



**UNVENTED MAINS PRESSURE SOLAR WATER HEATERS  
100 TO 300 LITRE CAPACITY  
DIRECT AND INDIRECT MODELS  
INSTALLATION AND SERVICING INSTRUCTIONS**

**PACK CONTENTS**

Pullin Evolution unvented solar water heater incorporating immersion heater(s) and thermal controls  
Factory fitted temperature/pressure relief valve | Cold water combination valve assembly | Expansion vessel  
and mounting bracket | Tundish | Motorised valve (indirect models only) | Compression nuts and olives  
Immersion heater spanner | Installation instructions

**IMPORTANT: PLEASE READ ALL THESE INSTRUCTIONS BEFORE  
COMMENCING INSTALLATION**

**PLEASE LEAVE THIS MANUAL WITH THE CUSTOMER FOR  
FUTURE REFERENCE**

**INTRODUCTION**

The Pullin Evolution Solar is a purpose designed unvented solar water heater. The unit has a stainless steel inner vessel, which ensures an excellent standard of corrosion resistance. The outer casing is a combination of resilient thermoplastic mouldings and corrosion proofed steel sheet. All products are insulated with CFC/HCFC free polyurethane foam to meet the latest European heat loss requirements (see Table 4).

The unit is supplied complete with all the necessary safety and control devices needed to allow connection to the cold water mains. All these components are preset and not adjustable.

This appliance complies with the requirements of the CE marking directive and is Kiwa approved to show compliance with Building Regulations (Section G3).

The following instructions are offered as a guide to installation which must be carried out by a competent plumbing and electrical installer in accordance with Building Regulation G3, The Building Standards (Scotland) Regulations 1990, or The Building Regulations (Northern Ireland).

**NOTE:** Prior to installation the unit should be stored in an upright position in an area free from excessive damp or humidity.

## IMPORTANT NOTE:

**THE PULLIN EVOLUTION SOLAR MUST BE INCORPORATED INTO A FULLY PUMPED SOLAR PRIMARY CIRCUIT. CONTROL OF THE SOLAR PRIMARY IS ACHIEVED BY THE USE OF EXTERNAL CONTROLS NOT SUPPLIED WITH THE UNIT. CONTROL MUST BE VIA A PURPOSE DESIGNED SOLAR HYDRAULIC STATION AND SOLAR DIFFERENTIAL TEMPERATURE CONTROLLER.**

## GENERAL REQUIREMENTS

### SITING THE UNIT

The Pullin Evolution Solar must be installed vertically. Although location is not critical, the following points should be considered:

- The Pullin Evolution Solar should be sited to ensure minimum dead leg distances, particularly to the point of most frequent use.
- Avoid siting where extreme cold temperatures will be experienced. All exposed pipework should be insulated.
- The discharge pipework from the safety valves must have minimum fall of 1:200 from the unit and terminate in a safe and visible position.
- Access to associated controls and immersion heaters should be possible to allow for periodic servicing and maintenance.
- Ensure that the base chosen for the Pullin Evolution Solar is level and capable of permanently supporting the weight when full of water (see Table 1).

Type	Model reference	Nominal capacity (litres)	Weight of unit full (kg)
DIRECT	PES190D	190	235
	PES210D	210	259
	PES250D	250	302
	PES300D	300	362
INDIRECT	PES190I	190	240
	PES210I	210	264
	PES250I	250	308
	PES300I	300	367

Table 1: Unit weights

### WATER SUPPLY

Bear in mind that the mains water supply to the property will be supplying both the hot and cold water requirements simultaneously. It is recommended that the maximum water demand is assessed and the water supply checked to ensure this demand can be satisfactorily met.

Note: A high mains water pressure will not always guarantee high flow rates.

The Pullin Evolution Solar has an operating pressure of 3.5 bar that is controlled by the cold water combination valve assembly. The cold water combination valve assembly can be connected to a maximum mains pressure of 16 bar.

Wherever possible the mains supply pipe should be 22mm. We suggest the minimum supply requirements should be 1.5 bar pressure and 20 litres per minute flowrate. However, at these values outlet flow rates may be poor if several outlets are used simultaneously. The higher the available pressure and flow rate the better the system performance.

### OUTLET/TERMINAL FITTINGS (TAPS, ETC.)

The Pullin Evolution Solar can be used with most types of terminal fittings. It is advantageous in many mixer showers to have balanced hot and cold water supplies. In these instances a balanced pressure cold water connection should be placed between the 2 pieces of the cold water combination valve assembly (see Fig. 1). Outlets situated higher than the Pullin Evolution Solar will give outlet pressures lower than that at the heater, a 10m height difference will result in a 1 bar pressure reduction at the outlet.

### LIMITATIONS

The Pullin Evolution Solar should not be used in association with any of the following:

- Solid fuel boilers or any other boiler in which the energy input is not under effective thermostatic control unless additional and appropriate safety measures are installed.
- Ascending spray type bidets or any other class 1 back syphonage risk requiring that a type A air gap be employed.
- Steam heating plants unless additional and appropriate safety devices are installed.
- Situations where maintenance is likely to be neglected or safety devices tampered with.
- Water supplies that have either inadequate pressure or where the supply may be intermittent.
- Situations where it is not possible to safely pipe away any discharge from the safety valves.
- In areas where the water consistently contains a high proportion of solids, e.g. suspended matter that could block the strainer, unless adequate filtration can be ensured.

### OPERATIONAL SUMMARY

Maximum mains pressure	16 bar
Operating pressure	3.5 bar
Expansion vessel charge pressure	3.5 bar
Expansion relief valve setting	6 bar
T&P relief valve setting	90°C/10 bar
Maximum primary circuit pressure (auxillary coil) (indirect only)	3 bar
Maximum primary circuit pressure (solar coil)	6 bar
Storage capacity	See Table 1
Weight when full	See Table 1

## INSTALLATION – GENERAL (FIGS 3 & 5)

### PIPEFITTINGS

All pipe fittings are made via 22mm compression fittings directly to the unit. The fittings are threaded 3/4" BSP male parallel should threaded pipe connections be required.

### COLD FEED

A 22mm cold water supply is recommended, however if a 15mm (1/2") supply exists which provides sufficient flow this may be used (although more flow noise may be experienced).

A stopcock or servicing valve should be incorporated into the cold water supply to enable the Pullin Evolution Solar and its associated controls to be isolated and serviced.

### COLD WATER COMBINATION VALVE ASSEMBLY (FIG 1)

The 2-piece cold water combination valve assembly can be located anywhere on the cold water mains supply prior to the expansion vessel (see Fig. 5) but the two pieces do not have to be installed together. The pressure reducing valve incorporates the pressure reducer & strainer and the expansion valve incorporates the expansion & check valves. Ensure that the valves are installed in the correct order and orientation. No other valves should be placed between the expansion valve and the Pullin Evolution Solar unit. A connection can be made between the expansion and pressure reducing valves to provide a balanced cold water connection. The expansion valve connection must not be used for any other purpose.

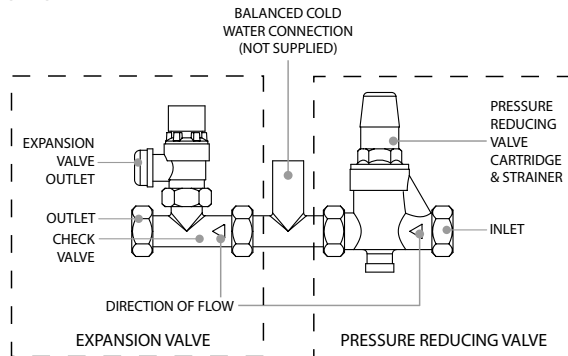


Fig. 1: Cold water combination valve assembly

### DRAIN TAP

A suitable draining tap should be installed in the cold water supply to the Pullin Evolution Solar unit between the expansion valve (see Fig. 1) and the heater at as low a level as possible. It is recommended that the outlet point of the drain pipework be at least 1 metre below the level of the heater (this can be achieved by attaching a hose to the drain tap outlet spigot).

### EXPANSION VESSEL

The expansion vessel accommodates expansion that results from heating the water inside the unit. The unit is pre-charged at 3.5 bar. The expansion vessel must be connected between the expansion valve (see Fig. 1) and the Pullin Evolution Solar (see Fig. 5). The location of the expansion vessel should allow access to recharge the pressure as and when necessary, this can be done using a normal car foot pump. It is recommended that the expansion vessel is adequately supported. An expansion vessel wall mounting bracket is supplied for this purpose.

**NOTE: DO NOT USE THE POTABLE WATER EXPANSION VESSEL SUPPLIED WITH THE PULLIN EVOLUTION SOLAR FOR ANY OTHER PURPOSE. IT IS NOT SUITABLE FOR USE ON A SOLAR PRIMARY CIRCUIT.**

### SECONDARY CIRCULATION

If secondary circulation is required it is recommended that it be connected to the Pullin Evolution Solar as shown in Fig. 2. The secondary return pipe should be in 15mm pipe and incorporate a check valve to prevent backflow. A suitable WRAS approved bronze circulation pump will be required. On large systems, due to the increase in system water content, it may be necessary to fit an additional expansion vessel to the secondary circuit. This should be done if the capacity of the secondary circuit exceeds 10 litres.

Pipe capacity (copper)

15mm o/d = 0.13 l/m (10 litres = 77m)

22mm o/d = 0.38 l/m (10 litres = 26m)

28mm o/d = 0.55 l/m (10 litres = 18m)

Secondary circulation is NOT recommended for direct electric units being used on Off Peak electricity tariffs.

### OUTLET

The hot water outlet is a 22mm compression fitting located at the top of the cylinder. Hot water distribution pipework should be 22mm pipe with short runs of 15mm pipe to terminal fittings such as sinks and basins. Pipe sizes may vary due to system design.

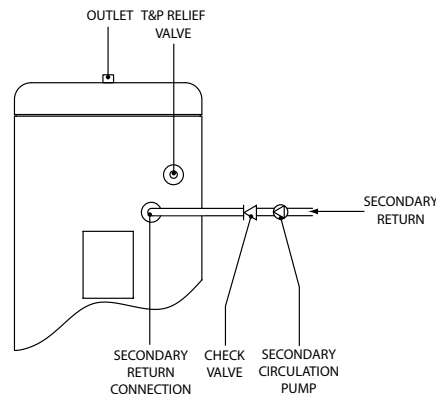
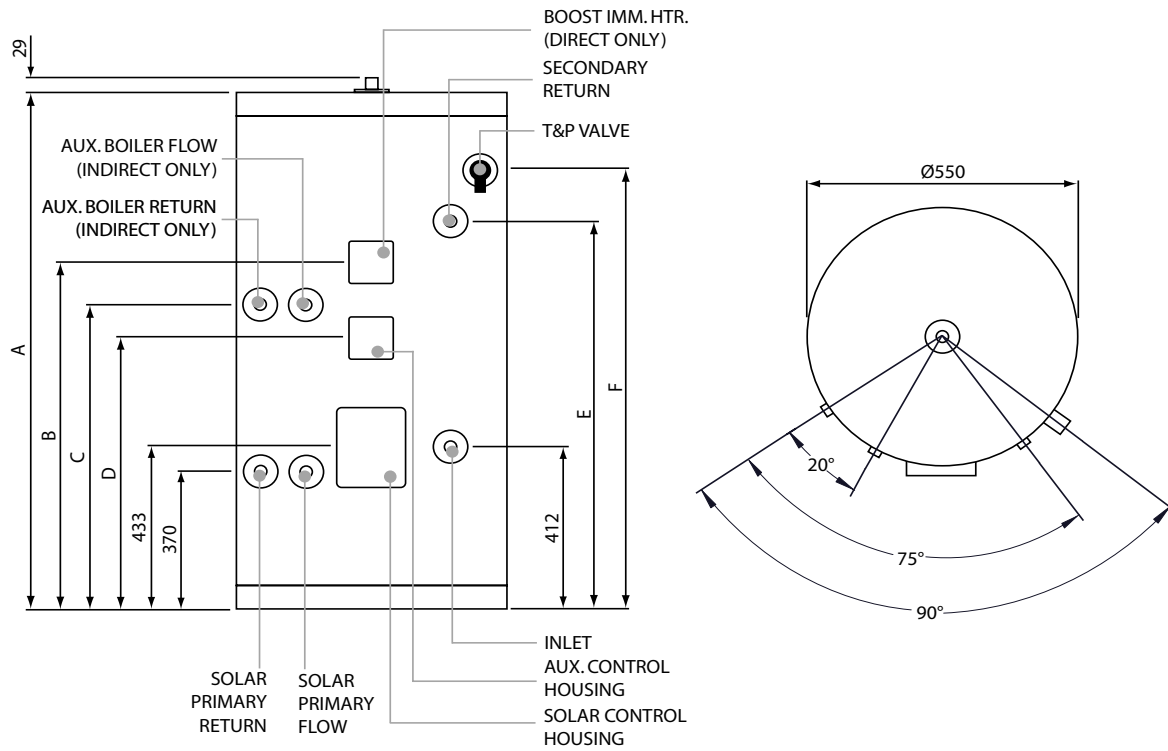


Fig. 2: Secondary circulation connection



NOMINAL CAPACITY (litres)	TYPE		DIMENSIONS (mm)						SOLAR SURFACE AREA (m <sup>2</sup> )	AUXILLARY VOLUME (litres)	AUXILLARY COIL			HEATING TIME DIRECT (mins)
	DIRECT	INDIRECT	A	B	C	D	E	F			SURFACE AREA (m <sup>2</sup> )	RATING (kW)	RECOVERY (mins)	
190	✓		1372	950		740		1019	1.1	110				115
190		✓	1372		732	803	923	1019	1.1	110	0.61	11.9	20	
210	✓		1473	1000		759		1184	1.1	130				136
210		✓	1473		892	808	1095	1184	1.1	130	0.68	15.2	20	
250	✓		1731	1072		773		1391	1.1	163				171
250		✓	1731		1160	883	1258	1391	1.1	163	0.79	15.2	23	
300	✓		2038	1409		870		1715	1.1	198				208
300		✓	2038		1438	1023	1573	1715	1.1	198	0.79	17.4	25	

NOTES:

1. Recovery time based on heating 70% of auxillary volume through 45°C
2. Direct heating times assume use of lower element only and auxillary cylinder volume being heated

Fig. 3: General Dimensions and features

## DISCHARGE PIPEWORK

It is a requirement of Building Regulation G3 that any discharge from an unvented system is conveyed to where it is visible, but will not cause danger to persons in or about the building. The tundish and discharge pipes should be fitted in accordance with the requirements and guidance notes of Building Regulation G3. The G3 Requirements and Guidance section 3.9 are reproduced in the following sections. Information Sheet No. 33 available from the British Board of Agrément gives further advice on discharge pipe installation. For discharge pipe arrangements not covered by G3 Guidance or BBA Info Sheet No.33 advice should be sought from your local Building Control Officer.

### G3 REQUIREMENT

"...there shall be precautions...to ensure that the hot water discharged from safety devices is safely conveyed to where it is visible but will not cause danger to persons in or about the building."

### G3 GUIDANCE SECTION 3.9

The discharge pipe (D1) from the vessel up to and including the tundish is generally supplied by the manufacturer of the hot water storage system. Where otherwise, the installation should include the discharge pipe(s) (D1) from the safety device(s). In either case the tundish should be vertical, located in the same space as the unvented hot water storage system and be fitted as close as possible and within 500mm of the safety device e.g. the temperature relief valve.

The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, preferably be of metal and:

a. be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device, between 18 and 27m at least 3 sizes larger, and so on. Bends must be taken into account in calculating the flow resistance. Refer to Diagram 1, Table 1 and the worked example.

An alternative approach for sizing discharge pipes would be to follow BS 6700:1987 Specification for design installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages, Appendix E, section E2 and table 21.

b. have a vertical section of pipe at least 300mm long, below the tundish before

any elbows or bends in the pipework.

c. be installed with a continuous fall.

d. have discharges visible at both the tundish and the final point of discharge but where this is not possible or is practically difficult there should be clear visibility at one or other of these locations. Examples of acceptable discharge arrangements are:

i. ideally below a fixed grating and above the water seal in a trapped gully.

ii. downward discharges at low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that where children may play or otherwise come into contact with discharges a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility.

iii. discharges at high level; e.g. into a metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastics guttering system that would collect such discharges (tundish visible).

iv. where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation discharging can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

**Note:** The discharge will consist of scalding water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.

### Worked example of discharge pipe sizing

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

From Table 4:

Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from a G1/2 temperature relief valve is 9.0m.

Subtract the resistance for 4 No. 22mm elbows at 0.8m each = 3.2m

Therefore the permitted length equates to: 5.8m

5.8m is less than the actual length of 7m therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28mm pipe (D2) from a G1/2 temperature relief valves equates to 18m.

Subtract the resistance of 4 No. 28mm elbows at 1.0m each = 4.0m

Therefore the maximum permitted length equates to: 14m

As the actual length is 7m, a 28mm (D2) copper pipe will be satisfactory.

#### WARNINGS

- Under no circumstances should the factory fitted temperature/pressure relief valve be removed other than by a competent person. To do so will invalidate any guarantee or claim.
- The cold water combination valve assembly must be fitted to the mains water supply to the Pullin Evolution Solar unit.
- No control or safety valves should be tampered with.
- The discharge pipe should not be blocked or used for any other purpose.
- The tundish should not be located adjacent to any electrical components.

Valve outlet size	Minimum size of discharge pipe D1	Minimum size of discharge pipe D2 from tundish	Maximum resistance allowed, expressed as a length of straight pipe (i.e. no elbows or bends)	Resistance created by each elbow or bend
G1/2	15mm	22mm	up to 9m	0.8m
		28mm	up to 18m	1.0m
		35mm	up to 27m	1.4m
G3/4	22mm	28mm	up to 9m	1.0m
		35mm	up to 18m	1.4m
		42mm	up to 27m	1.7m
G1	28mm	35mm	up to 9m	1.4m
		42mm	up to 18m	1.7m
		54mm	up to 27m	2.3m

Table 2: Sizing of copper discharge pipe (D2) for common temperature relief valve outlet sizes

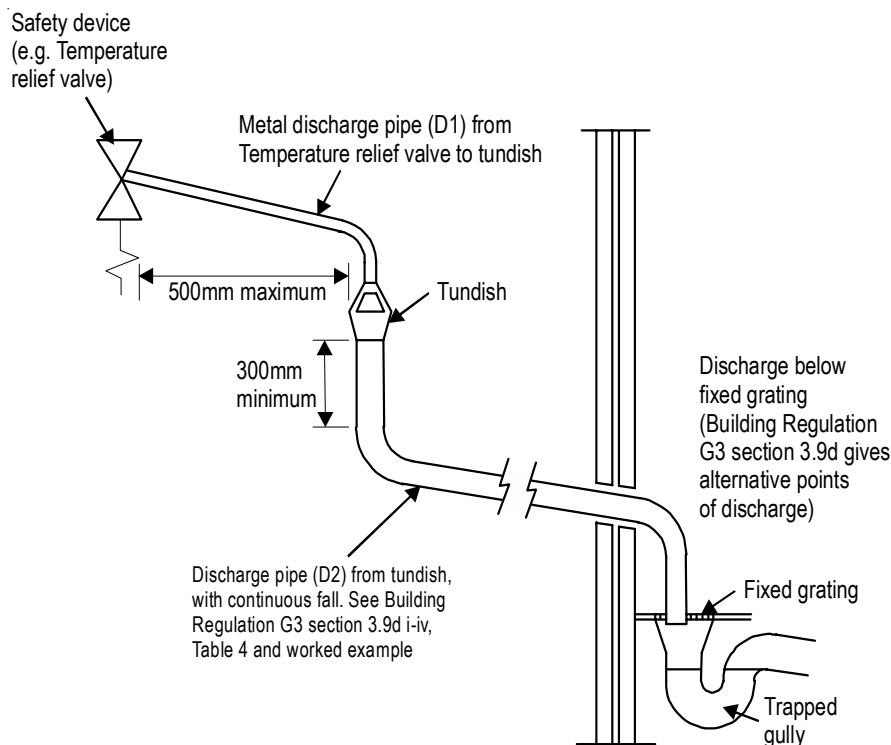
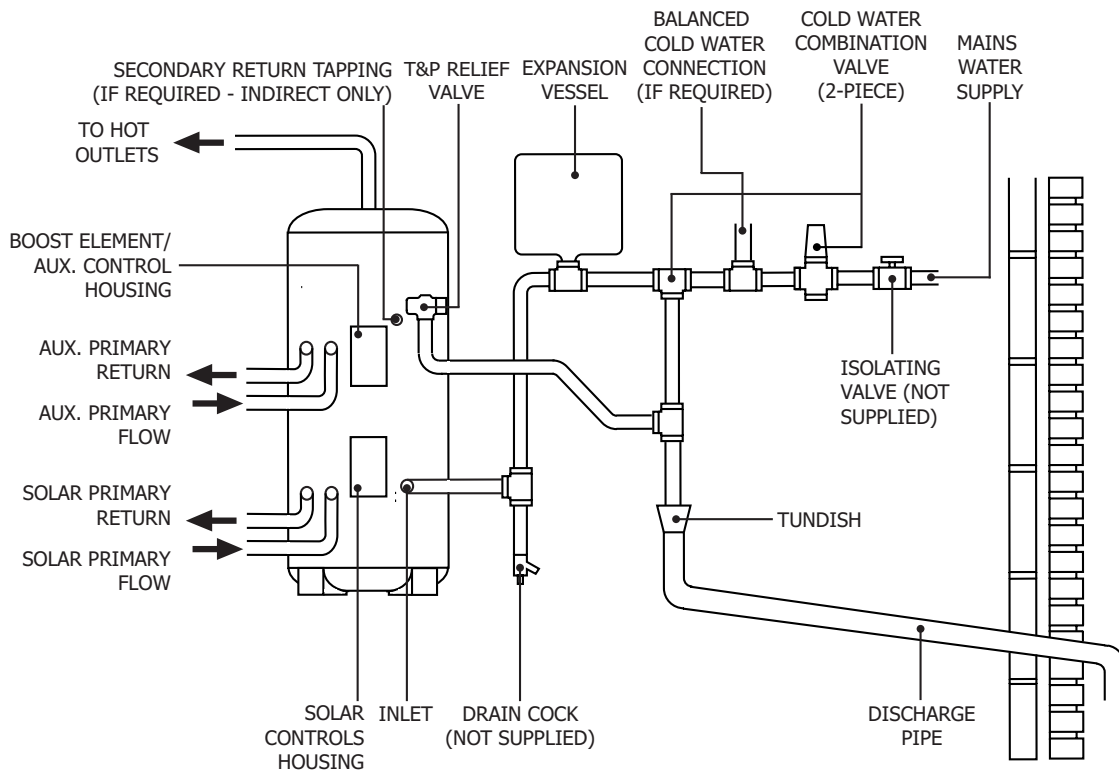


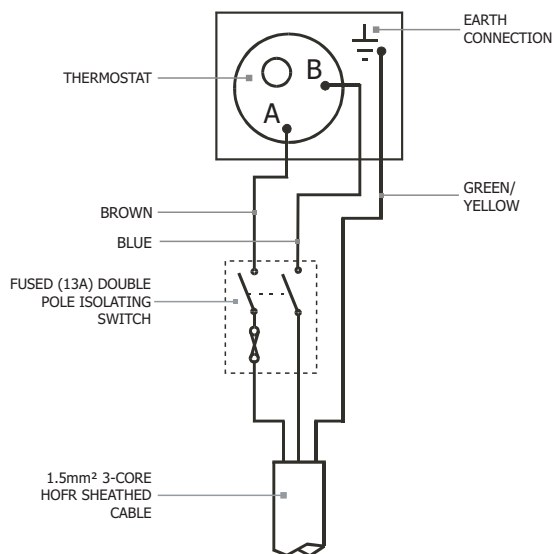
Fig.4: Typical discharge pipe arrangement (extract from Building Regulation G3 Guidance section)



NOTE: AUXILLARY HEATING COIL FITTED ON 190 TO 300 INDIRECT MODELS ONLY

Fig. 5: Typical installation - schematic

**DIRECT MODELS**



Note: On models fitted with two elements each element must be wired individually in accordance with the diagram above

**AUXILLARY HEATING CONTROL**

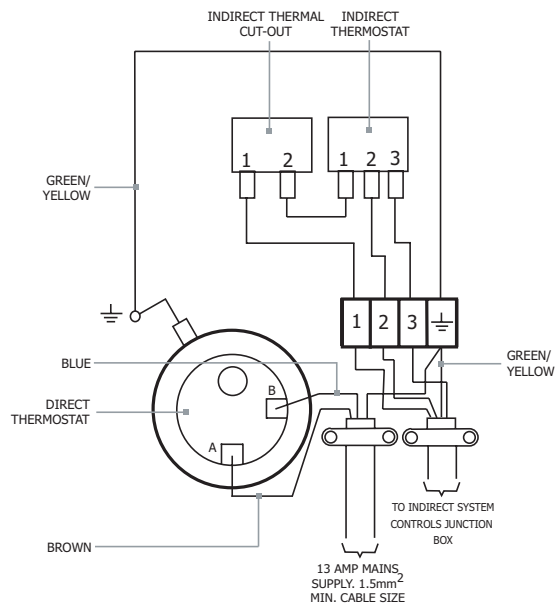


Fig.6 Electrical Connections (Schematic)

## INSTALLATION - SOLAR PRIMARY

### CONNECTION TO SOLAR PRIMARY CIRCUIT

The lower (solar) coil of the Pullin Evolution Solar **must** be connected to a fully pumped solar primary circuit. The connections are suitable for 22mm copper pipe direct to the compression fittings provided. The connections are also threaded 3/4" BSP male parallel should BSP be required.

The solar primary circuit should have its own dedicated circulating pump and safety controls which must be installed as per the manufacturers instructions.

### CONTROL OF SOLAR PRIMARY CIRCUIT

Temperature control of the Pullin Evolution Solar **must** be carried out using a suitable proprietary Solar Controller/Programmer. The cylinder temperature sensing probe (supplied with the solar controller) should be fully inserted into the pocket provided on the Pullin Evolution Solar and its cable secured using the cable clamps on the controls housing (see Fig.7).

Connection to the solar controller should be in accordance with manufacturer's instructions. The solar controller should be programmed to give a cylinder temperature of approximately 60°C (maximum 70°C).

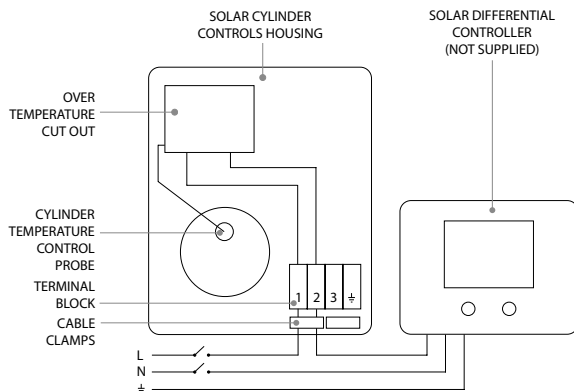


Fig. 7: Solar Control Connections

The solar controller and solar primary circulation pump **must** be wired via the over-temperature cut-out mounted in the lower solar controls housing (see Fig. 7). This will ensure that the heat input to the solar coil is interrupted in the event of the cylinder over-heating. There must also be suitable check (non-return) valves installed in the solar primary flow and return to prevent the possibility of any thermo-syphoning if the solar circulation is stopped.

## INSTALLATION - DIRECT UNITS

### PLUMBING CONNECTIONS

Direct units require the following pipework connections.

- Cold water supply to and from inlet controls.
- Outlet to hot water draw off points.
- Discharge pipework from valve outlets to tundish.

### ELECTRICAL SUPPLY (FIG. 6)

Pullin Evolution Solar units are fitted with two 3kW immersion heaters as standard. It is recommended that these should be wired via a suitable controller to BSEN 60730. **The Pullin Evolution Solar MUST be earthed.**

All wiring to the unit must be installed in accordance with the latest IEE Wiring Regulations and the circuit must be protected by a suitable fuse and double pole isolating switch with a contact separation of at least 3mm in both poles. The Live and Neutral connections are made directly onto the combined thermostat and thermal cut-out located under the terminal cover(s) mounted on the front of the unit. The earth connection should be made to the earth connection located to the side of the immersion heater boss(es). The supply cable must be routed through the cable gland located on the unit casing beneath the terminal housing.

**DO NOT** operate the immersion heaters until the Pullin Evolution Solar has been filled with water.

### SAFETY

**DISCONNECT FROM THE MAINS SUPPLY BEFORE REMOVING ANY COVERS.** Never attempt to replace the immersion heater(s) other than with the recommended Pullin immersion heater(s).

**DO NOT BYPASS THE THERMAL CUT-OUT(S) IN ANY CIRCUMSTANCES.** Ensure the two male spade terminations on the underside of the combined thermostat and thermal cut-out are pushed firmly onto the corresponding terminations on the element plate assembly.

In case of difficulty contact service support; contact details available at the back of this booklet.



## **INSTALLATION - AUXILLARY HEATING COIL**

### **PLUMBING CONNECTIONS**

**Indirect units require the following pipework connections.**

- Cold water supply to and from inlet controls.
- Outlet to hot water draw off points.
- Discharge pipework from valve outlets to tundish
- Connection to the auxillary primary circuit.

Primary connections are 22mm compression. However, 3/4" BSP parallel threaded fittings can be fitted to the primary coil connections if required.

### **ELECTRICAL SUPPLY (FIG. 6)**

All Indirect units are fitted with a 3kW immersion heater and a combined thermostat and thermal cut-out to control the primary heating source. **The Pullin Evolution Solar MUST be earthed.**

All wiring to the unit must be installed in accordance with the latest IEE Wiring Regulations and the supply circuits must be protected by a suitable fuse and double pole isolating switch with a contact separation of at least 3mm in both poles. Connection to the immersion heater thermostat(s) are made in accordance with the 'INSTALLATION - DIRECT UNITS' section. All auxillary heating source (boiler) connections are made to the terminal block located under the terminal cover mounted on the side of the unit. The supply cable(s) must be routed through the cable grip(s) in the terminal housing.

**DISCONNECT FROM MAINS SUPPLY BEFORE REMOVING ANY COVERS. DO NOT BYPASS THE THERMAL CUT-OUTS IN ANY CIRCUMSTANCES.**

Ensure the thermostat and thermal cut-out sensing bulbs are pushed fully into the pockets on the element plate assembly.

### **BOILER SELECTION**

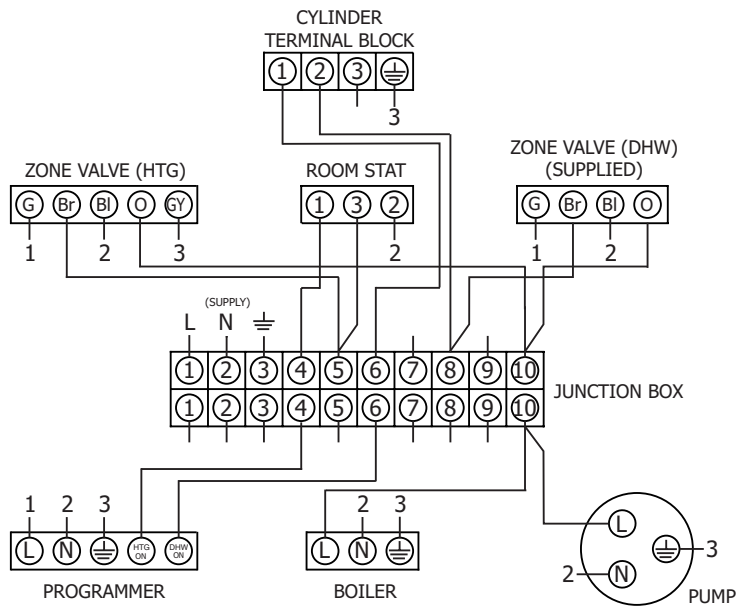
The boiler should have a control thermostat and non self-resetting thermal cut-out and be compatible with unvented storage water heaters.

Where use of a boiler without a thermal cut-out is unavoidable a "low head" open vented primary circuit should be used. The feed and expansion cistern head above the Pullin Evolution Solar should not exceed 2.5m.

### **AUXILLARY PRIMARY CIRCUIT CONTROL**

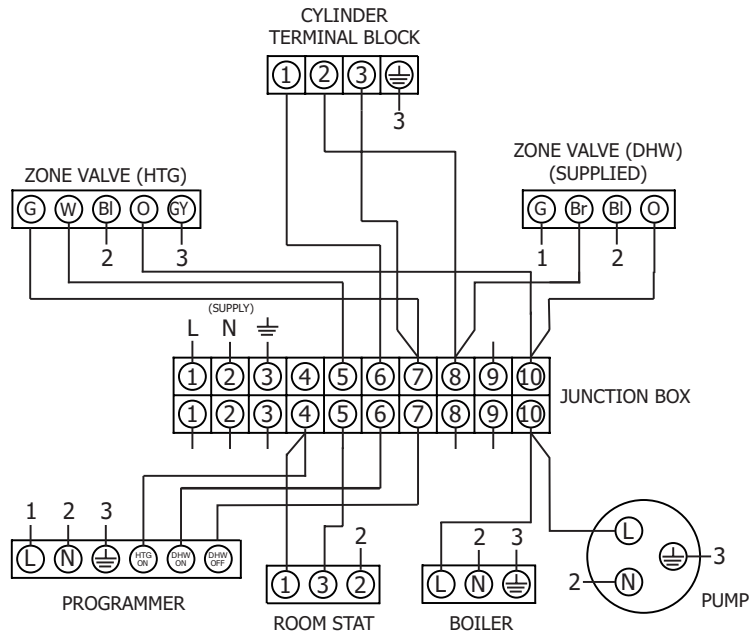
The 2-port motorised valve supplied with the Pullin Evolution Solar indirect units MUST be fitted to the primary auxillary circuit flow to the Pullin Evolution Solar heat exchanger and wired in series with the indirect thermostat and thermal cut-out fitted to the unit.

Primary circulation to the Pullin Evolution Solar heat exchangers must be pumped; gravity circulation WILL NOT WORK.



NOTES:  
 CONTROL TERMINAL NUMBERING MAY DIFFER FROM THOSE SHOWN.  
 REFER TO INSTRUCTIONS WITH CONTROLS SELECTED.  
 A DOUBLE POLE ISOLATING SWITCH MUST BE INSTALLED IN THE MAINS SUPPLY.  
 ALL EARTH CONNECTIONS MUST BE CONNECTED BACK TO THE MAINS EARTH SUPPLY.  
 CONTROL CIRCUIT FOR AUXILLARY HEATING BOILER ONLY.  
 SEPARATE CONTROLS WILL BE REQUIRED FOR THE SOLAR PRIMARY CIRCUIT.

Fig. 8: Schematic wiring diagram - Basic 2 x 2 port valve system



NOTES:  
 CONTROL TERMINAL NUMBERING MAY DIFFER FROM THOSE SHOWN.  
 REFER TO INSTRUCTIONS WITH CONTROLS SELECTED.  
 A DOUBLE POLE ISOLATING SWITCH MUST BE INSTALLED IN THE MAINS SUPPLY.  
 ALL EARTH CONNECTIONS MUST BE CONNECTED BACK TO THE MAINS EARTH SUPPLY.  
 CONTROL CIRCUIT FOR AUXILLARY HEATING BOILER ONLY.  
 SEPARATE CONTROLS WILL BE REQUIRED FOR THE SOLAR PRIMARY CIRCUIT.

Fig.9: Schematic wiring diagram - 3 port mid position valve system. N.B. Must be used in conjunction with 2 port zone valve supplied

## COMMISSIONING

### FILLING THE UNIT WITH WATER

- Check expansion vessel pre-charge pressure. The vessel is supplied pre-charged to 3.5 bar to match the control pressure of the pressure reducing valve. The pre-charge pressure is checked using a car tyre gauge by unscrewing the plastic cap opposite the water connection.
- Check all connections for tightness including the immersion heater(s). An immersion heater key spanner is supplied for this purpose.
- Ensure the drain cock is **CLOSED**.
- Open a hot tap furthest from the Pullin Evolution Solar.
- Open the mains stop cock to fill the unit. When water flows from the tap, allow to run for a few minutes to thoroughly flush through any residue, dirt or swarf, then close the tap.
- Open successive hot taps to purge the system of air.

### SYSTEM CHECKS

- Check all water connections for leaks and rectify as necessary.
- Remove the pressure reducing valve headwork to access the strainer mesh; clean and re-fit.
- Manually open, for a few seconds, each relief valve in turn, checking that water is discharged and runs freely through the tundish and out at the discharge point.
- Ensure that the valve(s) reseal satisfactorily.

### SOLAR PRIMARY CIRCUIT

Fill the solar primary circuit following the instructions provided with the solar hydraulic controls. The cylinder temperature control probe supplied with the solar controller must be fully inserted into the pocket in the lower controls housing and the cable securely clamped. Heating by the solar primary circuit is controlled by the solar controller; refer to the manufacturer's installation instructions for details of how to set up and connect the solar primary circuit. The solar controller should be programmed to give a maximum storage temperature in the Pullin Evolution Solar of 70°C; 60°C is recommended to minimise scaling.

### DIRECT UNITS

Switch on electrical supply to the immersion heater(s) and allow the Pullin Evolution Solar to heat up to normal working temperature (60°C recommended, approximately graduation 4 on the thermostat). If necessary the temperature can be adjusted by inserting a flat bladed screwdriver in the adjustment knob on top of the immersion heater thermostat and rotating.

The adjustment range 1 to 5 represents a temperature range of 10° to 70°C. Check the operation of thermostat(s) and that no water has issued from the expansion relief valve or temperature/pressure relief valve during the heating cycle.

### SECONDARY HEATING COIL

Fill the indirect secondary circuit following the boiler manufacturer's commissioning instructions. To ensure the Pullin Evolution Solar auxiliary heat exchanger is filled, the 2 port motorised valve (supplied) should be manually opened by moving the lever on the motor housing to the **FLUSHING ONLY** setting. When the circuit is full return the lever to the **NORMAL USE** position. Switch on the boiler, ensure the programmer is set to Domestic Hot Water and allow the Pullin Evolution Solar to heat up to a normal working temperature (60°C recommended, approximately graduation 4 on the thermostat). If necessary the temperature can be adjusted by inserting a flat bladed screwdriver in the adjustment knob (located on top of the thermostat mounting bracket - see Fig.10) and rotating. The minimum thermostat setting is 10°C. The adjustment range 1 to 5 represents a temperature range of 30 to 70°C. Check the operation of the indirect thermostat and 2-port motorised valve and that no water has issued from the expansion relief valve or temperature/pressure relief valve during the heating cycle.

### BENCHMARK™ LOG BOOK

On completion of the installation and commissioning of the Pullin Evolution Solar the Benchmark™ 'Installation, Commissioning and Service Record Log Book' should be completed and signed off by the competent installer or commissioning engineer in the relevant sections. The log book is included in the back of this instruction book.

The various system features, location of system controls, user instructions and what to do in the event of a system failure should be explained to the customer. The customer should then countersign the Benchmark™ log book to accept completion.

This book should be left with the customer. The log book includes sections that should be filled out when any subsequent service or maintenance operation is carried out on the Pullin Evolution Solar system.

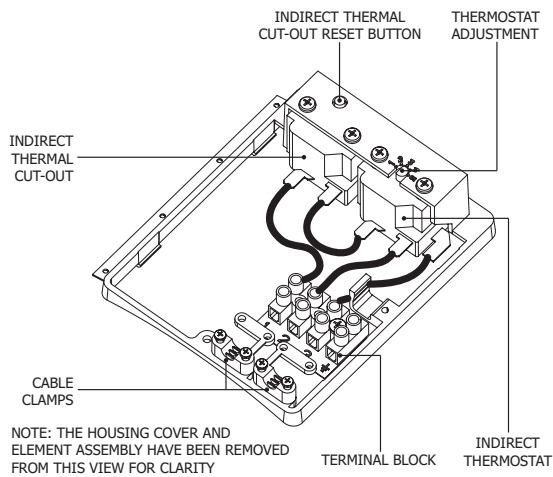


Fig. 10: Indirect thermostat and thermal cut-out

## MAINTENANCE

### MAINTENANCE REQUIREMENTS

Unvented hot water systems have a continuing maintenance requirement in order to ensure safe working and optimum performance. It is essential that the relief valve(s) are periodically inspected and manually opened to ensure no blockage has occurred in the valves or discharge pipework. Similarly cleaning of the strainer element and replacement of the air in the expansion vessel will help to prevent possible operational faults.

The maintenance checks described below should be performed by a competent installer on a regular basis, e.g. annually to coincide with boiler maintenance.

### SAFETY VALVE OPERATION

Manually operate the temperature/pressure relief valve for a few seconds. Check water is discharged and that it flows freely through the tundish and discharge pipework. Check valve reseats correctly when released. **NOTE: Water discharged may be very hot!**

Repeat the above procedure for the expansion valve.

### STRAINER

Turn off the cold water supply, boiler and immersion heaters. The lowest hot water tap should then be opened to de-pressurise the system. Remove the pressure reducing valve cartridge to access the strainer mesh. Wash any particulate matter from the strainer under clean water. Re-assemble ensuring the seal is correctly fitted, DO NOT use any other type of sealant.

### DESCALING IMMERSION HEATER(S)

Before removing the immersion heater(s) the unit must be drained. **Ensure the water, electrical supply, boiler and solar primary circuit are OFF before draining.** Attach a hosepipe to the drain cock having sufficient length to take water to a suitable discharge point below the level of the unit. Open a hot tap close to the unit and open drain cock to drain unit.

#### DIRECT MODELS:

Open the cover(s) to the immersion heater housing(s) and disconnect wiring from the thermostat mounted on top of the immersion heater(s). Remove the thermostat by carefully pulling outwards from the immersion heater. Unscrew immersion heater backnut(s) and remove immersion heater from the unit. A key spanner is supplied with the Pullin Evolution Solar unit for easy removal/tightening of the immersion heater(s). Over time the immersion heater gasket may become stuck to the mating surface. To break the seal insert a round bladed screwdriver into one of the pockets on the immersion heater and gently lever up and down.

#### INDIRECT MODELS:

Open the cover(s) to the immersion heater housing(s) and disconnect wiring from immersion heater(s). Remove the thermostat by carefully pulling outwards from the immersion heater. Remove thermostat capillary sensors from the pockets on the immersion heater. Unscrew immersion heater backnut(s) and remove immersion heater from the unit. A key spanner is supplied with the Pullin Evolution Solar unit for easy removal/tightening of the immersion heater(s). Over time the immersion heater gasket may become stuck to the mating surface. To break the seal insert a round bladed screwdriver into one of the pockets on the immersion heater and gently lever up and down.

Carefully remove any scale from the surface of the element(s). DO NOT use a sharp implement as damage to the element surface could be caused. Ensure sealing surfaces are clean and seals are undamaged, if in doubt fit a new gasket.

Replace immersion heater(s) ensuring the lower (right angled) element hangs vertically downwards towards the base of the unit. It may be helpful to support the immersion heater using a round bladed screwdriver inserted into one of the thermostat pockets whilst the backnut is tightened. Replace thermostat capillaries into pocket (indirect models). Replace the immersion heater thermostat by carefully plugging the two male spade terminations on the underside of the thermostat head into the corresponding terminations on the element. Rewire, check, close and secure immersion heater housing cover(s).

## **PULLIN EVOLUTION SOLAR EXPANSION VESSEL CHARGE PRESSURE**

Remove the dust cap on top of the vessel. Check the charge pressure using a tyre pressure gauge. The pressure (with system de-pressurised) should be 3.5bar. If it is lower than the required setting it should be re-charged using a tyre pump (Schrader valve type). DO NOT OVER CHARGE. Re-check the pressure and when correct replace the dust cap.

## **RE-COMMISSIONING**

Check all electrical and plumbing connections are secure. Close the drain cock. With a hot tap open, turn on the cold water supply and allow unit to refill. DO NOT switch on the immersion heater(s) or boiler until the unit is full. When water flows from the hot tap allow to flow for a short while to purge air and flush through any disturbed particles. Close hot tap and then open successive hot taps in system to purge any air.

When completely full and purged check system for leaks. The heating source (immersion heater(s), boiler or solar primary circuit) can then be switched on.

## **BENCHMARK™ LOG BOOK**

On completion of any maintenance or service of the Pullin Evolution Solar the Benchmark™ "Installation, Commissioning and Service Record Log Book" should be filled in to record the actions taken and the date the work was undertaken. The log book is included in the back of this instruction book.

## **USER INSTRUCTIONS**

### **WARNINGS**

**IF WATER ISSUES FROM THE TEMPERATURE/ PRESSURE RELIEF VALVE ON THE PULLIN EVOLUTION SOLAR SWITCH OFF ELECTRICAL SUPPLY TO THE IMMERSION HEATER(S) (DIRECT UNITS), SHUT DOWN THE BOILER (INDIRECT UNITS) AND SHUT DOWN THE SOLAR PRIMARY CIRCUIT. DO NOT TURN OFF ANY WATER SUPPLY. CONTACT A COMPETENT INSTALLER FOR UNVENTED WATER HEATERS TO CHECK THE SYSTEM.**

**DO NOT TAMPER WITH ANY OF THE SAFETY VALVES FITTED TO THE PULLIN EVOLUTION SOLAR SYSTEM. IF A FAULT IS SUSPECTED CONTACT A COMPETENT INSTALLER.**

### **TEMPERATURE CONTROLS - SOLAR**

Temperature control of the solar primary coil is by means of solar differential temperature controller. This will usually have been set during commissioning to give a storage temperature of approximately 60°C. Refer to user instructions supplied with the controller for details of how to adjust this if required.

### **TEMPERATURE CONTROLS – DIRECT UNIT IMMERSION HEATER(S)**

A combined adjustable thermostat and thermal cut-out is provided for each immersion heater. The thermostat is factory set to give a water storage temperature of approx. 55 to 60°C. Access to the thermostat can be made by opening the immersion heater cover - DISCONNECT THE ELECTRICAL SUPPLY BEFORE OPENING THE COVER(S). Temperature adjustment is made by inserting a flat bladed screwdriver in the slot on the adjustment disc on top of the thermostat and rotating. The adjustment range 1 to 5 represents a temperature range of 10 to 70°C (60°C will be approximately position 4). If in any doubt contact a competent electrician.

**DO NOT bypass the thermal cut-out(s) in any circumstances.**

### **TEMPERATURE CONTROLS – INDIRECT UNITS (Fig. 9)**

The Pullin Evolution Solar indirect units are fitted with an indirect thermostat and thermal cut-out. These controls must be wired in series with the 2-port motorised zone valve supplied to interrupt the flow of primary water around the heat exchanger coil when the control temperature has been reached. The controls are located within the upper white terminal housing along with the immersion heater thermostat. The thermostat is factory set to give a water storage temperature of approx. 55 to 60°C. Access to the thermostat can be made by opening the terminal housing cover - DISCONNECT THE ELECTRICAL SUPPLY BEFORE OPENING THE COVER.

Temperature adjustment is made by inserting a flat bladed screwdriver in the adjustment knob and rotating. The minimum thermostat setting is 10°C. The adjustment range 1 to 5 represents a temperature range of 30 to 70°C (60°C will be approximately position 4). If in any doubt contact a competent electrician.

On indirect units an immersion heater is also provided for use should the indirect heat source be shut down for any purpose. The immersion heater control temperature is set using the immersion heater (direct) thermostat, see User Instructions section for details.

**DO NOT bypass the thermal cut-out(s) in any circumstances.**

### FLOW PERFORMANCE

When initially opening hot outlets a small surge in flow may be noticed as pressures stabilise. This is quite normal with unvented systems. In some areas cloudiness may be noticed in the hot water. This is due to aeration of the water, is quite normal and will quickly clear.

### OPERATIONAL FAULTS

Operational faults and their possible causes are detailed in the Fault Finding section of this book. It is recommended that faults should be checked by a competent installer.

The air volume within the expansion vessel will periodically require recharging to ensure expanded water is accommodated within the unit. A discharge of water **INTERMITTENTLY** from the expansion valve will indicate the air volume has reduced to a point where it can no longer accommodate the expansion.

## FAULT FINDING AND SERVICING

### IMPORTANT

- Servicing should only be carried out by competent persons in the installation and maintenance of unvented water heating systems.
- Any spare parts used **MUST** be authorised Pullin Evolution Solar parts.
- Disconnect the electrical supply before removing any electrical equipment covers.
- **NEVER** bypass any thermal controls or operate system without the necessary safety valves.
- Water contained in the Pullin Evolution Solar unit may be very hot, especially following a thermal control failure. Caution must be taken when drawing water from the unit.

### SPARE PARTS

A full range of spare parts are available for the Pullin Evolution Solar range. Refer to the Technical Data label on the unit to identify the model installed and ensure the correct part is ordered.

Description	Part no.
Immersion heater (bent)	95 606 961
Immersion heater (straight)	95 606 962
Immersion heater gasket	95 611 822
Immersion heater backnut	95 607 869
Solar temperature probe pocket plate	95 607 064
Immersion heater key	95 607 861
Tundish	95 605 838
Expansion valve cartridge - 6bar	95 605 864
Expansion valve complete - 6bar	95 607 030
Cold water combination valve complete	95 605 047
Cold water combination valve body	95 605 048
Pressure reducing valve cartridge 3.5bar	95 607 029
Temperature/Pressure Relief Valve	95 605 810
Expansion vessel 25 litre	95 607 612
<b>Direct controls</b>	
Combined thermostat and thermal cut-out	95 612 026
Terminal cover	95 614 089
<b>Indirect controls</b>	
Indirect thermostat	95 612 697
Indirect Thermal cut-out and Solar Cut-out	95 612 698
Motorised valve 2-port	95 605 049
Terminal housing	95 614 090
4 Way terminal block	95 607 902

## FAULT FINDING

The Fault Finding chart below will enable operational faults to be identified and their possible causes rectified. Any work carried out on the Pullin Evolution Solar water heater and its associated controls MUST be carried out by a competent installer for unvented water heating systems. In case of doubt contact Service Support.

## WARNING

**DO NOT TAMPER WITH ANY OF THE SAFETY VALVES OR CONTROLS SUPPLIED WITH THE PULLIN EVOLUTION SOLAR AS THIS WILL INVALIDATE ANY GUARANTEE**

FAULT	POSSIBLE CAUSE	REMEDY
No hot water flow	1. Mains supply off. 2. Strainer blocked. 3. Cold Water Combination Valve incorrectly fitted.	1. Check and open stop cock. 2. Turn off water supply. Remove strainer and clean (see Maintenance section). 3. Check and refit as required.
Water from hot taps is cold	1. DIRECT immersion heater not switched on. 2. DIRECT immersion heater thermal cut-out has operated. 3. INDIRECT programmer set to Central Heating only. 4. INDIRECT boiler not working. 5. INDIRECT thermal cut-out has operated. 6. INDIRECT motorised valve not connected correctly.	1. Check and switch on. 2. Check. Reset by pushing button. 3. Check. Set to a Domestic Hot Water programme. 4. Check boiler operation. If fault is suspected consult boiler manufacturer's instructions. 5. Check. Reset by pushing button on cut-out. Check operation of indirect thermostat. 6. Check wiring and/or plumbing connections to motorised valve (see Fig. 8).
Water discharges from Expansion Valve	1. INTERMITTENTLY Expansion Vessel charge pressure has reduced below 3.5bar. 2. CONTINUALLY a. Cold Water Combination Valve Pressure Reducer not working correctly. b. Expansion Valve seat damaged.	1. See Maintenance section for re-charging procedure. 2a. Check pressure from Cold Water Combination Valve. If greater than 3.5bar replace Pressure Reducer cartridge. 2b. Remove Expansion Valve cartridge. Check condition of seat. If necessary fit new Expansion Valve cartridge.
Water discharges from T&P Relief Valve	1. Thermal control failure NOTE water will be very hot.	1. Switch off power to immersion heater(s) and shut down boiler. DO NOT turn off water supply. When discharge stops check all thermal controls, replace if faulty.
Milky water	1. Oxygenated water.	1. Water from a pressurised system releases oxygen bubbles when flowing. The milkiness will disappear after a short while.

Table 3: Fault Finding Chart

## OTHER INFORMATION

Nominal Capacity (litres)	Standing Heat Loss	
	per day (kWh/24h)	per year (kWh/365d)
190	2.11	770
210	2.30	840
250	2.45	894
300	2.72	993

Table 4: Standing heat losses (based on an ambient air temperature of 20°C and a stored water temperature of 65°C)

## ENVIRONMENTAL INFORMATION

Pullin products are manufactured from many recyclable materials. At the end of their useful life they should be disposed of at a Local Authority Recycling Centre in order to realise the full environmental benefits.

Insulation is by means of an approved CFC/HCFC free polyurethane foam with an ozone depletion factor of zero.

## **GUARANTEE**

The Pullin Evolution Solar stainless steel vessel carries a full 10 year parts guarantee against faulty manufacture or materials provided that:

- It has been correctly installed as per the instructions contained in the instruction manual and all relevant Codes of Practice and Regulations in force at the time of installation.
- It has not been modified in any way, other than by Pullin.
- It has not been frost damaged.
- It has only been used for the storage of potable water.
- It has not been tampered with or been subjected to misuse or neglect.
- Within 60 days of installation the user completes and returns the certificate supplied along with the proof of purchase to register the product.
- It has been installed in the United Kingdom.

The expansion vessel is guaranteed for a period of 2 years from the date of purchase. The Pullin Evolution Solar's components, immersion heater and thermal controls are guaranteed for a period of 2 years from the date of purchase. Evidence of purchase and date of supply may be required. The unit is not guaranteed against damage due to frost. The guarantee is transferable. This guarantee does not affect your statutory rights.

### **SPARES STOCKISTS**

For the fast and efficient supply of spares please contact:

interpart

Tel: 01926 405 405

### **TECHNICAL SUPPORT**

For all technical support and service issues please contact:

Pullin  
Brooks House,  
Coventry Road,  
Warwick  
CV34 4LL

Tel: 08706 060933

The policy of Pullin is one of continuous product development and, as such, we reserve the right to change specifications without notice.





*The code of practice for the installation, commissioning & servicing of mains pressure hot water storage*

# **Installation, Commissioning and Service Record**

## **CUSTOMER DETAILS**

**NAME  
ADDRESS**

**TELEPHONE NUMBER**

## **IMPORTANT**

- 1. Please keep this log book in a safe place for future reference.**
- 2. This Log Book is to be completed in full by the competent person(s) who commissioned the equipment and then handed to the customer. When this is done, the Log Book is a commissioning certificate that can be accepted as evidence of compliance with the appropriate Building Regulations.**
- 3. Failure to install and commission this appliance to the manufacturer's instructions may invalidate the warranty.**

**The above does not affect your statutory rights.**

# INSTALLER & COMMISSIONING ENGINEER DETAILS

## INSTALLER DETAILS

COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

INSTALLER NAME: \_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

DATE: \_\_\_\_\_

REGISTERED OPERATIVE ID CARD NO. (IF APPLICABLE): \_\_\_\_\_

## COMMISSIONING ENGINEER (IF DIFFERENT)

COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

ENGINEER NAME: \_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

DATE: \_\_\_\_\_

REGISTERED OPERATIVE ID CARD NO. (IF APPLICABLE): \_\_\_\_\_

## APPLIANCE & TIME CONTROL DETAILS

CAPACITY: \_\_\_\_\_ LITRES

SERIAL NUMBER: \_\_\_\_\_

GUARANTEE CODE: \_\_\_\_\_

TYPE: \_\_\_\_\_ (DIRECT/INDIRECT)

TIME CONTROL:  PROGRAMMER  
 TIME SWITCH

## COMMISSIONING PROCEDURE INFORMATION

### **BOILER PRIMARY SETTINGS (INDIRECT HEATING ONLY) ALL BOILERS**

IS THE PRIMARY A SEALED OR OPEN VENTED SYSTEM?  SEALED  OPEN  
WHAT IS THE BOILER FLOW TEMPERATURE?  °C

### **ALL MAINS PRESSURISED SYSTEMS**

WHAT IS INCOMING STATIC COLD WATER PRESSURE AT THE INLET TO THE PRESSURE REDUCING VALVE?  BAR  
HAS STRAINER (IF FITTED) BEEN CLEANED OF INSTALLATION DEBRIS?  YES  NO  
HAS A WATER SCALE REDUCER BEEN FITTED?  YES  NO  
WHAT TYPE OF SCALE REDUCER HAS BEEN FITTED? \_\_\_\_\_

### **UNVENTED SYSTEMS ONLY**

ARE COMBINED TEMPERATURE & PRESSURE RELIEF AND EXPANSION VESSEL FITTED AND DISCHARGE TESTED?  YES  NO  
IS PRIMARY ENERGY SOURCE CUT OUT FITTED (NORMALLY 2-PORT VALVE)?  YES  NO  
WHAT IS THE PRESSURE REDUCING VALVE SETTING (IF FITTED)?  BAR  
WHERE IS OPERATING PRESSURE REDUCING VALVE SITUATED? \_\_\_\_\_  
HAS THE EXPANSION VESSEL OR INTERNAL AIR SPACE BEEN CHECKED?  YES  NO  
WHAT IS THE HOT WATER TEMPERATURE AT THE NEAREST OUTLET?  °C

### **ALL PRODUCTS**

DOES THE HOT WATER SYSTEM COMPLY WITH THE APPROPRIATE BUILDING REGULATIONS?  YES  
HAS THE SYSTEM BEEN INSTALLED AND COMMISSIONED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS?  YES  
HAVE YOU DEMONSTRATED THE OPERATION OF THE SYSTEM CONTROLS TO THE CUSTOMER?  YES  
HAVE YOU LEFT ALL THE MANUFACTURER'S LITERATURE WITH THE CUSTOMER?  YES

COMPENTENT PERSON'S SIGNATURE

CUSTOMER'S SIGNATURE

\_\_\_\_\_  
(To confirm demonstrations of equipment and receipt of appliance instructions)

## SERVICE INTERVAL RECORD

It is recommended that your hot water system is serviced regularly and that your service engineer completes the appropriate Service Interval Record below.

### SERVICE PROVIDER

Before completing the appropriate Service Interval Record below, please ensure you have carried out the service as described in the manufacturer's instructions and in compliance with all relevant codes of practice.

<b>SERVICE 1</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE	<b>SERVICE 2</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE
<b>SERVICE 3</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE	<b>SERVICE 4</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE
<b>SERVICE 5</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE	<b>SERVICE 6</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE
<b>SERVICE 7</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE	<b>SERVICE 8</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE
<b>SERVICE 9</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE	<b>SERVICE 10</b> DATE: ENGINEER NAME COMPANY NAME TEL NO. COMMENTS  SIGNATURE