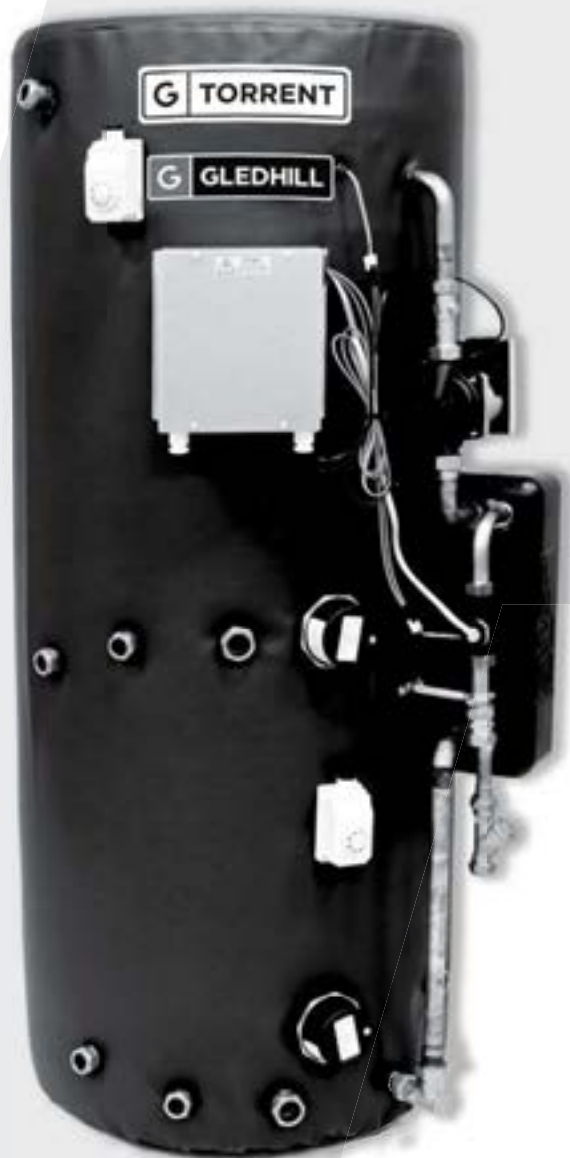


TORRENT ECO

OPEN VENTED 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 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.

ISSUE 3: SEPTEMBER 2017

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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	50 l/min
Min. flow rate - Measured by flow sensor	3.5 l/min
Immersion heater rating	3kW@230Vac,50Hz

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

Handling Before Installation

The Torrent 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.

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 Immersion heaters. These incorporate a thermostat (XB114) 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. If the thermal cut out operates the thermostat (XB114) is no longer effective and must be replaced.

DESIGN

Gledhill developed the principal of domestic thermal stores starting in 1982 and they have been manufacturing them since then.

Their importance to plumbing systems is described below.

- a) Why use a thermal store - 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. So the householder can enjoy the comfort and luxury of a mains pressure system produced from alternative energy sources.

The alternative energy feeds into the thermal store which is also the water that circulates around the heating system. 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 heart of an alternative energy system - The Torrent ECO 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
- ground or air source heat pumps
- 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. This is only possible with a thermal store such as the Torrent and is not possible with an unvented cylinder where you will only get an alternative energy contribution to the hot water.

- c) In-built upgrade potential - You are able to specify from the required tapplings, with any future requirements, for example, a wood burning stove or solar panels can be added as an upgrade to the property at a later stage and the hot water cylinder will be ready to work with it.
- d) Neutral Point - The Torrent ECO 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 acts as a low loss header.
- e) Apartments – The Torrent open vented thermal store does not need a discharge pipe from a pressure and temperature relief valve, unlike an unvented cylinder which does. This combined with the fact that discharges are not permitted into PVCu soil stacks makes the installation of un-vented stores in apartments difficult and expensive.
- f) Legionella Risk – 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.

- g) Less controls – 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.

- h) Building Regulation – The thermal store, being open vented, does not require Building control to be notified to comply with section G3 of the building regulations, unlike an unvented cylinder which does.

- i) Annual inspection – 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.

The Torrent provides high performance mains pressure hot water without the additional costs incurred with an unvented cylinder.

The Torrent ECO is available in the following basic variants:-

Torrent ECO OV

The Torrent ECO OV utilises an open vented boiler and / or direct electric immersion heaters as its primary energy source. It is available with tapplings for a woodburning or solid fuel boiler, but if any of the standard tapping are not required, they can be removed at the time of order.

One of the benefits of the open vented boiler configuration is that the whole output of the boiler is available to the thermal store, unlike the indirect Sealed Primary (SP) version where the output from the boiler is limited by the heat exchanger. This will provide an improvement in the operational efficiency of the boiler, reducing the primary energy usage and running costs.

The Torrent ECO OV provides high-performance mains pressure hot water. The heat energy provided from the primary heat source and / or solid fuel input is circulated from the store to the central heating circuit, allowing rapid heat-up of a radiator system.

In situations where no gas or solid fuel source is available the Torrent ECO OV can be used exclusively from the two 3kW electric immersion elements which will provide both hot water and auxiliary heating for the property. The obvious application is apartments where no gas main is available but this could also be appropriate where electricity is available from a renewable or low carbon source.

If connected to the standard grid then the thermal store is the perfect solution to maximise usage of an off peak tariff where arrangements

should be made to power the lower immersion element in order to minimise the running costs. It is important to note that the design heat loss, of the rooms to be heated, must be less than the lowest immersion power. If the design heat loss is greater than this, the heating will need to be supplemented by another heat source.

The Torrent ECO OV is designed to be heated directly (i.e. without internal heat exchangers) by one or more of the following heat sources;

- Site fitted electric immersion heaters e.g. to utilise off peak electricity
- A remote gas or oil boiler
- A solid fuel boiler or stove

Torrent ECO SP

The Torrent ECO SP utilises a sealed system boiler as its primary energy source. It is available with optional tappings for a woodburning or solid fuel boiler. If any of the standard tapping are not required, they can be removed at the time of order. The Torrent ECO SP provides high-performance mains pressure hot water.

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 the store, then hot water performance will be limited. The hot water priority should be protected by use of an appropriate thermostat. The central heating circuit is normally supplied directly from the boiler although an auxiliary heating circuit can be connected from the store in which case the solid fuel source will provide energy to the auxiliary heating circuit. Obviously, the energy output that can be provided by the auxiliary heating circuit will be limited to the energy input from the solid fuel appliance.

This sealed primary (SP) model permits the use of a smaller feed and expansion tank because the main central heating circuit does not need to be catered for. This can make positioning the F&E tank more straightforward.

An immersion boss is provided for a site fitted immersion heater, and it is normally envisaged that this will be used as an emergency electric back-up for hot water and to provide emergency energy to the auxiliary heating circuit.

The Torrent ECO SP is designed to be heated by one or more of the following heat sources;

- Directly by an electric immersion heater as a backup heat source only
- Indirectly (i.e. via a heat exchanger) by a remote gas or oil boiler
- Directly by a solid fuel boiler or stove

Torrent ECO SOL

The Torrent ECO SOL utilises either a sealed system boiler and / or an open vented boiler as its primary energy source. It also has a high-efficiency solar coil to allow the homeowner to benefit from a wide variety of alternative energy inputs. It is available with optional tappings for a woodburning or solid fuel boiler. If any of the standard tapping are not required, they can be removed at the time of order.

The Torrent ECO SOL provides high-performance mains pressure hot water. The central heating circuit can be supplied directly from a sealed system boiler although an auxiliary heating circuit can be connected from the store in which case both the solar and solid fuel energy will also provide an input to the auxiliary heating circuit. Alternatively, an open vented boiler can be used to directly heat the store so that the energy will be available for both hot water and auxiliary central heating circuit.

The cylinder comes with two return connections for solid fuel and woodburning stoves to enable the homeowner to have an aga running 24 hours a day but still retaining the dedicated solar volume.

An immersion boss is provided for a site fitted immersion heater, and it is normally envisaged that this will be used as an emergency electric back-up for hot water and to provide emergency energy to the auxiliary heating circuit.

The Torrent ECO SOL is designed to be heated by one or more of the following heat sources;

- Directly by an electric immersion heater as a backup heat source only
- Either indirectly or directly by a remote gas or oil boiler
- Directly by a solid fuel boiler or stove
- Indirectly by solar thermal system

Torrent ECO HP Models

The Torrent ECO HP and HP SOL are directly heated, open vented thermal stores designed for use with an air source or a ground source heat pump. It is available with optional tappings for a woodburning or solid fuel boiler. If any of the standard tapping are not required, they can be removed at the time of order.

Although the thermal store is open vented, the mains pressure hot water is heated instantaneously via the plate heat exchanger.

The Torrent ECO HP range of primary thermal stores are only suitable for open vented heating systems but they provide mains pressure hot water without the requirements of a pressure and temperature relief valve.

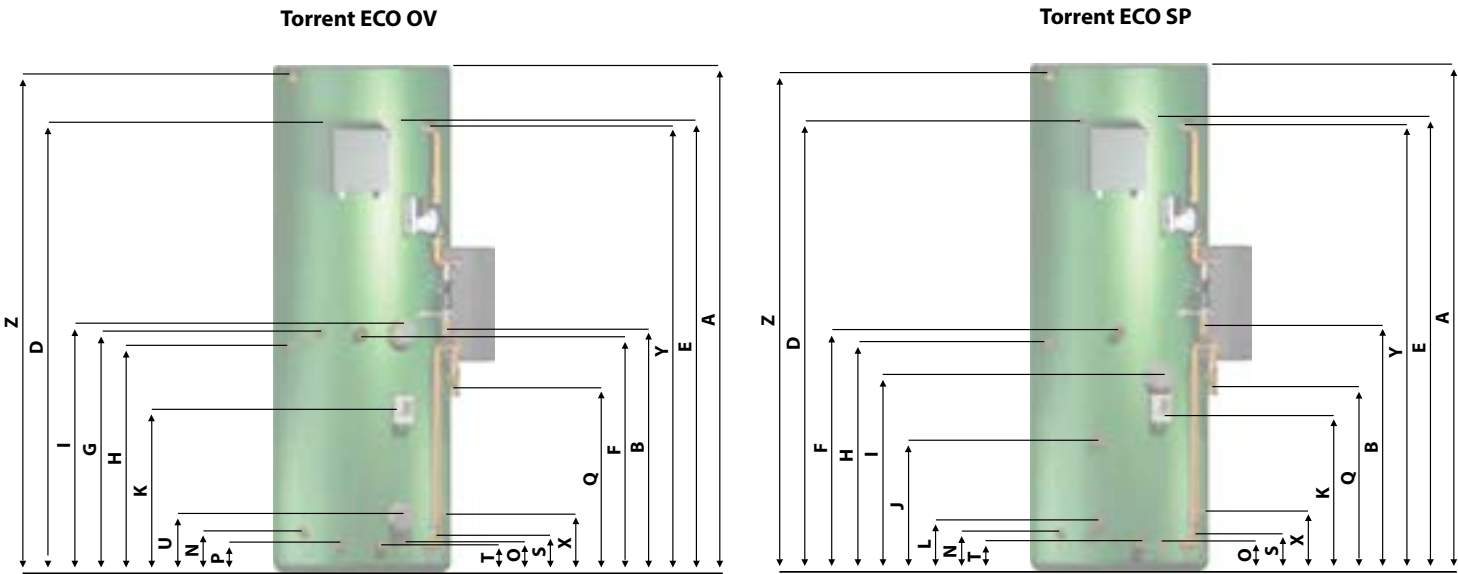
An immersion boss is provided for a site fitted immersion heater, and it is normally envisaged that this will be used as an emergency electric back-up for hot water and to provide emergency energy to the auxiliary heating circuit.

The suggested model sizes are based on typical hot water usage and the store charged to about 75°C. If the store charge temperature is going to be lower, then a larger model should be considered. This is especially important where the heat pump alone is unable to charge the store to 75°C as is likely to be the case with a heat pump. If the immersion element is used to raise the temperature of the store, then a suitable control system should be used to ensure the immersion element does not operate until the heat pump has raised the store to the maximum temperature, or the overall efficiency of the system will be reduced.

The Torrent ECO HP and HP SOL are designed to be heated by one or more of the following heat sources;

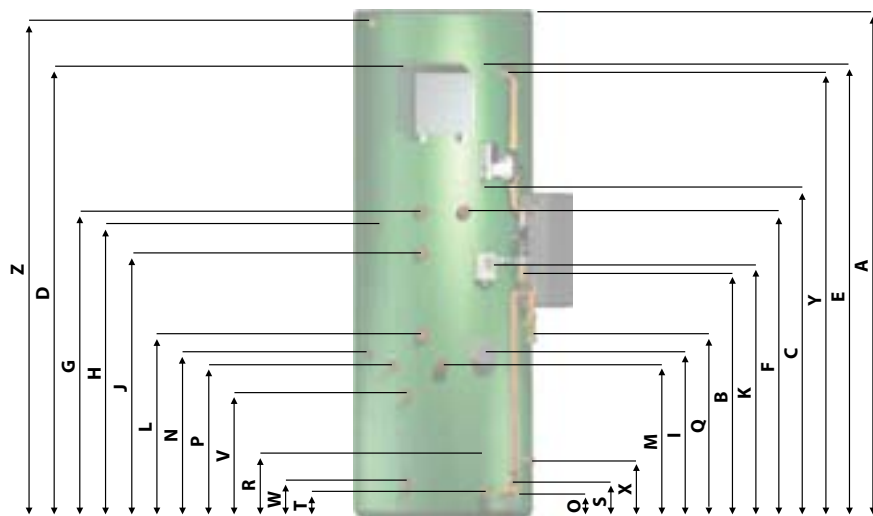
- Directly by a ground source or air source heat pump
- Directly by an electric immersion heater as a backup heat source only
- Directly by a solid fuel boiler or stove
- Indirectly by solar thermal system

DESIGN



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, see page 14)	Domestic Hot Water From Plate Heat Exchanger	Solar Sensor	Store Overheat	Domestic Hot Water Store Sensor	Solid Fuel Flow	Open Vented Boiler Flow	Central Heating Flow	On Peak Backup Immersion Heater	Sealed Primary Boiler Flow	Control Stat	
		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	
Torrent ECO OV																		
TEC140-OV	C	64	134	37	171	1219	535	490	n/a	1040	1040	545	545	505	570	n/a	395	
TEC170-OV	C	68	163	39	202	1449	535	720	n/a	1270	1270	670	670	630	685	n/a	470	
TEC210-OV	C	74	201	41	242	1414	585	680	n/a	1235	1235	685	685	645	690	n/a	455	
TEC250-OV	C	81	239	43	282	1654	585	925	n/a	1475	1475	785	785	745	790	n/a	540	
TEC350-OV	C	96	334	53	388	1874	636	1140	n/a	1690	1690	890	890	850	895	n/a	615	
Torrent ECO SP																		
TEC140-SP	C	64	134	42	176	1219	535	490	n/a	1040	1040	545	n/a	505	495	322	395	
TEC170-SP	C	68	163	44	207	1449	535	720	n/a	1270	1270	690	n/a	650	570	322	470	
TEC210-SP	C	74	201	47	248	1414	585	680	n/a	1235	1235	685	n/a	645	555	412	455	
TEC250-SP	C	81	239	49	288	1654	585	925	n/a	1475	1475	785	n/a	745	640	432	540	
TEC350-SP	C	96	334	61	396	1874	636	1140	n/a	1690	1690	890	n/a	850	480	350	615	
Torrent ECO SOL																		
TEC210-SOL	C	74	201	49	250	1414	585	680	920	1235	1235	845	845	805	455	702	705	
TEC250-SOL	C	81	239	51	290	1654	585	925	1085	1475	1475	1005	1005	965	545	872	830	
TEC350-SOL	C	96	334	63	398	1874	636	1140	1255	1690	1690	1010	1010	970	590	850	950	

Torrent ECO SOL

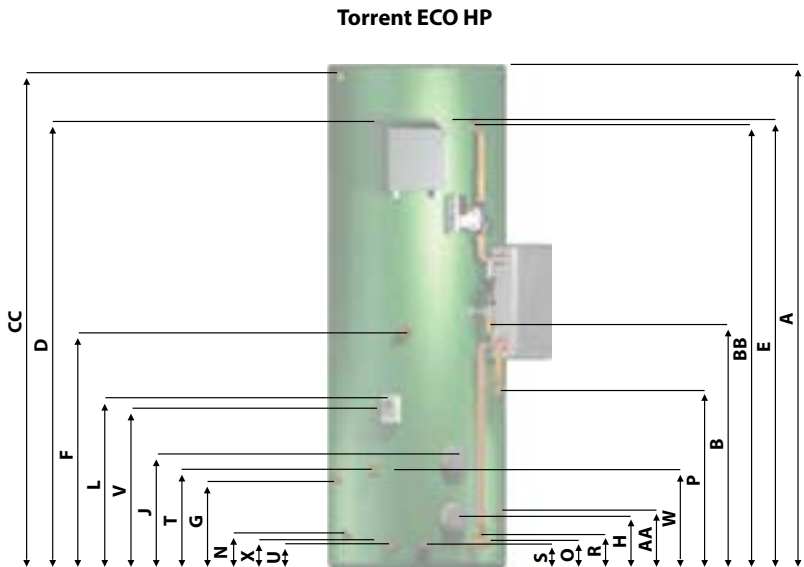


NOTES

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. The specifications shown are the standard range, but these can be changed at the time of order to suit specific installation requirements.
3. All connections are within 145°, but if more detail is required, please contact our technical desk on 01253 474584 or your local Gledhill depot.
4. 24 plate PHE used on all models apart from heat pump models.

Sealed Primary Boiler Return	Solid Fuel Return (Solar Model Only)	Central Heating Return	Drain	Open Vented Boiler return	Cold Mains To Plate Heat Exchanger	Solar Sensor	Plate Heat Exchanger Return	Solid Fuel return	Off Peak Immersion Heater	Solar Flow	Solar return	Cold Feed	Plate Heat Exchanger Flow	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
L mm	M mm	N mm	O mm	P mm	Q mm	R mm	S mm	T mm	U mm	V mm	W mm	X mm	Y mm	Z mm	m ²	m ²	litres	litres	litres/ min
n/a	n/a	135	90	95	155	n/a	95	95	185	n/a	n/a	195	1040	1129	n/a	n/a	134	n/a	35
n/a	n/a	135	90	95	385	n/a	95	95	185	n/a	n/a	195	1270	1359	n/a	n/a	163	n/a	35
n/a	n/a	135	90	95	345	n/a	95	95	185	n/a	n/a	195	1235	1324	n/a	n/a	201	n/a	35
n/a	n/a	135	90	95	590	n/a	95	95	185	n/a	n/a	195	1475	1564	n/a	n/a	239	n/a	35
n/a	n/a	140	95	100	805	n/a	100	100	190	n/a	n/a	200	1690	1784	n/a	n/a	334	n/a	35
145	n/a	135	90	n/a	155	n/a	95	95	n/a	n/a	n/a	195	1040	1129	1.38	n/a	134	n/a	35
145	n/a	135	90	n/a	385	n/a	95	95	n/a	n/a	n/a	195	1270	1359	1.38	n/a	163	n/a	35
145	n/a	125	90	n/a	345	n/a	95	95	n/a	n/a	n/a	195	1235	1324	1.84	n/a	201	n/a	35
165	n/a	125	90	n/a	590	n/a	95	95	n/a	n/a	n/a	195	1475	1564	1.84	n/a	239	n/a	35
150	n/a	140	95	n/a	805	n/a	100	100	n/a	n/a	n/a	200	1690	1784	2.28	n/a	334	n/a	35
525	95	475	90	435	345	190	95	435	n/a	355	125	195	1235	1324	1.84	0.27	201	62	35
605	95	545	90	505	590	220	95	505	n/a	410	125	195	1475	1564	1.84	0.34	239	73	35
650	100	610	95	570	805	225	100	570	n/a	475	130	200	1690	1784	2.28	0.40	334	101	35

DESIGN

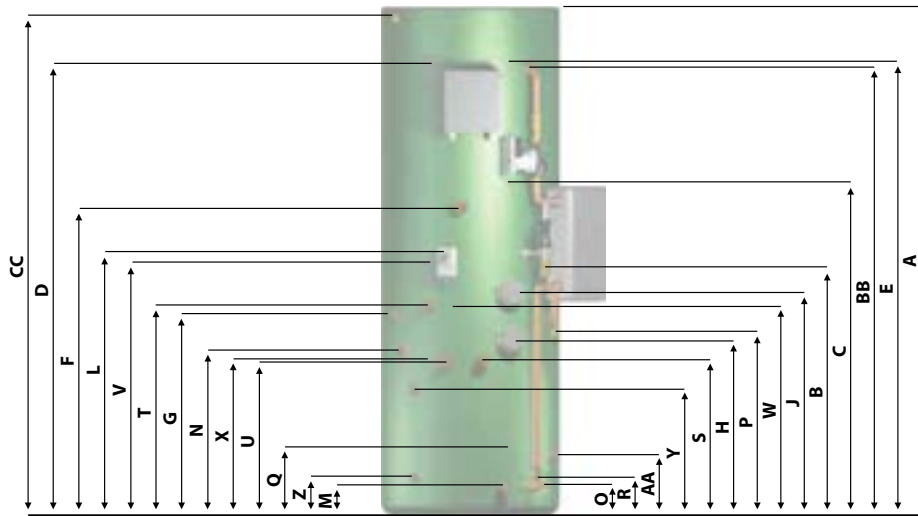


Technical

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, see Domestic Hot Water From Plate Heat Exchanger	Solar Sensor	Store Overheat	Domestic Hot Water Store Sensor	Solid Fuel Flow	Central Heating Flow	Central Heating Boost Immersion Heater	Second Central Heating Boost Immersion Heater	Domestic Hot Water Backup Immersion Heater	Second Domestic Hot Water Backup Immersion Heater	Control Stat	
		watts	litres	kg	kg	A mm	mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	mm	J mm	mm	L mm
Torrent ECO HP																		
TEC170-HP	C	68	163	37	171	1449	535	720	n/a	1270	1270	670	265	165	n/a	340	n/a	470
TEC210-HP	C	74	201	39	202	1414	585	680	n/a	1235	1235	665	255	160	n/a	325	n/a	455
TEC250-HP	C	81	239	41	242	1654	585	925	n/a	1475	1475	785	305	185	n/a	375	n/a	540
TEC350-HP	C	96	334	43	282	1874	636	1140	n/a	1690	1690	900	355	215	300	430	515	615
Torrent ECO HP SOL																		
TEC210-HP SOL	C	74	201	49	250	1414	585	680	920	1235	1235	845	550	490	n/a	625	n/a	705
TEC250-HP SOL	C	81	239	51	290	1654	585	925	1085	1475	1475	1000	655	580	n/a	730	n/a	830
TEC350-HP SOL	C	96	334	63	398	1874	636	1140	1255	1690	1690	1150	760	660	745	835	920	950

DESIGN

Torrent ECO HP SOL

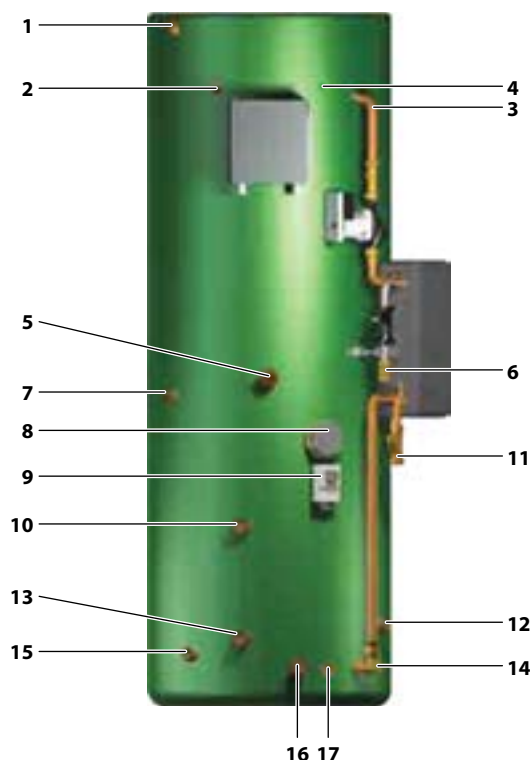
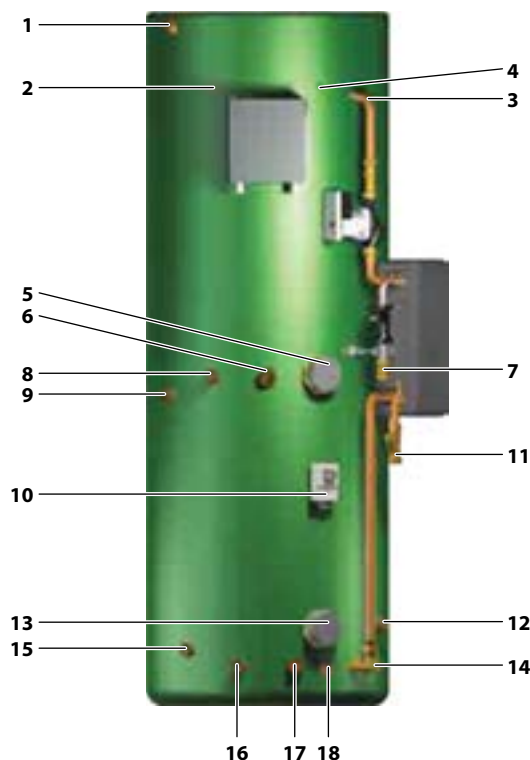


NOTES

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. The specifications shown are the standard range, but these can be changed at the time of order to suit specific installation requirements.
3. All connections are within 145°, but if more detail is required, please contact our technical desk on 01253 474584 or your local Gledhill depot.
4. The domestic hot water volume and maximum hot water flow rate figures are based on the store temperature being 75°C.
5. Heat pump models use a 30 plate PHE.

Solid Fuel Return (Solar Model Only)	Central Heating Return	Drain	Cold Mains To Plate Heat Exchanger	Solar Sensor	Plate Heat Exchanger Return	Solid Fuel return	Heat Pump Flow	Heat Pump Return	Heat Pump Cylinder Sensor	Heat Pump Flow Sensor	Heat Pump Return Sensor	Solar Flow	Solar return	Cold Feed	Plate Heat Exchanger Flow	Open Vent	Surface Area of Solar Heater Coil	Capacity (Total Volume)	Dedicated Solar Volume	Maximum Hot Water Flow Rate
M mm	N mm	O mm	P mm	Q mm	R mm	S mm	T mm	U mm	V mm	W mm	X mm	Y mm	Z mm	AA mm	BB mm	CC mm	m ²	litres	litres	litres/ min
n/a	125	90	385	n/a	95	95	295	95	470	295	95	n/a	n/a	195	1270	1359	n/a	163	n/a	15
n/a	125	90	345	n/a	95	95	285	95	455	285	95	n/a	n/a	195	1235	1324	n/a	201	n/a	15
n/a	125	90	590	n/a	95	95	335	95	540	335	95	n/a	n/a	195	1475	1564	n/a	239	n/a	15
n/a	130	95	805	n/a	100	100	385	100	615	385	100	n/a	n/a	200	1690	1784	n/a	339	n/a	15
95	465	90	345	190	95	435	580	435	705	580	435	355	125	195	1235	1324	0.27	201	62	15
95	535	90	590	220	95	505	685	505	830	685	505	410	125	195	1475	1564	0.34	239	73	15
100	600	95	805	225	100	570	790	570	950	790	570	475	130	200	1690	1784	0.40	334	101	15

DESIGN



Typical arrangement of tappings shown on the appliance, including optional extras, but these can be adjusted to suit specific installation requirements.

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

Torrent ECO OV

Available Components and Tappings

1. Open vent - 22mm comp
2. Overheat stat - 1/2" female
3. Plate heat exchanger flow - 22mm
4. Domestic hot water store sensor
5. Immersion heater
6. Solid fuel flow - 28mm comp
7. Hot water supply - 22mm comp
8. OV boiler flow - 22mm comp (350/450 - 28mm comp)
9. Central heating flow - 22mm comp
10. Limit stat - 1/2" female
11. Cold mains supply - 22mm comp
12. Cold feed - 22mm comp
13. Immersion heater
14. Plate heat exchanger return - 22mm
15. Central heating return - 22mm comp
16. OV boiler return - 22mm comp (350/450 - 28mm comp)
17. Solid fuel return - 28mm comp
18. Drain - 1/2" female

Component kit supplied

- A. Thermostat
- B. Immersion heater

Specify optional components at time of order

- A. Header tank
- B. Ball valve
- C. Float
- D. Overheat thermostat
- E. Solid fuel tappings
- F. Scale inhibitor

Torrent ECO SP

Available Components and Tappings

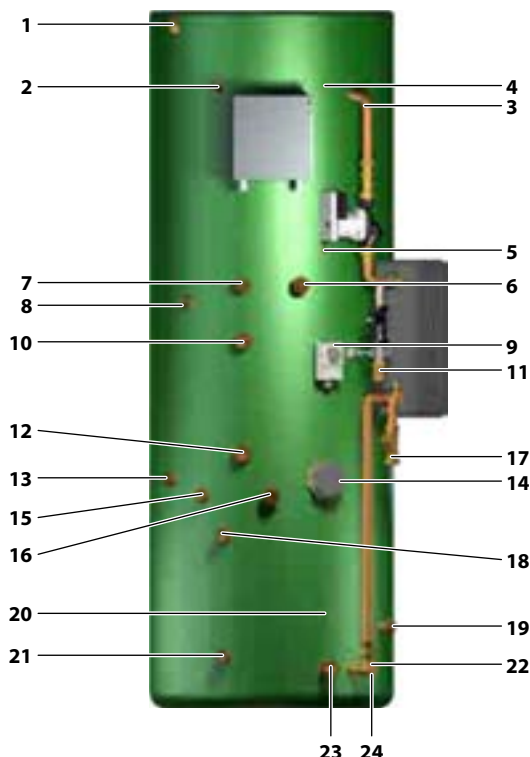
1. Open vent - 22mm comp
2. Overheat stat - 1/2" female
3. Plate heat exchanger flow - 22mm
4. Domestic hot water store sensor
5. Solid fuel flow - 28mm comp
6. Hot water supply - 22mm comp
7. Auxilliary heating flow - 22mm comp
8. Immersion heater
9. Limit stat - 1/2" female
10. SP coil flow - 22mm comp (250/350 - 28mm comp)
11. Cold mains supply - 22mm comp
12. Cold feed - 22mm comp
13. SP coil return - 22mm comp (250/350 - 28mm comp)
14. Plate heat exchanger return - 22mm
15. Auxilliary heating return - 22mm comp
16. Solid fuel return - 28mm comp
17. Drain - 1/2" female

Component kit supplied

- A. Thermostat
- B. Immersion heater

Specify optional components at time of order

- A. Header tank
- B. Ball valve
- C. Float
- D. Overheat thermostat
- E. Solid fuel tappings
- F. Auxilliary heating tappings
- G. Scale inhibitor



Torrent ECO SOL

Available Components and Tappings

1. Open vent - 22mm comp (450 - 28mm comp)
2. Overheat stat - 1/2" female
3. Plate heat exchanger flow - 22mm
4. Domestic hot water store sensor
5. Solar sensor
6. Solid fuel flow - 28mm comp
7. OV boiler flow - 22mm comp (350/450 - 28mm comp)
8. Central heating flow - 22mm comp
9. Limit stat - 1/2" female
10. SP coil flow - 28mm comp (210 - 22mm comp)
11. Hot water supply - 22mm comp
12. SP coil return - 28mm comp (210 - 22mm comp)
13. Central heating return - 22mm comp
14. Immersion heater
15. OV boiler return - 22mm comp (350/450 - 28mm comp)
16. Solid fuel return - 28mm comp
17. Cold mains supply - 22mm comp
18. Solar coil flow - 22mm comp (450 - 28mm comp)
19. Cold feed - 22mm comp
20. Solar sensor
21. Solar coil return - 22mm comp (450 - 28mm comp)
22. Plate heat exchanger return - 22mm
23. Solid fuel return 2 - 28mm comp
24. Drain - 1/2" female

Typical arrangement of tappings shown on the appliance, including optional extras, but these can be adjusted to suit specific installation requirements.

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

Please note there are 2 optional solid fuel return positions on the solar range to enable the whole store water volume to be used to store heat when the solar contribution is negligible.

For example, a solid fuel boiler that is used for space heating would be used in the winter months when the solar contribution is small. Connecting it to the lower return enables the store to hold more heat when the solar contribution is negligible.

Alternatively an Aga which runs 24 hours 365 days a year would need to be connected to the upper return when the solar contribution is greatest and the lower when the solar contribution is least. This allows the solar to make a contribution to the store even though the Aga is running 24 hours a day. A manual 3-port diverter valve may be used to switch from summer to winter mode or more sophisticated control methods used.

The controls should be fitted to maximise useful energy gain: minimise loss of useful energy and ensure that back-up heat sources are not used when adequate grade solar contribution is available. For precise guidance please refer to "table 37 section 6.0a System controls" of the "Domestic building compliance guide 2010".

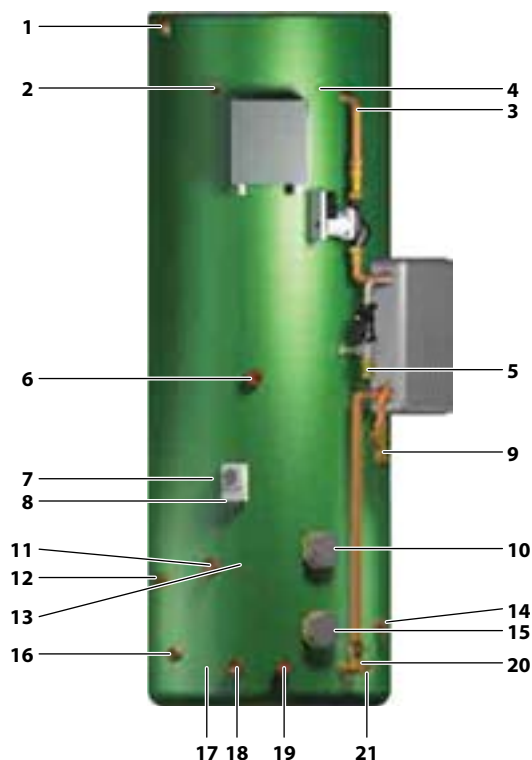
Component kit supplied

- A. Thermostat
- B. Immersion heater

Specify optional components at time of order

- A. Header tank
- B. Ball valve
- C. Float
- D. Overheat thermostat
- E. Solid fuel tappings
- F. Sealed primary boiler coil
- G. Scale inhibitor

DESIGN



Torrent ECO HP

Available Components and Tappings

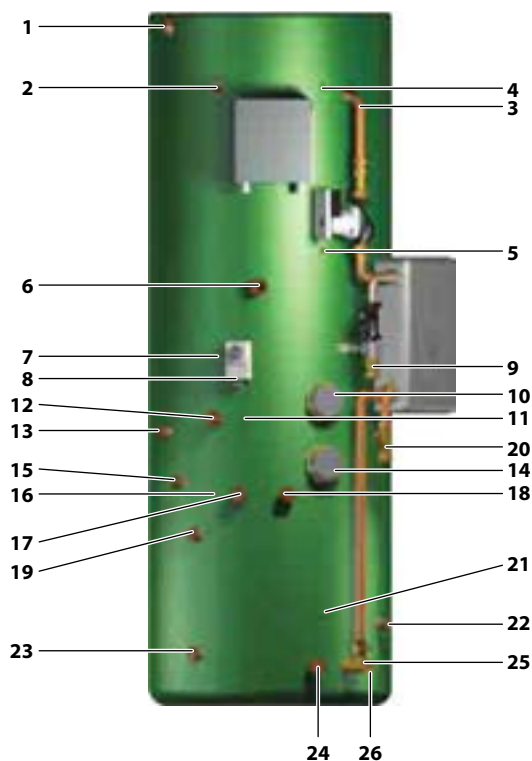
1. Open vent - 22mm comp (450 - 28mm comp)
2. Store overheat - 1/2" female
3. Plate heat exchanger flow - 22mm
4. Domestic hot water store sensor
5. Hot water supply - 22mm comp
6. Solid fuel flow - 28mm comp
7. Heat pump cylinder sensor
8. Limit stat - 1/2" female
9. Cold mains supply - 22mm comp
10. DHW backup immersion heater
11. Heat pump flow - 28mm comp (350/450 1.25 Fem)
12. Central heating flow - 22mm comp
13. Domestic hot water store sensor
14. Cold feed - 22mm comp
15. CH boost immersion heater
16. Central heating return - 22mm comp
17. Heat pump return sensor
18. Heat pump return - 28mm comp (350/450 1.25 Fem)
19. Solid fuel return - 28mm comp
20. Plate heat exchanger return - 22mm
21. Drain - 1/2" female

Component kit supplied

- A. Thermostat
- B. Immersion heater

Specify optional components at time of order

- A. Header tank
- B. Ball valve
- C. Float
- D. Overheat thermostat
- E. Solid fuel tappings
- F. Scale inhibitor



Torrent ECO HP SOL

Available Components and Tappings

1. Open vent - 22mm comp (450 - 28mm comp)
2. Overheat stat - 1/2" female
3. Plate heat exchanger flow - 22mm
4. Domestic hot water store sensor
5. Solar sensor
6. Solid fuel flow - 28mm comp
7. Heat pump cylinder sensor
8. Limit stat - 1/2" female
9. Hot water supply - 22mm comp
10. DHW backup immersion heater
11. Heat pump flow sensor
12. Heat pump flow - 28mm comp (350/450 1.25 Fem)
13. Central heating flow - 22mm comp
14. CH boost immersion heater
15. Central heating return - 22mm comp
16. Heat pump return sensor
17. Heat pump return - 28mm comp (350/450 1.25 Fem)
18. Solid fuel return - 28mm comp
19. Solar coil flow - 22mm comp (450 - 28mm comp)
20. Cold mains supply - 22mm comp
21. Solar sensor
22. Cold feed - 22mm comp
23. Solar coil return - 22mm comp (450 - 28mm comp)
24. Solid fuel return - 28mm comp
25. Plate heat exchanger return - 22mm
26. Drain - 1/2" female

Component kit supplied

- A. Thermostat
- B. Immersion heater

Specify optional components at time of order

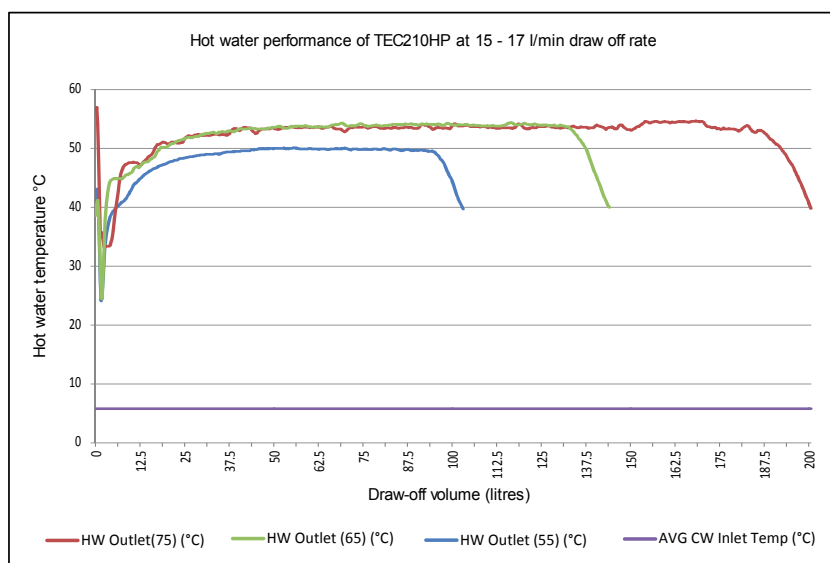
- A. Header tank
- B. Ball valve
- C. Float
- D. Overheat thermostat
- E. Solid fuel tappings
- F. Scale inhibitor

Typical arrangement of tappings shown on the appliance, including optional extras, but these can be adjusted to suit specific installation requirements.

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

General

- All Torrent ECO HP models covered by this manual, are only suitable for open vented primary (heat pump and space heating) circuits. Therefore the pressure in the primary circuit depends upon the height of the feed and expansion cistern and could be as low as 0.20 bar. Therefore ensure that the heat pump selected will operate at primary circuit pressures e.g. it is not fitted with a non-adjustable low system pressure switch.
- The heat pumps normally operate at lower temperature difference (5-10°C) between flow and return than that for a gas boilers (10-20°C) resulting in higher flow rates in the heat pump primary circuit. Therefore it is important that the primary pipework connecting the heat pump to the thermal store and the circulating pump are sized to achieve flow rates recommended by the heat pump manufacturer.
- The efficiency (i.e. coefficient of performance, COP) of a heat pump depends upon the primary flow and return temperatures and it is generally higher at lower primary circuit temperatures. Also the heat pumps normally operate at lower flow temperatures; typically 45-55°C compared with 75-80°C for gas boilers. Therefore if traditional radiators are used then, these should be oversized in accordance with the heat pump manufacturers recommendations.
- For optimum operational efficiency and hence lower running costs, a low temperature space heating (e.g. under-floor heating) system should be used where feasible.



The draw off volume figures shown above are for the TEC210 HP store. These are increased accordingly as the cylinder capacity increases. The graph illustrates the increase in volume that can be achieved by the use of the auxiliary heat source.

A 15 - 17 litre/min flow restrictor is fitted to the Torrent ECO HP hot water supply outlet on commissioning. Check that the hot water flow does not exceed 17 litre/min.

Particular attention needs to be paid to the product size selection. If the intention is for the majority of the hot water to be provided by the heat pump with minimal use of the auxiliary immersion element then it may be necessary to choose a larger store.

Heat Pump Sizing

- The efficiency (i.e. coefficient of performance, COP) of an air source heat pump and hence its heat output generally decreases as the ambient air temperature decreases. Therefore, this factor should be taken into account when sizing and selecting the heat pump.
- The design space heating load of a dwelling should be calculated in accordance with BS EN 12831 and/or the CIBSE guide. The allowance for domestic hot water heating (shown in table below), depends upon the operating mode. For example, if the system is designed to operate with priority for domestic hot water, then no additional allowance for hot water is required for sizing the heat pump.

Allowance for Domestic Hot Water Heating		
Torrent Model	Allowance for Domestic Hot Water	
	Hot Water Priority Mode	Flow Share Mode
180 HP-SOL	0kW	1.5kW
180 HP 210 HP-SOL	0kW	2.5kW
210 HP 250 HP-SOL	0kW	3.0kW
250 HP 300 HP-SOL	0kW	3.5kW
350 HP 450 HP-SOL	0kW	4.0kW
450 HP-SOL	0kW	5.0kW

INSTALLATION

Torrent ECO OV Model Selection Guide		
Max hot water demand	Bedrooms	Model
1 bathroom	1 - 2	TEC140-OV
1 bathroom + en-suite shower	2 - 4	TEC170-OV
2 bathrooms + en-suite shower	3 - 4	TEC210-OV
2 bathrooms + 2 en-suite showers	3 - 5	TEC250-OV
3 bathrooms + 2 en-suite showers	3 - 5	TEC350-OV

Torrent ECO SP Model Selection Guide		
Max hot water demand	Bedrooms	Model
1 bathroom	1 - 2	TEC140-SP
1 bathroom + en-suite shower	2 - 4	TEC170-SP
2 bathrooms + en-suite shower	3 - 4	TEC210-SP
2 bathrooms + 2 en-suite showers	3 - 5	TEC250-SP
3 bathrooms + 2 en-suite showers	3 - 5	TEC350-SP

Torrent ECO SOL Model Selection Guide			
Max hot water demand	Max solar collector area (m ²)	Bedrooms	Model
1 bathroom + en-suite shower	2.47	2 - 4	TEC210-SOL
2 bathrooms + en-suite shower	2.91	2 - 4	TEC250-SOL
2 bathrooms + 2 en-suite showers	4.03	3 - 5	TEC350-SOL
3 bathrooms + 2 en-suite showers	5.19	4 - 6	TEC450-SOL

Torrent ECO HP Model Selection Guide		
Max hot water demand	Bedrooms	Model
1 bathroom + en-suite shower	2 - 3	TEC170-HP
1 bathroom + 2 en-suite showers	2 - 3	TEC210-HP
2 bathrooms + en-suite shower	3 - 4	TEC250-HP
2 bathrooms + 2 en-suite showers	3 - 4	TEC350-HP
3 bathrooms + 2 en-suite showers	4 - 5	TEC450-HP

Torrent ECO HP-SOL Model Selection Guide			
Max hot water demand	Max solar collector area (m ²)	Bedrooms	Model
1 bathroom + en-suite shower	2.47	2 - 3	TEC210-HPSOL
1 bathroom + 2 en-suite showers	2.91	2 - 3	TEC250-HPSOL
2 bathrooms + 1 en-suite shower	4.03	3 - 4	TEC350-HPSOL
2 bathrooms + 2 en-suite showers	5.19	3 - 4	TEC450-HPSOL

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 6-7) 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.

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.

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

General Restrictions

- An ascending spray type bidet or any other appliance with a Class 1 back-syphonage risk requiring a type A air gap should not be used.
- Torrent 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. All Torrent models are designed to be fed directly from the mains 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 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 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

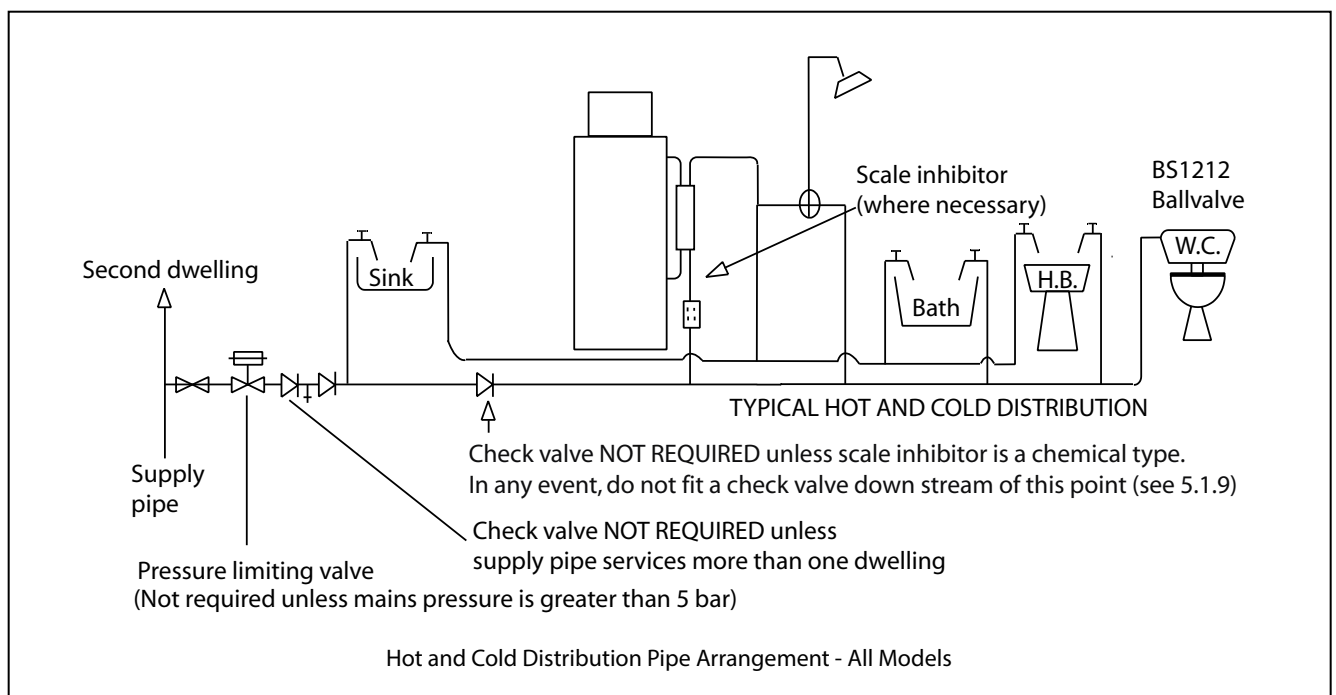
Aerated taps are recommended to prevent splashing.

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. 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 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.

The supply of hot and cold mains water directly to the bidet is permitted provided that it is of the over-rim flushing type and that type 'A' air gap is incorporated.



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 18 for guidance sizing the feed and expansion tank.

Water Treatment

In all Torrent 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 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 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 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 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 R&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 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.

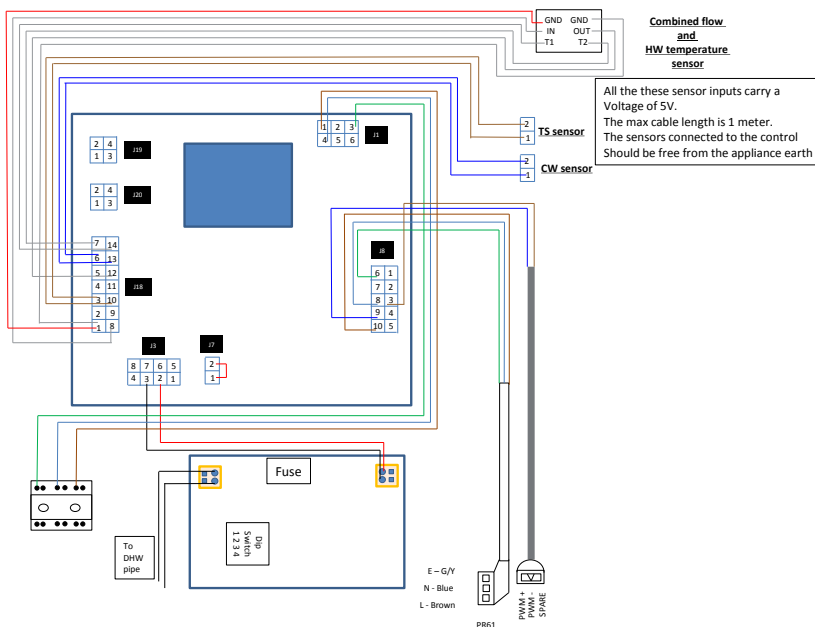
INSTALLATION

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.

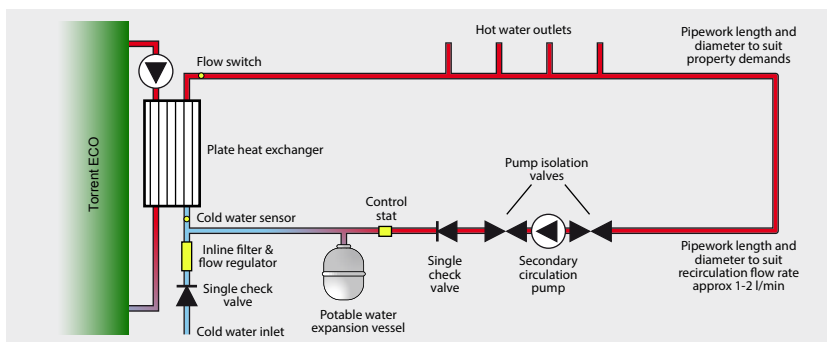
The control panel front cover is secured by 4 black screws. Remove these and lift off the front cover to expose the power terminals. These are found at the bottom left of the control panel. Prepare the cable end and feed it through the cable gland.

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.



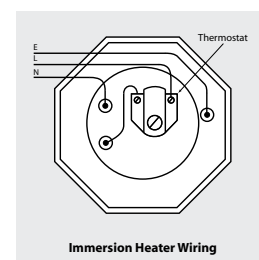
It is important that the cold water pipework is adequately separated and protected

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

If secondary circulation is used, there is a possibility that excessively hot temperatures may be experienced in the hot water supply pipework due to the blending valve not being able to mix with cold water because the water is always supplied hot. 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 of the blending valve.

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 incorporating a 'single shot' overheat energy cut out which means it cannot

be reset and must be replaced if it has operated. They have incolloy elements to prolong their life expectancy in aggressive water conditions.

The correct method of connecting the wiring to the immersion heater is shown here.

Utilising Off Peak Electricity

Where it is intended that units are fitted to 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 fuse and a 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

INSTALLATION

Allowance for domestic hot water for sizing the boiler		
Torrent model	Allowance for domestic hot water heating (kW)	
	Full divert mode	Flow share mode
140	0	2
170	0	3
210	0	3.5
280	0	4.5
350	0	6.0
450	0	8.0

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.

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

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 primary heat exchanger is listed in specification tables on pages 6 and 7 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.

Thermal Store	Potential Expansion of Water in Store (litres)	Minimum Number of Feed and Expansion Tanks (16 litre model inc. 10 litre expansion)
TEC140	OV model - 6.6 SP model - 6.6	1
TEC170	OV model - 7.0 SP model - 7.0	1
TEC210	OV model - 9.6 SP model - 9.5 SOL model - 8.0	1
TEC250	OV model - 10.6 SP model - 10.1 SOL model - 11.1	2
TEC350	OV model - 16.5 SP model - 16.3 SOL model - 16.4	2
TEC450	SOL model - 21	3
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).		

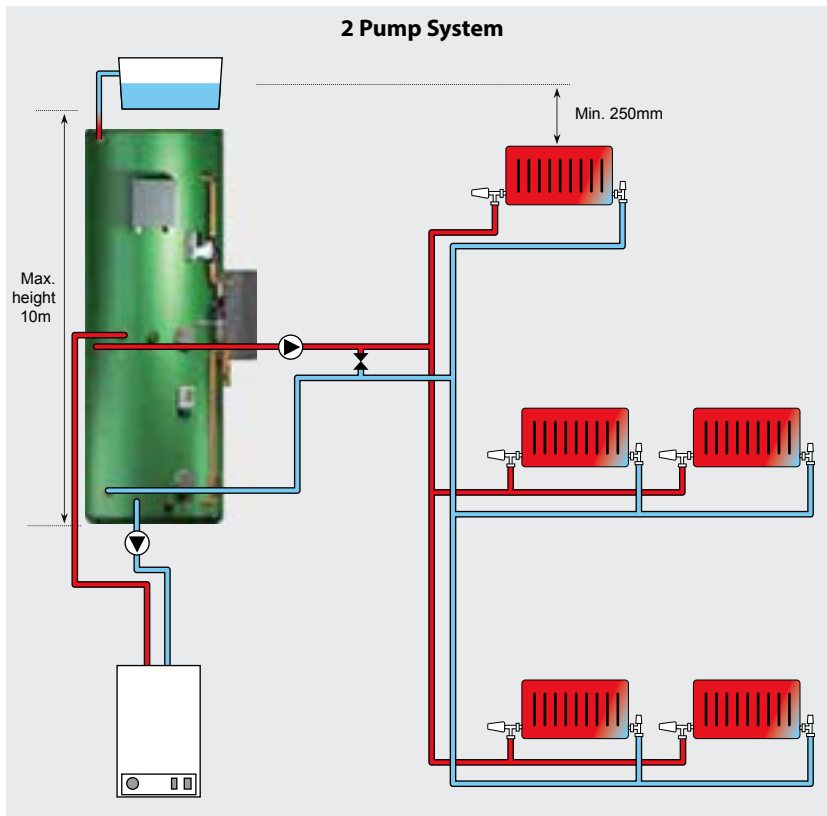
Feed And Expansion Tank For Open Vented Heating System

The potential expansion of all the thermal stores in the range is shown in the table opposite, alongside the capacity for expansion, in our standard F & E tank, which can be supplied as an optional extra.

Expansion for all other open vented 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 26 for further information regarding F&E tanks when using solid fuel input.

INSTALLATION

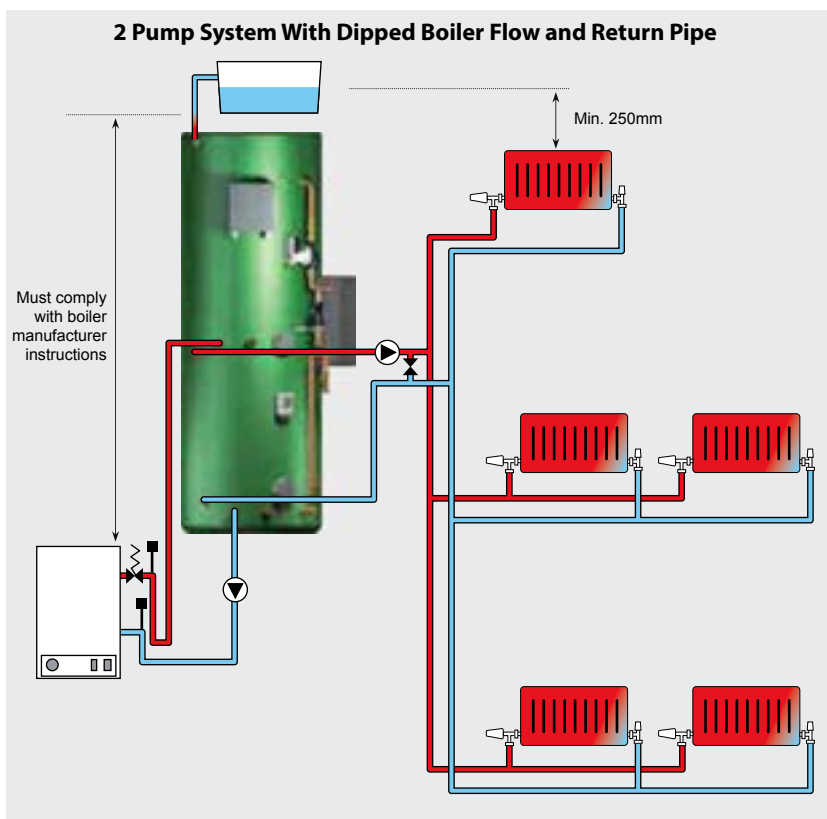


Open vented heating systems

The open vented primary system is filled via the feed and expansion (F&E) tank fitted with the Torrent 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 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 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 OV and the Torrent SOL provided the flow pipe from the boiler to the Torrent is continuously rising. The flow pipe between the boiler and the Torrent 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.

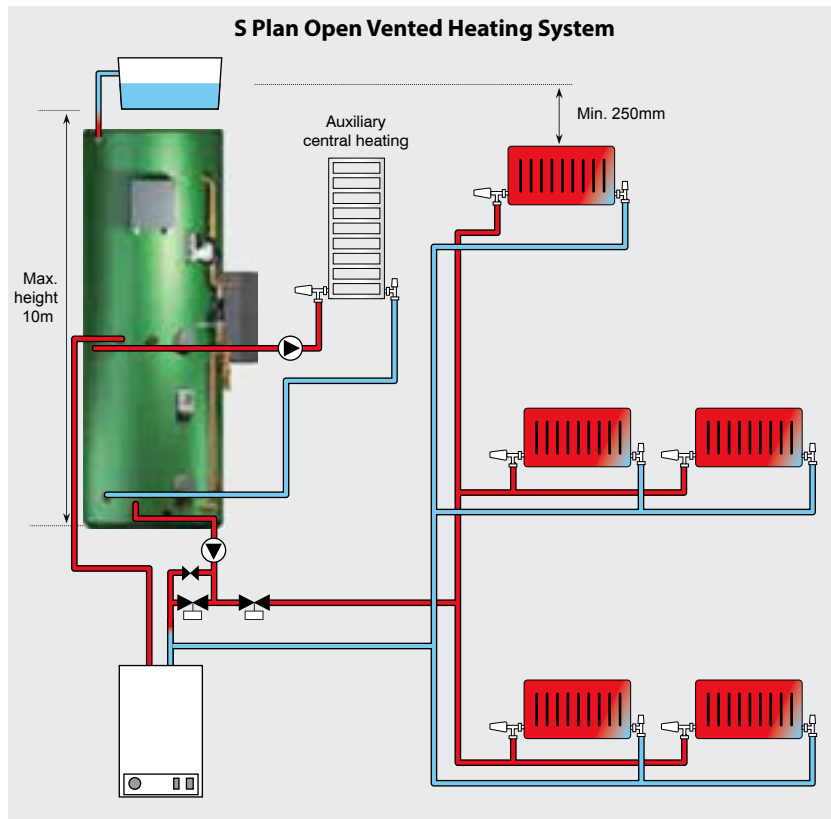
The minimum size of flow and return pipe between the boiler and the Torrent should be 22mm copper or equivalent. In any case it should be sized to suit the installed boiler capacity, available pump head and the circuit resistance.

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

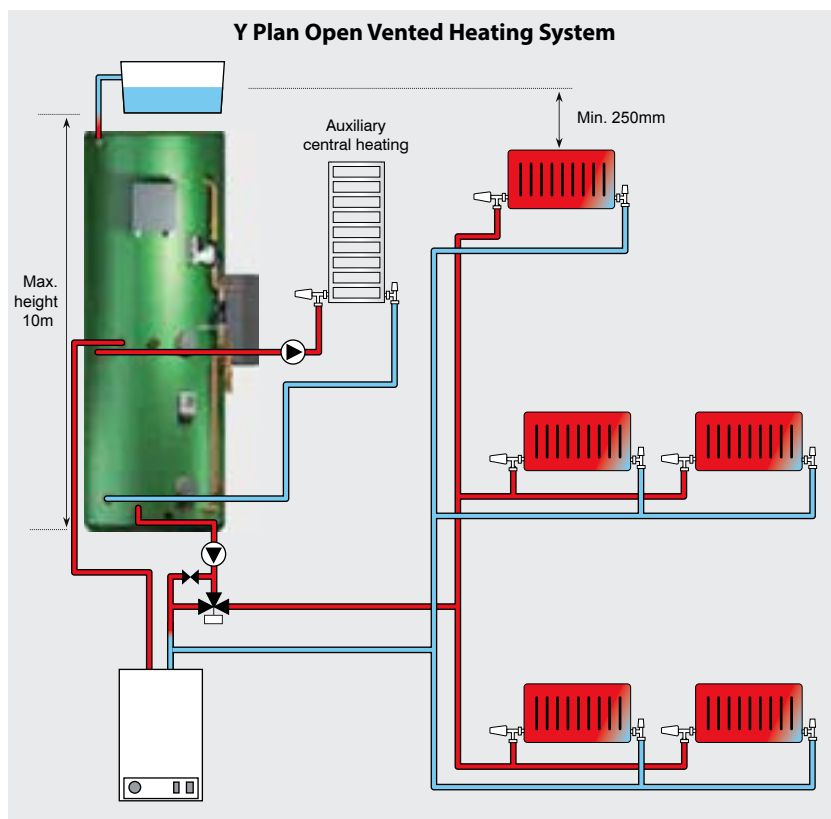


The two diagrams shown on this page show how an 'S' plan and 'Y' plan may be used in conjunction with the Torrent ECO OV, with another space heating supply being taken direct from the store. The type of space heating used is the installer's choice and the diagrams only show possible layouts.

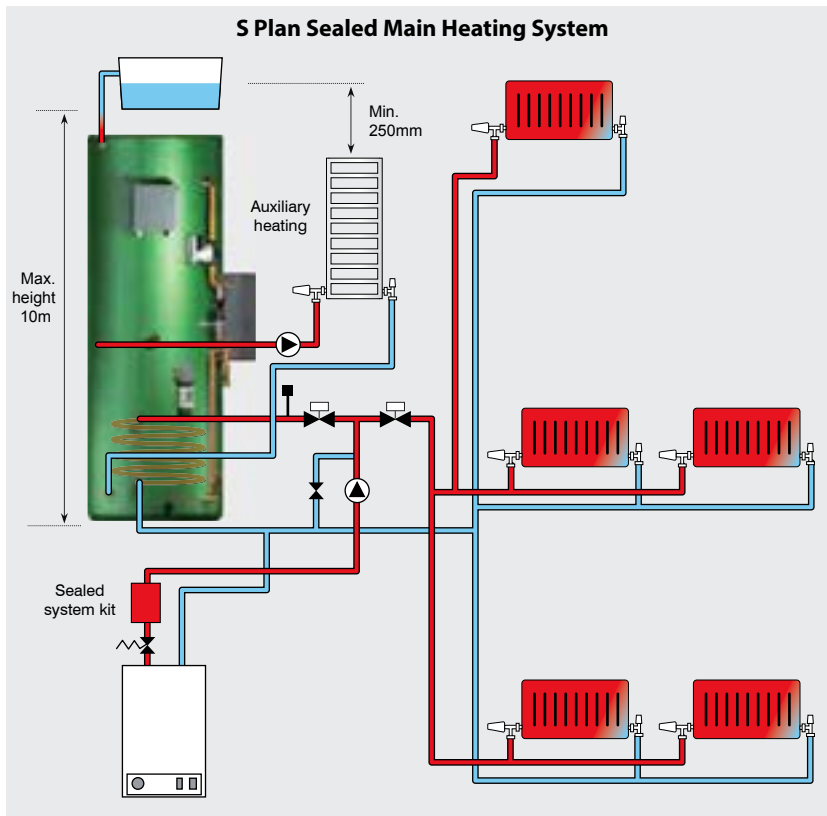
The auto bypass is positioned here to allow minimum flow rates through the boiler as TRVs close; and to allow for boilers with pump overrun.

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 ECO OV, please refer to page 20 for further information.



INSTALLATION



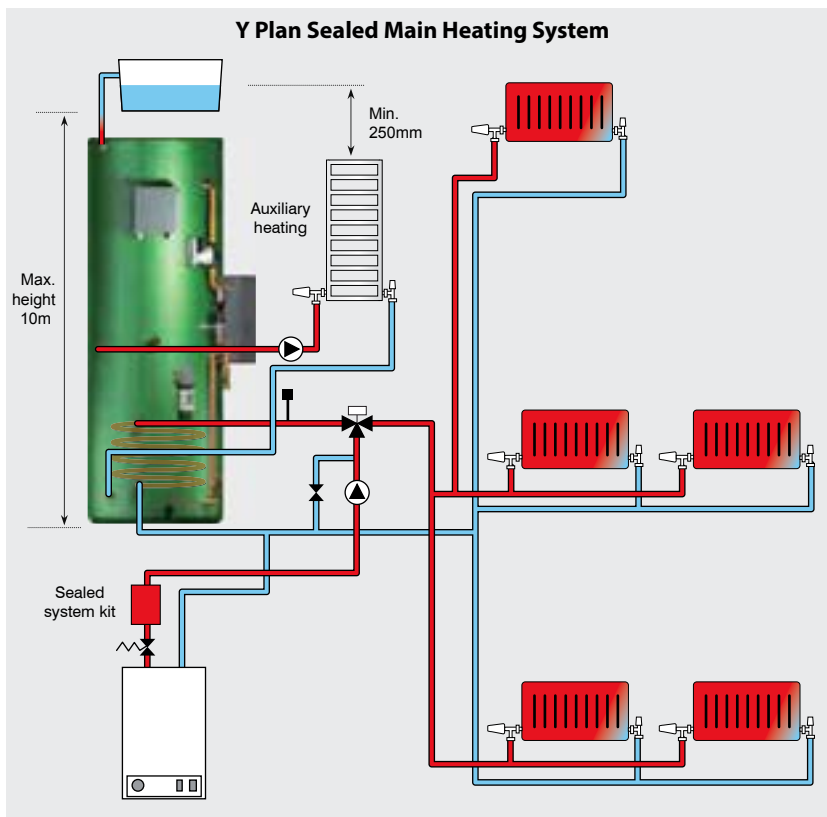
Sealed heating system

All Torrent 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 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. However it can be fitted remotely up to 10m above the base of the Torrent, 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.

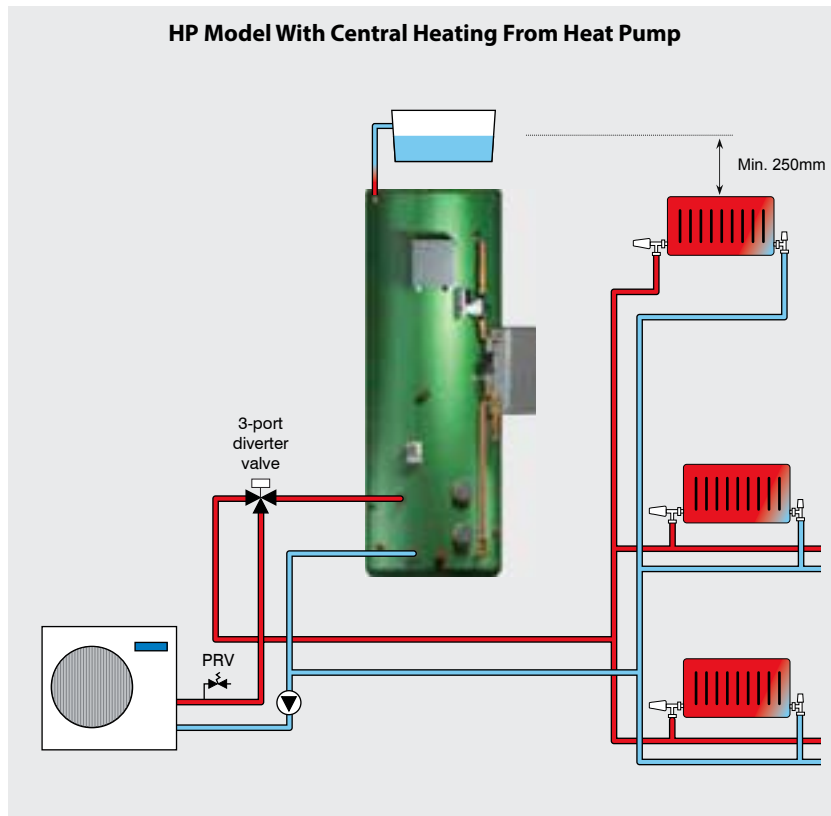
The minimum system pressure should not be less than the static head plus 0.5 bar i.e. the height of the highest point in the system above the expansion vessel plus a margin of 0.5 bar.

A solid fuel boiler is also able to be connected to the Torrent ECO SP, please refer to page 20 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.

INSTALLATION

HP Model With Central Heating From Heat Pump



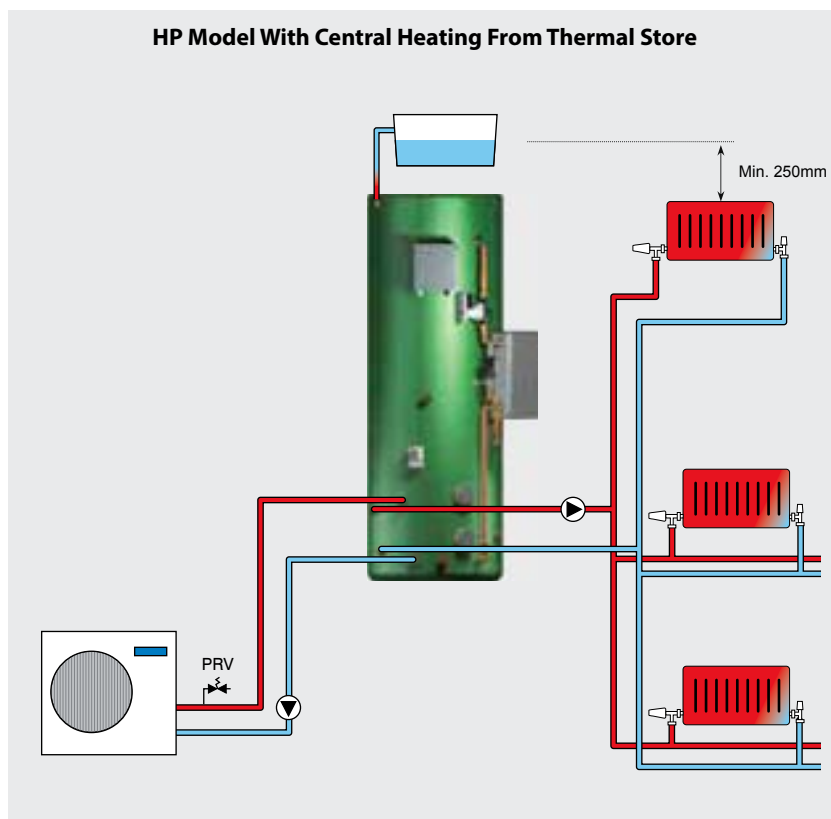
Torrent Green HP Models

The Torrent ECO HP models are all open vented and are designed to be heated directly by an air or a ground source heat pump which does not require a minimum pressure in the primary circuit for operation. The space heating can be supplied directly from the heat pump circuit or from the thermal store.

The selection between the two options will depend upon the operating characteristics of the heat pump, type of heating system and control strategy. For general guidance: -

- If the heat pump requires a buffer for operation; for example to reduce rapid cycling etc, then the system would benefit if the heating system is supplied from the thermal store. In this configuration, the operation of the heat pump is only controlled by the store thermostat(s).
- A hybrid system arrangement can also be used (not shown). For example; a low temperature weather compensated heating circuit e.g. under floor heating can be supplied directly from the heat pump circuit and constant temperature e.g. towel rails can be supplied from the thermal store.

HP Model With Central Heating From Thermal Store



A typical wiring arrangement for a system in which the space heating is supplied from a Torrent ECO HP is shown on page 34 and a typical wiring arrangement for a system in which the space heating is supplied from a heat pump circuit is shown on page 35.

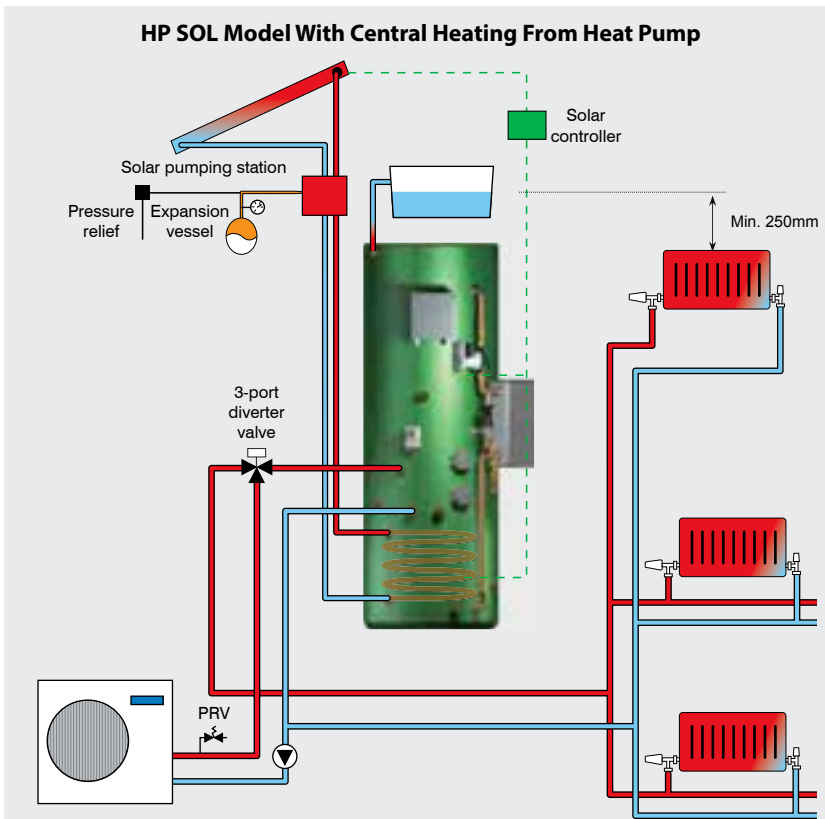
On page 34, the control of heat pump is shown with top and bottom thermostats to enhance the performance of the heat pump by decreasing the frequency of cycling. The heat pump is switched on when both top and bottom thermostats are calling for heat and is switched off when both thermostats stop calling for heat. A two channel programmer suitable for gravity hot water system should be used with this arrangement.

On page 35, the generic wiring arrangement is shown with a 3-port diverter valve with hot water priority. If a 3-port flow share valve is used, then the controls should be wired to provide priority for hot water because the space heating and the hot water heating may be operating at different flow temperatures.

Technological advancement of heat pump control systems is occurring at a fast pace and the control systems supplied with the heat pump can provide full control of the system. It is also important to ensure that the minimum head for the heat pump and the system pump is as required by the heat pump manufacturer. Please refer to the heat pump manufacturers instructions to obtain further information.

INSTALLATION

HP SOL Model With Central Heating From Heat Pump



Torrent ECO HP-Solar Models

The heat pump and space heating system configurations and operation with the Torrent ECO HP-solar models is the same as for standard models. The solar thermal system operates independent of the heat pump system. A typical generic solar system configuration is shown for guidance only. The solar system and the associated controls should be planned and installed following manufacturers instructions.

All components in the solar primary system must be marked or identifiable in such a way that their design pressure and temperature can be readily determined.

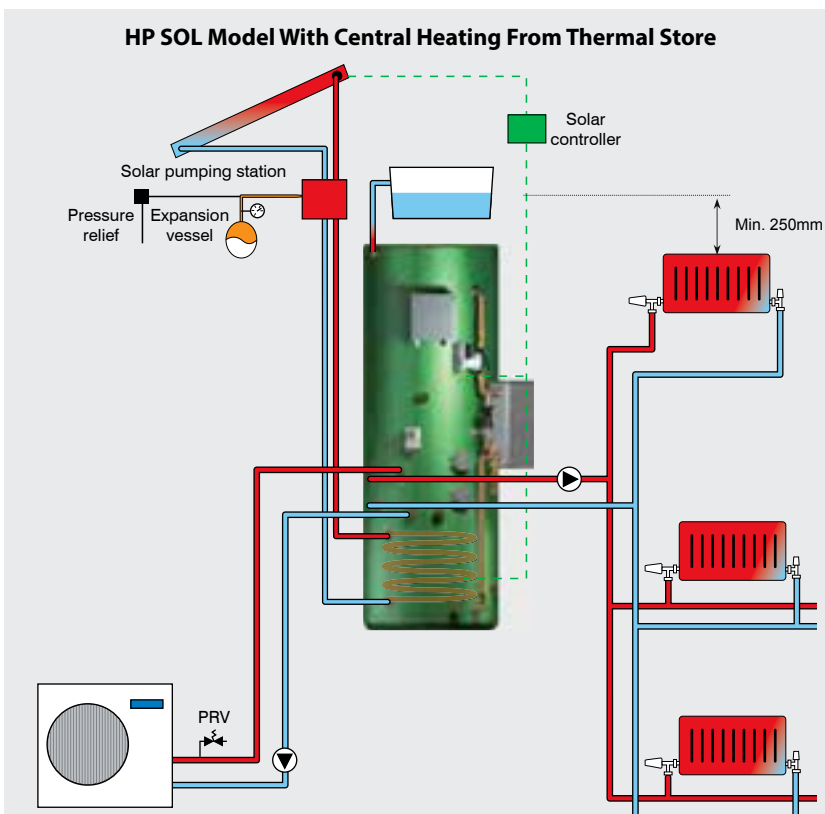
A safety device i.e. pressure relief valve to control the risk of over-pressure in the system components should be fitted as per solar system manufacturers instructions. A termination from the pressure relief valve should minimise the risk of damage to persons or materials. Suitable locations are a high temperature receptacle, internal gully or else externally at ground level. High level termination from a wall or on a roof could cause injury to people or animals below if the valve were to release scalding water and steam.

The pipe leading to from the safety device to the collector should be rigid and non-deformable construction, without any possibility of restriction, distortion or closure by any other fitted component.

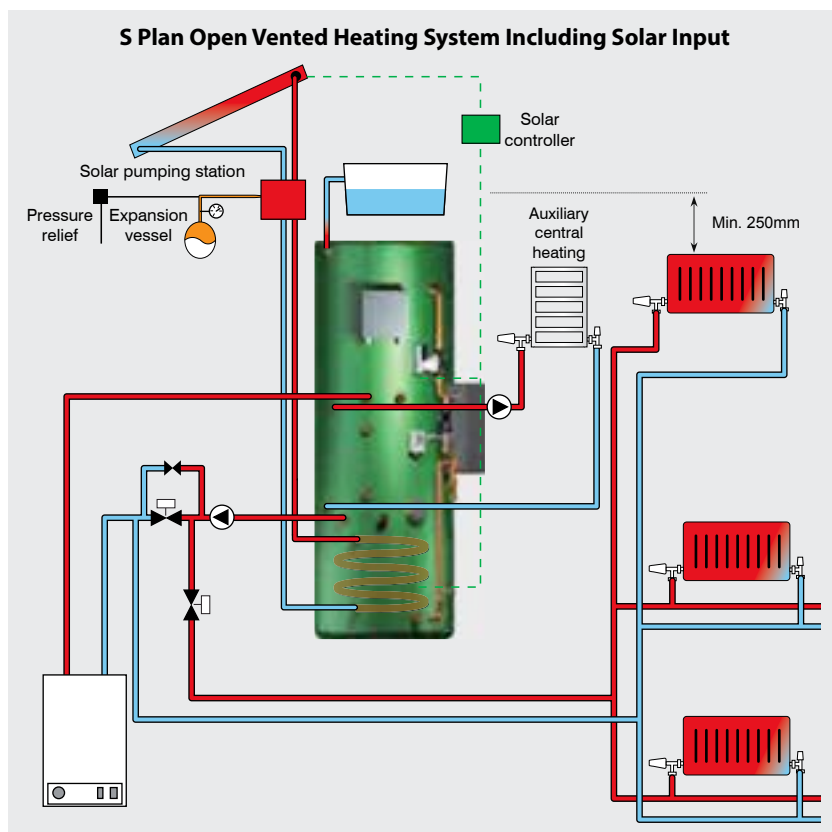
A typical wiring diagram for the solar thermal system for the Torrent ECO HP-solar is shown on page 35.

The control packages supplied with the heat pump can not only control the heat pump but any backup devices as well, for example, solar thermal, gas boiler and immersion heater flow boilers.

HP SOL Model With Central Heating From Thermal Store



INSTALLATION



Solar heating circuit

The Torrent 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 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 SOL based systems.

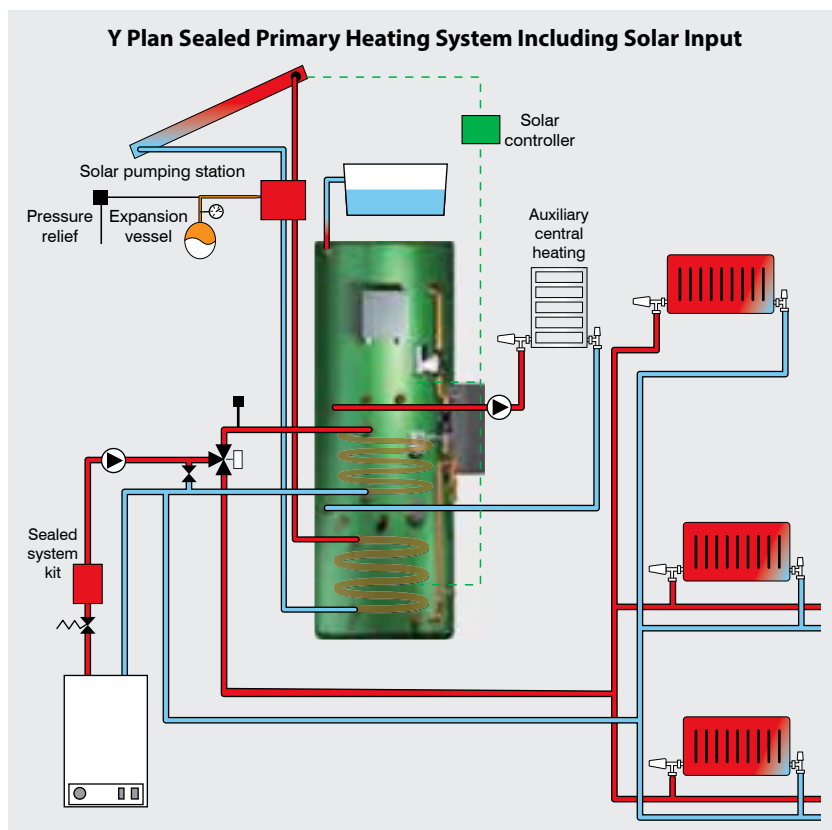
The diagram opposite shows the Torrent SOL type used in a traditional open vented heating system. The water level in the F&E tank should be at least 250mm above the highest point of the heating system e.g. a radiator.

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 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 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).



INSTALLATION

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 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 ECO SOL, please refer to page 20 for further information.

Domestic overheat protection

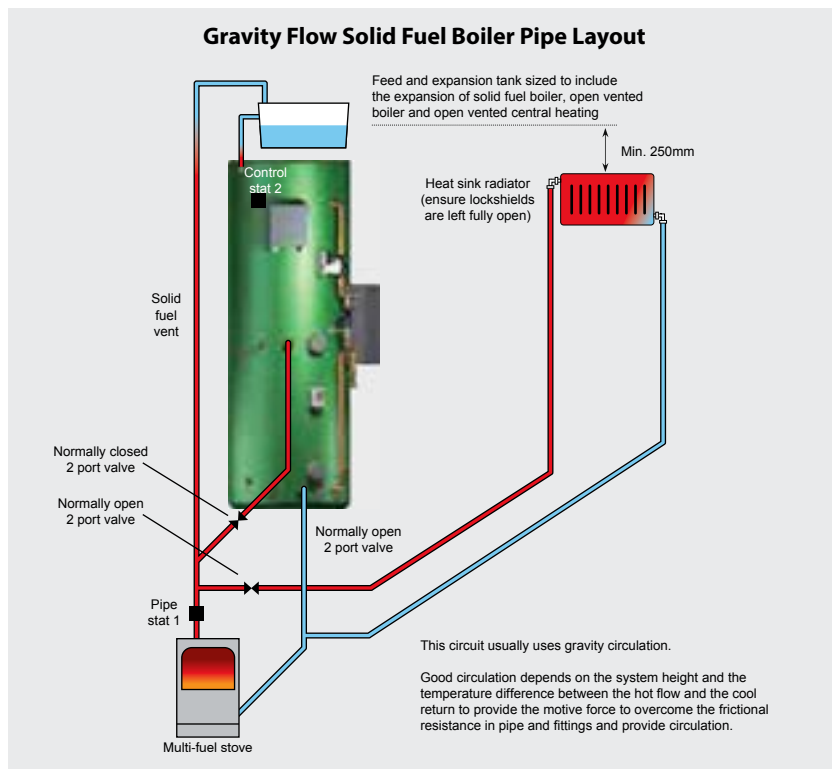
To comply with building regulations the solar overheat thermostat should be set at a temperature which prevents the contents of the thermal store exceeding 100°C.

The DHW production board does not incorporate an overheat functionality linked to the primary store temperature which prevents 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 Eco 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



Solid Fuel Option

All models of the Torrent ECO 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 17th 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) - High limit pipe thermostat
- (XC010) - Control thermostat

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. To comply with building regulations control stat 2 should be set at a temperature which prevents the contents of the thermal store exceeding 100°C. If temperatures in store exceed 85°C then secondary protection will be required in accordance with Part G3 of Building regulations.

There are 2 solid fuel returns on the Sol cylinder range to enable the whole store water volume to be used to store heat when the solar contribution is negligible. For example, a solid fuel boiler that is used for space heating would only be used in the winter months when the solar contribution is small. Connecting it to lower return enables the store to hold more heat when the sun cannot provide as much.

Alternatively an Aga which runs 24 hours 365 days a year would need to be connected to the upper return when the solar contribution is greatest and the lower when the solar contribution is least. A pair of simple isolation valves may be used to switch from summer to winter mode or more sophisticated control methods used.

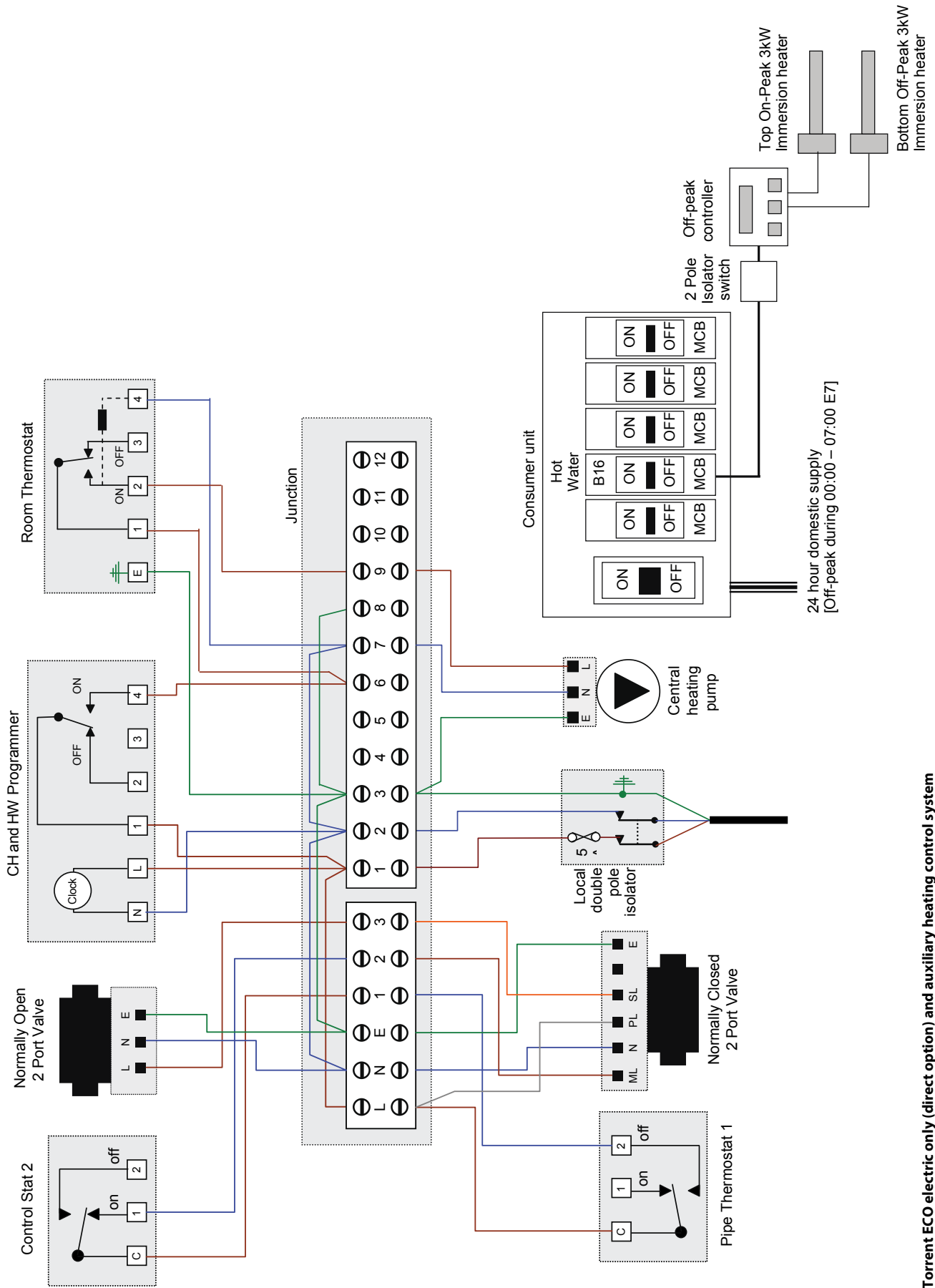
With regards to the domestic hot water overheat protection, please refer to page 25 in this installation manual.

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.

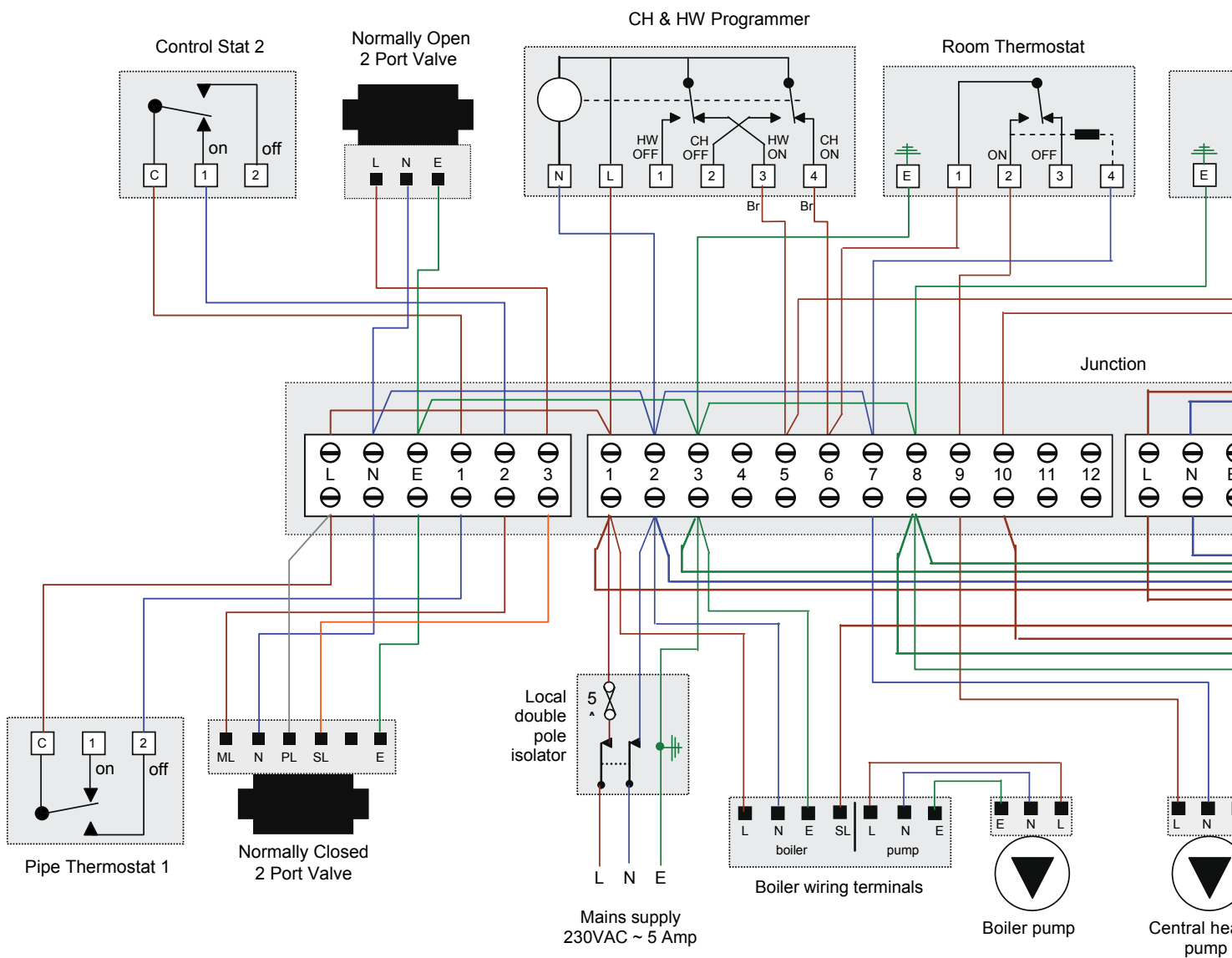
The capacity of the cistern should be at least one twentieth of the total system volume. The cistern should be fitted with a brass float operated valve that is manufactured to BS1212 Pt. 2 and is fitted with an appropriately sized copper float. The overflow pipe should be either made of metal or manufactured 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.

INSTALLATION



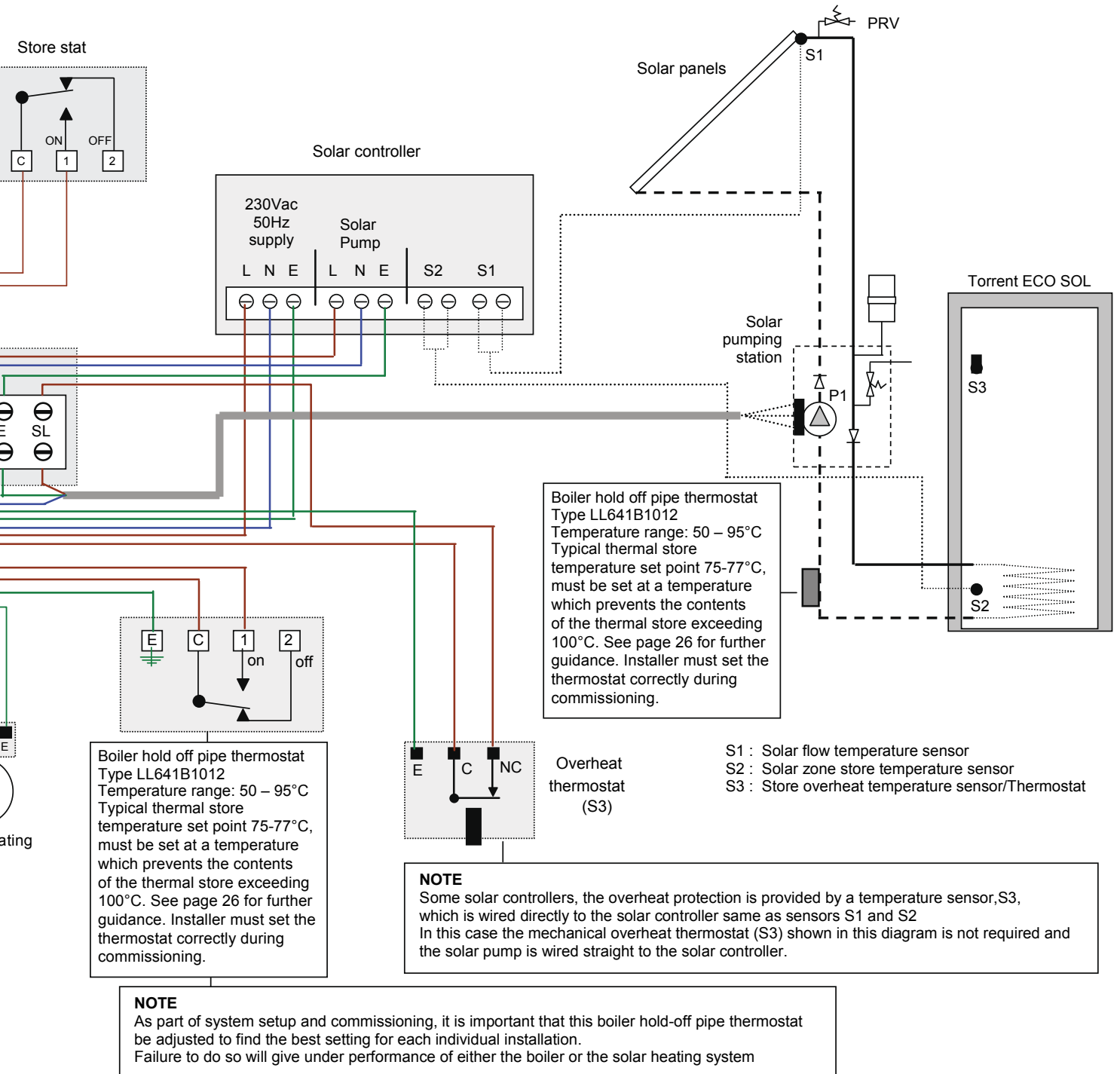
Torrent ECO electric only (direct option) and auxiliary heating control system

INSTALLATION

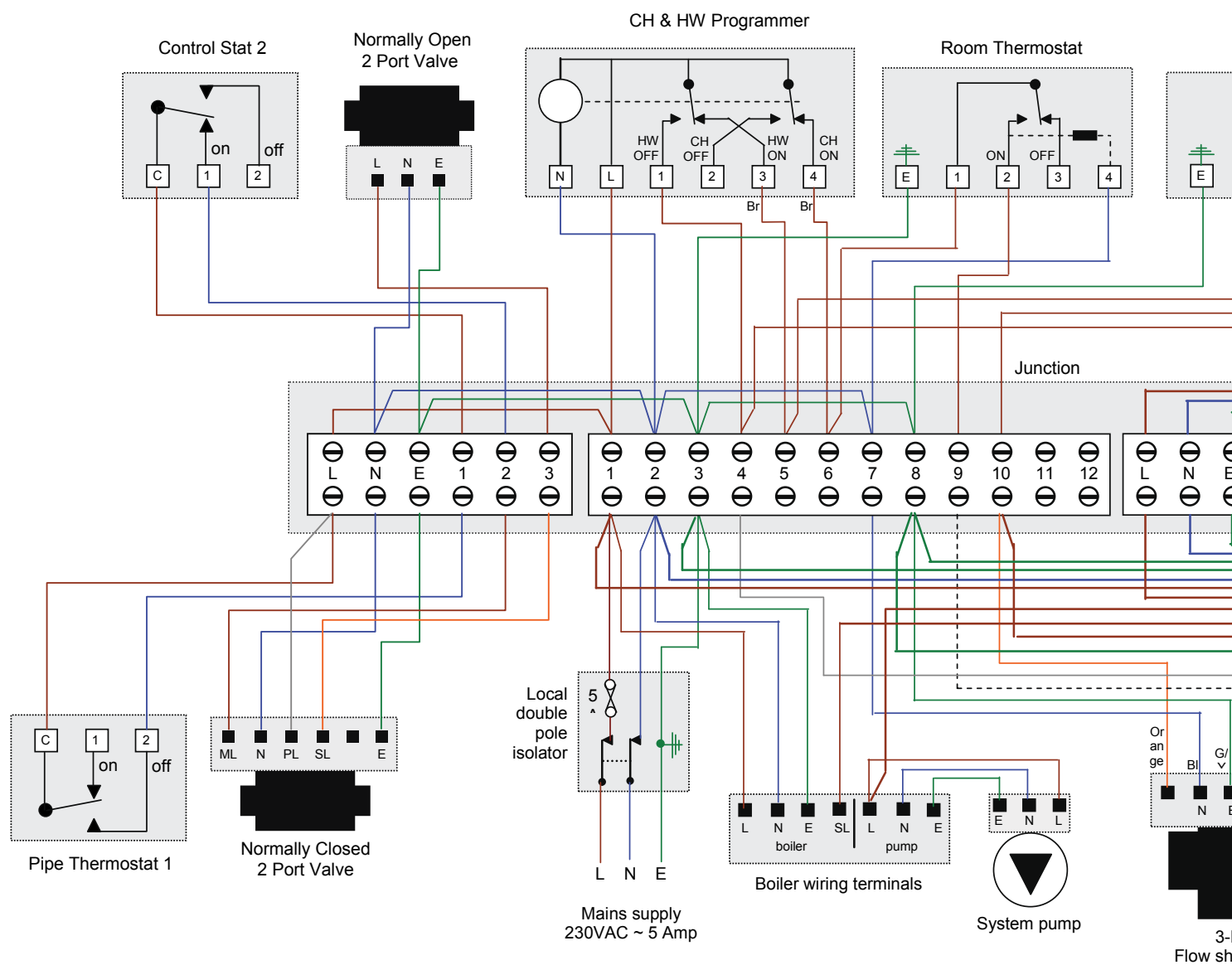


Torrent ECO with 2 pump heating control system and typical solar heating system

INSTALLATION

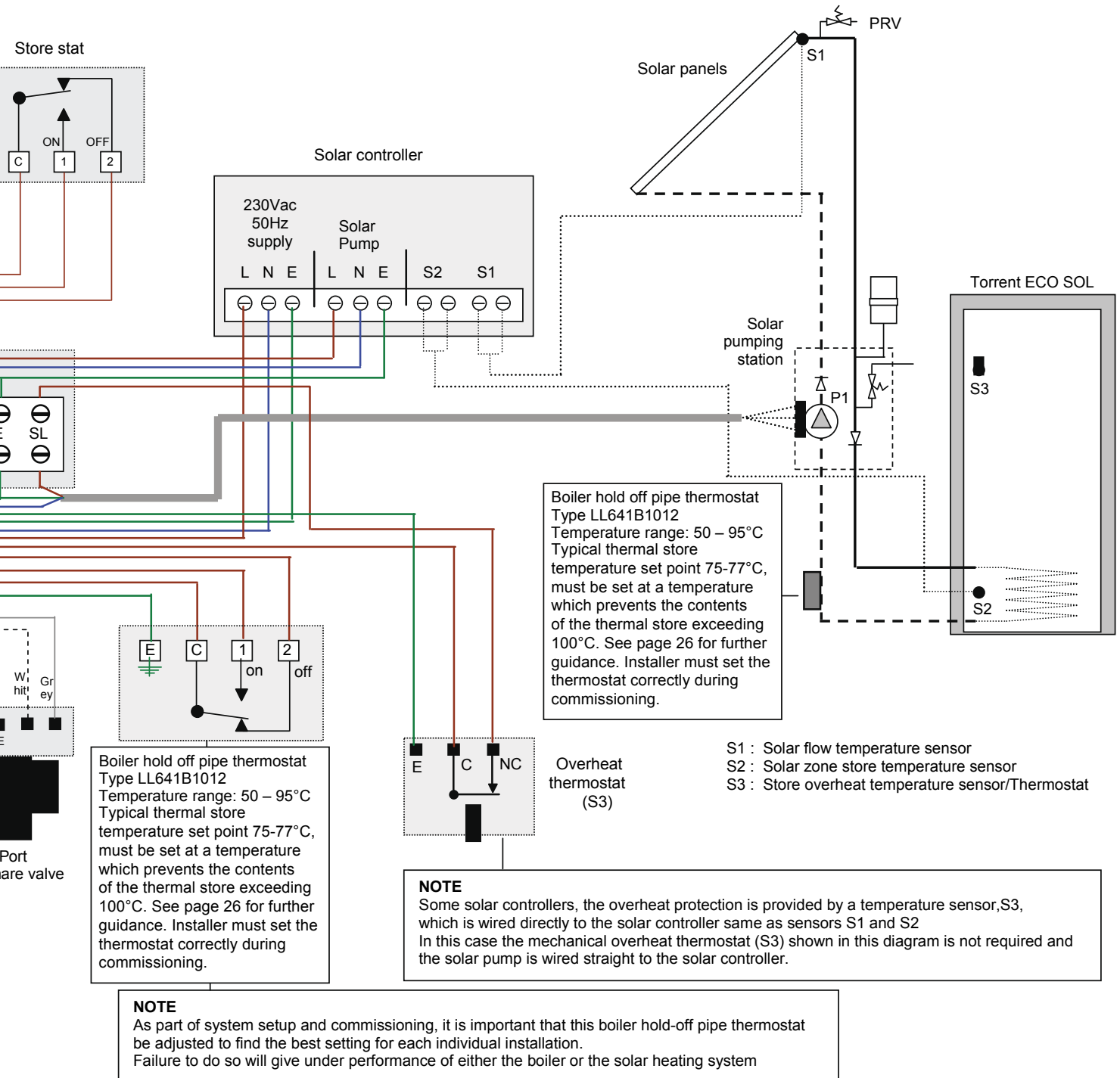


INSTALLATION

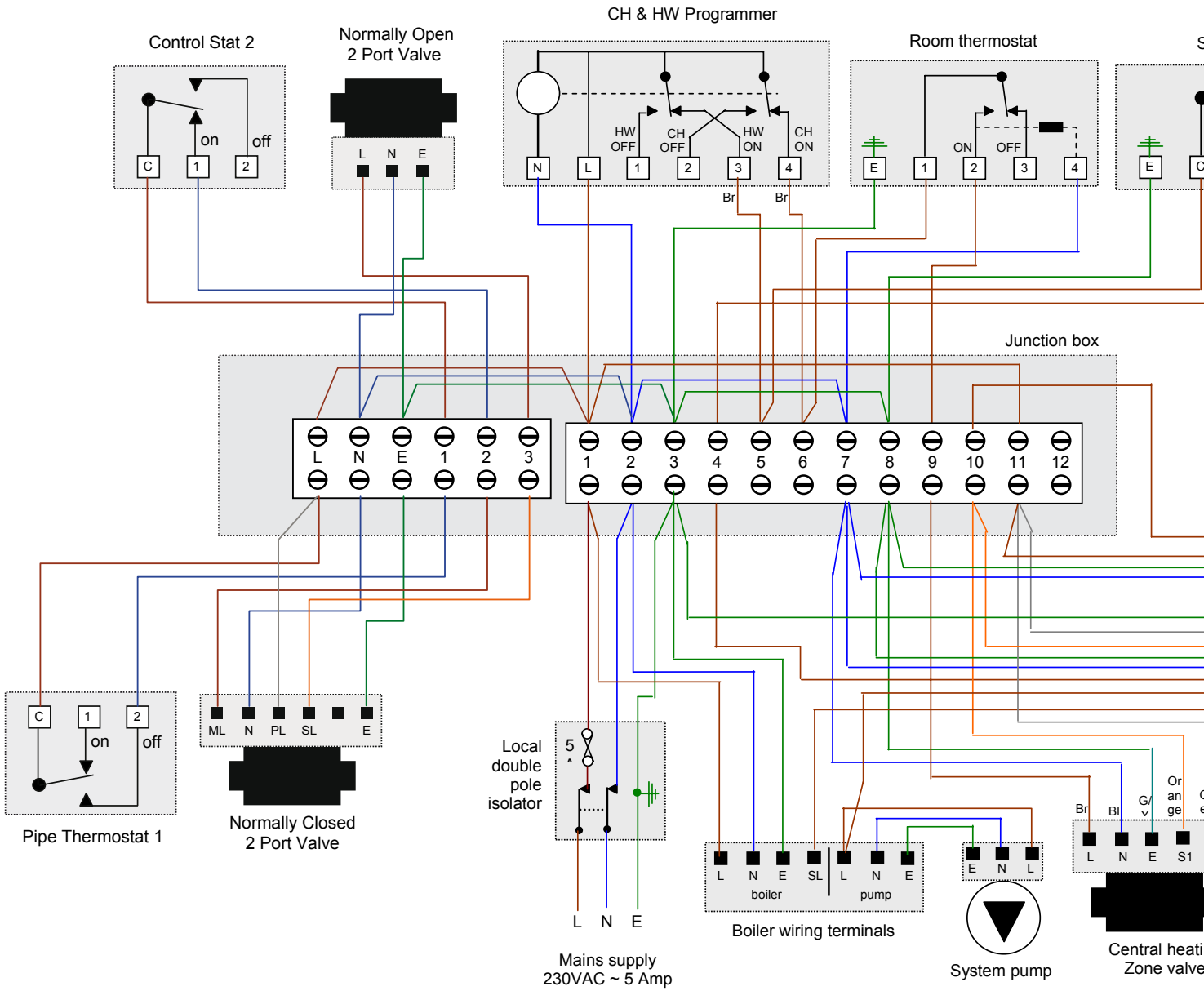


Torrent ECO with 'Y' Plan heating control system and typical solar heating system

INSTALLATION

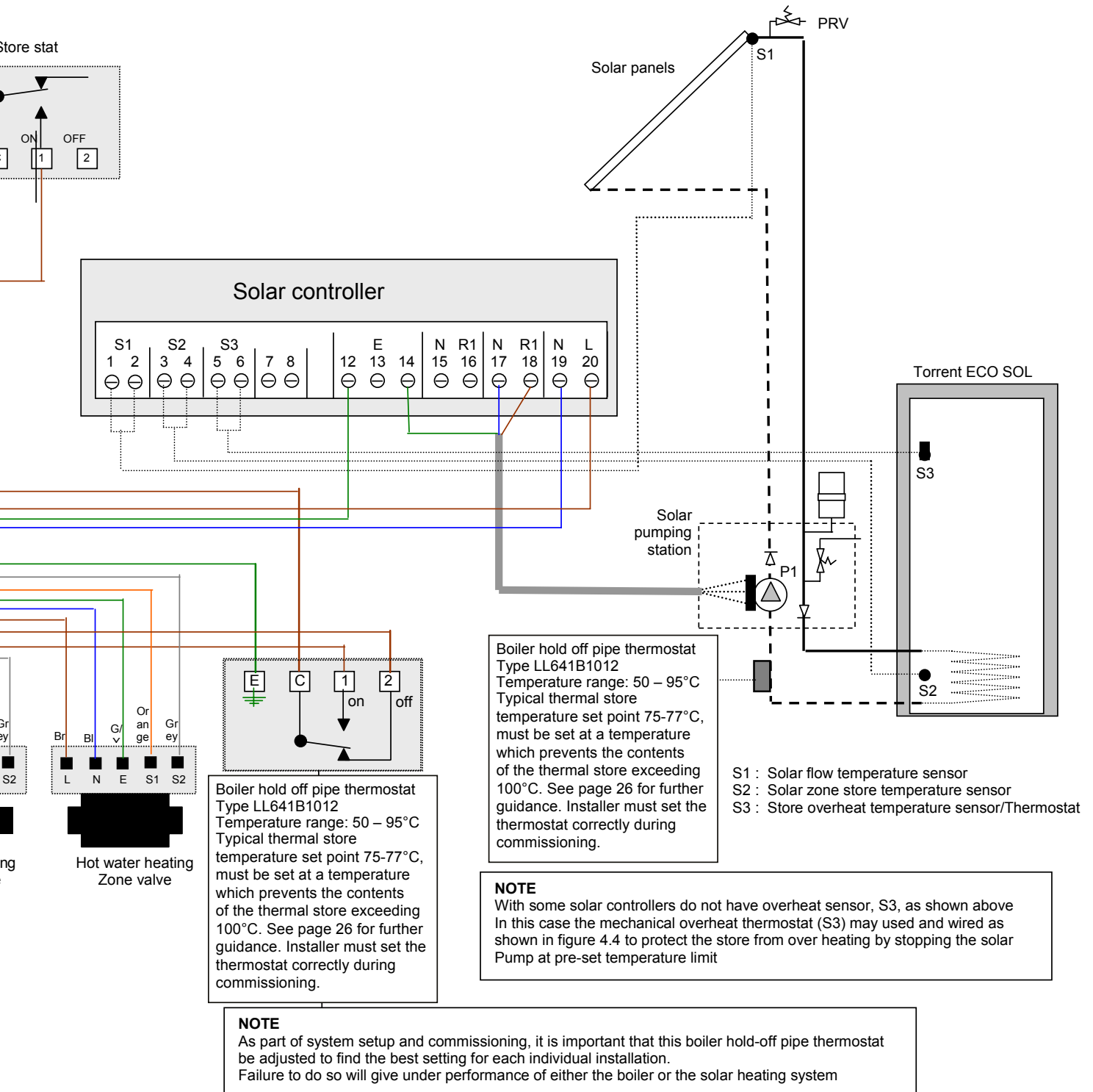


INSTALLATION

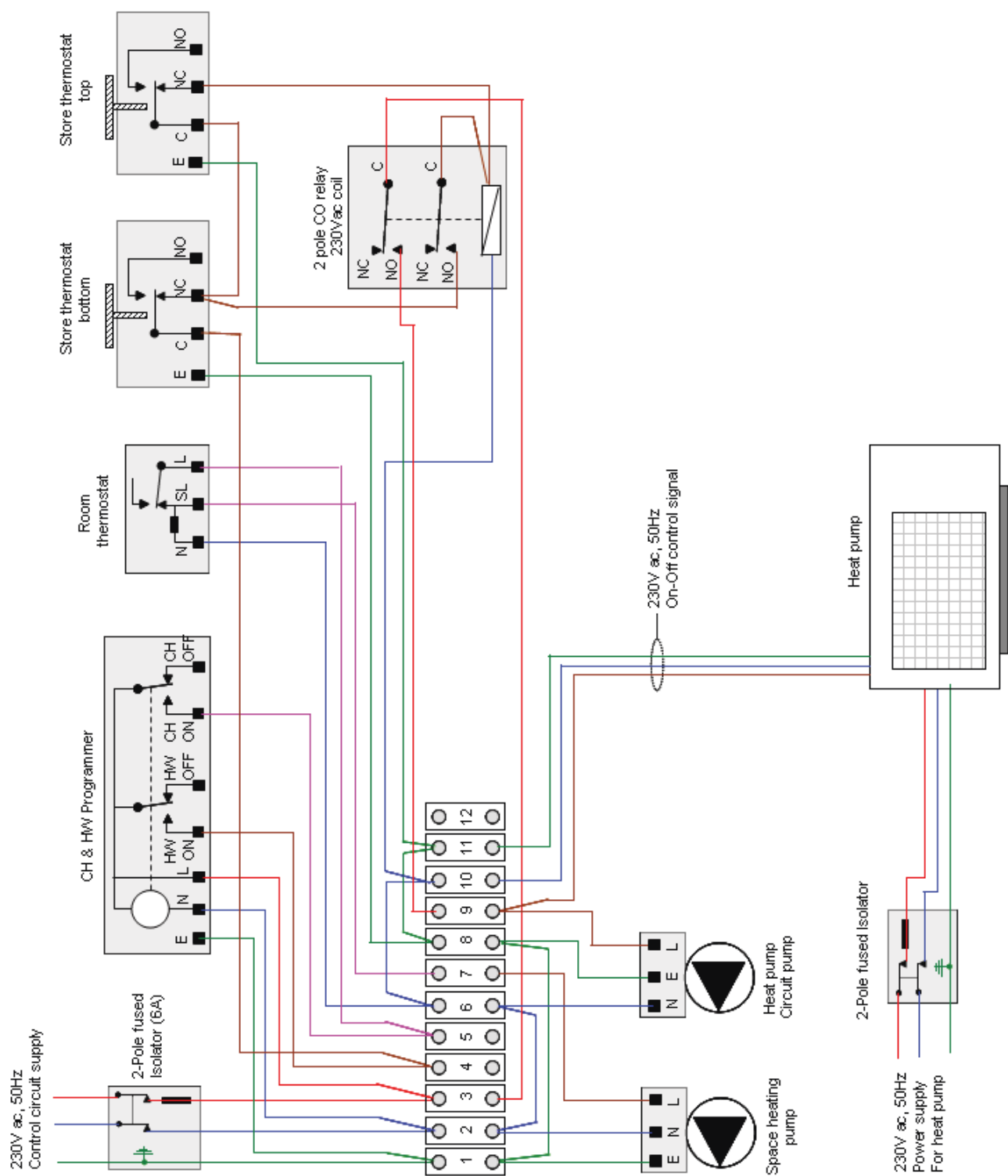


Torrent ECO with 'S' Plan heating system with typical solar heating system

INSTALLATION

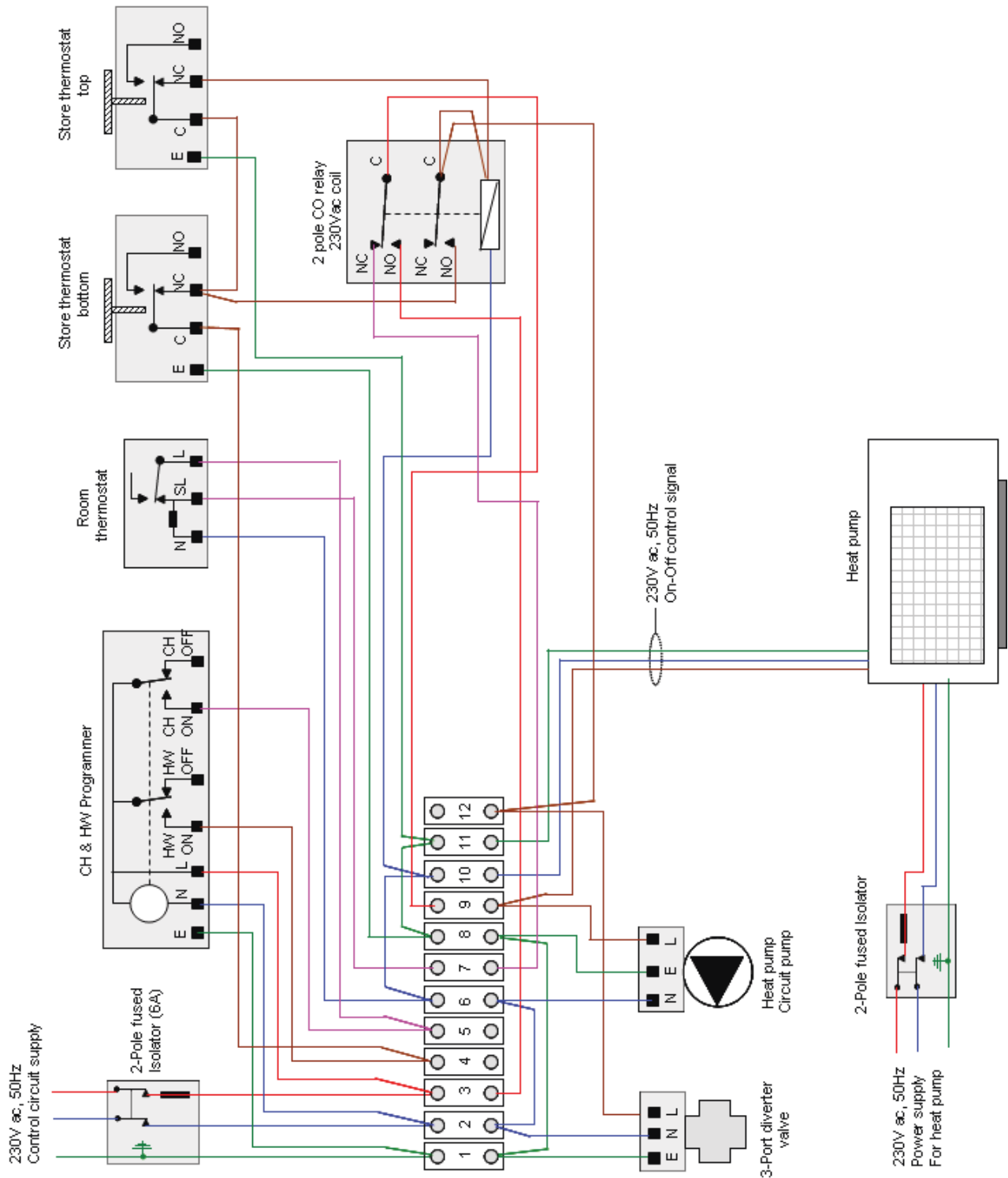


INSTALLATION



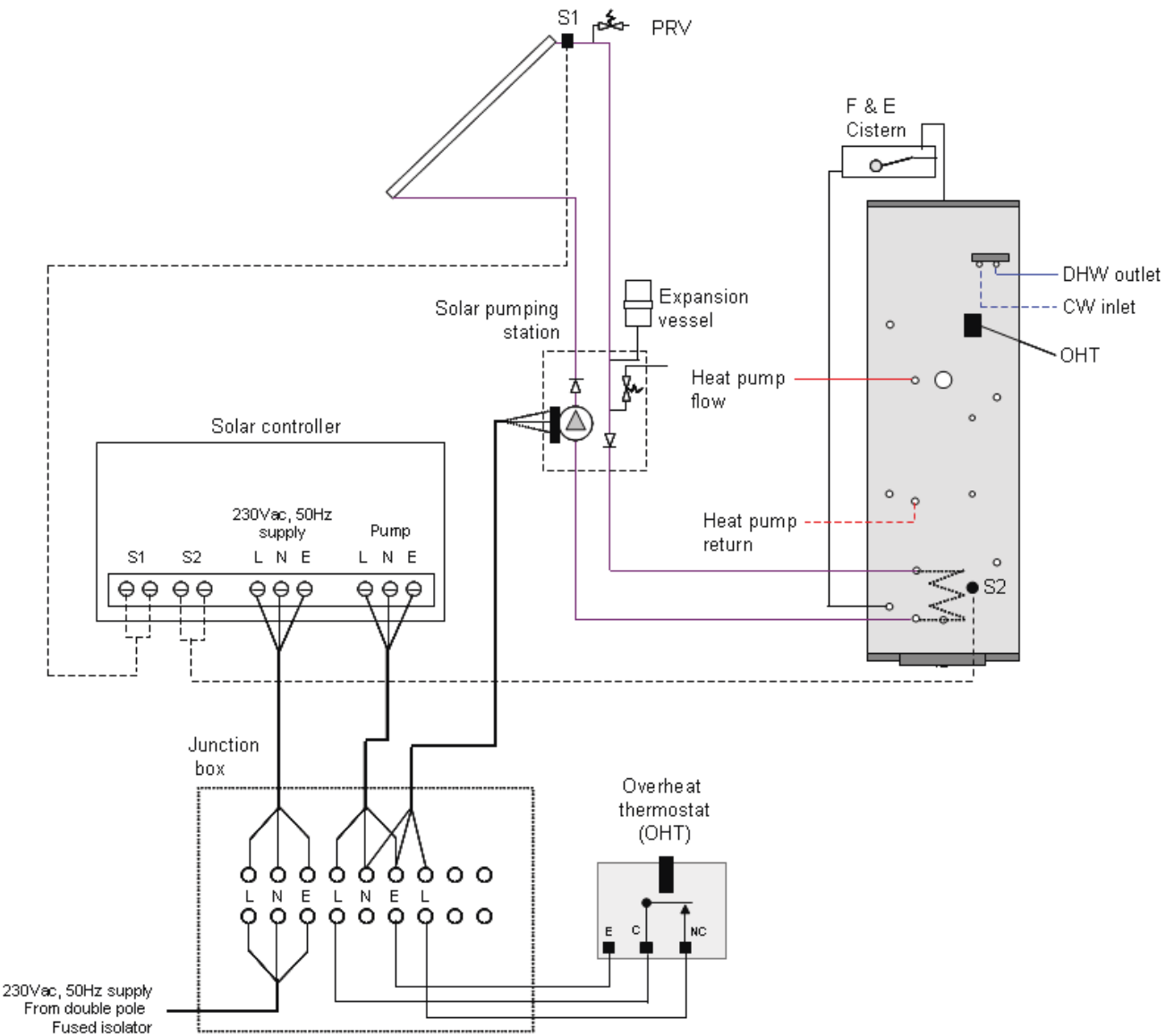
Typical schematic wiring diagram for the Torrent ECO HP and Torrent ECO HP-solar with space heating supplied from thermal store.

INSTALLATION



Typical schematic wiring diagram for the Torrent ECO HP and Torrent ECO HP-solar with space heating supplied directly from the heat pump circuit.

INSTALLATION



Typical schematic wiring diagram and system configuration for the Torrent ECO HP-solar.

INSTALLATION

Boost Immersion Heater

All Torrent ECO HP models are fitted with a 3kW immersion heater so that the store can be heated to a temperature above the heat pump delivery temperature to increase the hot water performance of the unit if necessary. Because the TorrentHP is a primary thermal store it is **not** necessary to heat the store above 60°C for hygienic protection against growth of 'legionella'. This is because the domestic hot water is heated instantaneously via a heat exchanger and so there are no legionella problems associated with stored water.

This is of **great significance for the heat pump application** where the heat pump will not normally be able to raise stored water to above 60°C which is necessary to sterilise a cylinder.

By using the immersion element to boost the water temperature (**not** needed for legionella protection as described above), this will provide a greater volume of hot water from a given size of cylinder (see figures 3-5, page 5). However, the overall COP of the system will reduce and so to maximise the benefit of fitting a heat pump, minimal use should be made of the immersion heater.

The immersion heater should **not** be left permanently switched on as this will drastically reduce the contribution of heat pump to hot water heating and hence increase the running costs.

If the use of the immersion heater is necessary to meet the hot water requirements of a dwelling, then please consult your heat pump manufacturers instructions regarding the wiring and control of the immersion heater operation.

If these instructions aren't included in the heat pump manual, then a suggested method of controlling it is described below.

Control By Programmer

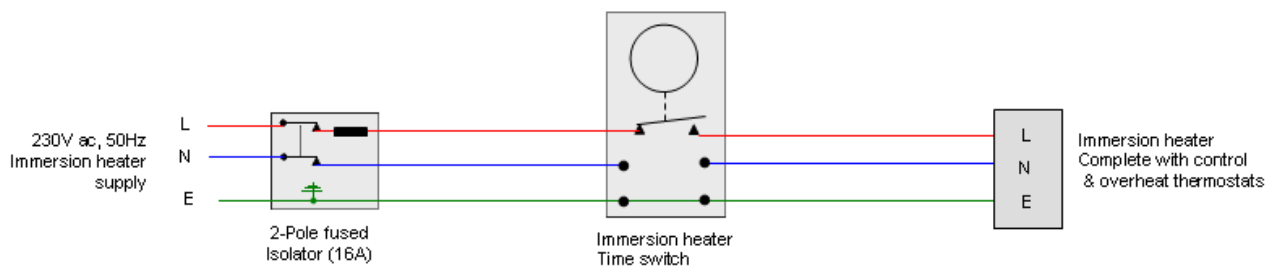
The operation of the boost immersion heater can be controlled by means of an independent time switch as shown schematically. The on time settings on the immersion heater should be between 30 – 60 minutes later than the on times set for the hot water programmer channel.

For example if the hot water is programmed to come on between say 0600 – 0900 and 1700 – 2200 then the immersion heater timer setting should be 0640 – 0900 and 1740 – 2200. This will make maximum use of the heat pump allowing it to charge the store to the maximum potential temperature before any use of the immersion element.

Additional top and bottom thermostat pockets can be provided in case a more sophisticated control system is required to be fitted.

Control By Heat Pump Control System

Where more sophisticated control systems are used to control the immersion heater, the immersion heater may be programmed to only achieve 60°C. Please consult the heat pump manufacturer's instructions/help desk for further information on their control systems to ensure that the required operation is achieved.



Typical schematic wiring diagram for the boost immersion heater using programmable immersion heater timer.

INSTALLATION

Torrent 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 Eco 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 70°C on some cylinders, due to the temperature gradient through the store. The actual set point must be set up and checked during commissioning by the installer. The rod thermostats (XB114) used in these immersion heater incorporate an overheat component which will operate at circa 95°C. If the overheat component operates the thermostat is no longer effective and must be replaced.

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 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 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 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 should be added to the water content of the primary system. Although the Torrent

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 is isolated from the heating system being cleaned, as debris from the system could be washed into the Torrent 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 Superfloc or sentinel X300 to ensure that flux residues and the installation debris are removed from the system.
- Ensure that the store thermostat is set as described on page 23, and the boiler thermostat is set at its maximum. Set the boiler/system pump to give temperature difference across the boiler between 8 – 15°C.
- 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 MB1 or Sentinel X100.

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 as described on page 23, 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 labelling on the thermal store.
- 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 -** Check the pump setting. This should be set as high as possible (consistent with not creating noise) so as to give a small temperature difference across the boiler, i.e. not greater than 11°C.
- 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 page 15.
- 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 ECO 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
- 15l/min for heat pump products and 26.5l/min for all others
- 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
- The green LED will flash showing the pump has a power supply and is in standby mode.
- 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 some hot water, higher thermal store temperatures will provide more.

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 ECO 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.

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.

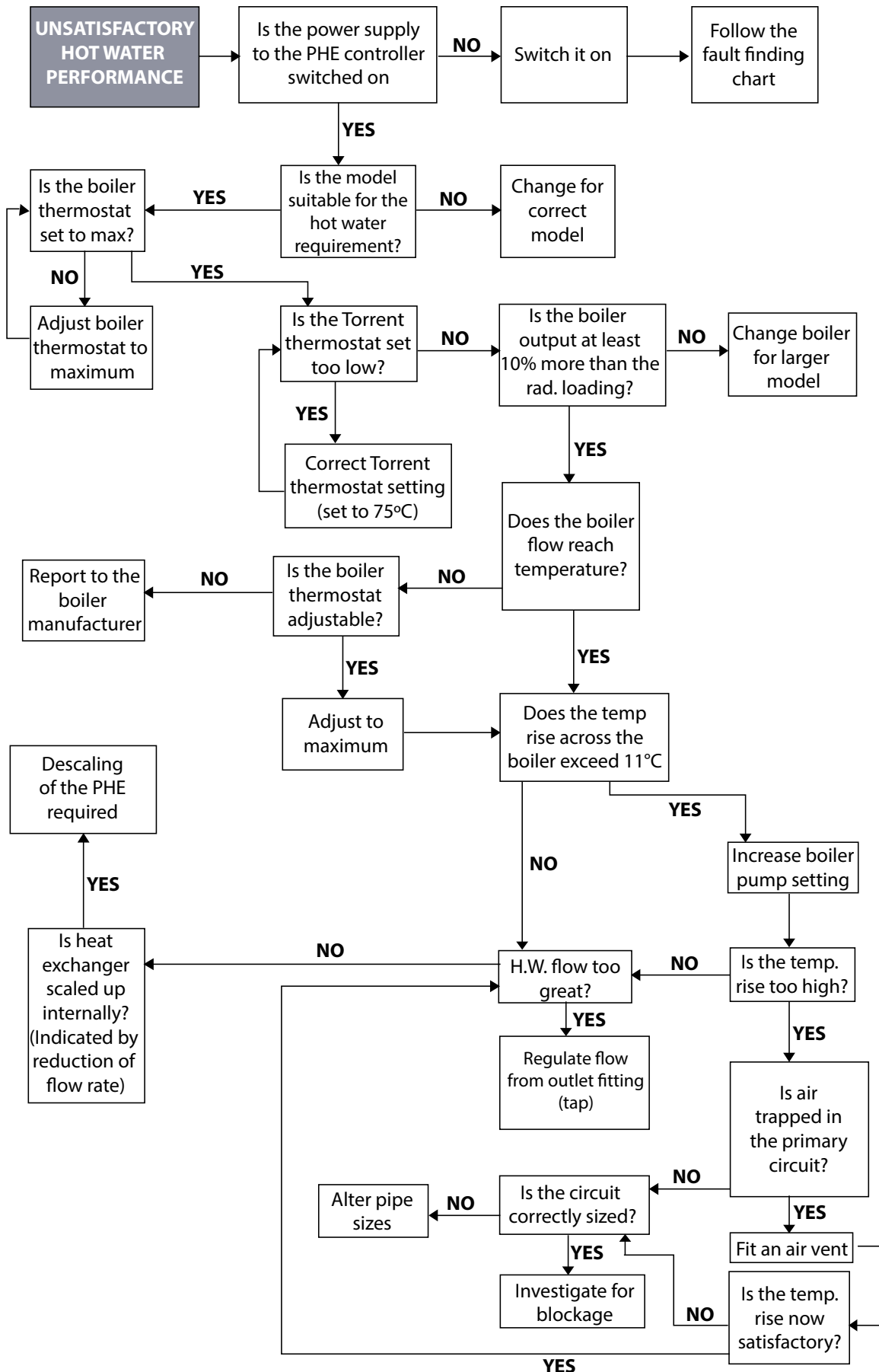
Help and advice is also available from the Technical Helpline on 01253 474584.

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 ECO 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.

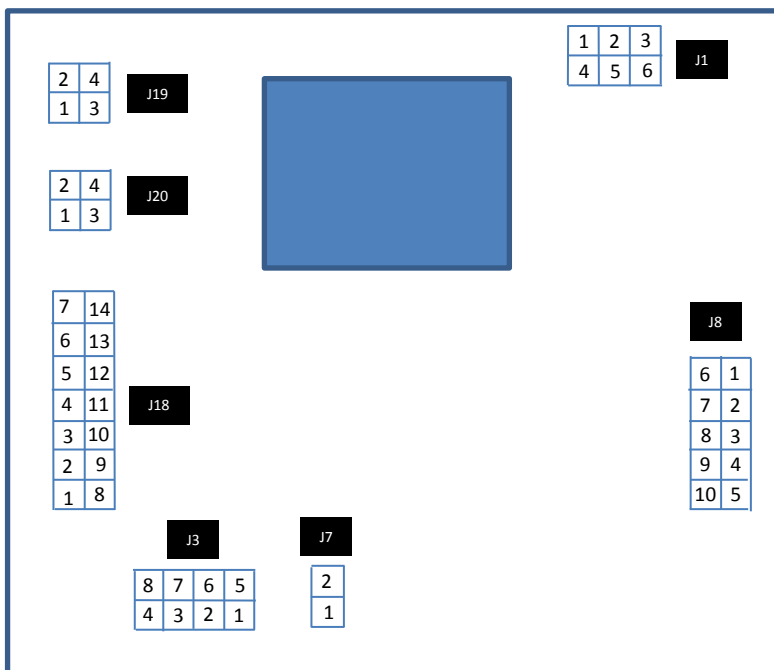
A multi meter, a weir gauge and a thermometer will be required to confirm that all the components are working effectively.

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 44 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
- 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

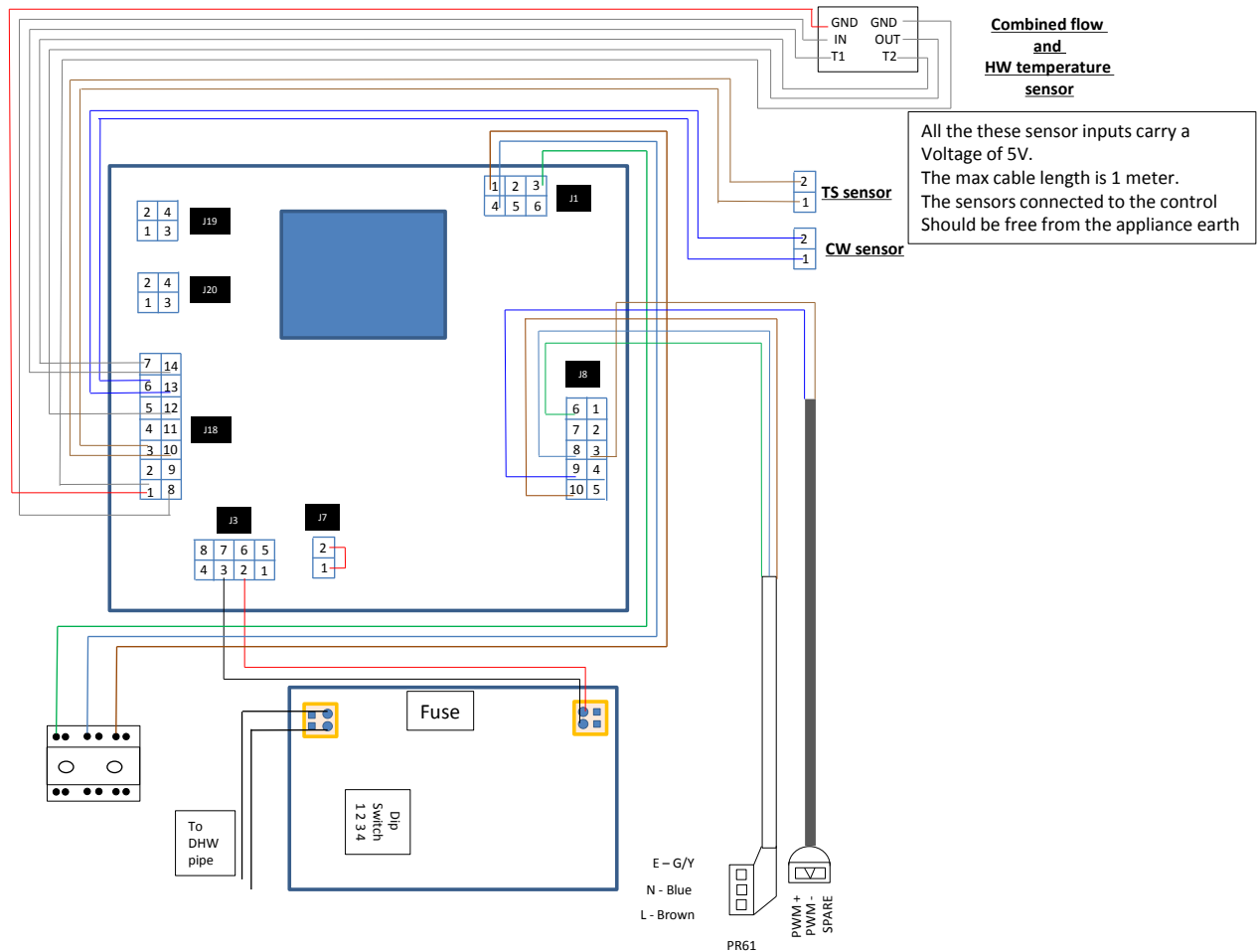
Electrical power connections

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 connected to the live etc <ul style="list-style-type: none"> • 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		
Resistance	Temperature	
Ohm	°C	±°C
309396	-40	1.7
171840	-30	1.7
98932	-20	1.6
58879	-10	1.5
36129	0	1.4
22804	10	1.4
14773	20	1.3
12000	25	1.2
9804	30	1.2
6652	40	1.1
4607	50	1
3252	60	0.9
2337	70	1.1
1707	80	1.3
1266	90	1.5
952	100	1.8

Used on the store temperature sensors and the cold water inlet temperature sensors

R-nominal	12Kohm @25°C
B-value	B3740K
R-Tolerance	3% @60°C
Tmin	-40°C
Tmax	150°C

Huba combined flow sensor and NTC 10k thermistor		
Resistance	Temperature	
Ohm	°C	±°C
334275	-36	0.9
47369	-6	0.1
26023	5	0.1
11000	23	0.6
10500	24	0.6
10000	25	0.6
9500	26	0.7
9000	27	0.7
8500	29	1.4
8000	30	1.5
7500	31	1.6
7000	33	1.7
6500	35	1.7
6000	37	1.8
5500	39	1.9
5000	41	2.1
4500	44	2.2
4000	47	2.3
3500	50	2.5
3000	54	2.7
2500	59	2.9
2000	65	3.3
1500	73	3.7
1000	86	4.3

R-nominal	12Kohm @25°C
B-value	B4050K
R-Tolerance	under 25°C±0.025*°T °C over 25°C±0.05*°T °C
Tmin	-40°C
Tmax	125°C

flow rate determination			
HZ	l/min	HZ	l/min
20	3.4	95	17.1
25	4.4	100	18.0
30	5.3	105	19.0
35	6.2	110	19.9
40	7.1	115	20.8
45	8.0	120	21.7
50	8.9	125	22.6
55	9.8	130	23.5
60	10.7	135	24.4
65	11.7	140	25.3
70	12.6	145	26.2
75	13.5	150	27.2
80	14.4	155	28.1
85	15.3	160	29.0
90	16.2	165	29.9

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

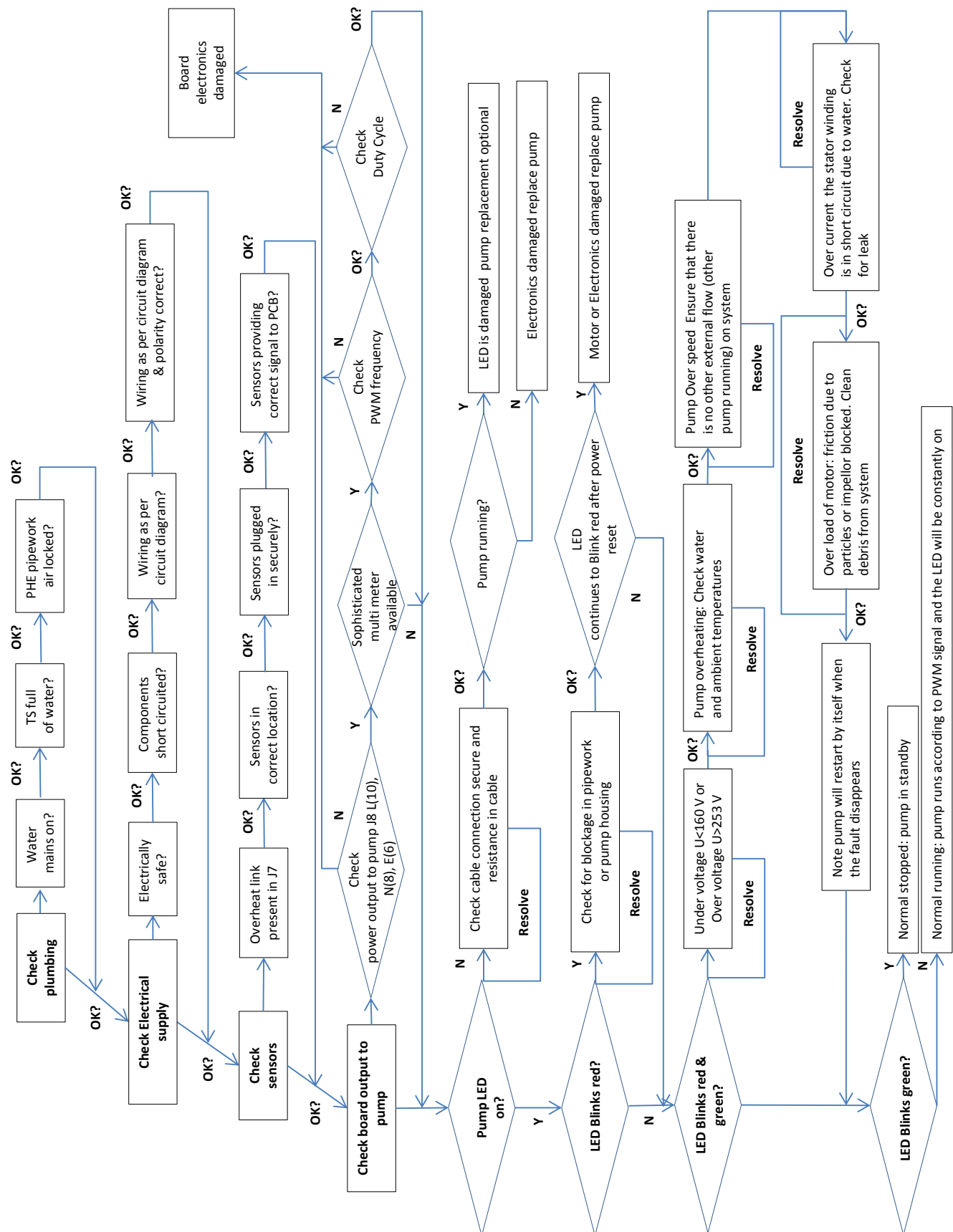
Check pump electrical circuits

LED	Meaning	Diagnosis	Cause	Remedy
Lights green	Normal running	Pump runs according PWM input	Normal operation	n/a
Blinks quick green	Normal stopped	Pump in standby		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 $U < 160\text{ V}$ or Over voltage $U > 253\text{ V}$	Check voltage supply $195\text{ V} < U < 253\text{ V}$
			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 If the pumps still blinking red after a power reset then replace the pump
			Faulty electronic module and/or faulty motor	
LED off	No power supply	No voltage on electronics	Pump is not connected to power supply	Check 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



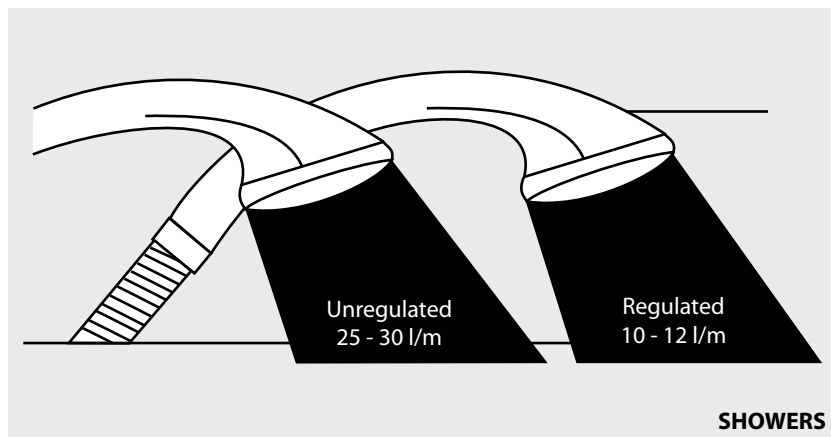
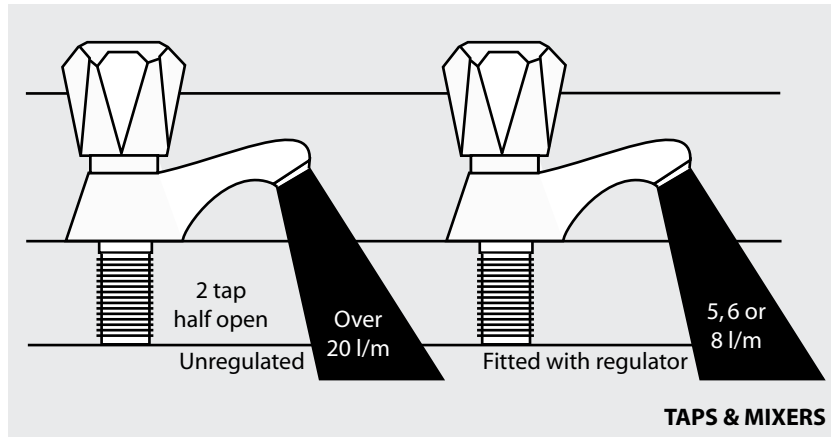
SERVICING AND MAINTENANCE

	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)	GT528
4	Pump isolating valve - outlet 1"	GT133
5	14" Immersion heater - with stat	XB482
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	Single shot overheat immersion stat	XB114
12	Plastic feed and expansion tank	XB343
13	22mm Blank	FT311
14	28mm Blank	FT466
15	Self resetting thermostat (store/control)	XC010
16	Non return valve	GT048
17	Manual reset overheat thermostat	XC011
18	Copper F&E for solid fuel (Bespoke manufacture, contact local Gledhill depot)	n/a
19	Scale inhibitor	XB142
20	Flow sensor	XB091
21	90 Degree isolation valve	GT135

APPENDIX

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:-

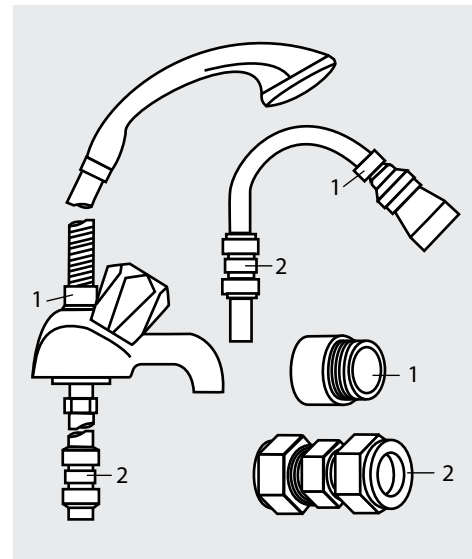
Options For Showers

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

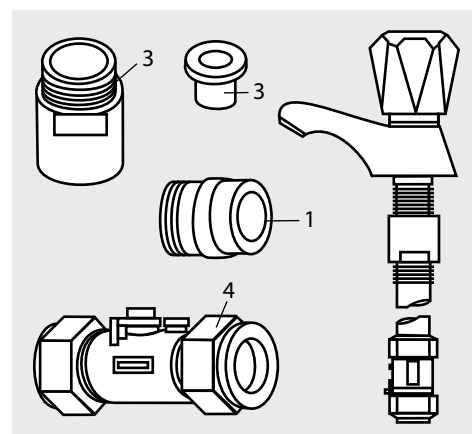
AQUAFLOW REGULATORS LTD

Haywood House, 40 New Road, Stourbridge, West Midlands DY8 1PA
TELEPHONE (01384) 442611 FAX: (01384) 442612



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. "UKWFB" 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.



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.

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:

- (i) 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
- (ii) 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

9.1. 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.

9.2. Each Guarantee is strictly conditional upon the following:-

9.2.1. 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.

9.2.2. 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.

9.2.3. All necessary inlet controls and safety valves have been fitted correctly.

9.2.4. 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)

9.2.5. Where appropriate the unit has been regularly maintained as detailed in the installation and service instructions

9.2.6. Defects caused by corrosion or scale deposits are not covered by any Guarantee.

9.2.7. Where we agree to rectify any defect we reserve the right to undertake the work on our own premises.

9.2.8. We will not accept any labour charges associated with replacing the unit or parts for any of the following products listed.

9.2.9. 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:**

- (i) It has not been modified, other than by Gledhill.
- (ii) It has not been subjected to wrong or improper use or left uncared for.
- (iii) It has only been used for the storage of potable water supplied from the public mains, max 200mg/litre chloride.
- (iv) It has not been subjected to frost damage.
- (v) The benchmark service record is completed after each annual service.
- (vi) The unit has been serviced annually.
- (vii) 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:-

- (a) We accept liability for death or personal injury to the extent that it results from our negligence or that of our employees
- (b) 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.
- (c) 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
- (d) 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:-
 - (i) 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:-

- (a) any loss injury or damage wholly or partly caused by any goods supplied by us or their use.
- (b) 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.
- (c) any loss injury or damage in any way connected with the performance of this contract.
- (d) 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

- (a) 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.
- (b) property in the goods supplied hereunder will pass to the Purchaser when full payment has been made by the Purchaser to us for :-
 - (i) the goods of the subject of this contract.
 - (ii) 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.
- (c) until property in the goods supplied hereunder passes to the Purchaser in accordance with paragraph (2) above.
 - (i) 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.
 - (ii) 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.
- (d) the Purchaser's right to possess the goods shall cease forthwith upon the happening of any of the following events, namely :-
 - (i) if the Purchaser fails to make payment in full for the goods within the time stipulated in clause 4 hereof.
 - (ii) 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.
 - (iii) 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.
- (e) 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.
- (f) 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 :-
 - (i) shall be held in trust for us in a manner which enables such proceeds to be identified as such, and;
 - (ii) 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.
- (g) 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:-
 - (i) ensure that the goods are capable of being removed without material injury to such land or building.
 - (ii) take all necessary steps to prevent title to the goods from passing to the landlord of such land or building.
 - (iii) 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.
 - (i) 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 :-
 - (ii) the Purchaser shall forthwith inform us in writing of the fact and circumstances of such loss, theft, damage or destruction.
 - (iii) 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)																								

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



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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