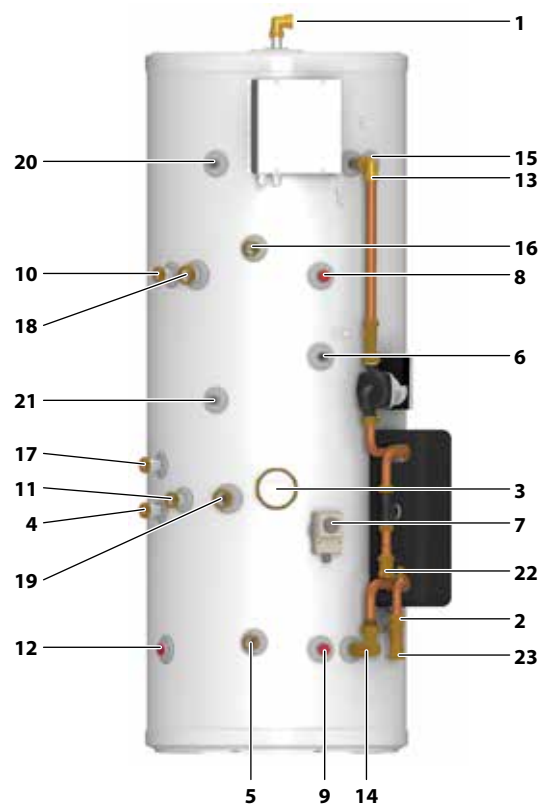
If more detail is required, please contact our technical desk on 01253 474584

Technical																									
Model	Energy Efficiency Class	Heat Loss	Domestic Hot Water Volume	Weight - Empty	Weight - Full	Overall Height (Excluding F&E Tank)	Overall Diameter (Allow additional 150mm for PHE)	Cold Feed	Sealed Primary Boiler Coil Flow	Sealed Primary Boiler Coil Return	Solar Coil Flow	Solar Coil Return	Central Heating Flow	Central Heating Return	Cylinder Drain	Solid Fuel Flow	Solid Fuel Return	Open Vented Boiler Flow	Open Vented Boiler Return	Open Vent	Surface Area of Primary Heater Coil	Surface Area of Solar Heater Coil	Capacity (Total Volume)	Dedicated Solar Volume	Maximum Hot Water Flow Rate
		watts	litres	kg	kg	A mm	mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	I mm	J mm	K mm	L mm	M mm	N mm	m²	m²	litres	litres	litres/min
Torrent Stainless OV																									
TST150OV	B	47	141	32	180	1118	550	285	n/a	n/a	n/a	n/a	614	220	220	614	223	651	220	1177	n/a	n/a	148	n/a	26.5
TST180OV	B	55	169	36	214	1306	550	285	n/a	n/a	n/a	n/a	665	220	220	665	223	732	220	1365	n/a	n/a	178	n/a	26.5
TST210OV	B	62	198	39	247	1494	550	285	n/a	n/a	n/a	n/a	710	220	220	710	223	828	220	1553	n/a	n/a	208	n/a	26.5
TST250OV	C	74	236	44	292	1744	550	285	n/a	n/a	n/a	n/a	783	220	220	783	223	939	223	1803	n/a	n/a	248	n/a	26.5
TST350OV	C	79	328	54	399	1765	630	285	n/a	n/a	n/a	n/a	690	218	218	690	221	896	221	1826	n/a	n/a	345	n/a	26.5
Torrent Stainless OV SOL																									
TST150OVSOL	B	47	141	34	182	1118	550	285	n/a	n/a	405	235	838	427	220	838	430	804	504	1177	n/a	0.78	148	63.9	26.5
TST180OVSOL	B	55	169	38	216	1306	550	285	n/a	n/a	405	235	838	427	220	838	430	804	504	1365	n/a	0.78	178	73.8	26.5
TST210OVSOL	B	62	198	42	250	1494	550	285	n/a	n/a	515	235	1015	537	220	1015	540	1071	611	1553	n/a	1.27	208	83.7	26.5
TST250OVSOL	C	74	236	47	295	1744	550	285	n/a	n/a	515	235	1040	537	220	1040	540	1441	761	1803	n/a	1.27	248	96.9	26.5
TST350OVSOL	C	79	328	57	402	1765	630	285	n/a	n/a	498	218	971	520	218	971	523	1446	676	1826	n/a	1.27	345	129.9	26.5
Torrent Stainless SP SOL																									
TST150SPSOL	B	47	141	36	184	1118	550	285	804	504	405	235	838	427	220	838	430	n/a	n/a	1177	0.78	0.78	148	63.9	26.5
TST180SPSOL	B	55	169	41	219	1306	550	285	804	504	405	235	838	427	220	838	430	n/a	n/a	1365	1.27	0.78	178	73.8	26.5
TST210SPSOL	B	62	198	45	253	1494	550	285	1071	611	515	235	1015	537	220	1015	540	n/a	n/a	1553	1.27	1.27	208	83.7	26.5
TST250SPSOL	C	74	236	51	299	1744	550	285	1441	761	515	235	1040	537	220	1040	540	n/a	n/a	1803	1.40	1.27	248	96.9	26.5
TST350SPSOL	C	79	328	63	408	1765	630	285	1446	676	498	218	971	520	218	971	523	n/a	n/a	1826	2.50	1.27	345	129.9	26.5



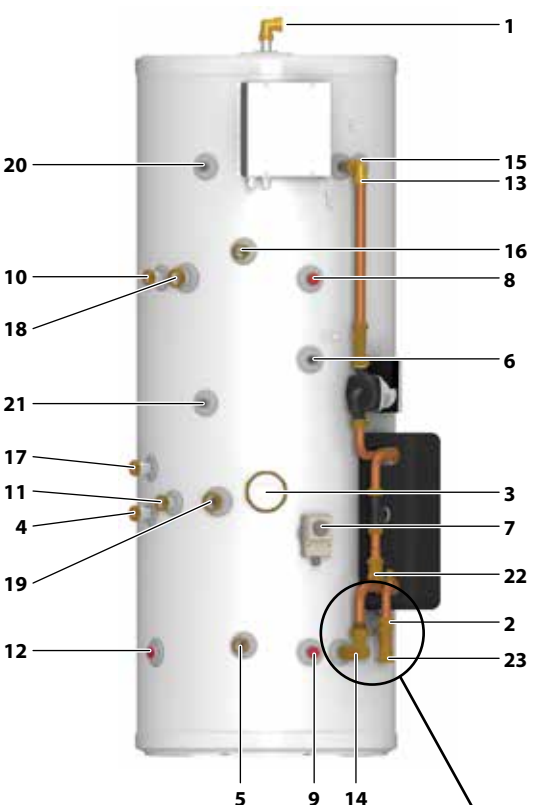
Torrent Stainless OV

- Available Components and Tappings**
- 1. Open Vent - 22mm Compression
 - 2. Cold Feed (F&E tank) - 22mm Compression
 - 3. On-Peak Immersion Heater - 1 3/4" Female
 - 4. Off-Peak Immersion Heater - 1 3/4" Female
 - 5. Control Thermostat Pocket - 22mm Dual Pocket
 - 6. Control Thermostat - 22mm Dual Pocket
 - 7. Control Thermostat Pocket- 22mm Dual Pocket
 - 8. Central Heating Flow - 22mm Compression
 - 9. Central Heating Return - 22mm Compression
 - 10. Cylinder Drain - 1/2" Female
 - 11. PHE Flow - 22mm Plain Pipe
 - 12. PHE Return - 22mm Plain Pipe
 - 13. DHW Store Sensor - 10mm Single Pocket
 - 14. Open Vented Flow - 22mm Compression
 - 15. Open Vented Return - 22mm Compression
 - 16. Solid Fuel Flow - 28mm Compression
 - 17. Solid Fuel Return - 28mm Compression
 - 18. Solid Fuel Overheat Stat - 22mm Dual Pocket
 - 19. Solid Fuel Control Thermostat - 22mm Dual Pocket
 - 20. Hot water supply - 22mm Compression
 - 21. Mains cold water supply - 22mm Comp.



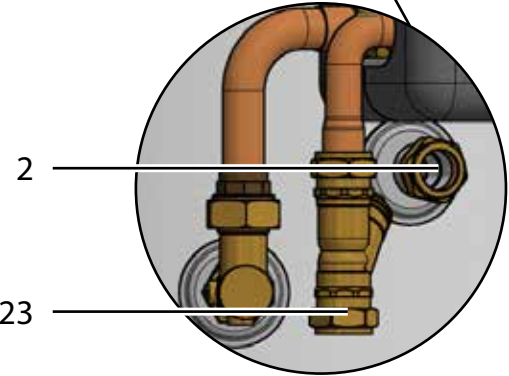
Torrent Stainless OV SOL

- Available Components and Tappings**
- 1. Open Vent - 22mm Compression
 - 2. Cold Feed (F&E tank) - 22mm Compression
 - 3. Immersion Heater - 1 3/4" Female
 - 4. Solar Coil Flow - 22mm Compression
 - 5. Solar Coil Return - 22mm Compression
 - 6. Control Thermostat Pocket - 22mm Dual Pocket
 - 7. Control Thermostat - 22mm Dual Pocket
 - 8. Solar Sensor Pocket - 22mm Dual Pocket
 - 9. Solar Sensor Pocket - 22mm Dual Pocket
 - 10. Central Heating Flow - 22mm Compression
 - 11. Central Heating Return - 22mm Compression
 - 12. Cylinder Drain - 1/2" Female
 - 13. PHE Flow - 22mm Plain Pipe
 - 14. PHE Return - 22mm Plain Pipe
 - 15. DHW Store Sensor - 10mm Single Pocket
 - 16. Open Vented Flow - 22mm Compression
 - 17. Open Vented Return - 22mm Compression
 - 18. Solid Fuel Flow - 28mm Compression
 - 19. Solid Fuel Return - 28mm Compression
 - 20. Solid Fuel Overheat Stat - 22mm Dual Pocket
 - 21. Solid Fuel Control Thermostat - 22mm Dual Pocket
 - 22. Hot water supply - 22mm Compression
 - 23. Mains cold water supply - 22mm Comp.



Torrent Stainless SP SOL

- Available Components and Tappings**
- 1. Open Vent - 22mm Compression
 - 2. Cold Feed (F&E tank) - 22mm Compression
 - 3. Immersion Heater - 1 3/4" Female
 - 4. Solar Coil Flow - 22mm Compression
 - 5. Solar Coil Return - 22mm Compression
 - 6. Control Thermostat Pocket - 22mm Dual Pocket
 - 7. Control Thermostat - 22mm Dual Pocket
 - 8. Solar Sensor Pocket - 22mm Dual Pocket
 - 9. Solar Sensor Pocket - 22mm Dual Pocket
 - 10. Central Heating Flow - 22mm Compression
 - 11. Central Heating Return - 22mm Compression
 - 12. Cylinder Drain - 1/2" Female
 - 13. PHE Flow - 22mm Plain Pipe
 - 14. PHE Return - 22mm Plain Pipe
 - 15. DHW Store Sensor - 10mm Single Pocket
 - 16. Primary Coil Flow - 22mm Compression
 - 17. Primary Coil Return - 22mm Compression
 - 18. Solid Fuel Flow - 28mm Compression
 - 19. Solid Fuel Return - 28mm Compression
 - 20. Solid Fuel Overheat Stat - 22mm Dual Pocket
 - 21. Solid Fuel Control Thermostat - 22mm Dual Pocket
 - 22. Hot water supply - 22mm Compression
 - 23. Mains cold water supply - 22mm Comp.



The cold feed to the cylinder is taken from the F&E tank (connection 2 shown above). The mains cold water supply is connected to the pipework leading to the plate heat exchanger (connection 23 shown above).

The feed and expansion tank for the Torrent Stainless must be sized to take the water expansion of the whole system (i.e. solid fuel boiler, open vented boiler and auxiliary heating).

- Specify optional components at time of order with any of the Torrent Stainless models**
- A. Header tank
 - B. Ball valve
 - C. Float
 - D. Overheat thermostat
 - E. Scale inhibitor (fitted to the control panel)

See page 39 for part reference codes.

INSTALLATION

Torrent Stainless OV Model Selection Guide		
Max hot water demand	Bedrooms	Model
1 bathroom	1 - 2	TST150OV
1 bathroom + en-suite shower	2 - 3	TST180OV
2 bathrooms + en-suite shower	2 - 3	TST210OV
2 bathrooms + 2 en-suite showers	3 - 4	TST250OV
3 bathrooms + 2 en-suite showers	4 - 5	TST350OV

Torrent Stainless SP SOL Model Selection Guide (Boiler Only)		
Max hot water demand	Bedrooms	Model
1 bathroom	1 - 2	TST150SPSOL
1 bathroom + en-suite shower	2 - 3	TST180SPSOL
2 bathrooms + en-suite shower	2 - 3	TST210SPSOL
2 bathrooms + 2 en-suite showers	3 - 4	TST250SPSOL
3 bathrooms + 2 en-suite showers	4 - 5	TST350SPSOL

The figures above are to be used where there is only a sealed system boiler connected, and both boiler and solar coils are connected to the boiler.

Torrent Stainless OV SOL Model Selection Guide			
Max hot water demand	Max solar collector area (m²)	Bedrooms	Model
1 bathroom	2.22	1 - 2	TST150OV SOL
1 bathroom	2.54	2 - 3	TST180OV SOL
1 bathroom + en-suite shower	2.91	2 - 3	TST210OV SOL
2 bathrooms + en-suite shower	3.88	3 - 4	TST250OV SOL
2 bathrooms + 2 en-suite showers	4.64	4 - 5	TST350OV SOL

Torrent Stainless SP SOL Model Selection Guide			
Max hot water demand	Max solar collector area (m²)	Bedrooms	Model
1 bathroom	2.22	1 - 2	TST150SP SOL
1 bathroom	2.54	2 - 3	TST180SP SOL
1 bathroom + en-suite shower	2.91	2 - 3	TST210SP SOL
2 bathrooms + en-suite shower	3.88	3 - 4	TST250SP SOL
2 bathrooms + 2 en-suite showers	4.64	4 - 5	TST350SP SOL

Model Selection

The suggested model sizes shown in the tables opposite are based on a typical daily hot water usage and on the assumptions that the heating system is correctly sized and that the thermal store is fully charged to at least 75°C by the main heat source.

When selecting a solar model, it is important to check the dedicated solar volume (shown in table on pages 4-5) complies with the Building Regulations ADL1 Domestic Building Services Compliance Guide.

The suggested model sizes are based on typical hot water usage. For high specification dwellings an increase of one model size should be considered.

Please see page 18 for pipework configuration where Torrent Stainless SP SOL is selected and both coils are to be used with a boiler.

General Design Considerations

As a general rule, the cupboard footprint needs to be a minimum of 150mm wider, 80mm deeper and 80mm taller than the unit selected. to accommodate the plate heat exchanger and associated pipework.

The base chosen for the Torrent Stainless should be level and capable of supporting the weight of the unit when full of water as shown in General Data.

General Restrictions

- a. Bidets incorporating an ascending spray inlet, or using a flexible hose or arranged with a spray or jet are a fluid category 5 risk. These should not be used with the Torrent Stainless when it is also serving other outlets.
- b. Torrent Stainless should not be used where steam is the primary heating medium.

INSTALLATION

Mains Water Supply

A typical arrangement of the hot and cold water system is shown below. The PHE on all Torrent Stainless models are designed to be fed directly from the mains water supply and they fulfil the requirements of WRAS Schedule 2 (paragraph 15.2), and therefore do not require a check valve to be fitted to the cold water supply pipe.

The performance of the Torrent Stainless is directly related to the cold water supply pressure and volume to the dwelling. This must be capable of providing for all those services which could be required simultaneously and the maximum demand should be calculated for sizing the distribution network.

As a general guideline, although a 15mm external service may be sufficient for the smaller dwelling with one bathroom, a 22mm service is preferred (25mm MDPE) and should be the minimum for larger dwellings.

The Torrent Stainless will operate at dynamic pressure as low as 1.5 bar (at the appliance) which must be available when the local demand is at its maximum, but the preferred range is between 2 and 3.0 bar.

If the incoming static mains pressure **exceeds** 5.0 bar at any point in the 24 hour cycle, then a pressure limiting valve set at 3.0 bar should be fitted downstream of the stop tap where the cold supply enters the dwelling.

If a water meter is fitted in the service pipe, it should have nominal rating to match the anticipated maximum simultaneous hot and coldwater demand, calculated in accordance with BS EN 8558:2011. This could be up to 50 l/min in some properties.

The sanitary water equipment used in the system should be suitable for a working pressure of 10 bar and the units must be fitted strictly in accordance with the requirements of the Water Supply (Water Fittings) Regulations 1999.

Taps and Shower Fittings

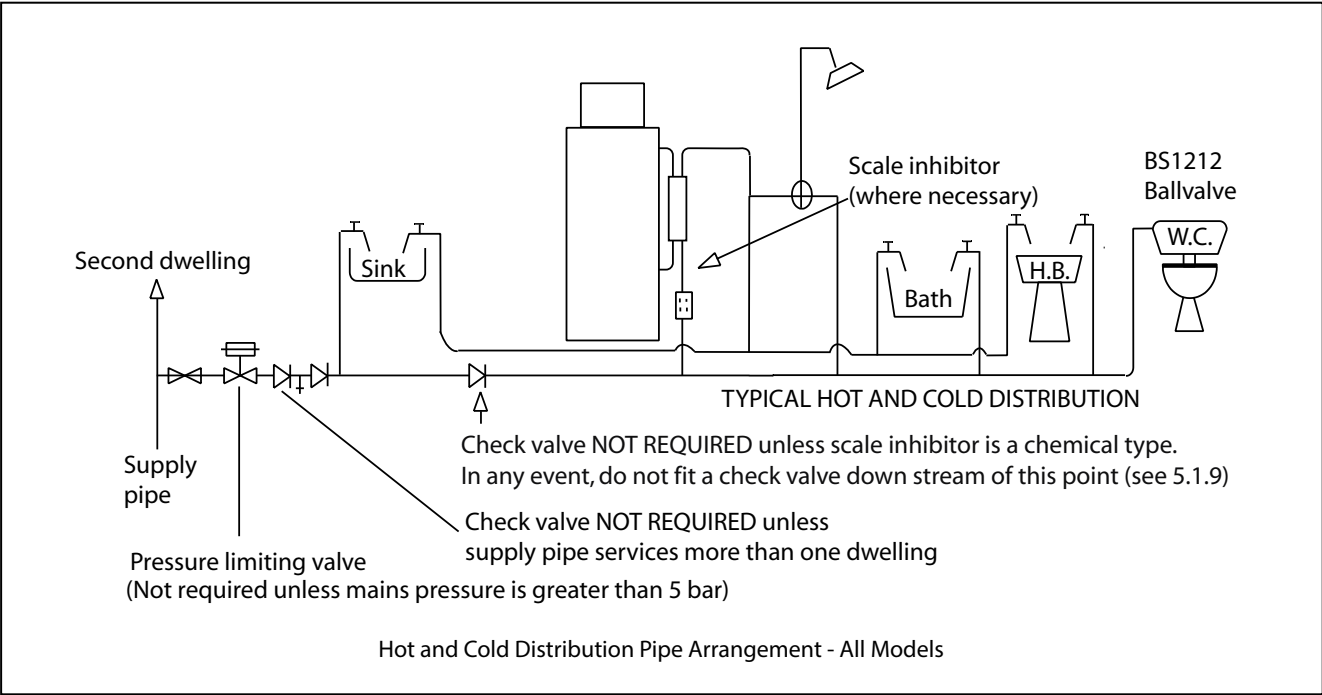
Aerated taps are recommended to prevent splashing.

All types of shower mixing valves can be used as long as both hot and cold supplies are mains fed. However all mains pressure systems are subject to dynamic changes particularly when other hot and cold taps/showers are opened and closed, which will cause changes in the water temperature at the mixed water outlet such as showers. For this reason and because thermostatic showers are now no more expensive than manual showers, we strongly recommend thermostatic showers with Torrent Stainless. The shower head provided must also be suitable for mains pressure supplies.

The hot water supply to a shower-mixing valve should be fed where practical directly from the Torrent Stainless or be the first draw-off point on the hot circuit. The cold water supply to a shower-mixing valve should where practical be fed directly from the rising mains via an independent branch.

The shower must incorporate or be fitted with the necessary check valves to prevent back-syphonage protection in accordance with Water Regulations.

Bidets in domestic locations of the over rim style, that have no ascending spray or spray and/or flexible hose may be supplied by the Torrent Stainless, providing that a type AUK2 air gap is maintained between the outlet of the water fitting and the spill over level of the bidet.



INSTALLATION

Pipe Layout

In all mains pressure installations it is important to remember that the incoming cold supply must be shared between all terminal fittings. It is important that a 22mm supply is brought to the appliance and a 22mm take-off is continued at least to the bath. If there are two baths, 28mm pipework should be considered. One metre of smaller diameter pipework, or flow restrictors, should be provided on the final connection to all outlets so as to balance the water available. In any event the distribution pipework should generally be in accordance with BS EN 806:3.

Plastic Pipework

All the recommendations with regard to the heating systems in this manual are generally based on BS/EN Standards copper pipework and fittings. However plastic pipework system can be used in place of copper as long as:-

- a. The chosen system is recommended for use in domestic heating systems by the manufacturers and it is installed fully in accordance with their recommendations.
- b. The design criterion of the plastic system is at least equivalent to the use of BS/EN Standards copper pipework and fittings.

- c. Barrier pipework for these systems is recommended.

Ball Valve and Overflow

The feed and expansion tank can be filled manually if required e.g. using a hose pipe fitted with a double check valve.

In this situation an overflow pipe can still be fitted if required to ensure that if a leak occurs on the plate heat exchanger it can be discharged safely to the outside of the building.

Note: If a ball valve is fitted, then a warning/overflow pipe must always be fitted.

The feed and expansion tank (provided by the installer) must be sized correctly to enable the expansion of the entire system volume. This will include the central heating, store, solid fuel and boiler circuit volumes.

See page 12 for guidance sizing the feed and expansion tank.

Water Treatment

In all Torrent Stainless models, the primary (i.e. non-potable) water is stored and the domestic hot water is heated instantaneously by means of heat exchangers. Therefore treating the primary water will not contaminate the domestic hot water supply.

Although the Torrent Stainless primary store has no special water treatment requirements, the radiators and other parts of the circuit will require the application of a scale and corrosion inhibitor. The only Fernox products that are compatible are the Flux and to a lesser extent some of our Acidic Cleaning products, namely DS40. This is because the Chloride in Flux can cause pitting in even Duplex Steel. The volumes and concentration should be calculated in accordance with the manufacturers instructions and when calculating the system volume (i.e. the water content), the volume of the Torrent Stainless should be taken into account.

Use In Hard Water Areas And Scale Protection

The patented design of the domestic hot water plate heat exchanger is such that the turbulence through the plates slows down the formation of scale in moderate hard water conditions. However, the requirements set out in the 'Domestic Building Services Compliance Guide' and the Building Regulations approved documents L1A and L1B regarding scale protection should be complied with.

These requirements state that; "where the mains water hardness exceeds 200ppm provision should be made to treat the feed water to the water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of scale". To comply with this requirement:-

- a. The hardness of the mains water should be checked by the installer and if necessary a suitable in-line scale inhibitor device should be specified for hardness levels between 200 and 300ppm (mg/l).
- b. Where the hardness level is 300ppm (mg/l) and above, the optional phosphate type inhibitor should be specified and fitted at a suitable point in the cold water supply to the appliance.

It is important that where the supply to the Torrent Stainless is in 22mm the in-line scale inhibitor is also 22mm. In practice servicing is not normally required but in hard water areas, the requirements can be considered similar to those needed for instantaneous or 'combi' appliances.

The installation of scale inhibitor should be in accordance with the manufacturers instructions and Water Byelaws.

London Loop

As the thermal store gets hot the water will expand and the water level in the F&E tank will rise, as will the level of water in the vent pipe. Hot water will also rise to the top of the cylinder. When the water at the base of the cylinder becomes hotter it may run out the cold feed connection pipe. If the cold feed pipe then runs vertically it works like a chimney with the hot water rising to the top in the same way hot air does from a fire. If this section is not insulated then it will lose heat and waste energy.

If, however, the cold feed is formed into a sheppard's crook or London loop it will form a thermal trap. A thermal trap works by ensuring that cold water is held below hot water. Because hot water always rises it will not be able to move down and around the loop/crook and therefore will not rise up the cold feed pipe work. This will reduce heat loss and thereby prevent energy waste.

The minimum depth of the U trap is calculated by multiplying the pipe diameter by 8. For example;

- Using 22mm pipework will require a minimum of 176mm

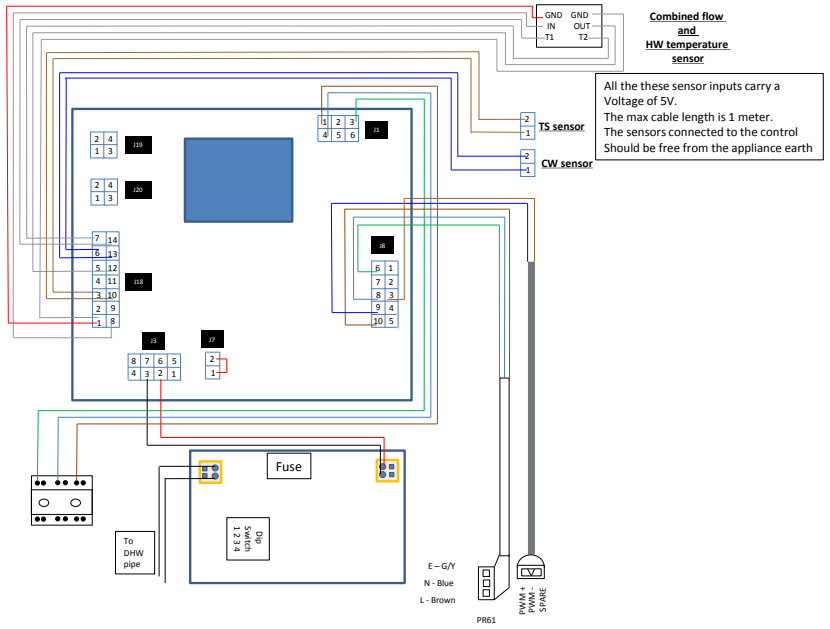
22mm pipework is highly recommended to ensure that the London loop does not air lock during the commissioning process. It also enables a faster installation of the product due to the increased filling rate.

Wiring The Control Panel

The control panel requires a separate 3 amp fuse spur double pole to ensure safe isolation. The cable/flex from the fuse spur to the control panel must be a minimum of 0.75mm² C.S.A. and be heat resistant. The cable should be clipped to prevent accidental snagging.

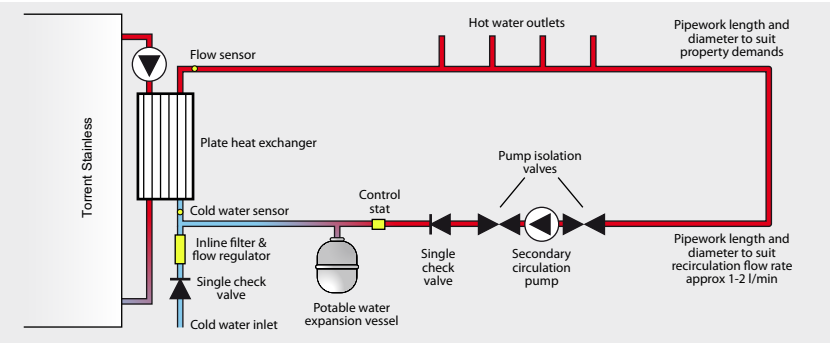
The control panel front cover is secured by 4 screws. Remove these and lift off the front cover to expose the power terminals. These are found at the bottom left of the control panel. Prepare the cable end and feed it through the cable gland.

Use a screwdriver to press the neutral cross down on the WAGO connector. This opens the clamp and the neutral wire can be fed into the connector. Remove the screwdriver and test the wire is securely fit. Repeat with the PE and live cables. Tighten the cable gland and check for security. Perform the necessary safety checks and refit the front panel.



Secondary Hot Water Circulation

If the length of the hot water draw-off pipework is excessive and the delivery time will be more than 60 seconds before hot water is available at the tap, you may wish to consider using trace heating to the hot water pipework such as the Raychem HWAT system. Also a conventional pumped secondary circulation system (shown below) can be used with any model of the Torrent Stainless.



It is important that the cold water pipework is adequately separated and protected

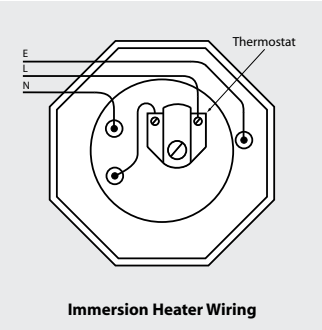
INSTALLATION

from any heating from the hot water pipework to ensure that the water remains cold and of drinking water quality.

A pipe thermostat is incorporated in the circuitry which cuts the supply to the pump when the water in the return pipe reaches the set temperature. Ensure the hot water temperature is set correctly to avoid excessively hot water at the outlets and long pump run times.

Secondary circulation pipework must be insulated to prevent energy loss in both heated and unheated areas.

Immersion Heaters



These are 3kW 230V AC heaters and incorporate a thermostat. The thermostat incorporates a manual reset. They have incolloy elements to prolong their life expectancy in aggressive water conditions. We recommend best practice of connecting the wiring to the immersion heater is using crimp connections.

Utilising Off Peak Electricity

Where it is intended that units are fitted to unrestricted offpeak circuits, then suitable controllers such as the Horstmann off peak electric time controller will be required. External wiring to the immersion heaters must be in accordance with the relevant IEE Wiring Regulations and the circuit must be protected by a suitable 16A MCB fuse and a 20A double pole isolating switch.

Safety

The immersion heaters must be earthed and they must be isolated from the mains before the cover is removed on every occasion. Replacement immersion heaters should be obtained from Gledhill Building Products Limited.

Important

The unit must not be powered up unless the thermal store has been filled with water, the pump has been bled and water is confirmed to be present in the pipework above the pump.

INSTALLATION

Allowance for domestic hot water for sizing the boiler			
Torrent Stainless model	Allowance for domestic hot water heating (kW)		
	Full divert mode	Flow share mode	
150	0	2	
180	0	3	
210	0	4	
250	0	5	
350	0	7	

Coil Performance						
Nominal volume	litres	150	180	210	250	350
(SP SOL) Primary coil only						
Coil power at 7°C temp. difference	kW	3	4	6	6	7
Average power	kW	9	13	15	16	18
Coil power at 47°C temp. difference	kW	23	26	33	32	36
Volume of water heated	litres	84	102	130	144	230
Recovery time	min	22	18	22	20	28
(SP SOL) Combined coils coil						
Coil power at 7°C temp. difference	[kW]	4	4	6	4	3
Average power	[kW]	12	16	18	16	15
Coil power at 47°C temp. difference	[kW]	25	36	39	36	41
Volume of water heated	litres	150	180	210	250	350
Recovery time	[min]	25	28	30	34	42
coil cofiguration		series	parallel	parallel	parallel	parallel

Sealed Heating System Expansion Vessel Requirements									
Safety valve setting	3.0								
Vessel charge pressure (bar)	0.5			1.0			1.5		
Initial system charge pressure (bar)	0.5	1.0	1.5	2.0	1.0	1.5	2.0	1.5	2.0
Total System Volume (litres)	Expansion Vessel Volume (litres)								
25	2.1	3.5	6.5	13.7	2.7	4.7	10.3	3.9	8.3
50	4.2	7.0	12.9	27.5	5.4	9.5	20.6	7.8	16.5
75	6.3	10.5	19.4	41.3	8.2	14.2	30.9	11.7	24.8
100	8.4	14.0	25.9	55.1	10.9	19.0	41.2	15.6	33.1
125	10.4	17.5	32.4	68.3	13.6	23.7	51.5	19.5	41.3
150	12.5	21.0	38.8	82.6	16.3	28.5	61.8	23.4	49.6

Thermal Store	Minimum Number of Feed and Expansion Tanks (16 litre model inc. 10 litre expansion)
TST150, TST180, TST210	1
TST250, TST350	2
Expansion of all connected open vented systems must be added to the store expansion when choosing the size of the feed and expansion tank. The weight of each tank when full is 27kg (not including pipework and valves).	

Boiler Size

The minimum total boiler power required is the sum of the power required for space heating which should be calculated in accordance with BS EN 12831 and/or the CIBSE guide and the power required for producing hot water which can be read from the table to the left.

The coil performance figures are based on a boiler flow temperature of 82°C and flow rate of 0.25 litres per second. The boiler needs to be able to modulate down to the 7°C temperature difference setting to maximise efficiency.

Please see page 18 for pipework configuration where Torrent Stainless SP SOL is selected and both coils are to be used with a boiler.

Expansion Vessel For Sealed Heating System

The table opposite can be used for sizing the heating system expansion vessel. The water content of the Torrent Stainless primary heat exchanger is listed in specification tables on pages 4 and 5 and a figure of 4.5 l/kW of installed radiator capacity can be used for a preliminary assessment of the water content of the heating system.

The expansion vessel requirements shown in the table are based on a maximum boiler flow temperature of 93°C. The expansion vessel must be suitable to accommodate the change in volume of water in the heating system when heated from 10°C to 100°C, with a maximum operating temperature of 99°C.

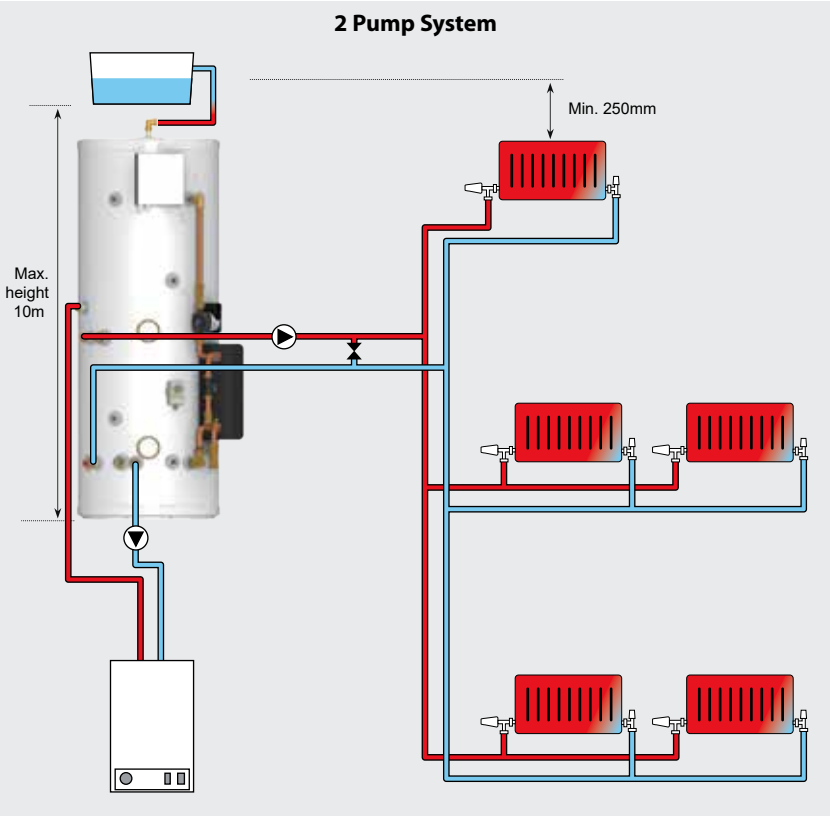
Feed And Expansion Tank For Open Vented Heating System

The table opposite shows the recommended size and number of F & E tanks required for an open vented hot water only system, which can be supplied as an optional extra.

Expansion for the open vented heating systems connected to the store must be added to this figure. So, as a preliminary assessment of the water content of the attached open vented systems, a figure of 4.5 l/kW of radiator output can be used. For example, 20 kW radiator output would have a system volume of 90 litres, and potential expansion of this would be 3.6 litres, and 10 kW would be 45 litres total volume and 1.8 litres for expansion.

Please refer to page 19 for further information regarding F&E tanks when using solid fuel input.

INSTALLATION

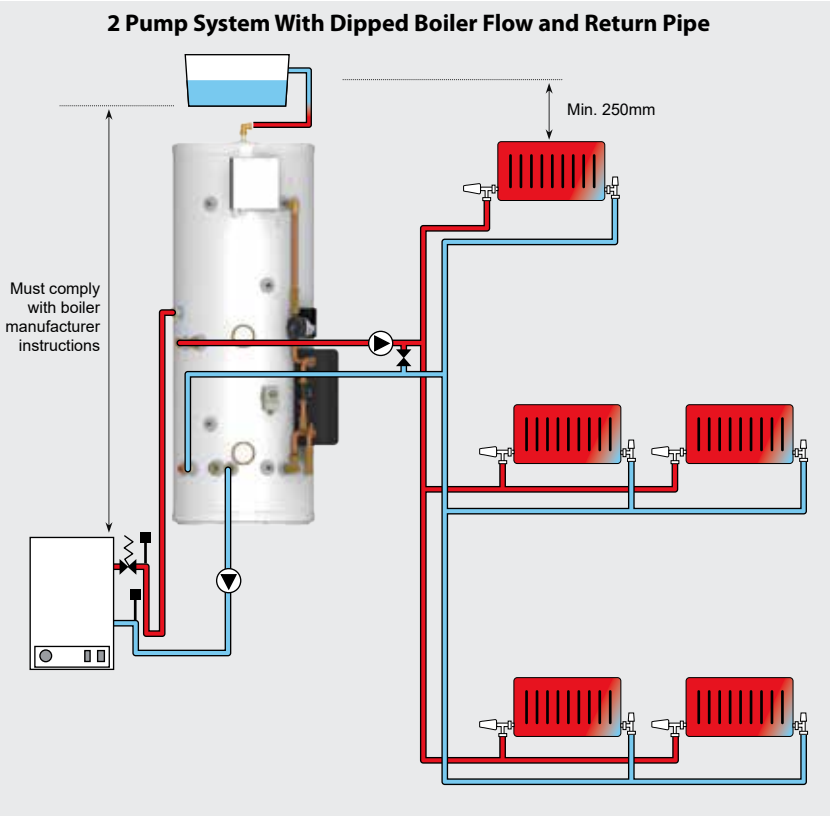


Open vented heating systems

The open vented primary system is filled via the feed and expansion (F&E) tank fitted with the Torrent Stainless OV model and therefore it is important that the F&E tank is positioned at least 250mm above the highest point in the system. Please check the F&E tank is big enough for the whole system expansion. Also ensure that the height of the F&E tank is sufficient to meet the manufacturer's requirements for the minimum head required for the boiler and the system pump(s).

The Torrent Stainless OV models can be installed using both 'Y' Plan and 'S' Plan heating system controls. These models can also be installed without either 3-port or 2-port valves using a separate central heating pump as shown in diagrams on this page. In this case no bypass valve is required unless TRV's are used on all radiators.

If the flow and return pipes between the boiler and the Torrent Stainless OV thermal store are dipped as illustrated in the schematic shown opposite, then the boiler selected must be suitable for a sealed heating system i.e. it must be fitted with an overheat thermostat. Automatic air vents should be fitted at appropriate places to vent the system and a pressure relief valve should also be fitted close to the boiler.



Any boiler can be used with the Torrent Stainless OV and the Torrent Stainless SOL provided the flow pipe from the boiler to the Torrent Stainless is continuously rising. The flow pipe between the boiler and the Torrent Stainless thermal store is part of the open vent and therefore it must not be fitted with any isolating valve, non-return valve or any other component which can obstruct the flow.

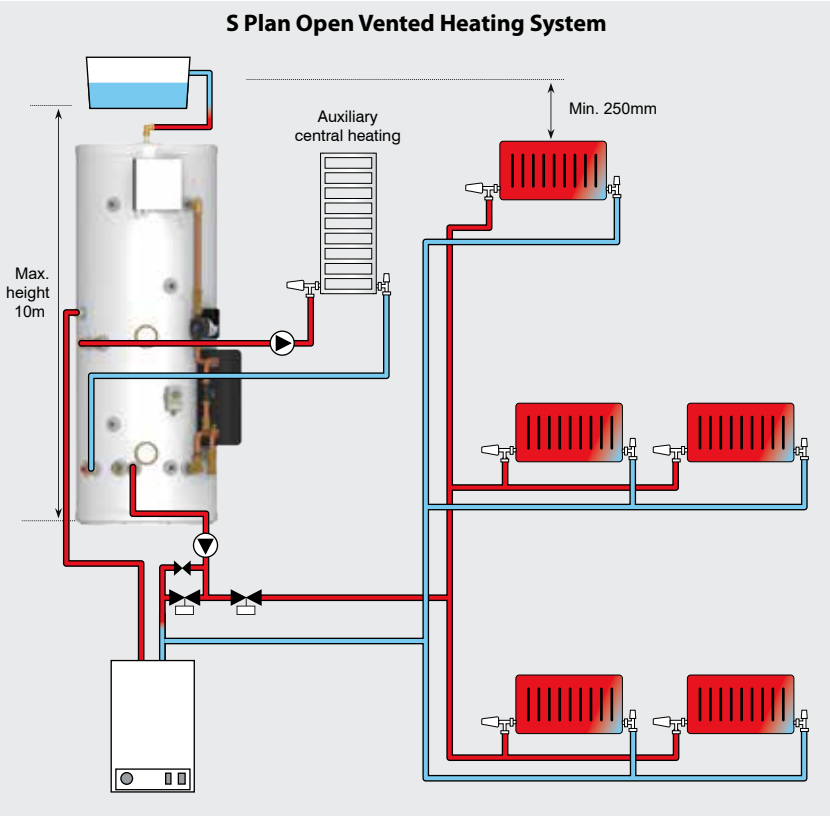
The minimum size of flow and return pipe between the boiler and the Torrent Stainless should be 22mm copper or equivalent. In any case it should be sized to suit the installed boiler capacity, available pump head and the circuit resistance.

The water level must be set correctly by adjusting the ball valve in the F&E tank. The overflow/warning pipe, should be no less than the 20mm internal diameter and have a continuous fall.

The overflow/warning pipe should be fitted to discharge clear of the building and be sited so that any overflow can be easily observed. The warning pipe should be installed in either high temperature uPVC or copper and should not have any other connections to it.

If the boiler does not incorporate an overheat thermostat, then one should be fitted to the store.

INSTALLATION

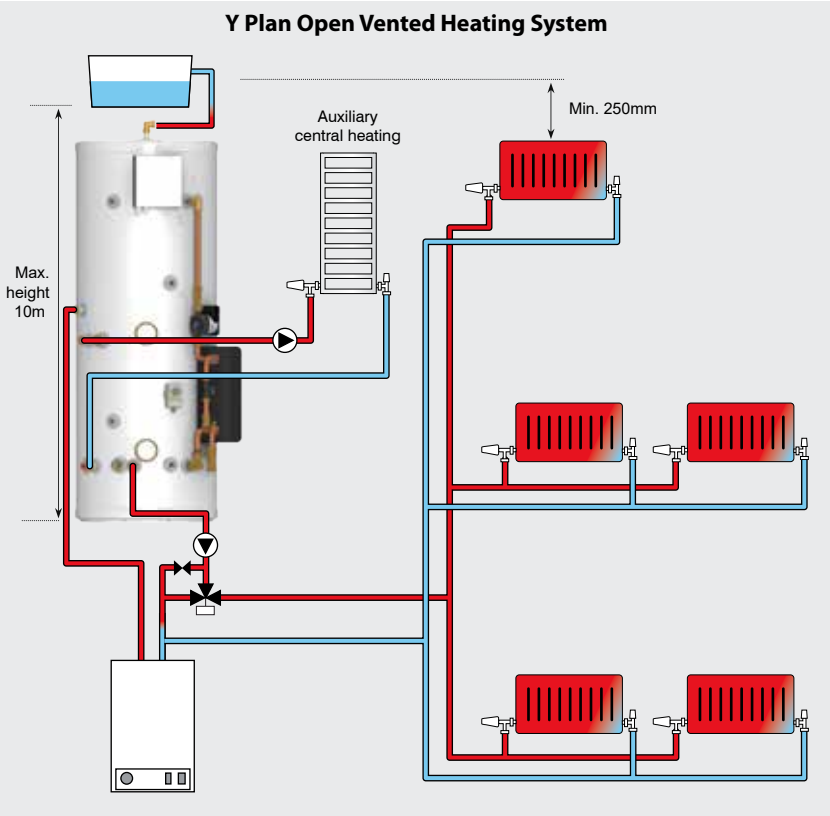


The two diagrams shown on this page show how an 'S' plan and 'Y' plan may be used in conjunction with the Torrent Stainless OV, with another space heating supply being taken direct from the store. The type of space heating used is the installer's choice and the diagrams only show possible layouts.

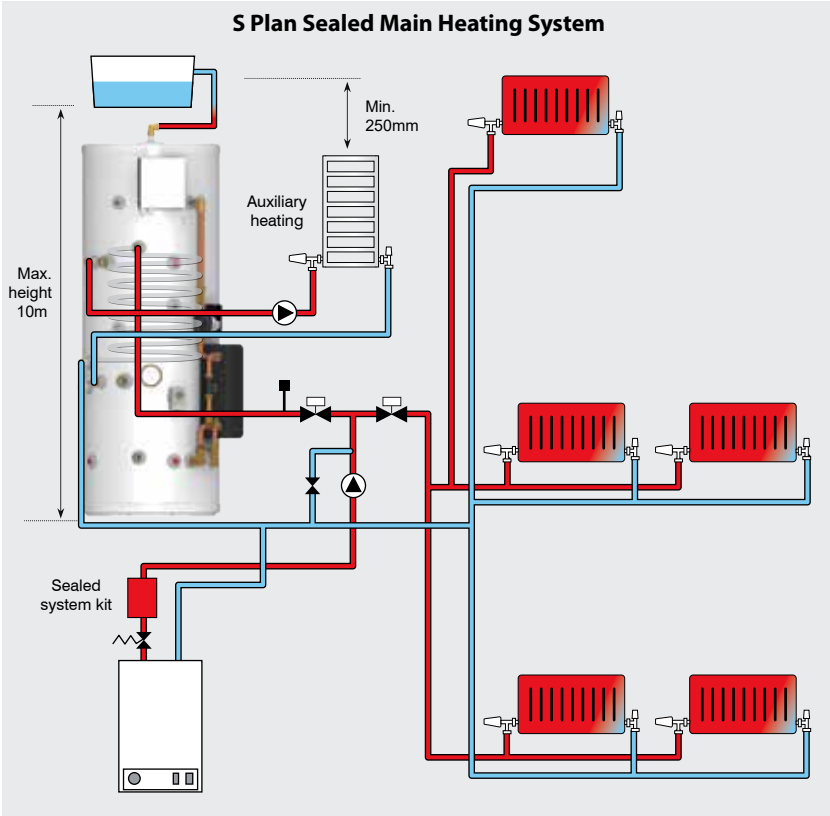
The auto bypass is positioned here to allow minimum flow rates through the boiler as TRVs close; and to allow for boilers with pump overrun.

Off delay timers may be considered for use in situations where the boiler pump overrun is controlled by sensing a temperature drop before shutting off. This type of boiler may cause the pump to run on for some minutes while the temperature slowly drops, but the store temperature may also drop causing the boiler to fire again; the boiler then short cycles. If an off delay timer is used it allows the pump to overrun for about a minute to remove any excess heat; then shuts off the pump, but it does not remove so much of the heat from the store that it causes the boiler to fire again.

A solid fuel boiler is also able to be connected to the Torrent Stainless OV, please refer to page 19 for further information.



INSTALLATION



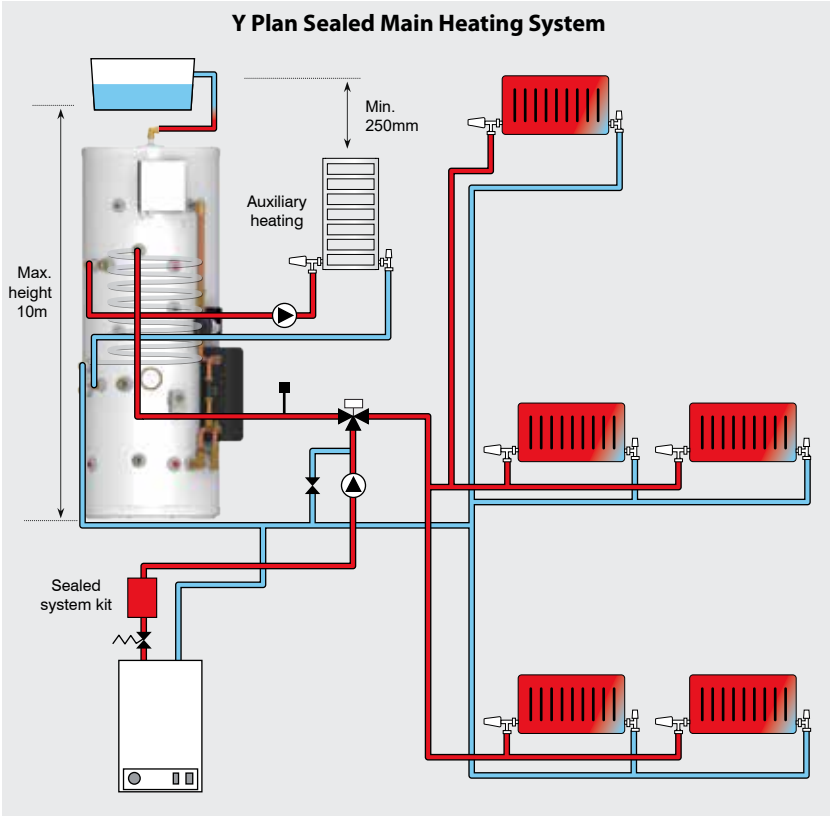
Sealed heating system

All Torrent Stainless SP models are suitable for sealed heating systems up to 3.5 bar maximum operating pressure, however the normal pressure relief valve setting is 3.0 bar. The typical layout of the open vented 'Y Plan' and 'S Plan' for the indirect Torrent Stainless models is shown in the diagrams on this page.

A boiler used in a sealed heating system must be suitable for this application i.e. it must be fitted with an overheat cut-out thermostat and can be located above the thermal store F&E tank, as can the central heating system connected to the boiler.

It is recommended that the F&E tank (for the thermal store) is fitted at a high level in the same cupboard as the Torrent Stainless. However it can be fitted remotely up to 10m above the base of the Torrent Stainless, and sized to accommodate the expansion of the cylinder and any attached central heating and solid fuel volumes.

The F&E tank overflow/warning pipe should be installed in a material suitable for a heating system feed and expansion tank.



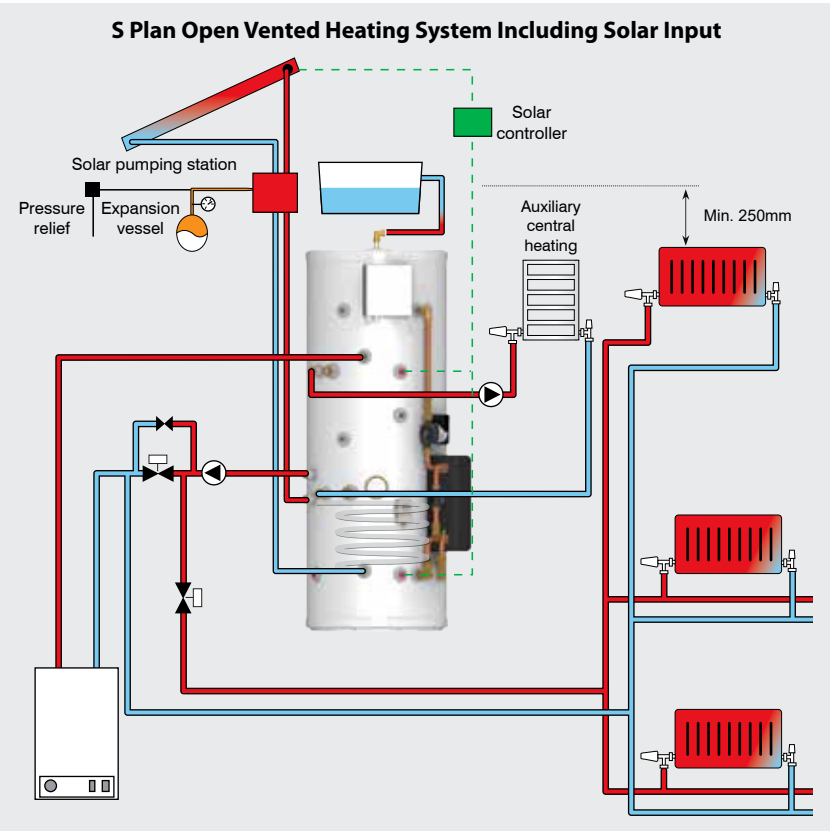
There shall be no permanent connection to the mains water supply for filling the heating system even through a non-return valve without the approval of the Local Water Authority. An approved filling loop is required for filling the heating system, which should be disconnected after commissioning the system.

The filling loop should be located adjacent to the boiler along with a suitable expansion vessel, pressure gauge, pressure relief valve and discharge arrangement.

The minimum system pressure should not be less than the static head plus 0.5 bar i.e. the height of the highest point in the system above the expansion vessel plus a margin of 0.5 bar.

A solid fuel boiler is also able to be connected to the Torrent Stainless SP, please refer to page 19 for further information.

Where a sealed primary coil is used, the thermal store is a hot water only thermal store. If too much heat is taken out of store, then hot water performance will be limited. The hot water priority should be protected by use of an appropriate thermostat. Heating can be taken from the SP thermal store to provide auxiliary heating to towel radiators, which are low output. It is not suitable for full central heating systems, this should be taken directly from the boiler.



Solar heating circuit

The Torrent Stainless SOL is an advanced thermal store and has been designed to incorporate existing boiler and central heating controls and is based on the tried and tested standard Torrent Stainless range. Therefore general design requirements for hot and cold water systems, for ball valve and overflow, for water treatment and for heating system design should be taken into account when designing the Torrent Stainless SOL based systems.

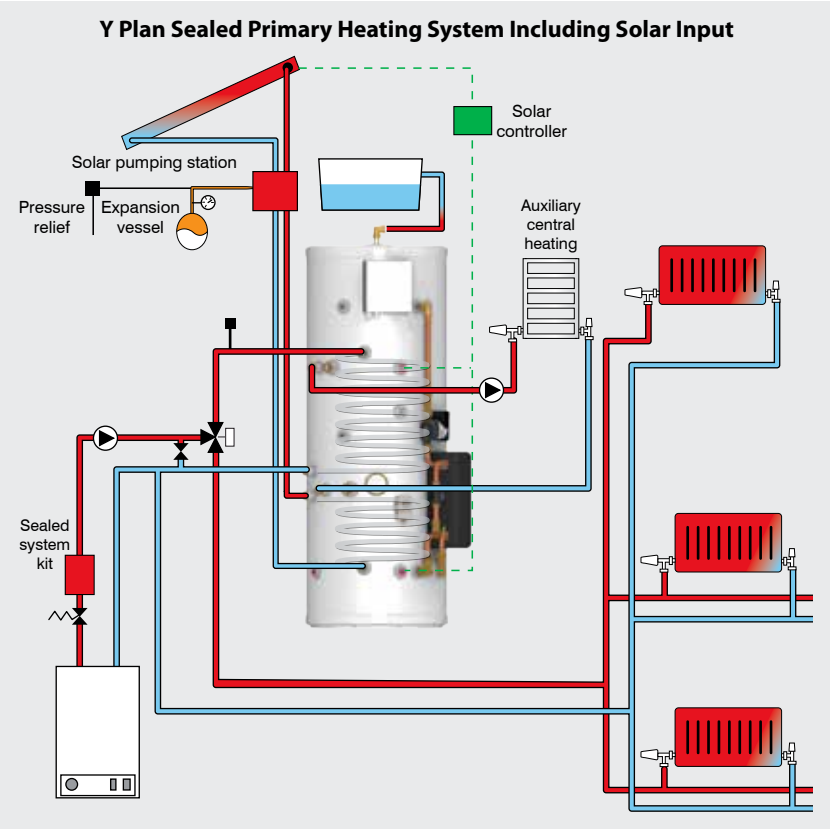
The diagram opposite shows the Torrent Stainless SOL type used in a traditional open vented heating system. The water level in the F&E tank should be at least 250mm above the highest point of the heating system e.g. a radiator.

In the open vented system shown opposite, the thermal store, radiator heating circuit and the auxilliary heating circuit are all fed from the same feed and expansion tank. Therefore it should be sized to accommodate the expansion of total water content of the complete system (i.e. water content of the store + water content of radiator heating circuit + water content of under-floor heating circuit).

The diagram opposite shows the sealed primary 'SP' variant of the Torrent Stainless SOL used in a typical sealed heating system. With this system arrangement, although the boiler and the radiator central heating circuits are sealed, both the store and the auxilliary heating circuit (if installed) are open vented. Therefore the feed and expansion tank should be sized to accommodate the expansion of total water content of the open vented system (i.e. water content of the store + water content of under-floor heating circuit).

The diagrams also show typical configurations of a solar thermal system with Torrent Stainless SOL, which will accumulate the energy from more than one renewable energy sources (e.g. solar, wood burning stove).

In the open vented system, this energy is available for hot water and at low level for both radiator and under-floor (if installed) space heating circuits. However in the sealed primary system configuration, this energy is only available for hot water and at low levels for the under-floor space heating circuit (if installed).



For maximising the use of the renewable 'green' energy, the system should be managed and controlled so that unnecessary firing of the boiler is kept to a minimum. This can be achieved by a combination of householder use of the system and controls, for example;

Use the store to provide shower or a bath to utilise the heat gained by the system from the previous day's solar energy input. Alternatively showering or bathing in the evening will utilise the energy that has been stored during the day from the solar system.

- As with any system, hot water and space heating should be programmed according to house holder requirements. However it is always good to remember that to gain maximum advantage from the solar panels, the store should be as cool as possible, prior to expected periods of high solar gain. To achieve this in spring, summer and autumn, the hot water channel of the boiler should be programmed to come on 30 minutes before the hot water is required in the morning and then programmed off before volumes of water are drawn off the system. This way the store is depleted of heat allowing maximum transfer from the solar system during the day.
- However further supplementary time periods for the boiler will be required in winter when not much solar energy is available.
- Uncontrolled boiler operation can also be reduced by fitting and wiring a pipe thermostat on the solar return pipe close to the Torrent Stainless SOL.

As part of setup and commissioning, it is important that this boiler hold-off pipe thermostat be adjusted to find the best setting for each individual installation. Failure to do so will give under performance of either the boiler or the solar heating system.

A solid fuel boiler can also be connected to the Torrent Stainless SOL, please refer to page 19 for further information.

Domestic overheat protection

To comply with building regulations the solar overheat thermostat should be set at a temperature which prevents the contents of the thermal store exceeding 100°C.

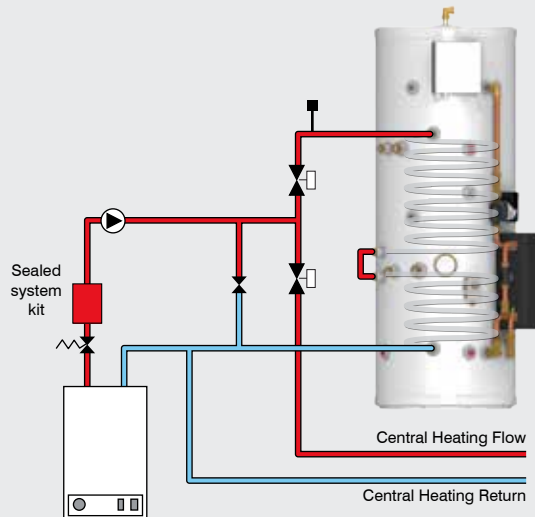
The DHW production board does not incorporate an overheat function, linked to the primary store temperature, which would prevent it from running when this exceeds 80°C. The DHW temperature and flow rate are measured accurately and virtually instantaneously by the HUBA flow sensor. The software algorithm is therefore enabled to react virtually instantaneously to raised DHW temperatures.

The PWM pump flow rate will be reducing as the DHW temperature rises above 60°C and fully stopped if the sensed DHW reaches 80°C. Thereby, the Torrent Stainless DHW production is limited to 80°C in normal operating conditions, and does not need an inline hot water tempering valve to limit the domestic hot water system to 60°C (see part G para 3.64). However, this does not remove the obligation on the installer to observe building regulations and water supply regulations recommendations.

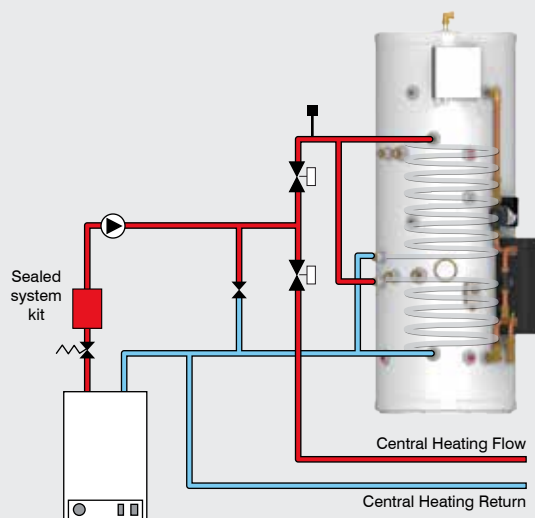
In any installation, the hot water supply to a bath should be limited to 48°C by the use of an inline blending valve (see part G para 3.65). In addition, the Water supply regulations 1999 (WRAS) recommends thermostatically controlled mixers should be used in all installations, particularly where children in schools or aged or disabled people are using showers in public buildings and are unsupervised. (see R18.5 section 8 page 9).

INSTALLATION

Coil Connection With Boiler Input Only (150 litre models)



Coil Connection With Boiler Input Only (180-350 litre models)



Torrent Stainless SP SOL boiler only

Where the Torrent Stainless SP SOL product is selected to be used purely with a sealed primary boiler, by combining the boiler and solar coils the volume of heated water will increase.

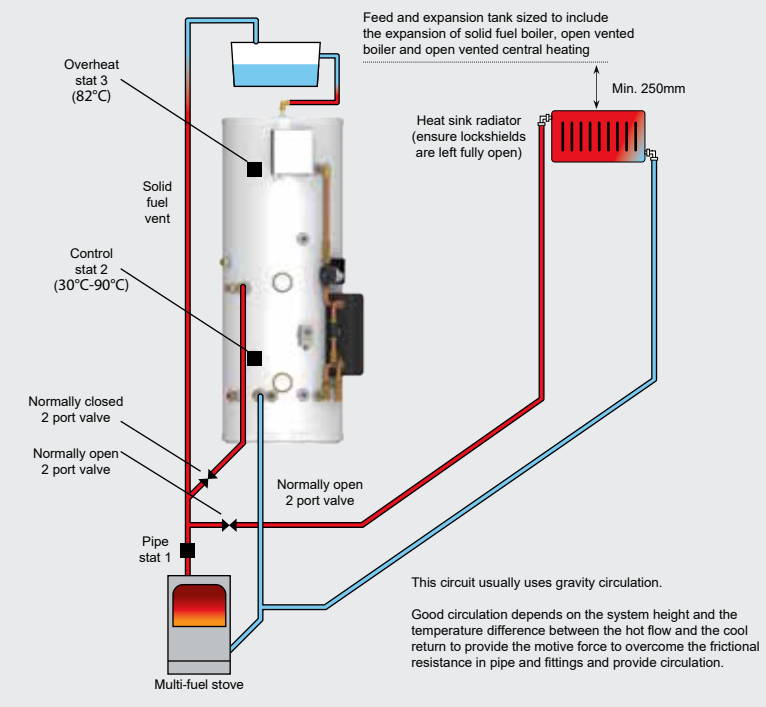
The diagrams opposite show the pipe configurations recommended to maximise the boilers input where the two coils are utilised.

The 150 litre model internal coils can be connected in series, with the SP boiler return connected to the solar flow.

We recommend the 180 to 350 litre models are connected in parallel to maximise the heat transfer into the cylinder.

INSTALLATION

Gravity Flow Solid Fuel Boiler Pipe Layout



When the boiler is lit, the water temperature raises. When the temperature is above pipe thermostat 1 set point, the contacts close signalling the normally closed valve to move open. Once it is fully open, it signals the normally open valve to motor there by closing it. The thermal store now receives heat from the solid fuel boiler via gravity circulation.

If control stat 2 set point is exceeded then the power to the normally closed valve is cut which in turn cuts the power to the normally open valve. Excess heat from the solid fuel boiler is then circulated around the heat sink radiator. Careful selection of the pipe and control thermostat set points should be made during commissioning to get the best performance from the system.

Setting control stat 2 at too high temperature will cause dripping at overheat stat 3. We recommend that there is a gap of at least 7°C between the two stats. Therefore 75°C is ideal.

If temperatures in store exceed 82°C the secondary protection will cut off the power (overheat stat 3) in accordance with Part G3 of Building regulations.

With regards to the domestic hot water overheating protection, please refer to page 17 in this installation manual.

Feed and Expansion Tank

A feed and expansion cistern supplying a system heated by wet solid fuel appliance should either be of metal construction (copper, stainless steel etc.) or manufactured of a material that has been certified as being suitable for temperatures up to 110°C. These are available to order from Gledhill at the time of purchase.

The capacity of the cistern should be at least one twentieth of the total system volume. The cistern should be fitted with a brass float operated valve that is manufactured to BS1212 Pt. 2 and is fitted with an appropriately sized copper float. The overflow pipe should be either made of metal or manufactured from a material that has been certified as being suitable for temperatures up to 110°C. The overflow pipe must have appropriate support – for plastics this may require continuous support.

Solid Fuel Option

All models of the Torrent Stainless shown in this installation manual have the tappings included as standard for a solid fuel boiler. In the absence of recommendations from HETAS or the solid fuel boiler manufacturer, we would advise the following pipe layout to achieve the best performance from your solid fuel system and our thermal store.

This diagram represents a good example of a gravity circulation pipe layout. Points to note are;

- All pipework rises towards the cylinder and the heat sink radiator and fall back towards the solid fuel burner.
- The heat source is below the cylinder which gives the layout a good system height.
- All gravity circulation pipework is recommended to be 28mm or above pipe diameter, at low flow speeds the pipe resistance is negligible in this pipe diameter.
- Avoid long horizontal runs and try to make the ratio horizontal:vertical to be a maximum of 20:80.

To ensure that the solid fuel boiler does not overheat the thermal store during its operation and prevent gravity circulation cooling the thermal store when it is not, the following controls can be used. Other methods of control can be used; HETAS and/or the solid fuel boiler manufacturers instructions should be consulted. This control system is fed from a dedicated fuse spur to enable safe isolation for changing components. All wiring should comply with BS7671 Requirements for Electrical Installations latest edition.

Typical components (not supplied but available to purchase from Gledhill Spares Ltd);

- Honeywell V4043B1265 (XB165) - 28mm compression normally open 2 port valve
- Honeywell V4043H1106 (XC012) - 28mm compression normally closed 2 port valve
- Honeywell L641B1012 (XC016) - Pipe thermostat
- (XC010) - Control thermostat 2
- (XC011) - Overheat thermostat 3

INSTALLATION

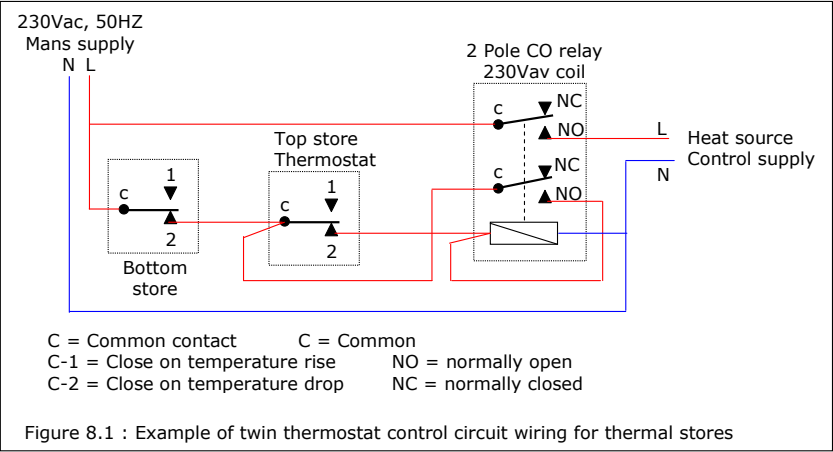
Primary Heat Source Control Sensor / Thermostat Pockets

In all thermal stores heated by a primary heat source e.g. a boiler (with the exception of direct thermal stores heated by immersion heaters with integral control and overheat thermostats), the thermostat and sensor pockets for controlling the system are designed and located to sense the bulk water temperature.

The Torrent Stainless thermal stores have been fitted with four store thermostat/sensor pockets, with their position complying with the HWA Performance Specification for Thermal Stores 2010 (section 6.4).

- When two control thermostats / sensors (S1 and S2) are fitted their operating control logic should be as follows: -
- (a) The primary heat source should be switched 'ON' when both sensors (thermostats), S1 and S2 are calling for heat.
 - (b) The primary heat source should only be switched 'OFF' when both sensors (thermostats), S1 and S2 stop calling for heat.

Note: A typical wiring arrangement for 2 thermostats is shown in figure 8.1.

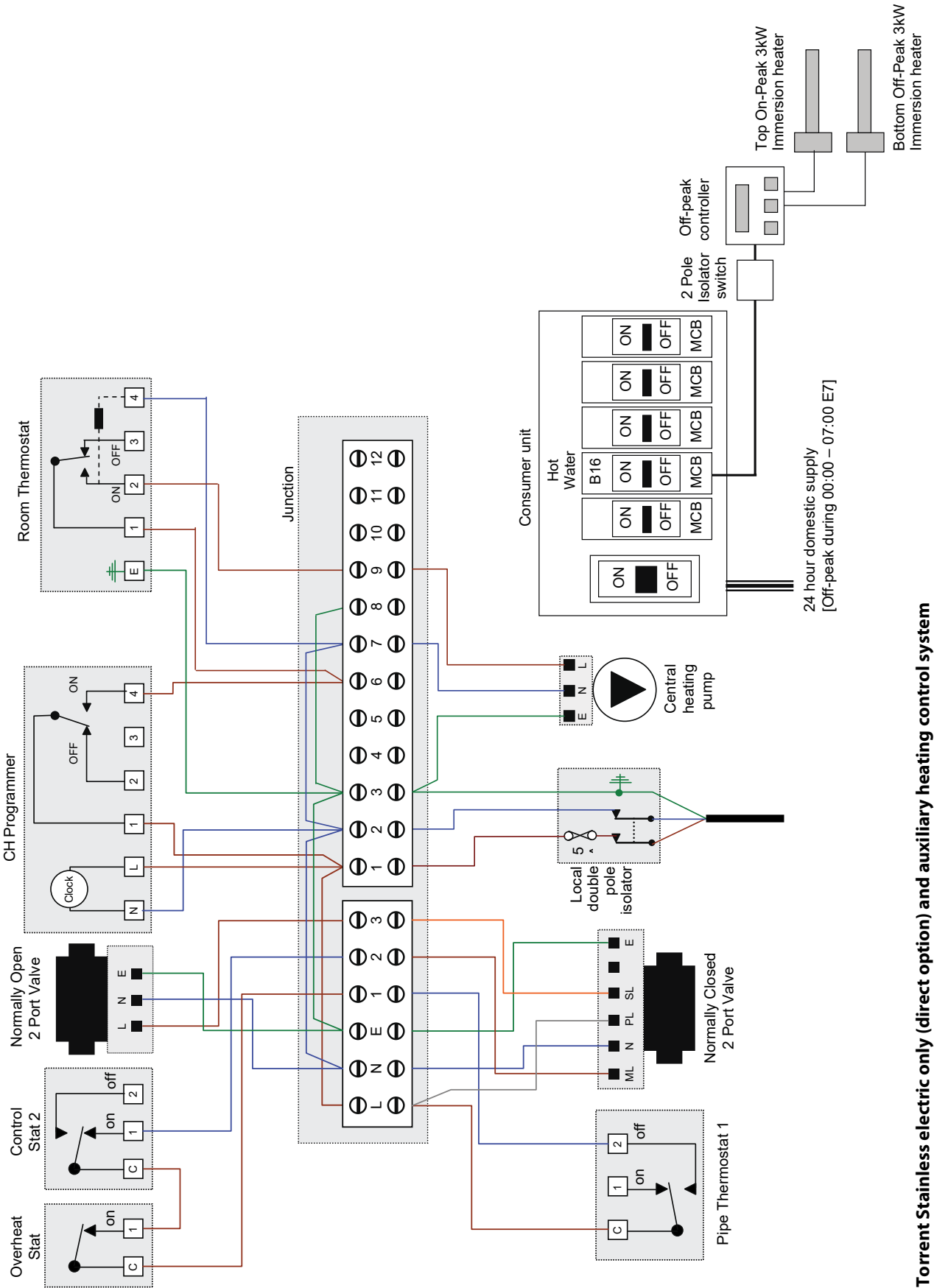
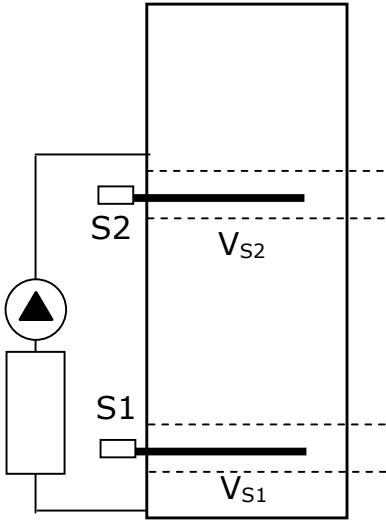


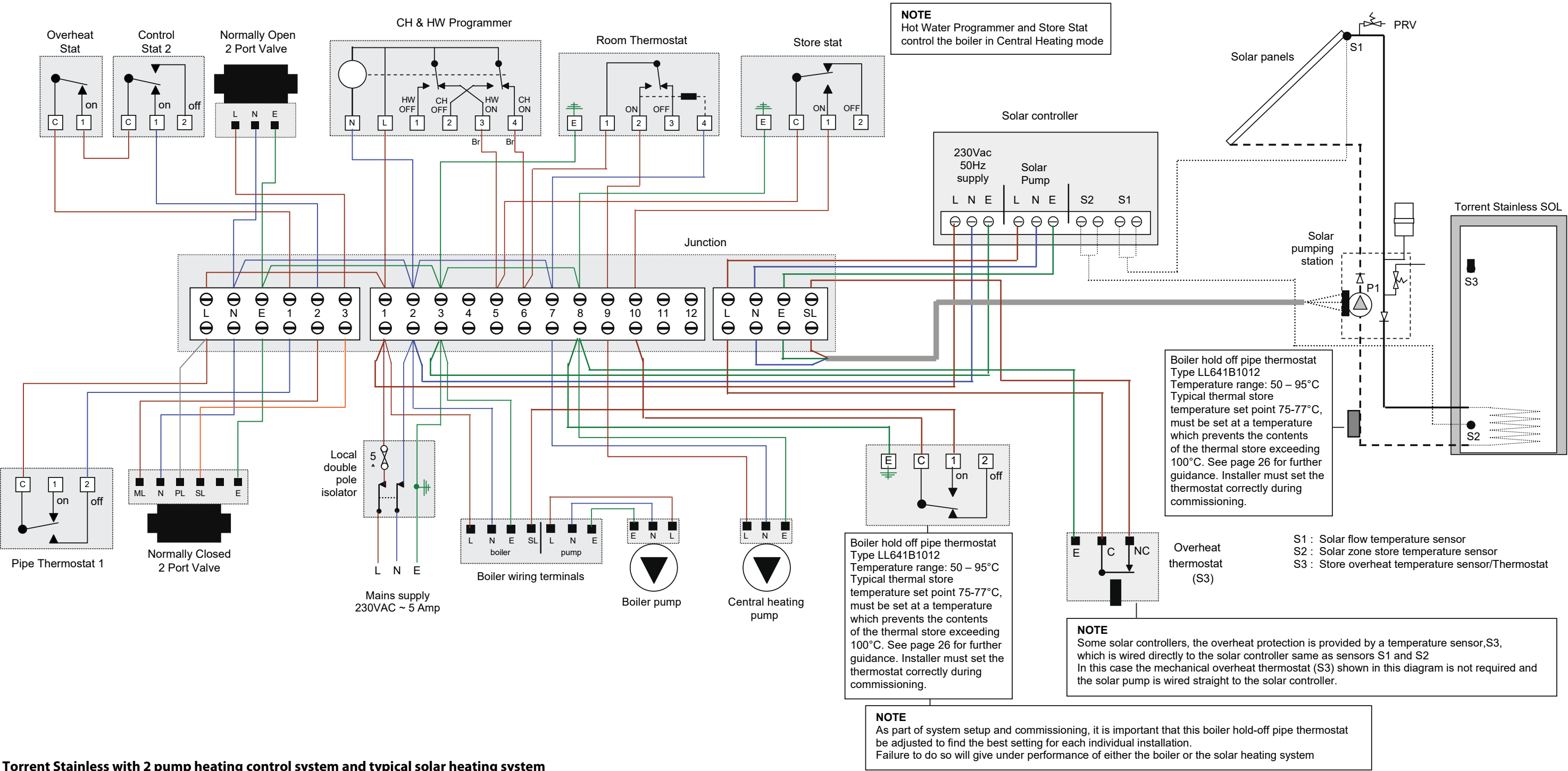
Store Thermostat(s) For Controlling Primary Heat Source

The specified store thermostat setting for controlling the primary heat source should prevent unnecessary cycling of the heat source (e.g. the boiler) on its internal thermostat for efficient operation.

All types of thermal stores must be supplied with one or more thermostats or electronic controls with an adjustable range of up to 90°C and span not greater than 70°C. The switching differential of the thermostat should be 6°C±1°C.

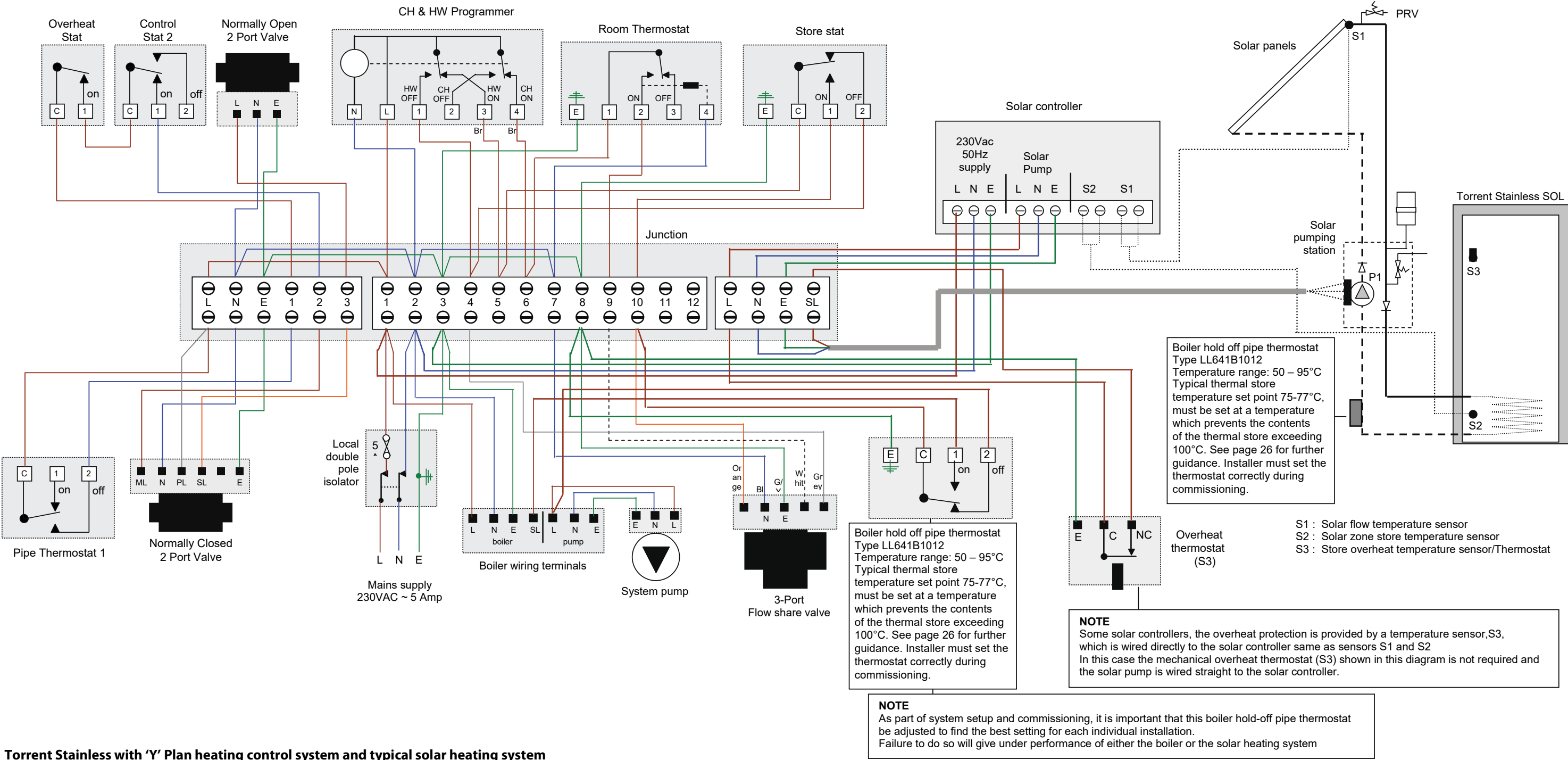
A strap on surface cylinder thermostat is not considered suitable for this application.





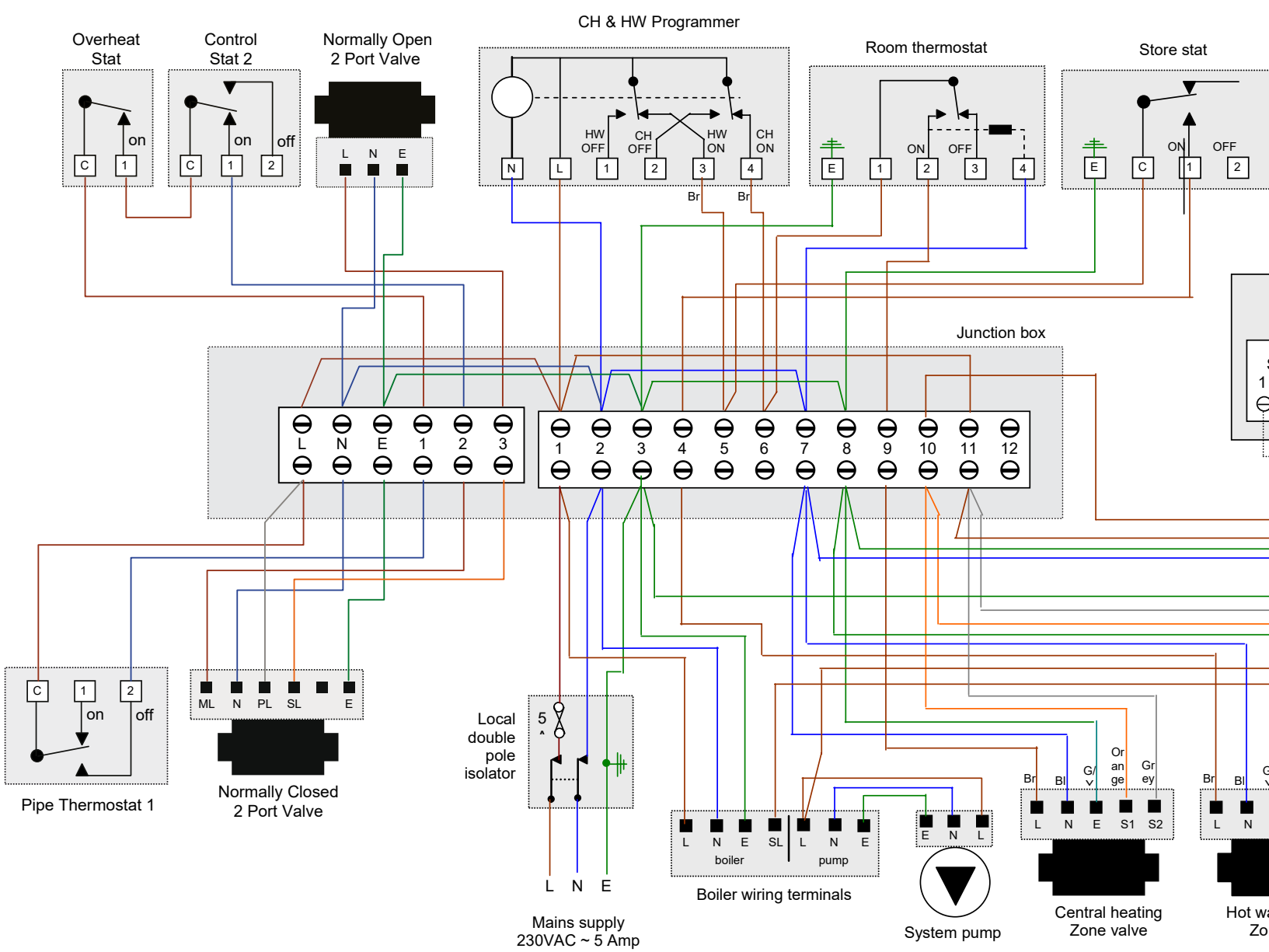
Torrent Stainless with 2 pump heating control system and typical solar heating system

INSTALLATION



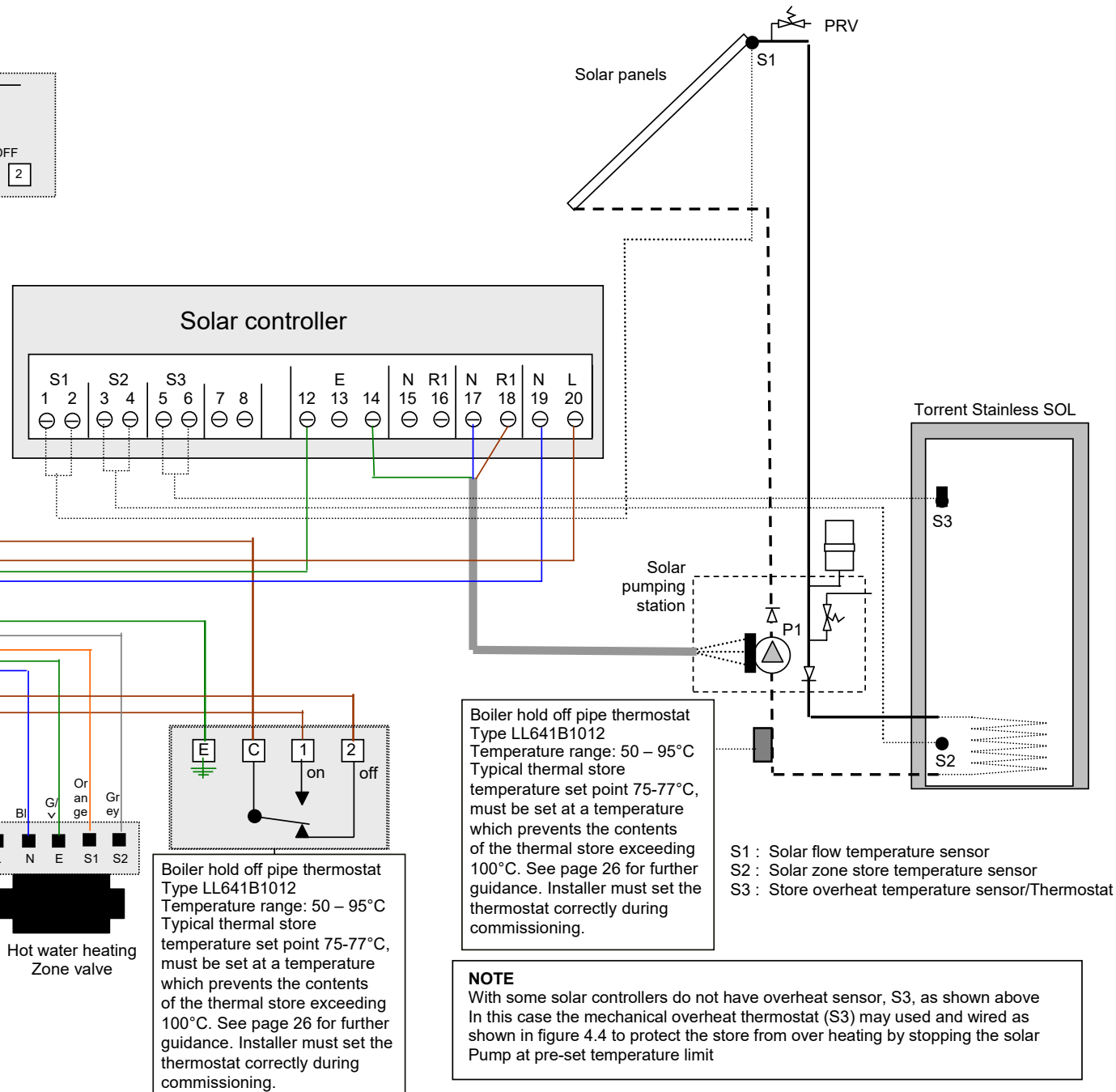
INSTALLATION

INSTALLATION



Torrent Stainless with 'S' Plan heating system with typical solar heating system

INSTALLATION



Boiler hold off pipe thermostat
Type LL641B1012
Temperature range: 50 – 95°C
Typical thermal store
temperature set point 75-77°C,
must be set at a temperature
which prevents the contents
of the thermal store exceeding
100°C. See page 26 for further
guidance. Installer must set the
thermostat correctly during
commissioning.

NOTE
With some solar controllers do not have overhear sensor, S3, as shown above
In this case the mechanical overhear thermostat (S3) may used and wired as
shown in figure 4.4 to protect the store from over heating by stopping the solar
Pump at pre-set temperature limit

NOTE
As part of system setup and commissioning, it is important that this boiler hold-off pipe thermostat
be adjusted to find the best setting for each individual installation.
Failure to do so will give under performance of either the boiler or the solar heating system

INSTALLATION

Torrent Stainless OV Models (heated by electricity only)

Ensure that the thermal store is filled with water to the water level mark inside the feed and expansion tank and the ball valve (if fitted) is adjusted correctly.

If a ball valve is fitted turn down the service valve once the system is finally filled to the point where the warning/overflow pipe will cope with the discharge arising from a ball valve failure.

Switch the immersion heater on and allow the store to heat up to full temperature. The Torrent Stainless will produce at least its actual volume as DHW above 40°C when its entire contents are at between 75°C and 80°C. The tolerances of immersion heater thermostats is quite large so care must be taken to ensure that the correct temperature is achieved during commissioning to ensure that the desired performance is achieved. This means that the control thermostat may need to be set at 73°C on some cylinders, due to the temperature gradient through the store. The actual set point must set up and checked during commissioning by the installer. The rod thermostats (XB081) used in these immersion heater incorporate an overheat component which will operate at circa 85°C.

Instruct the occupant on how to use the off-peak timer (if fitted) and the appliance.

At the time of commissioning, complete all relevant sections of the Benchmark Checklist located on the inside back pages of this document.

Electrician/Installer: Please note that water at the hot tap does not indicate that the Torrent Stainless is full. Check that there is water in the feed and expansion tank before switching on the immersion heaters. Dry firing the elements will cause premature failure which is not covered by our warranty.

Non-Electric Torrent Stainless Models

Open the incoming stop valve and fill the domestic hot water system. For open vented heating system, fill the whole of the primary heating system and the thermal store with potable water through the feed and expansion tank. For sealed heating system fill the thermal store with potable water through the feed and expansion tank and the heating system to the design pressure using the filling loop.

Check the water level in the feed and expansion tank and adjust the ball valve if necessary. Check the whole of the primary heating and domestic hot and cold distribution system, including the Torrent Stainless for leaks.

It is essential that all systems function properly for optimum performance and to achieve this:-

- The primary system should be commissioned in accordance with good practice and generally in accordance with the requirements of BS 6798, BS EN 12831, the CIBSE guide and BS 7593. Full details of the requirements are given in PAS 33:1999 under section 10 Commissioning.
- The boiler manufacturers instructions should be followed during the commissioning phase.
- If a solar thermal system is fitted it should be commissioned as per manufacturers instructions to ensure compliance with Building regulations.
- When using either cleansing or corrosion inhibitor chemical, the manufacturers instructions must be followed.

When determining the quantities of cleanser required, the volume of the Torrent Stainless should be added to the water content of the primary system. Although the Torrent Stainless has no special water treatment requirements, the radiators and other

parts of the circuit will require the application of a scale and corrosion inhibitor.

If it is proposed to ‘powerflush’ the heating system we would recommend that the Torrent Stainless is isolated from the heating system being cleaned, as debris from the system could be washed into the Torrent Stainless and could impair its performance or seriously damage the unit. If in doubt please contact our Technical Helpline on 01253 474584.

- Fill the system and flush cold and then refill and vent the system.
- Add cleanser such as Fernox to ensure that flux residues and the installation debris are removed from the system (check with manufacturer for compatability with stainless steel).
- Ensure that the store thermostat is set correctly and the boiler thermostat is set at its maximum.
- Switch on the system and to ensure full cleansing, circulation to all parts of the system should continue for a minimum of 1 hour.
- Flush the system hot having checked that there is no overflow or leaks when the system is up to temperature.
- Refill and vent the system and add appropriate amount of scale inhibitor, such as Fernox (check with manufacturer for compatability with stainless steel).

Set the boiler temperature to maximum and with the central heating off, let the system (i.e. store) heat up (Approximately 1 – 2 hours). When the store is up to temperature: -

- Check that the space heating system controls (e.g. programmer, room thermostat) are functioning correctly.

Switch off space heating system and ensure that the store thermostat is set correctly and the boiler thermostat is set to maximum.

Re-fire the boiler by running a little water and wait for the boiler to switch off. Check that there is no live supply from the store thermostat i.e. it is satisfied.

INSTALLATION

- DO -** Check the incoming mains water pressure. If it exceeds 5.0 bar at any point in the 24 hour cycle then a pressure limiting valve set at 3.0 bar should be fitted where the cold supply enters the property.
- DO -** Check the flow rate of the incoming cold water main is adequate to meet the maximum hot and cold water simultaneous demands.
- DO -** Check that all connections are in accordance with the schematics on pages 6 and 7.
- DO -** Fill the tank manually or adjust the ballvalve so that the water in the F & E tank is set to the correct level.
- DO -** Restrict the ballvalve fill rate when full so that the overflow pipe can cope with the fill rate in the event of a ballvalve failure.
- DO -** Make sure there is adequate clearance above the F & E tank to service the valve.
- DO -** Ensure that range-rated appliances are set **to the specified design heat input and the boiler thermostat is set to maximum for all boilers.**
- DO -** Ensure that the water level in the expansion tank is at least 250mm above the highest point on the radiator circuit and satisfies the boiler head required.
- DO -** Insulate any exposed pipework in the Torrent cupboard.
- DO -** Plumb the overflow warning pipe in 20mm minimum internal diameter tubing to discharge in a conspicuous external position, using high temperature uPVC or copper.
- DO -** Leave the electricity switched on to the appliance once it has been filled and commissioned to prevent the pump sticking.
- DON'T -** Use a combined feed and vent on Torrent indirect installations.
- DON'T -** Use tube smaller than 28mm between boiler and Torrent when the boiler exceeds 60,000 Btu (17kW) output.
- DON'T -** Use dipped flow and return pipes between boiler and Torrent unless the boiler is fitted with an overheat switch, then follow the recommendations on pages 13/15/16.
- DON'T -** place any clothing or other combustible materials against or on top of this appliance.

INSTALLATION

Circulating fluid in thermal store pipework

- The Torrent Stainless and the thermal store pipework must have completed filling prior to switching the electricity supply to the PWM controller PCB. If there is no water in these pipes then there may be significant wear on the PWM pump.
- This can be confirmed by
 - Checking the thermal store pipework servicing valves are open
 - Loosening the connection points on the thermal store pipework in a systematic manner and checking for water presence.
 - Confirming that the feed and expansion tank has completed filling and the servicing valve is open.

Cold mains water supply to plate heat exchanger and hot water taps

- Confirm that the CW mains stop valve is open
- Open all HW taps and confirm that the water runs freely and that any air is bled from the DHW system
- Determine the maximum flow rate obtained and record
- Limited to 26.5l/min for all products
- If flow rate not as expected determine the cause and rectify
 - clean inline strainer
 - check the flow restrictor is present and not blocked. It is located in the top of the inline strainer

Power on

- Switch on the Local fuse spur and observe the PWM pump
- Open a HW tap and observe the PWM pump
- The green LED will be constantly lit showing the pump has a power supply and is running to generate HW

NOTE: -The thermal store will only produce hot water when it is hot enough. A mid 40°C thermal store temperature will provide very little hot water, higher thermal store temperatures will provide more, 75°C is recommended.

Inline scale inhibitor (if fitted)

- Check power supply
- PWM Controller PCB supplies a maximum of 12vDC/300mA to the Scale inhibition board. (From J3)
- Check dip switches set correctly
- The correct settings for tube diameter 22mm is switch no. 3 on.
- Switch no. 4 can be either on or off.
- If the switch no. 4 is turned on the output electromagnetic field is generated harmoniously otherwise the field is generated inharmoniously.

SERVICING AND MAINTENANCE

Annual Servicing

No annual servicing of the Torrent Stainless is necessary.

However, if required, a hot water performance test can be carried out to prove the appliance is working satisfactorily and within its specification.

We recommend electrical inspections are carried out regularly. Please seek advice from a qualified electrician.

If it is decided to carry out the above test, the water level in the top cistern should also be checked and if necessary topped up.

Changing Components

Failed components should be returned during the in-warranty period on return of the faulty part (normally 12 months) via the local authorised supplier. A nominal charge of £30 will be made which is refunded in full by Gledhill on receipt of the original part and proof of purchase.

After this, spares can be obtained direct from Gledhill Spares, or through any of the larger plumbers merchants/specialist heating spares suppliers.

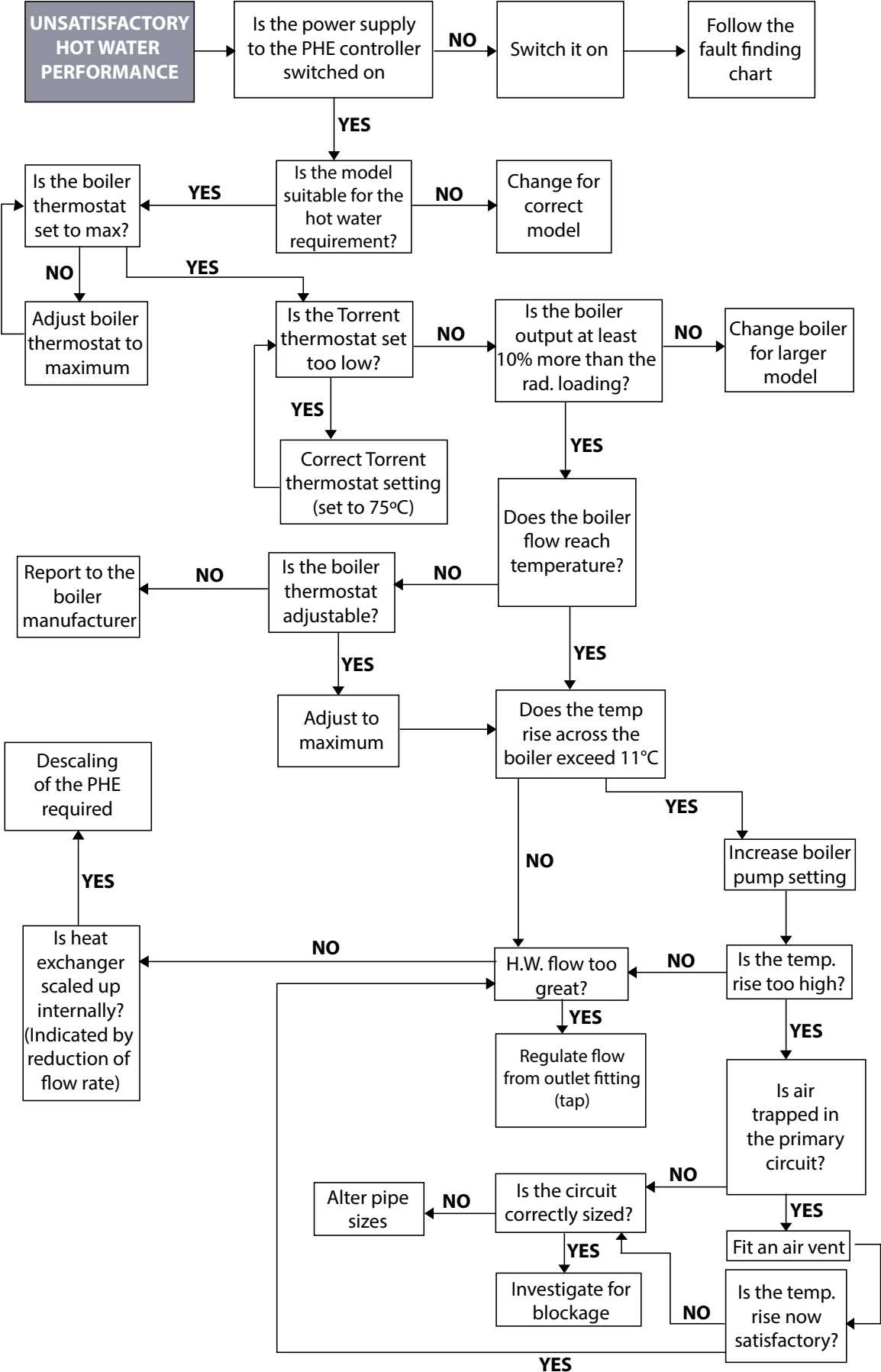
Help and advice is also available from the Technical Helpline on 01253 474584.

However, all components are readily accessible and can be changed quickly and easily by the installer using common plumbing/electrical practice.

Note: All maintenance work on the Torrent Stainless must be carried out by a competent trades person.

After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist located on the inside back pages of this document.

SERVICING AND MAINTENANCE



SERVICING AND MAINTENANCE

Test Equipment

The initial assumption in this procedure is that the plumbing and water supply is working effectively. If in doubt please confirm and refer to the end of this section for advice on specific components.

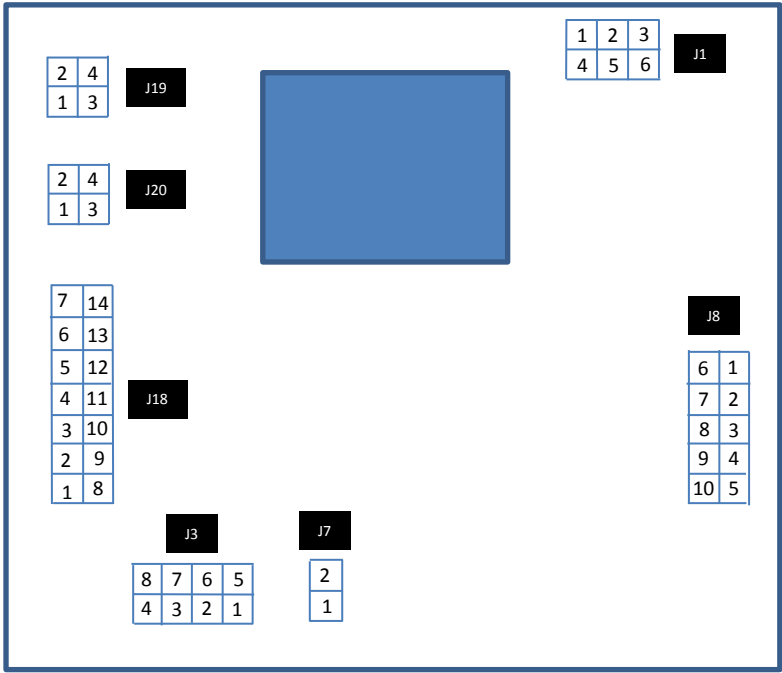
A multi meter, a weir gauge and a thermometer will be required to confirm that all the components are working effectively.

The PWM controller PCB manufacturer suggests "Fluke 87 TRUE RMS Multi meter" as a suitable product. This will be able to measure;

- the frequency output from the Board to the pump
- the Duty cycle % output from the Board to the pump

Connection numbering

For reference the connections to the PCB are numbered below for



Logical sequence;

- check electrical connections fault finding section on page 34 first to ensure your own safety. This section will potentially identify any short circuited components and/or wiring faults that need to be rectified before continuing to work on the appliance.
- check that the correct information is being supplied to the board. This section will identify if any sensors are faulty or out of tolerance. These will need to be replaced before continuing
- check that the overheat link is present (J7 see page 37)
- check that the outputs to the board are being generated. If at this stage the board does not provide the correct outputs then potentially the board should be replaced
- check the pump electrical circuit

SERVICING AND MAINTENANCE

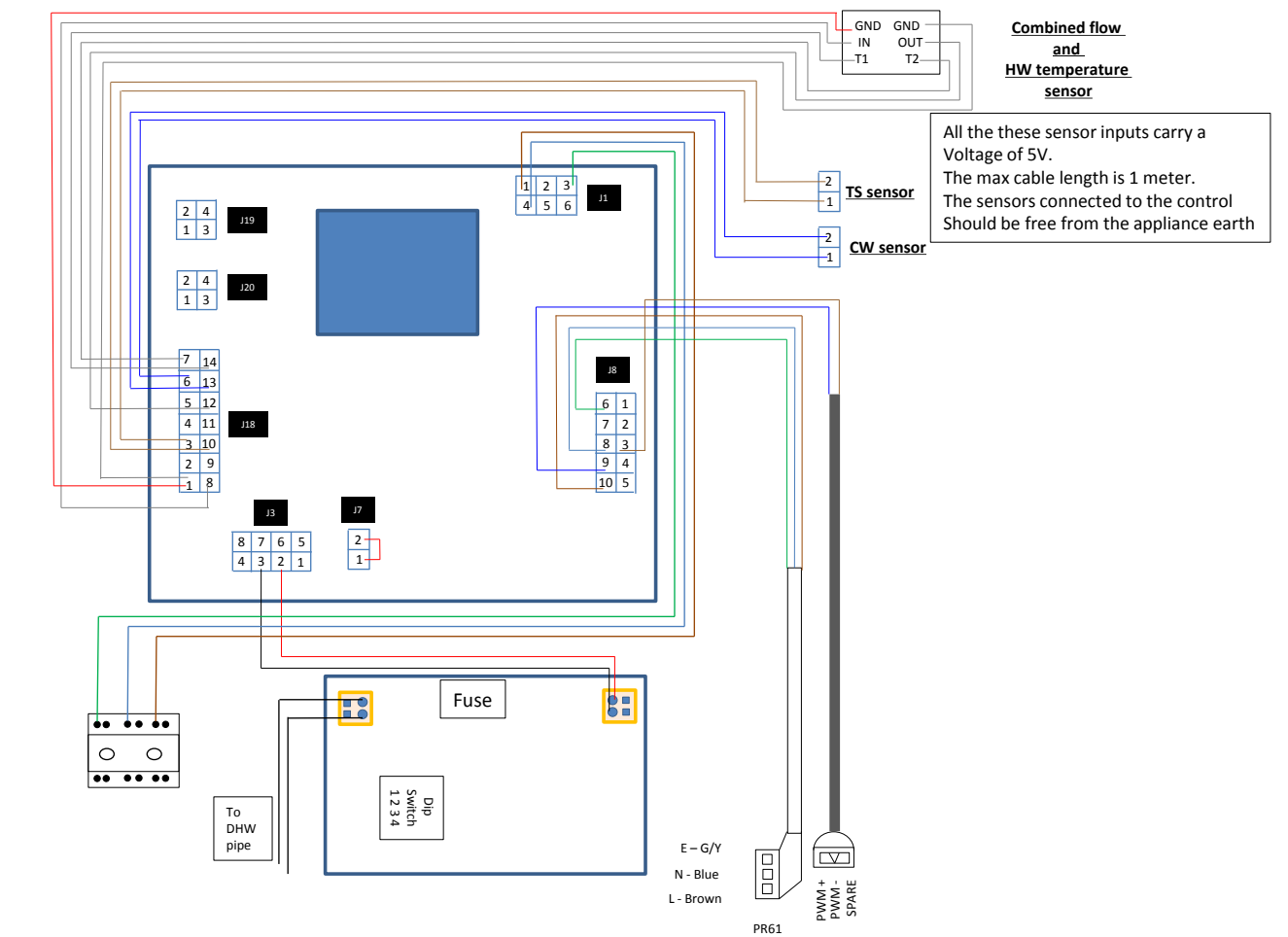
Electrical power connections

Reference schematic opposite	Check procedure
Power supply to PWM Controller PCB	Electrically isolate power supply at fused spur switch and remove fuse.
	Earth continuity test (dead test) – to ensure that the appliance is earthed
	Mains voltage test (dead test) – to ensure that the appliance is isolated
	Resistance to earth (dead test) – to ensure that the wiring insulation to the product is intact
	Short circuit test (dead test) – to ensure that no components in the products circuit have a short circuit
	Visually inspect wiring is correct as per fig 4.3
	Connect supply
	Polarity test (live test) - to ensure that the live is connector to the live etc
	• Check 230V ac across L1 to Earth
	• Check 230V ac across L1 to N
	• Check for 0 to 15V ac N to earth
	Reference to “Boilerfault finder.com” gives clear instructions to on how to perform these tests. (Menu options 1st. Boiler Fault finder 2nd. Electrical safety checks).

Check inputs to the PWM Controller PCB

Reference schematic opposite	Check procedure
CW temperature sensor	Power off
	Disconnect J18
	Measure and record the resistance across terminals 6 and 13
	Measure the cold water inlet temperature
	Compare the resistance measured with chart “Tasseron NTC 12k thermistor”
	The reading should make sense taking measurement conditions into consideration
TS temperature sensor	Power off
	Disconnect J18
	Measure and record the resistance across terminals 3 and 10
	Measure the thermal store temperature
	Compare the resistance measured with chart “Tasseron NTC 12k thermistor”
	The reading should make sense taking measurement conditions into consideration
HW temperature sensor	Power off
	Disconnect J18
	Measure and record the resistance across terminals 7 and 14
	Measure the Hot water temperature
	Compare the resistance measured with chart “HUBA combined flow sensor and NTC 10k thermistor”
	The reading should make sense taking measurement conditions into consideration
Flow sensor	Power off
	Disconnect J18
	Power on Sensor required a power supply 5 VDC
	Open a HW tap and set to a flow rate.
	Measure and record the frequency across terminals 1 and 12
	Compare the frequency measured with chart “flow rate determination”
	The reading should make sense taking measurement conditions into consideration

SERVICING AND MAINTENANCE



Tasseron NTC 12k thermistor			Huba combined flow sensor and NTC 10k thermistor			Flow volume determination		
Resistance	Temperature	±°C	Resistance	Temperature	±°C	(Full range 1.8 to 32.0 l/min, restricted to 26.5 l/min)		
Ohm	°C		Ohm	°C		HZ	L/min	HZ
309396	-40	1.7	334275	-36	0.9	25	1.9	125
171840	-30	1.7	47369	-6	0.1	30	2.3	130
98932	-20	1.6	26023	5	0.1	130	10.8	230
58879	-10	1.5	11000	23	0.6	230	11.2	235
36129	0	1.4	10500	24	0.6	235	11.6	240
22804	10	1.4	10000	25	0.6	240	12.1	245
14773	20	1.3	9500	26	0.7	245	12.5	250
12000	25	1.2	9000	27	0.7	250	12.9	255
9804	30	1.2	8500	29	1.4	255	13.3	260
6652	40	1.1	8000	30	1.5	260	13.7	265
4607	50	1	7500	31	1.6	265	14.2	270
3252	60	0.9	7000	33	1.7	270	14.6	275
2337	70	1.1	6500	35	1.7	275	15.0	280
1707	80	1.3	6000	37	1.8	280	15.4	285
1266	90	1.5	5500	39	1.9	285	15.9	290
952	100	1.8	5000	41	2.1	290	16.3	295
			4500	44	2.2	295	16.7	300
			4000	47	2.3	300	17.1	305
			3500	50	2.5	305	17.5	310
			3000	54	2.7	310	18.0	315
			2500	59	2.9	315	18.4	320
			2000	65	3.3	320		
			1500	73	3.7			
			1000	86	4.3			
R-nominal	12Kohm @25°C		R-nominal	12Kohm @25°C				
B-value	B3740K		B-value	B4050K				
R-Tolerance	3%@60°C		R-Tolerance	under 25°C±0.025*°T °C over 25°C±0.05*°T °C				
Tmin	-40°C		Tmin	-40°C				
Tmax	150°C		Tmax	125°C				

SERVICING AND MAINTENANCE

Check for presence of overheat link

An overheat link connection should be present in connection Junction 7. If you are fitting a new board the overheat link that is on the board just removed must be retained as the newly supplied board will not have one fitted.

Check outputs from the PWM controller PCB to the pump

PWM pump power	Check 230V ac across Junction 8, L(10) to E(6) and L(10) to N(8) (live test)
	Check for 0-15V ac across Junction 8, N(8) to E(6) (live test)
PWM frequency	Power on the unit
	Set the multi meter to measure the frequency
	Measure the PWM frequency produced by the board between pins 3 on J8 and pin 9 on J8
	This can be between 100Hz – 5000 Hz (1000Hz nominal) (Lab tested figure of 562Hz recorded in steady state conditions).
Duty cycle	Switch your Multimeter to 'duty cycle or %' then it will show a percentage from 0 to 100%.
	This percentage is the command for the pump how fast it should run.
	When you perform a small DHW tapping, the percentage will be low
	When you perform a large DHW tapping, the percentage will be higher
	PWM input signal [%] indications <ul style="list-style-type: none">• 0-7 Pump stops (Standby)• 7-15 Pump runs at minimum speed (operation)• 12-15 Pump runs at minimum speed (start-up)• 15-95 Pump speed increases linearly from minimum to maximum• > 95 Pump runs at maximum speed

SERVICING AND MAINTENANCE

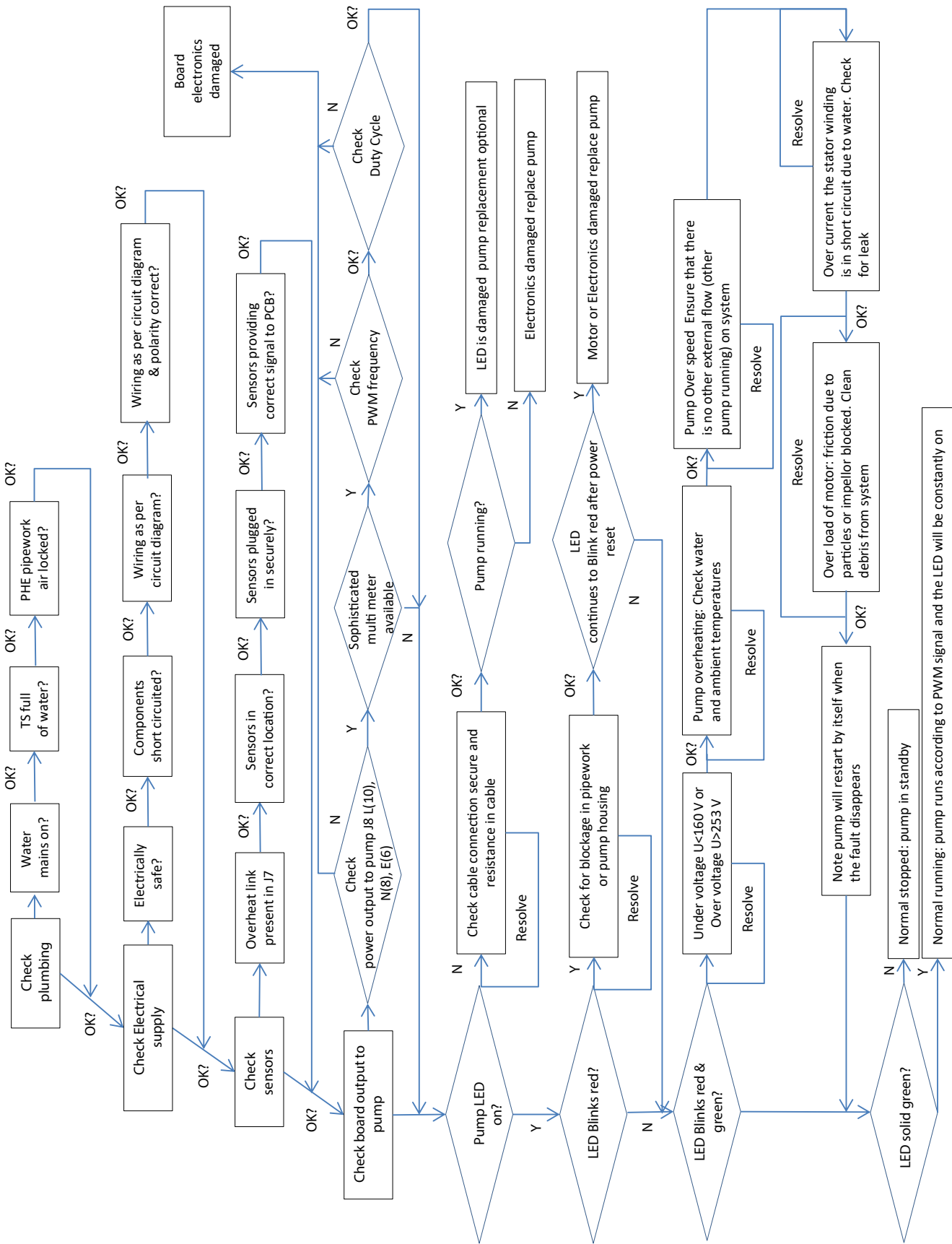
Check pump electrical circuits

LED	Meaning	Diagnosis	Cause	Remedy
Lights solid green	Normal running	Pump runs according PWM input	Normal operation	n/a
Blinks red/ green	Abnormal running mode -pump stopped but still functional	The pump has stopped due to external failure Pump restarts by itself after the fault has disappeared	Under voltage U<160 V or Over voltage U>253 V	Check voltage supply 195 V <U< 253 V
			Pump overheating: temperature inside motor too high	Check water and ambient temperature
			Over speed: the pump rotor is driven by an external flow above the maximum allowed value	Ensure that there is no other external flow (other pump running) on system
			Over current: the stator winding is in short circuit due to water	Check for leakage application on application
			Overload of motor: friction due to particles and/or impeller blocked with debris	Check installation water quality, clean system if debris
Blinks red	Pump out of function	Pump stopped (blocked)	Blockage: the pumps is fully blocked due to debris in system	Check for blockage. Turn ON/OFF to reset the pump by unplugging the power supply
			Faulty electronic module and/or faulty motor	If the pumps still blinking red after a power reset then replace the pump
LED off (Normal / standby)	No power supply / No demand to run	No voltage on electronics (Turn on h/w tap, tap running)	Pump is not connected to power supply	Check PWM cable connection
			LED is damaged	Check if pump is running
			Electronics are damaged	Replace pump

Check plumbing components

CW In line filter	Isolate the CW mains supply at the servicing valve
	Open HW taps to relieve the pressure
	Undo securing nut ensuring that any remaining water is collected
	Remove filter and clean it
	The flow regulator can be checked at the same time by removing the upper pipe section.
Thermal store return check valve + return servicing valve	Isolate both servicing valves
	Drain water from the section between the servicing valves
	Remove the bottom pipe section
	Check for free movement of the check valve incorporated in the body. Remove and replace if the check valve sticks.

SERVICING AND MAINTENANCE

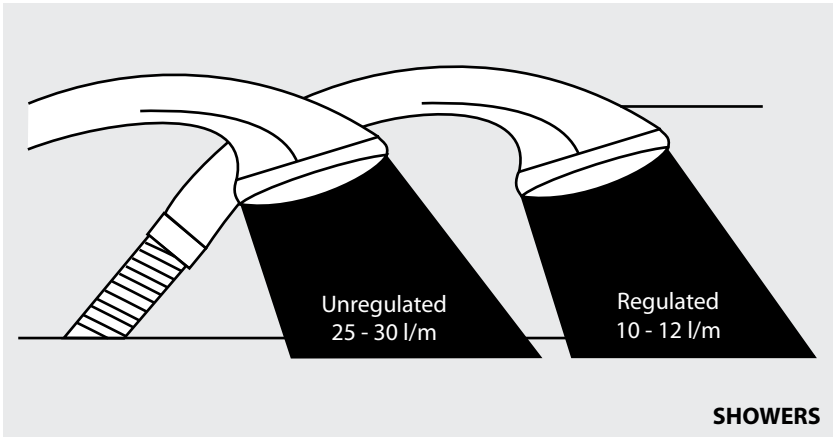
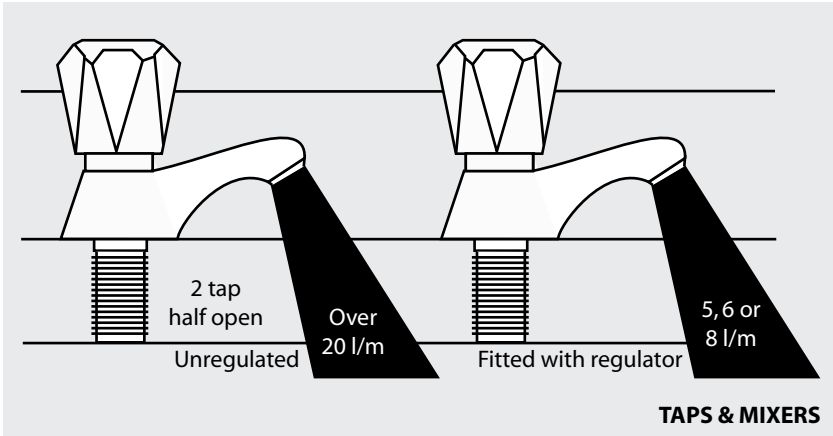


SERVICING AND MAINTENANCE

	Description	Stock Code
1	PHE pump - PWM	XB065
2	Plate heat exchanger - 24 plate (All non heat pump models)	GT017
3	Plate heat exchanger - 30 plate (Heat pump models only)	GT027
4	Pump isolating valve - outlet 1"	GT133
5	14" Immersion heater - with stat	SH003
6	Main PCB controller - 1472H	XB111
7	Middle sensor	GT198
8	DHW inlet & outlet sensors	GT198
9	Ballvalve 1212 Part 2	FT206
10	Ballvalve float	FT429
11	Resetable overheat immersion stat	XB081
12	Plastic feed and expansion tank	XB343
13	22mm Blank	FT311
14	28mm Blank	FT466
15	Self resetting thermostat (store/control)	XC010
16	90 degree isolating elbow (150 litre only)	GT135A
17	Manual reset overheat thermostat	XC011
18	Copper F&E for solid fuel (Bespoke manufacture, contact local Gledhill depot)	n/a
19	Scale inhibitor	XB153
20	Flow sensor	XB095
21	90 degree isolation valve (all except 150 litre)	GT135

Water Savings

Water Related Costs Can Be Reduced By Good Plumbing Practice



Vast quantities of water are needlessly run off to waste due to Taps, Mixers and Showers discharging flow rates far in excess of the rates required for them to perform their duties.

The contrasting flow rates shown on this leaflet clearly illustrate the savings that can be made whilst still providing a good performance.

British made Aquaflow Regulators provide constant flow rates by automatically compensating for supply pressure changes between 1 bar & 10 bars.

To facilitate installation into the wide range of plumbing equipment which is encountered in the U.K, Four Fixing Options are available:-

Options For Showers

1. MXF “DW” Range - For fitting behind Fixed Shower Heads or onto Flexible Hoses for Handshowers (preferably onto the inlet end when lightweight hoses are used).
2. Compression Fitting Range. “In Line” regulators as in Option 4 for Taps & Mixers.

Information by courtesy of
AQUAFLOW REGULATORS LTD
Haywood House, 40 New Road, Stourbridge, West Midlands DY8 1PA
TELEPHONE (01384) 442611 FAX: (01384) 442612

MANUAL HANDLING OF APPLIANCE PRODUCTS

Description

Manual handling means any transporting or supporting of a load (including lifting, putting down, pushing, pulling, carrying or moving) by hand or bodily force.

Scope

This assessment will cover the largest unit within each product range.

For specific weights and dimensions please refer to technical data section.

Main Hazards

Vision may not be clear due to the size of the products.
Adopting an incorrect method of lifting may cause injury, attempting to lift these products will require help from others. (Team lifts)

Control Measures

Manual lifting procedure

The lift, key factors in safe lifting are:

- a. **Balance**
 - b. **Position of back**
 - c. **Positioning of the arms and body**
 - d. **The hold**
 - e. **Taking the lead for team lifts**
- a. **Balance** - Since balance depends essentially upon the position of the feet, they should be apart about hip breadth with one foot advanced giving full balance sideways and forward without tension. In taking up this position, lifting is done by bending at the knees instead of the hips and the muscles that are brought into use are those of the thigh and not the back.
 - b. **Position of back** - Straight - not necessary vertical. The spine must be kept rigid, this coupled with a bent knee position, allows the centre line of gravity of the body to be over the weight so reducing strain.
 - c. **Positioning of arms and body** - The further arms are away from the side, the greater the strain on the shoulders, chest and back. Keep elbows close to the body arms should be straight.
 - d. **The hold** - Before lifting ensure you have a good hold.

- e. **Taking the lead for team lifts**- As more than one person is required for these products ensure that one person is taking the lead. **This may be you** so ensure that each person that is helping is made aware of the weight and of the items listed within this assessment. Make sure you and any others helping know the route you intend to take that it is clear of any obstructions. Never jerk the load as this will add a little extra force and can cause severe strain to the arms, back and shoulders. If there are steps involved decide on where you will stop and take a rest period. Move smoothly and in unison taking care to look and listen to others helping with the lift. Where possible use a sack truck to move the product over long flat distances, only lift the products when necessary. If in doubt stop and get more help.

Individual capability

Individual capability plays an important part in handling these products. Persons above average build and strength will find it easier and should be in good health. Persons below average build and strength may require more rest periods during the handling process.

Pregnant women should not carry out this operation.

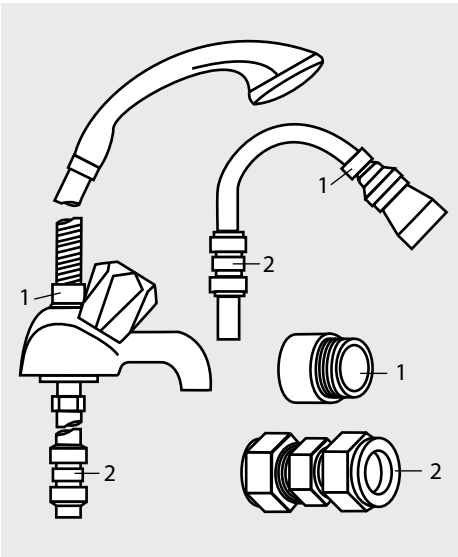
Persons who are not in good health should seek medical advice prior to commencing any lifting or manual handling operation.

Residual risk

Following the guidelines given above will reduce any risk to injury.

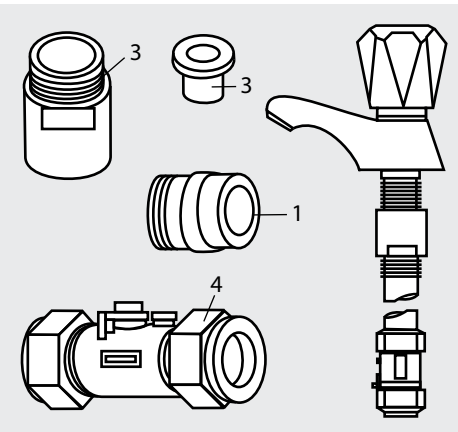
All persons carrying out this operation must be fully trained and copies of the specific risk assessment made available for inspection and use in their training process.

Further guidance on Manual Handling can be obtained from the Health and Safety Executive. Manual Handling Operations Regulations 1992.



4 Fixing Options For Taps & Mixers

1. MK Range - Combined Regulators & Aerator for screwing onto Taps & Mixers with internal or external threads on their noses. Anti Vandal models also available.
2. MR05-T Range - Internal Regulators. Push-fit into Tap or Mixer seats. Produced in three sizes - 12.5mm (BS1010), 12mm & 10mm, Flangeless models also available for Taps with Low Lift washers.
3. MXF Standard Range - Screw on tail models for Taps & Mixers. Fix onto the tails before fitting the tap connectors. Available in 3/8", 1/2", 3/4" and 1" BSP.
4. Compression Fitting Range - “In Line” regulators housed in 15mm & 22mm CXC Couplers & Isolating Valves. “UKWFS” listed by the Water Research Centre. Isolation valves available for slotted screwdriver operation or with coloured plastic handles. Now available also in plastic bodied push-fit couplers & valves.



Gledhill (Building Products) Ltd

AMD. SEPTEMBER 2017

CONDITIONS OF SALE & GUARANTEE TERMS

1. Gledhill (Building Products) Ltd (“We” or “Gledhills”) only do business upon the Conditions which appear below and no other. Unless we so agree in writing these Conditions shall apply in full to any supply of goods by us to the exclusion of any Conditions or terms sought to be imposed by any purchaser. These Conditions of Sale and Warranty Terms override those which are contained on the Invoice Forms and all Sales are now subject to these Conditions of Sale and Warranty terms only.

2. PRICE

Once an order or call off has been accepted the price will be held for three months **but if delivery is extended beyond that period at the customer’s request, then we reserve the right to amend the price when necessary.** The company reviews its pricing annually to adjust for changes in our cost base. We reserve the right to alter prices at any time for severe movements in raw materials (mainly copper and steel). If there is to be a change we will give customers at least **four weeks** notice but **anything delivered** after that date will be at the revised price. An order may not be cancelled or varied after acceptance without the written consent of the company. Such cancellation or variation shall be subject to such reasonable charges as may be appropriate.

3. SPECIFICATION

The goods are supplied in accordance with the Specifications (if any) submitted to the Purchaser and any additions and alterations shall be the subject of an extra charge. Any goods not so specified shall be in accordance with our printed literature or the literature of any of our component suppliers (subject to any modifications made since publication). If we adopt any changes in construction or design of the goods, or in the specification printed in our literature, the Purchaser shall accept the goods so changed in fulfilment of the order.

4. PAYMENT

The buyer shall make payment in full within thirty days from the end of the month in which the invoice is dated. If we receive payment in full on or before the due date we will allow an appropriate settlement discount except where we have quoted a special net price. If payment is not received in full on or before the due date we shall be entitled in addition to the invoice price to:

- payment of a sum equal to any increase in the copper price supplement applicable to the particular goods sold between the date of receipt of order and the date of receipt of payment in full; and
- interest on any part of the invoice price unpaid after the due date at the rate of 3% per annum over the base rate for the time being of HSBC Bank plc.

5. TIME

We give estimates of delivery dates in good faith and time of delivery is not nor shall be made of the essence of any contract nor shall we be liable for any loss or damage occasioned by delay in delivery.

6. DELIVERY

We deliver free normally by our own vehicles within 25 miles of any of our manufacturing depots. Delivery to any place more than 25 miles from one of our manufacturing depots may be subject to our quoted delivery charges. We reserve the right to make delivery of goods contained in one order by more than one consignment and at different times. Where a period is agreed for delivery and such period is not extended by our Agreement, the Purchaser shall take delivery within that period. If the Purchaser fails to take delivery, we shall be entitled at the Purchaser’s risk and expense to store the goods at the Purchaser’s premises or elsewhere and to demand payment as if they had been despatched. Off loading at point of delivery shall be the responsibility of and be undertaken by the Purchaser.

7. SHORTAGES OR DAMAGE

Goods must be inspected before signature of delivery note and any damage, shortage or discrepancy noted on the delivery note and the goods returned on the same vehicle. The buyer must also give us immediate written notice of the damage, shortage or discrepancy so that we may prompt investigation.

8. RETURN OF GOODS

Goods may not be returned to the Company except by prior written permission of an authorised officer of the Company and such return shall be subject to payment by the Purchaser of handling and re-stocking charges, transport and all other costs incurred by the Company.

9. COMPANY LIABILITY AND GUARANTEE

- Subject to the terms of these Conditions of Sale and Guarantee Terms Gledhills provide Guarantees in respect of specific products as set out in this clause.
- Each Guarantee is strictly conditional upon the following:-
 - Complaints must be given to us immediately, before any action is taken, as responsibility cannot be accepted if repairs or renewals are attempted on site without our written approval.
- The unit has been installed in accordance with our installation and service instructions and all relevant codes of practice and regulations in force at the time of installation.
- All necessary inlet controls and safety valves have been fitted correctly.
- The unit has only been used for the storage of potable water supplied from the public mains. The water quality shall be in accordance with European Council Directive 98/83 EC, or revised version at the date of installation, and is not fed with water from a private supply. Particular:

Chloride content:	Max. 200 mg/l
Sulphate content:	Max. 200 mg/l
Combination chloride/sulphate:	Max. 300 mg/l (in total)
- Where appropriate the unit has been regularly maintained as detailed in the installation and service instructions
- Defects caused by corrosion or scale deposits are not covered by any Guarantee.
- Where we agree to rectify any defect we reserve the right to undertake the work on our own premises.
- We will not accept any labour charges associated with replacing the unit or parts for any of the following products listed.
- If the newly fitted water heater is not in regular use then it must be flushed through with fresh water for at least 15 minutes. Open at least one hot water tap once per week, during a period of at least 4 weeks.

9.3. Guarantees are provided in respect of specified goods supplied by Gledhills as follows:-

(a) Domestic and Commercial Open Vented Cylinders and Tanks.

The storage vessel is guaranteed for ten years and if it proves to be defective either in materials or workmanship, we reserve the right to either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in England, Wales and Scotland (excluding all Scottish Islands).

(b) Domestic Mains Fed Products [Primary Stores]

The storage vessel is guaranteed for five years and if it or any integral pipework as part of the storage vessel assembly proves to be defective either in materials or workmanship, we reserve the right to either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in England, Wales and Scotland (excluding all Scottish Islands).

(c) Unvented Cylinders

Gledhill guarantee the components including controls, valves and electrical parts for two years from the date of purchase. IT SHOULD BE NOTED THAT THE FACTORY FITTED TEMPERATURE AND PRESSURE RELIEF VALVE MUST NOT BE REMOVED OR ALTERED IN ANY WAY OR THE GUARANTEE WILL NOT BE VALID. GLEDHILL WILL

NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL LOSS OR DAMAGE HOWEVER IT IS CAUSED.

The guarantee for the stainless steel vessel is for twenty five years against material defect or manufacturing faults if the original unit is returned to us **AND PROVIDED THAT:**

- It has not been modified, other than by Gledhill.
- It has not been subjected to wrong or improper use or left uncared for.
- It has only been used for the storage of potable water supplied from the public mains, max 200mg/litre chloride.
- It has not been subjected to frost damage.
- The benchmark service record is completed after each annual service.
- The unit has been serviced annually.
- Any disinfection has been carried out strictly in accordance with BS6700.

If the stainless steel vessel proves to be defective either in materials or workmanship we reserve the right to either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in England, Wales and Scotland (excluding all Scottish Islands).

ACTION IN THE EVENT OF FAILURE

We will require the return of a cylinder which develops a leak for inspection. If our examination confirms a failure then an appropriate level of credit against the cost of the original cylinder will be issued in line with the terms of our warranty.

Please note:

- Installation must have been carried out by a licensed specialized company (heating contractor or plumber) following the version of installation instructions in force.
- Gledhill or its representative was given the opportunity to check complaints on site immediately after any defect occurred.
- Confirmation exists that the system was commissioned properly and that the system was checked and maintenance was performed annually by a specialised company licensed for this purpose.

(d) Components of our products other than Storage Vessels and Integral Pipework.

We will either extend to the purchaser the same terms of warranty as we are given by the manufacturer of the component or if the manufacturer does not give any warranty, replace free of charge any component which becomes defective within two years after the date of the delivery by us and is returned to us at the purchaser’s expense but we shall not meet the cost of removal or shipping or return of the component or any other cost charges or damages incurred by the purchaser.

9.4.

9.4.1. In respect of goods supplied by us and in respect of any installation work carried out by or on our behalf, our entire liability and the purchaser’s sole remedies (subject to the Guarantees) shall be as follows:-

- We accept liability for death or personal injury to the extent that it results from our negligence or that of our employees
- Subject to the other provisions of this clause 9 we accept liability for direct physical damage to tangible property to the extent that such damage is caused by our negligence or that of our employees, agents or subcontractors.
- Our total liability to the purchaser over and above any liability to replace under the Guarantees (whether in contract or in tort including negligence) in respect of any one cause of loss or damage claimed to result from any breach of our obligations hereunder, shall be limited to actual money damages which shall not exceed £20,000 provided that such monetary limit shall not apply to any liability on the part of ourselves referred to in paragraph (a) above
- Except as provided in paragraph (a) above but otherwise not withstanding any provision herein contained in no event shall we be liable for the following loss or damage howsoever caused and even if foreseeable by us or in our contemplation:-
 - economic loss which shall include loss of

profits, business revenue, goodwill or anticipated savings

(ii) damages in respect of special indirect or consequential loss or damage (other than death, personal injury and damage to tangible property)

(iii) any claim made against the purchaser by any other party (save as expressly provided in paragraph (b) above)

(e) Except in respect of our liability referred to in paragraph (a) above no claim may be made or action brought (whether in contract or in tort including negligence) by the purchaser in respect of any goods supplied by us more than one year after the date of the invoice for the relevant goods.

(f) Without prejudice to any other term we shall not be liable for any water damage caused directly or indirectly as a result of any leak or other defect in the goods. We cannot control the conditions of use of the goods or the time or manner or location in which they will be installed and the purchaser agrees to be fully responsible for testing and checking all works which include the goods at all relevant times (up to, including and after commissioning) and for taking all necessary steps to identify any leaks and prevent any damage being caused thereby.

(g) Nothing in these Conditions shall confer on the purchaser any rights or remedies to which the purchaser would not otherwise be legally entitled

10. LOSS OR INJURY

Notwithstanding any other provision contained herein the purchaser’s hereby agree to fully indemnify us against any damages losses costs claims or expenses incurred by us in respect of any claim brought against us by any third party for:-

- any loss injury or damage wholly or partly caused by any goods supplied by us or their use.
- any loss injury or damage wholly or partly caused by the defective installation or substandard workmanship or materials used in the installation of any goods supplied by us.
- any loss injury or damage in any way connected with the performance of this contract.
- any loss resulting from any failure by the purchaser to comply with its obligations under these terms as to install and/or check works correctly.

PROVIDED that this paragraph will not require the purchaser to indemnify us against any liability for our own acts of negligence or those of our employees agents or sub-contractors

FURTHER in the case of goods supplied by us which are re-sold and installed by a third party by the purchaser it will be the sole responsibility of the purchaser to test the goods immediately after their installation to ensure that inter alia they are correctly installed and in proper working order free from leaks and are not likely to cause any loss injury or damage to any person or property.

11. VARIATION OF WARRANTY AND EXCLUSION

Should our warranty and exclusion be unacceptable we are prepared to negotiate for variation in their terms but only on the basis of an increase in the price to allow for any additional liability or risk which may result from the variation. Purchasers are advised to insure against any risk or liability which they may incur and which is not covered by our warranty.

12. ADVICE

Any advice or assistance given by the Company is provided without charge and is in good faith without undertaking, representation or warranty, and we will not accept any liability, whether consequential or compensatory, for advice or assistance given.

13. RISK AND RETENTION OF TITLE

- goods supplied by us shall be at the Purchaser’s risk immediately upon delivery to the Purchaser or into custody on the Purchaser’s behalf or to the Purchaser’s Order. The Purchaser shall effect adequate insurance of the goods against all risks to the full invoice value of the goods, such insurance to be effective from the time of delivery until property in the goods shall pass to the Purchaser as hereinafter provided.
- property in the goods supplied hereunder will pass to the Purchaser when full payment has been made by the Purchaser to us for :-
 - the goods of the subject of this contract.
 - all other goods the subject to of any other contract between the Purchaser and us which, at the time of payment of the full price of the goods sold under this contract, have been delivered to the Purchaser but not paid for in full.
- until property in the goods supplied hereunder passes to the Purchaser in accordance with paragraph (2) above.
 - the Purchaser shall hold the goods in a fiduciary capacity for us and shall store the same separately from any other goods in the Purchaser’s possession and in a manner which enables them to be identified as our goods.
 - the Purchaser shall immediately return the goods to us should our authorised representative so request. All the necessary incidents associated with a fiduciary relationship shall apply.
- the Purchaser’s right to possess the goods shall cease forthwith upon the happening of any of the following events, namely :-
 - if the Purchaser fails to make payment in full for the goods within the time stipulated in clause 4 hereof.
 - if the Purchaser, not being a company, commits any act of bankruptcy, makes a proposal to his or her creditors for a compromise or does anything which would entitle a petition for a Bankruptcy Order to be presented.
 - if the Purchaser, being a company, does anything or fails to do anything which would entitle an administrator or an administrative receiver or a receiver to take possession of any assets or which would entitle any person to present a petition for winding up or to apply for an administration order.
- the Purchaser hereby grants to us an irrevocable licence to enter at any time any vehicle or premises owned or occupied by the Purchaser or in the possession of the Purchaser for the purposes of repossessing and recovering any such goods the property in which has remained in us under paragraph (2) above. We shall not be responsible for and the Purchaser will indemnify us against liability in respect of damage caused to any vehicle or premises in such repossession and removal being damaged which it was not reasonably practicable to avoid.
- notwithstanding paragraph (3) hereof and subject to paragraph (7) hereof, the Purchaser shall be permitted to sell the goods to third parties in the normal course of business. In this respect the Purchaser shall act in the capacity of our commission agent and the proceeds of such sale :-
 - shall be held in trust for us in a manner which enables such proceeds to be identified as such, and;
 - shall not be mixed with other monies nor paid into an overdrawn bank account.We, as principal, shall remunerate the Purchaser as commission agent a commission depending upon the surplus which the Purchaser can obtain over and above the sum, stipulated in this contract of supply which will satisfy us.
- in the event that the Purchaser shall sell any of the goods pursuant to clause (6) hereof, the Purchaser shall

forthwith inform us in writing of such sale and of the identity and address of the third party to whom the goods have been sold.

(h) if, before property in the goods passes to the Purchaser under paragraph (2) above the goods are or become affixed to any land or building owned by the Purchaser it is hereby agreed and declared that such affixation shall not have the effect of passing property in the goods to the Purchaser. Furthermore if, before property in the goods shall pass to the Purchaser under paragraph (2) hereof, the goods are or become affixed to any land or building (whether or not owned by the Purchaser), the Purchaser shall:-

- ensure that the goods are capable of being removed without material injury to such land or building.
- take all necessary steps to prevent title to the goods from passing to the landlord of such land or building.
- forthwith inform us in writing of such affixation and of the address of the land or building concerned.

The Purchaser warrants to repair and make good any damage caused by the affixation of the goods to or their removal from any land or building and to indemnify us against all loss damage or liability we may incur or sustain as a result of affixation or removal.

- in the event that, before property in the goods has passed to the Purchaser under paragraph (2) hereof, the goods or any of them are lost, stolen, damaged or destroyed :-
- the Purchaser shall forthwith inform us in writing of the fact and circumstances of such loss, theft, damage or destruction.
- the Purchaser shall assign to us the benefit of any insurance claim in respect of the goods so lost, stolen, damaged or destroyed.

14. NON-PAYMENT

If the Purchaser shall fail to make full payment for the goods supplied hereunder within the time stipulated in clause 4 hereof or be in default of payment for any other reason then, without prejudice to any of our other rights hereunder, we shall be entitled to stop all deliveries of goods and materials to the Purchaser, including deliveries or further deliveries of goods under this contract. In addition we shall be entitled to terminate all outstanding orders.

15. VALUE ADDED TAX

All prices quoted are exclusive of Value Added Tax which will be charged at the rate ruling at the date of despatch of invoice.

16. TRADE SALES ONLY

We are only prepared to deal with those who are not consumers within the terms of the Unfair Contract Terms Act 1977, the Sale of Goods Act 1979 and the Supply of Goods and Services Act 1982. Accordingly any person who purchases from us shall be deemed to have represented that he is not a consumer by so purchasing.

17. JURISDICTION

The agreement is subject to English law for products delivered in England and Scottish law for products delivered in Scotland and any dispute hereunder shall be settled in accordance therewith dependent upon the location.

18. PRODUCT DEVELOPMENT

Gledhill have a policy of continuous product development and may introduce product modifications from time to time.

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)																					

While this Checklist can be used for any installation covered by its description, only appliances manufactured by Scheme Members will be covered by the rules and requirements of the Benchmark Scheme.

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 01		Date:		SERVICE 02		Date:	
Engineer name:				Engineer name:			
Company name:				Company name:			
Telephone No:				Telephone No:			
Comments:				Comments:			
Signature				Signature			
SERVICE 03		Date:		SERVICE 04		Date:	
Engineer name:				Engineer name:			
Company name:				Company name:			
Telephone No:				Telephone No:			
Comments:				Comments:			
Signature				Signature			
SERVICE 05		Date:		SERVICE 06		Date:	
Engineer name:				Engineer name:			
Company name:				Company name:			
Telephone No:				Telephone No:			
Comments:				Comments:			
Signature				Signature			
SERVICE 07		Date:		SERVICE 08		Date:	
Engineer name:				Engineer name:			
Company name:				Company name:			
Telephone No:				Telephone No:			
Comments:				Comments:			
Signature				Signature			
SERVICE 09		Date:		SERVICE 10		Date:	
Engineer name:				Engineer name:			
Company name:				Company name:			
Telephone No:				Telephone No:			
Comments:				Comments:			
Signature				Signature			

FOR TECHNICAL SUPPORT:

01253 474584

FOR ANNUAL SERVICE AND MAINTENANCE:

0800 3800 129

FOR SPARE PARTS:

01253 474412

OR

WWW.GLEDHILL-SPARES.NET



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FM 02057



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