



Please read these instructions before installing or commissioning.  
Potterton Solar - Solar Thermal Domestic Hot Water System  
should only be installed by a competent person.  
Please leave these instructions with the user for safe keeping.

# Commissioning, Maintenance & Servicing Guide



## Potterton Solar - Solar Thermal Domestic Hot Water System

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### 1.1 Commissioning - General

The Potterton Solar system uses a sealed system indirect solar primary circuit which must be filled with the solar heat transfer fluid provided. This is pre-diluted to the appropriate strength (40% glycol/60%water) and should not be diluted further. Use only the fluid supplied. Additional canisters of solar fluid are available in 10 litre (5119550) and 20 litre (5119549) bottles.

**DO NOT** mix the fluid with other types.

The system should be filled when there is no direct radiation from the sun. If direct radiation occurs the collector panels should be shaded by covering them during filling and flushing.

Although the solar heat transfer fluid is non corrosive and biodegradable appropriate precautions should be taken when handling.

- Wear protective gloves and goggles.
- Wash with soap and water if the fluid comes into contact with skin.
- If fluid gets into eyes, immediately rinse with large quantities of clear running water.
- A full safety and specification sheet can be obtained by request.

The solar heat transfer fluid must be pumped into the system. The pump can be electric or manual but must be capable of producing a pressure of at least 2 bar.

The system should be thoroughly flushed to remove any contaminants in the solar primary circuit prior to filling with the heat transfer fluid

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Fig. 1

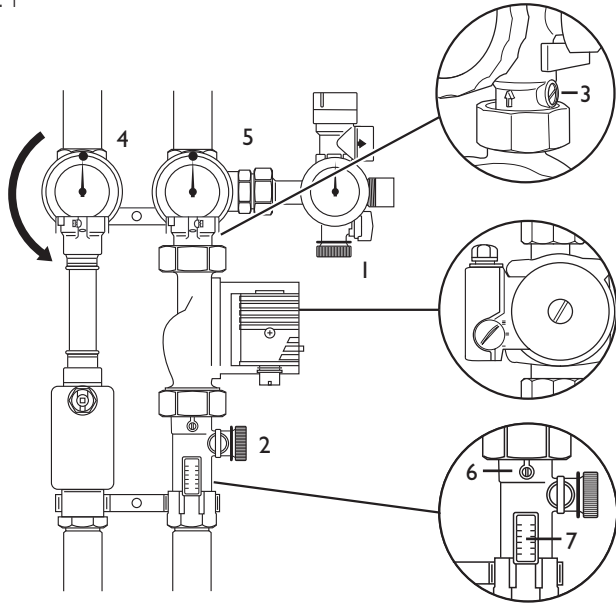


Fig. 2

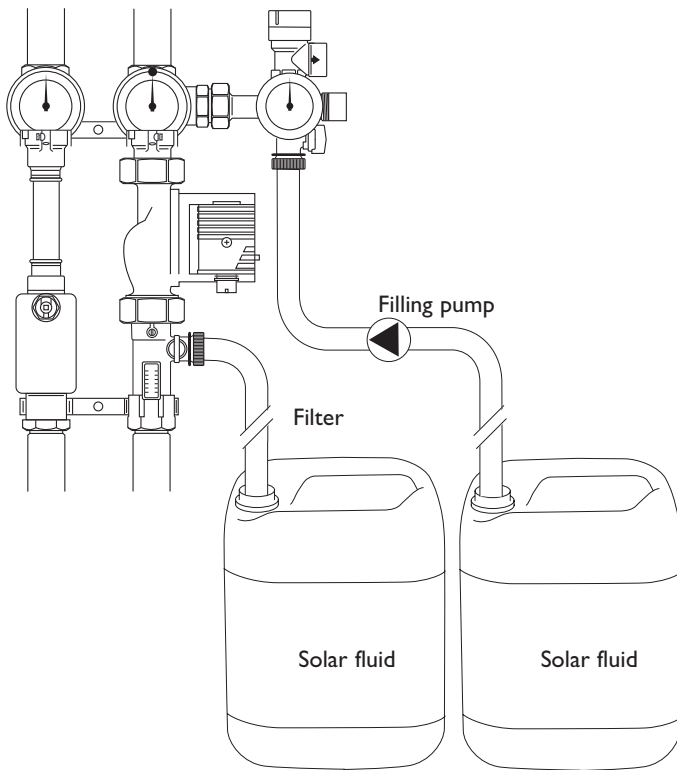
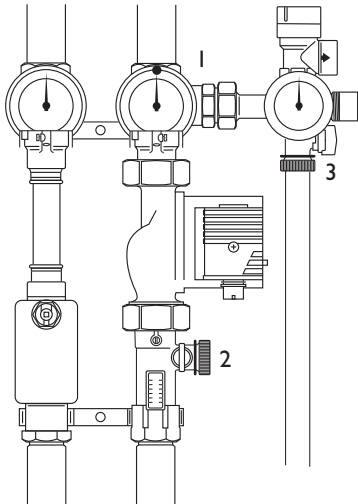


Fig. 3



## 1.0 Commissioning of system

### 1.2 Flushing the pipework

Before the system is commissioned the pipework must be flushed to remove any contaminants. It is recommended that this is done using the solar heat transfer fluid as it will be impossible to fully drain all parts of the system.

Connect the flushing pipes to the fill & drain valve on the safety group (Fig. 1 Item 1) and to the fill & drain valve on the flow meter (Fig. 1 Item 2).

Open the fill & drain valves.

Turn the slot of the adjusting screw (Fig. 1 Item 3) in the return so the slot is vertical to open the non-return valve.

Turn the left hand isolating valve with integral thermometer in the flow (Fig. 1 Item 4) in the direction indicated by the arrow (to a 45° position) to open the non-return valve.

Ensure that the right hand isolating valve with integral thermometer in the return (Fig. 1 Item 5) is open indicated by the dot on the thermometer bezel being at the top.

Turn the slot of the adjusting screw of the flow meter (Fig. 1 Item 6) in the return vertically to open the flow limiter (Fig. 1 Item 7).

Flush the solar primary pump by pumping the fluid into the system via the fill and drain valve on the safety group. Close right hand isolating valve (dot on thermometer bezel at 9 o'clock position). Flush solar primary pipework and panels via the fill and drain valve on the safety group. **If reusing flushed fluid ensure this is filtered before re-introducing into the system (see Fig. 2).**

### 1.3 Filling the pipework

Close the fill and drain valve (Fig. 3 Item 2) on the flow meter. Open the righthand isolating valve (Fig. 3. Item 1) with integral thermometer by turning so that the dot on the bezel is at the top. Fill the solar primary system by pumping in fluid until the system pressure reads 1.5 to 2.0 bar. Close the fill and drain valve (Fig. 3. Item 3) on the safety group.

### 2.1 Check pressure in the solar primary pipework

After flushing and filling the solar primary system with heat transfer fluid the pressure must be checked.

Pressure test the system (6 bar). Observe the maximum pressure ratings of all components concerned.

Check the solar heating system for leaks.

Close the fill and drain valve on the safety group.

### 2.2 Ensure the solar primary system is free from air

Switch on the power supply to the solar differential temperature controller.

Manually switch the circulation pump ON and OFF via the solar differential temperature controller (see section 3.1.7) to pump fluid around the solar primary system.

Turn the pump off and open the airbleed screw on the air separator (Fig. 4 Item 1). Bleed any air from the air separator. If the system pressure drops top up by opening the fill and drain valve (Fig. 4 Item 2) on the safety group and pumping in more solar fluid to restore the pressure. This must be repeated until the pressure remains stable.

### 2.3 Setting the system pressure

During commissioning, the system pressure should be 0.7 bar above the static pressure (1 metre height differential equals 0.1 bar). However, it must be at least 1.5 bar and no higher than 2.2 bar.

Determine the system pressure when the system is cold (20°C). This should be recorded on the Commissioning Record Sheet (page 21).

If the pressure is too low you should pump additional heat transfer fluid into the system; the fill & drain valve on the safety group (Fig. 4 Item 2) needs to be opened for this purpose. When system pressure is correctly set, ensure the fill and drain valve is closed and remove filling hose from safety group.

Fig. 4

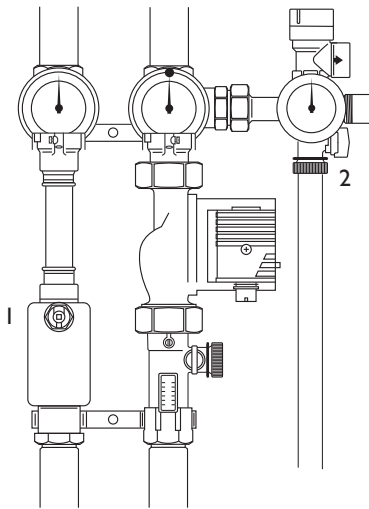


Fig. 5

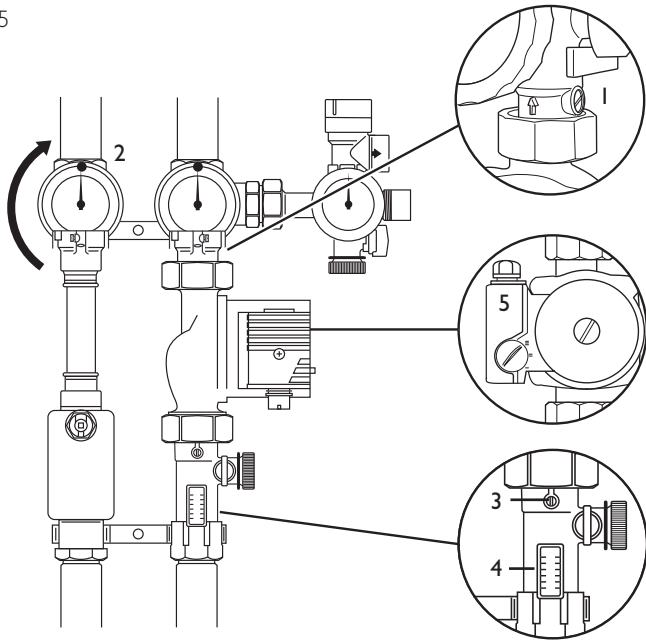
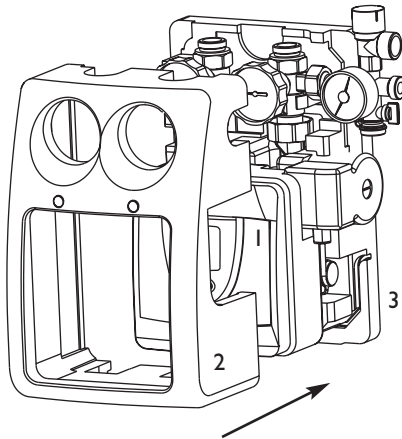


Table 1

Flow rate (when system is cold)	
Collectors	l/min
1	approx. 2
2	approx. 4
3	approx. 6

Fig. 6



**2.4** Checking and adjusting the flow rate

Adjust the flow rate when the system is cold (20°C) (see Fig. 5).

The flow rate should be adjusted to give the optimum flow rate depending on the number and type of collector panels connected.

Turn the slot of the adjusting screw (Fig. 5 Item 1) below the return temperature gauge horizontally to close the non-return valve.

Turn the l.h. isolating valve with integral thermometer in the flow (Fig. 5 Item 2) as far as it will go in the direction indicated by the arrow to close the non-return valve (dot on bezel on top).

Turn the slot of the adjusting screw (Fig. 5 Item 3) in the return vertically to open the flow limiter on the flow meter (Fig. 5 Item 4).

Manually operate the solar pump (see section 3.1.7).

Set the solar pump switch (Fig. 5 Item 5) so that the required flow rate is achieved or exceeded with the lowest possible setting. The flow limiter adjusting screw (Fig. 5 Item 3) can be used to fine-tune the flow rate.

Depending on the number and type of collectors installed, set the required flow rate from table (See Table 1).

The float in the flow meter will indicate the circulation flow rate through the flow meter sight glass.

Adjust screw of the flow limiter (Fig. 5 Item 3) with a screwdriver, until the upper edge of the float in the sight glass indicates the required flow rate.

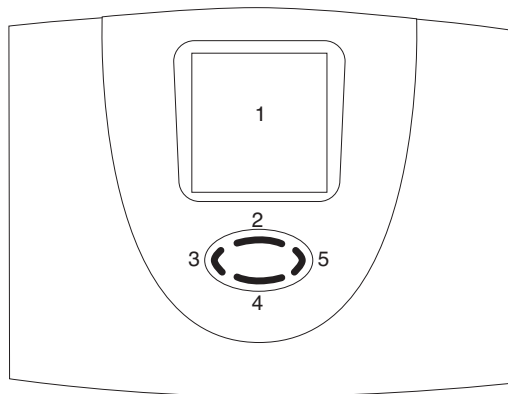
Set manual pump operation to off.

**2.5** Installation of the thermal insulation

Refit the controller mounting moulding (Fig. 6 Item 1) onto the rear moulding.

Push the front thermal insulation (Fig. 6 Item 2) against the rear thermal insulation section (Fig. 6 Item 3) until it clips into place.

Fig. 7



## 3.0 Commissioning of solar controller










### 3.1 Overview of display and operating elements (see Fig. 7).









Number	Description
1	Display with graphic symbols
2	Control button scroll upwards / +
3	Control button exit / break-off
4	Control button scroll downwards / -
5	Control button choice / confirmation

#### 3.1.1 Explanation of graphic symbols

Graphic symbol	Description	Indication in operation
<b>Main Menu</b>		
	Menu "Info"	When symbol flashes it is possible for it to be selected. If that symbol is chosen by pressing the button, the symbol remains static (not flashing).
	Menu "Programming"	
	Menu "Manual operation"	
	Menu "Basic adjustment"	

Graphic symbol	Description	Indication in operation
<b>Indicator values</b>		
dT	Temperature difference	
min	Min value	Appears when minimum values are indicated
max	Max value	Appears when maximum values are indicated
min 0:00 I	Timeframe I start	Appears when the differential controller is active (timeframe 1-3) or tube collector is active (timeframe 4)
Max 23:59 I	Timeframe I stop	Appears when the differential controller is active (timeframe 1-3) or tube collector is active (timeframe 4)
	5 x 7 segment display. Presentation of figures 00000 to 99999	Display of all values, display flashes when a value is changed
°C	Temperature in Celsius	
K	Temperature difference in Kelvin	
h	Operating hours	
kWh	Productivity indication in kWh	

Graphic symbol	Description	Indication in operation
<b>Measuring points assignment</b>		
	Temperature measuring point collector array 1	
	Temperature measuring point collector array 2	
	Temperature measuring point storage tank 1 lower (storage tank 1 charging)	
	Temperature measuring point storage tank lower (storage tank 2 charging)	
	Temperature measuring point collector - return	
	Temperature measuring point storage tank upper (thermostat function)	
	Antifreezing sensor or universal temperatures measuring point (T6) (no sensor monitoring)	
	2nd temperature differential controller	
	Operating hours, energy productivity measurement	

<b>Status indication</b>		
	Solar circulation pump	Symbol revolves when solar circulation pump is on
	Switch output 1 is active	Appears when switch output 1 is active (on)
	Switch output 2 is active	Appears when switch output 2 is active (on)
	Switch output 3 is active	Appears when switch output 3 is active (on)
	Reference to system fault	Display flashes when a fault occurs in the system
	Safety query for value changes which are to be stored	Input value can be either  rejected or  accepted



### 3.1.2 Button function

Operation and programming of the Potterton Solar differential temperature controller is by means of 4 operating buttons. By means of pressing these buttons you can:

- recall display values
- carry out controller adjustments

The graphic symbols on the display step through the operating structure and show clearly the current menu points, display values or parameters.

Operating buttons have the following functions:

Button	Function	Description
	"Up" "+"	<ul style="list-style-type: none"> <li>• Step up through menu</li> <li>• Value change: Increase of the indicated value by 1, holding the button down will automatically increase values</li> </ul>
	"Call" "Down"	<ul style="list-style-type: none"> <li>• Call up of main menu, step down through menu</li> <li>• Value change: Decrease of the indicated value by 1, holding the button down will automatically decrease values</li> </ul>
	"Scroll left" "Exit"	<ul style="list-style-type: none"> <li>• In main menu, scrolls to the left</li> <li>• Exit current menu</li> <li>• Exit menu point</li> <li>• Break-off value change without storing</li> </ul>
	"Scroll right" "Choice" "Confirmation"	<ul style="list-style-type: none"> <li>• In main menu, scrolls to the right</li> <li>• Choosing one menu point</li> <li>• Confirmation of value change, stores value change</li> </ul>

#### Example of setting procedure

Button	Function	Icon after operation step				Description
	"Exit"					Exit menu's "Info" Currently selected menu icon will flash
	"Scroll right"					Choosing menu "Programming" Chosen menu icon will flash
	"Call"		Max 65°C			Call up menu "Programming", the first menu point appears
	"Down"		dT min 3K			Repeated pressing up to menu point "SI dTmin" appears
	"Choice"		dT min 3K			Choosing presented character When chosen, value to be changed will flash
	"Up"		dT min 4K			Increase of parameter
	"Confirm"		dT min 4K			Confirmation of the character "ok?" icon will flash
	"Confirm"		dT min 4K			Storing of the parameter When stored, icon will stop flashing
	"Exit"					Exit menu "Programming" Currently selected menu icon will flash
	"Scroll left"					Choosing menu "Info" Chosen menu icon will flash
	"Call"		60°C			Call up menu "Info"





### 3.1.3 Operating menu

To make the operation of the controller clear, operating and display functions are divided into 4 main menus.

These are





- Info
- Programming
- Manual operation
- Basic adjustment

Each active menu is shown in the upper line of the display by its corresponding icon.

Menu	Description
Info 	Main menu for automatic regulation of solar system <ul style="list-style-type: none"> <li>• Indication of current measured values</li> <li>• Indication of system condition</li> <li>• Indication of error messages</li> <li>• Indication of operating hours and energy productivity (if installed)</li> </ul>
Programming 	Changes to programmable values (parameters) <p><b>Note: Changes can affect system functions!</b></p>
Manual operation 	Switching on and off connected pumps / valves by hand. Overrides automatic regulation.
Basic adjustment 	Information about basic adjustment for system function <p style="text-align: center;"><b>Important</b></p> <p><b>Adjustments and changes in this menu must be carried out only by a competent installer or service engineer.</b></p>

3.1.4 Overview: Construction of menu structure


The overview shows the whole menu structure. According to basic adjustment and system type some menu points may not be displayed.


 Info	 Program	 Manual operation	 Basic setting
Current collector temperature / Collector1	Maximum temperature storage cylinder1	Pump1 off / on	Collector protection function off / on
Minimum collector temperature / Collector1	Storage cylinder1 Td max (Td on)	Pump2 / Valve1 off / on	Collector protection temperature
Maximum collector temperature / Collector1	Storage cylinder1 Td min (Td off)	Heating / Cooling / Temperature differential controller off / on	Re-cooling off / on
Current storage cylinder temperature / storage1 at bottom	Maximum temperature of storage cylinder2		Re-cooling temperature
Minimum storage cylinder temperature / storage1 at bottom	Storage cylinder2 Td max (Td on)		Tube collector off / on
Maximum storage cylinder temperature / storage1 at bottom	Storage cylinder2 Td min (Td off)		Yield estimation off / on
Current storage cylinder temp / storage2 at bottom / collector 2	Minimum pump rotating speed in %		Glycol type
Minimum storage cylinder temp / storage2 at bottom / collector 2	Start temperature Heating / cooling		Glycol percentage
Maximum storage cylinder temp / storage2 at bottom / collector 2	Hysteresis temperature heating / cooling Td		Volume flow
Current collector temperature - return line	Temperature differential controller: Maximum temperature of the heating target Tmax		Controlling time in seconds
Current temperature heating / cooling / differential controller heating source	Temperature differential controller: Minimum temperature of the heating source Tmin		Storage cylinder priority
Current temperature frost protection sensor / differential controller heating target / universal measuring point T6	Temperature differential controller: Hysteresis Tdmax		Frost protection off / on
Operating hours pump1	Temperature differential controller: Hysteresis Tdmin		Frost protection sensor assignment
Yield storage1	Timeframe start 1,2,3 for the independent controller, 4 for the tube collector function		Frost protection: start temperature
Operating hours pump2	Timeframe stop 1,2,3 for the independent controller, 4 for the tube collector function		Independent controller assignment: Cooling, heating, temperature differential controller
Yield storage2	Set time		Sensor assignment for the independent controller
			Select basic configuration

3.1.5 Menu ‘Info’

















In this menu mode all measured values and operating states are shown.

If the values are marked as “resettable”, they may be reset in the following way:

Choose the value with buttons  and 













Reset value by means of the button 

Message “OK?” confirm with  = no or  = yes

Indication		Description	Reset possible
75°C		Indication of current collector temperature	no
min. 12°C		Indication of minimum collector temperature Re-settable to current temperature	yes
max. 105°C		Indication of maximum collector temperature Re-settable to current temperature	yes
52°C		Indication of current temperature storage tank (lower)	no
min. 40°C		Indication of minimum temperature storage tank (lower) Re-settable to current temperature	yes
max. 67°C		Indication of maximum temperature storage tank (lower) Re-settable to current temperature	yes
25°C		Indication of universal temperature measuring points (T3)	no
55°C		Indication of current temperature storage tank thermostat	no
60°C		Indication of current temperature collector return	no
60°C	 	Heating, cooling, temperature differential controller heat source. Sensor T1...T6	no
35°C	 	Temperature differential controller heat target	no
1234 h		Operating hours for charging storage tank Resettable to 0 h	Yes
927 kWh		Energy productivity for storage tank Resettable to 0 kWh	Yes





3.1.6 Menu ‘Programming’

All adjustable parameters can be checked in this menu and, if necessary, changed. The default factory set values will usually give efficient, problem free operation. The number of indicated values depends on the controller type and the adjusted additional functions. Only the required values are shown at each menu step:

Indication		Description	Value range	Defaults
max 65°C		Storage 1/2: Maximum temperature	15..95°C	65°C
dT max 7 K		Storage 1/2: Hysteresis (Tdon)	3..40 K	7 K
dT min 3 K		Storage 1/2: Hysteresis (Tdoff)	2..35 K	3 K
min 100	 	Setting the speed control of the pump 100% = speed control off	30%..100%	100%
13:21		Clock	0:00...23.59	12:00
min 40°C		Temperature start for the function heating/cooling	20..90°C	40°C
dT 10K		Hysteresis heating/cooling	1..30K	10K
max 65°C		Differential controller: Maximum temperature of heat target Tmax	15..95°C	65°C
min 15°C		Differential controller: Maximum temperature of heat source Tmin	0..95°C	15°C
dTmax 7 K		Temperature differential controller: Hysteresis dTmax	3..40K	7K
dT min 3 K		Temperature differential controller: Hysteresis dTmin	2..35K	3K
min 00:00 1(2,3)		Timeframe 1(2,3): Start for the independent controller	0:00... 23.59	00:00
max 23:59 1(2,3)		Timeframe 1(2,3): Stop for the independent controller	0:00... 23:59	23:59
min 6:00 4		Timeframe 1(2,3): Start for the tube collector function	0:00... 23:59	6:00
max 20:00 4		Timeframe 1(2,3): Stop for the tube collector function	0:00... 23:59	20:00

## 3.1.7 Menu 'Manual operation'

For commissioning, service and test purposes the solar primary system can be manually operated. For this purpose the switch outputs may be disconnected or connected. During manual operation there is no automatic regulation of the system. To avoid inadmissible operating states this mode of operation changes into "Indication" after ca. 8 hours and the automatic regulation is activated again.

Indication	Description	Value range
		
	Switching on / off switch output A1 (solar circulation pump) by hand	0 = off 1 = on
	Switching on / off switch output A2 (pump2 / valve1) by hand	0 = off 1 = on
	Switching on / off switch output A3 (cooling, thermostat or 2nd temperature difference controller function) by hand	0 = off 1 = on

3.1.8 Menu ‘Basic adjustment’

Adjustments and changes in this menu must be carried out only by a competent installer or service engineer. **Incorrect adjustments may adversely affect the function of controller and solar primary system**

To avoid accidental changes in menu “Basic adjustment”, it is not editable in normal functioning but has only a display function. To be able to carry out any changes, this menu must be chosen within the first minute after switching on the appliance. The basic adjustment menu is ‘blocked’ automatically one minute after if no buttons are pressed or one minute after switching on the appliance.

Indication Parameter / value	Description	Value range	Factory set-up
0 – 0	Collector protection	0 = off 1 = on	0 = off
1 – 120°C	Start temperature for the collector protection	110..150°C	120°C
2 – 0	Re-cooling function (only when collector protection is on)	0 = off 1 = on	0 = off
3 – 40°C	Target temperature for the storage after collector protection activity	30..90°C	40°C
4 – 0	Time controlled circulation with tube collectors	0 = off 1 = on	0 = off
5 – 0	Yield estimation off/on	0 = off 1 = on	0 = off
6 – 0	Glycol types (see table below)	0...10	0
7 – 50	Glycol percentage	0 ... 100% 5% - steps	50
8 – 1,0	Volume flow: Litre per impulse - flow meter	0,5 ... 25 l/l 0,5l - steps	1,0
9 – 240	Time controlling in s	30...480	240
10 – 1	Storage priority	1...2	1
11 – 0	Frost protection on/off	0 = off 1 = on	0
12 – 6	Sensor assignment - Frost protection	1...6	6
13 – 3	Start temperature for the frost protection function	-20°C ... +7°C	3
14 – 0	Select cooling thermostat or temperature differential controller	0 = off 1 = cooling 2 = heating 3 = temperature differential controller	0
15 – 5	Sensor assignment for the independent controller (source)	1...6	5
16 – 0	System configuration	0...4	0

Glycol types (point 6):

0	Anro	6	Tyfocor L5.5 - supplied
1	Ilexan E, Glythermin	7	Dowcal 10
2	Antifrogen L	8	Dowcal 20
3	Antifrogen N	9	Dowcal N
4	Ilexan E	10	Tyfocor LS
5	Ilexan P		

**3.1.9 Controller functions**

The Potterton Solar differential temperature controller contains many functions to regulate and monitor the solar primary system. Including

- controller functions for heating the solar cylinder
- functions for system protection and system monitoring
- additional functions (other accessories may be required to achieve these functions).

**3.1.10 General controller functions**

The controller collects the temperatures of various measuring points and determines the right time to charge the storage tank on account of programmed (additional) functions and controller parameters.

**3.1.11 Cylinder heating by solar primary system**

Switching action can be adjusted through dTmax (dTon) and dTmin (dToff), but dTon cannot be set lower than dT off + 1K. The solar cylinder is heated by operating the solar pump on output A1 up to the set maximum storage temperature. Pump operation is allowed as long as the collector panel temperature exceeds the cylinder temperature by a set amount.

Corresponding values in menu	
‘Basic adjustment’	‘Programming’
---	Maximum temperature
---	dT max (dT on) Switch-on temperature difference
---	dT min (dT off) Switch-off temperature difference

**3.1.12 Systems with two storage cylinders**

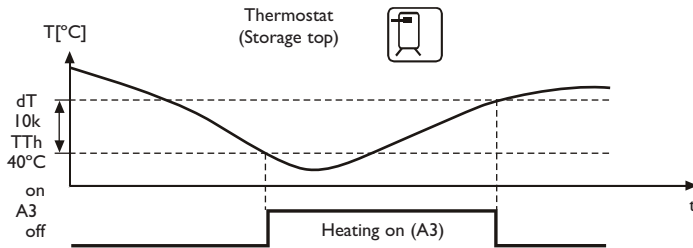
For systems with more than one storage cylinder (System Types 1 and 2) the cylinder heating can be optimised depending on the energy supply. Usually the cylinder with lower priority will have a lower temperature than that with the higher priority. Re-directing the energy to the lower priority cylinder will lower the temperature in the collector array. To “reinforce” the collector temperature the heating of the lower priority cylinder will be interrupted for a short while at fixed intervals. If the heating criteria for the higher priority cylinder is fulfilled then the lower priority cylinder will be heated. The higher priority cylinder can be selected in the “Basic Settings” menu point no. 10.



### 3.1.13 Rotational speed regulation

The solar circulation pump on 230V-outputs A1 and A2 can be operated either in switch-mode (two-point controller) or in a rotational speed regulated way. If the rotational speed regulation is activated the pump power is adjusted by a controller so that switch-on temperature difference "Storage tank dTmax" is kept constant as much as possible. At lower deviation of "Storage tank dTmax" the pump is operated with the lowest power till the switch-off wave is reached.

Corresponding values in menu	
"Basic adjustment"	"Programming"
---	Rotational speed min <100%



### 3.1.14 Thermostat (heating)

The thermostat is a control circuit that's independent from the storage loading. Thus an auxiliary heating in the top area of the storage cylinder is made possible. The output A3 will be:

- Switched on, when the temperature falls below the adjusted start level.
- Switched off, when the temperature reaches the adjusted start level + hysteresis.

Corresponding values in menu	
"Basic adjustment"	"Programming"
14 -- 2	Start temperature max $^{\circ}\text{C}$
15 -- 5	Hysteresis $T_d$ in K
	Timeframe (1...3) Start: min time
	Timeframe (1...3) Stop: max time

### 3.1.15 Thermostat (cooling)

In order to optimise the energy yield, it could be useful to "redirect" the solar energy, or to take it away from the storage when the storage temperature reaches a certain level.

When the sensor reaches the start temperature, output A3 will be switched on. When the temperature level falls below the start temperature hysteresis, the output A3 will be switched off.

Corresponding values in menu	
"Basic adjustment"	"Programming"
14 -- 1	Start temperature max $^{\circ}\text{C}$
15 -- 5	Hysteresis $T_d$ in K
	Timeframe (1...3) Start: min time
	Timeframe (1...3) Stop: max time

### 3.1.16 Temperature difference control

The temperature difference control manages an output according to adjustable temperature differential criteria. The function is independent from all the other functions. TDiff1 is the temperature of the heating source and TDiff2 of the heating target. Output A3 will be switched on regarding the conditions below, when a timeframe is active.


Corresponding values in the menu	
'Basic Setting'	'Programming'
14 -- 3	Maximum temperature heating target max °C
15 -- 5	Minimum temperature heating source min °C
	Hysteresis Td max in K
	Hysteresis Td min in K
	Timeframe (1...3) Start: min time
	Timeframe (1...3) Stop: max time
A3 on	TDiff >= TDiff2 + Diff.Tdmax and TDiff2 < Diff.Tmax - I and TDiff1 >= Diff.Tmin + I
A3 off	TDiff1 < TDiff2 + Diff.Tdmin or TDiff2 >= Diff.Tmax or TDiff1 < Diff.Tmin

### 3.1.17 Tube collector



The function "tube collector" can be switched off/on in the "Basic setting" menu – point 4. The timeframe 4 in the "Program" menu makes it possible to activate this function only for a certain period of time (sunshine period). When activated, the solar pump will be switched on every 30 minutes for a period of 30 seconds. This is necessary, to measure a temperature change in the collector if there was no circulating for a long period of time.

Corresponding values in menu	
'Basic Setting'	'Programming'
4 -- 1	Timeframe (4) Start: min time
	Timeframe (4) Stop: max time

### 3.2.1 Sensor monitoring

The sensors necessary for control functions and their connecting cables are monitored regarding break and short circuit. If a faulty sensor is recognised by the software, the symbol  is shown. By scrolling up and down you can find an error source.

 **The use of temperature sensors of the wrong type can also lead to an error message**


Indication	Meaning
	Short circuit on temperature sensor of the current measuring point
	Break on temperature sensor of the current measuring point, circulation error at activated energy productivity measurement

### 3.2.2 Flow monitoring

If the energy productivity measurement option is deactivated, the temperature difference between collector and storage tank is checked. If it exceeds the amount of  $(60K + dT_{max})$ , it is then interpreted as an error because in the case of normal system dimensioning and a pump switched on such large differences cannot take place.

If the energy productivity measurement option is activated, the flow amount when the pump is switched on is checked. If for 15 minutes no flow is recognised it is evaluated as an error.

Error message is automatically reset after eliminating the failure.

Indication	Meaning
	Missing circulation in solar circuit

### 3.2.3 Collector protection / Re-cooling

This function can be switched on/off in the “Basic settings” menu.

High temperatures can destroy antifreeze liquids. Therefore, the maximum collector temperature should be restricted. When all storages have been loaded to the limit, the solar pump is switched off. If the collector temperature rises above “T collector max”, the solar pump is switched on, until the collector temperature drops by 10K. Part of the energy is lost in the pipes, the rest is loaded in the storage, which results in increasing the storage temperature above the adjusted maximum storage temperature. For security reasons the function will be interrupted if the storage reaches 95°C.

If the storage temperature is bigger  $T_{Stmax}+2K$  and the collector temperature is 10K below  $T_{St}$ , then the re-cooling function is activated. The redundant storage energy will be released through the collector in order to assure reserves for the next loading cycle.

The re-cooling ends when  $T_{St}$  drops below the value “re-cooling till...” in the “Basic settings” menu, point 3, or when the collector temperature  $\geq$  the storage temperature – 2K.

The re-cooling function can be active only when the collector protection function is on.

Corresponding values in menu	
‘Basic SETTINGS’	‘Programming’
0 -- 1	---
1 -- 120°C	
2 -- 1	
3 -- 40°C	

### 3.2.4 System protection function

The system protection function switches the system off if the “maximum collector temperature” is exceeded by 10K. As soon as the temperature drops below the “maximum collector temperature”, the system is started up again. This function has higher priority and is always active, regardless of whether the collector protection is on or off.

### 3.2.5 Frost protection

This function can be switched on/off in the “Basic settings” menu, point 11 and the start temperature can be adjusted in point 13. Furthermore, a frost protection sensor can be selected (T1-T6, point 12).

For systems driven without or with very low amounts of antifreeze, the pipes and the collector have to be protected from freezing. For this purpose, the selected frost protection sensor measures the temperature at an exposed place, e.g. blank pipes before the collector. If the measured value is lower than the start temperature, the solar pump is activated until the adjusted frost protection start temperature +5K is reached. The minimum runtime of the pump is 5 minutes.

For security reasons the function is deactivated if the temperature of the priority storage falls below 5°C.

### 3.2.6 Energy productivity measurement

For the purposes of energy productivity measurement (solar gain), a sensor on the collector return line and a flow meter are required. The yield value is calculated from the values of the temperature difference between the collector and collector return line and the value measured by the flow meter. This function is switched on and off in the “Basic settings” menu.

Corresponding values in menu		
“Basic Setting”	“Programming”	“info”
5 -- 1	---	XXXX kWh

### 3.2.7 Operating hours meter

So long as the storage tank is charged by a pump, the operating hours meter records for each separate pump. The number of operating hours can be read in menu “info” and for each pump separately reset to 0.

Corresponding values in menu	
“Programming”	“info”
---	XXXX h

## Commissioning record

The following chart should be completed during Commissioning of the system.

Installer: \_\_\_\_\_

Contact details: \_\_\_\_\_

Original installation date: \_\_\_\_\_

<b>General Commissioning</b>	
All pipework correctly installed, identified and earth bonded	<input type="checkbox"/>
Solar primary system filled with heat transfer fluid supplied	<input type="checkbox"/>
System pressure test carried out	<input type="checkbox"/>
Solar expansion vessel charge pressure checked and set	<input type="checkbox"/> bar
Air vented from system	<input type="checkbox"/>
Exposed pipework insulated using high-temp and weather resistant insulation	<input type="checkbox"/>
Panel fixing bracket positions weatherproofed where necessary	<input type="checkbox"/>
Panel fixings checked and secure	<input type="checkbox"/>
<b>Hydraulic Station</b>	
System pressure when cold	bar
Solar primary flow when cold	l/min
Isolating/non-return valves (flow and return) in operating position	<input type="checkbox"/>
<b>Solar Collector Panels</b>	
Panels visually inspected for defects	<input type="checkbox"/>
Collector temperature sensor correctly installed and secured	<input type="checkbox"/>
Pipe entry points to building weatherproof	<input type="checkbox"/>
<b>Solar Differential Temperature Controller</b>	
Record all operational parameters set (see separate table)	<input type="checkbox"/>
Pump operation tested in automatic and manual modes	<input type="checkbox"/>
All cables correctly installed and secured	<input type="checkbox"/>
Suitably fused isolating device installed	<input type="checkbox"/>
<b>Solar Cylinder</b>	
Cylinder installed and commissioned in accordance with cylinder installation instructions	<input type="checkbox"/>

## Solar differential temperature controller - operational parameters

If any factory values are changed please enter the new values in the table below.

Adjustable in menu "Programming"	Typical adjustment	Current adjustment
Storage tank1: Maximum storage temperature	65°C	
Storage tank1: switch-on difference (dT <sub>on</sub> )	7 K	
Storage tank1: switch-off difference (dT <sub>off</sub> )	3 K	
Storage tank2: Maximum storage temperature	90°C	
Storage tank2: switch-on difference (dT <sub>on</sub> )	7 K	
Storage tank2: switch-off difference (dT <sub>off</sub> )	3 K	
Minimum pump power on rotational speed regulation	100%	
Switch-on temperature of thermostat function	40°C	
Hysteresis of thermostat function	10 K	
2nd temperature differential controller maximum temperature T <sub>max</sub>	65°C	
2nd temperature differential controller hysteresis dT <sub>max</sub>	7 K	

Adjustable in menu "Basic adjustments"	Typical adjustment	Current adjustment
Switching on or off the function collector protection	0 = off	
Temperature at which the collector protection function is active	120°C	
Switching on or off the function recooling (only when the collector protection is on)	0 = off	
Temperature to which the storage tank is recooled when collector protection function is on	40°C	
Function for time-controlled circulation in operation with tube collectors	0 = off	
Switching on or off the function energy productivity measurement	0 = off	
Choice of glycol types used	0 = Anro	
Mixture ratio of coolants	50%	
Litres per impulse of the flowmeter	1.0 L/l	
Switching on or off the function antifreezing	0 = off	
Temperature at which the antifreezing is active	-1°C	
Alternative choice of the cooling, thermostat function or the 2nd temperature differential controller	0 = none	
System type	type 0	
Time control in secs	240	
Storage priority	I	

## Servicing and maintenance record

Please complete the following record after any Servicing or Maintenance of the Baxi Solarflo system. Refer to the Commissioning Record charts for details of the original system for reference. Refer to Maintenance section for recommended Maintenance periods

	Date / /	Date / /	Date / /	Date / /	Date / /	Date / /	Date / /	Date / /	Date / /	Date / /	Date / /	Date / /
Check condition of all pipework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check condition of insulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check frost protection of solar fluid (every 2 years) Concentration Protection to °C Next check date	—	—	—	—	—	—	—	—	—	—	—	—
Check solar expansion vessel charge pressure	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Check solar primary system pressure (cold)	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Check solar primary system flow rate	l/min	l/min	l/min	l/min	l/min	l/min	l/min	l/min	l/min	l/min	l/min	l/min
Check operation of PRV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check sensor operation (use resistance/temperature table. See page 22)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check solar cylinder in accordance with manufacturer's instructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensure system is free of air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visually check condition of solar collector panels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visually check condition of collector panel brackets and fixings (every 2 years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visually check condition of any waterproofing (around pipe entries to roof and roof fixings)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engineers initials	—	—	—	—	—	—	—	—	—	—	—	—



## 4.0 Maintenance

### 4.1 Check heat transfer fluid

The heat transfer fluid must be checked every two years with regard to its antifreeze and pH value.

- Check antifreeze using antifreeze tester. Target value is approximately -21 deg C (40% concentration). Do not allow to fall below 30% concentration. If necessary replace or replenish the solar heat transfer fluid.
- Check pH value with a pH indicator rod (target value approx. pH 7.5). If the limit pH value is less than pH 7, replace the heat transfer fluid.

### 4.2 Maintenance of the collector

The collector or the collector array must be inspected visually, once a year, for any damage, leaks and contamination.

### 4.3 Cylinder

Refer to manufacturers documentation.

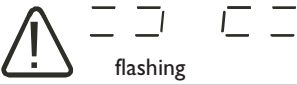
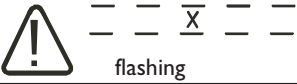


#### Solar fluid concentrations

% volume	Density at 20°C g/cu.cm	Refractive Index nD20	Frost protection °C
25	1.023	1.3627	-10
30	1.029	1.3690	-14
35	1.033	1.3747	-17
40	1.037	1.3801	-21
45	1.042	1.3855	-26
50	1.045	1.3910	-32

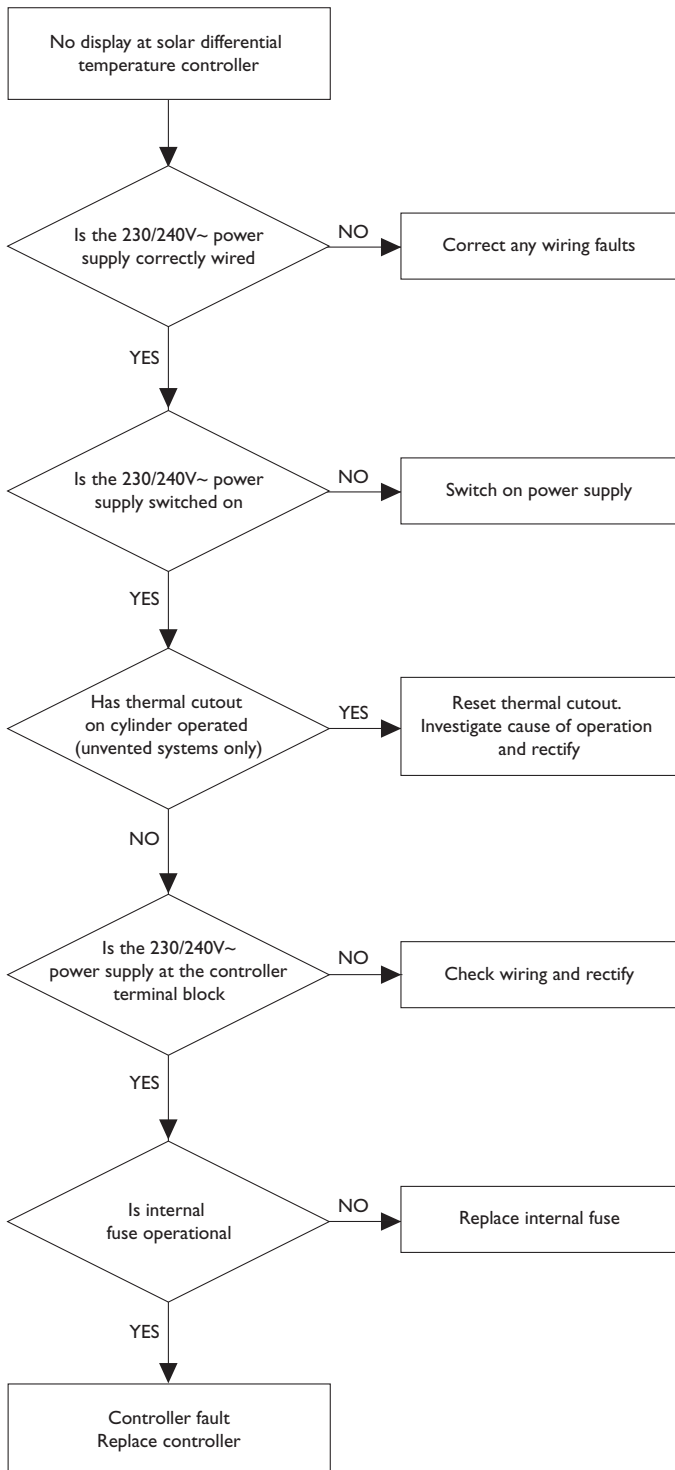


5.1 Failures with error message

Some system failure modes can be recognised by the solar differential temperature controller and will be indicated by an error message on the controller display. Refer to the table below for details of possible errors and suggested measures to rectify.

Error representation on display	Possible reasons	Measures
 <p>flashing</p>	<ul style="list-style-type: none"> <li>• Sensor wire broken</li> <li>• Sensor defect</li> </ul>	<ul style="list-style-type: none"> <li>• Check wire</li> <li>• Check sensor resistance, if necessary exchange sensor</li> </ul>
 <p>flashing</p>	<ul style="list-style-type: none"> <li>• Short circuit in sensor wire</li> <li>• Sensor defect</li> </ul>	<ul style="list-style-type: none"> <li>• Check wire</li> <li>• Check sensor resistance, if necessary exchange sensor</li> </ul>
<p>Circulation error: no flow</p>  <p>flashing</p> <p>Additionally at energy productivity measurement:</p> 	<ul style="list-style-type: none"> <li>• Error in pump connection</li> <li>• Pump defect</li> <li>• Air in the system</li> <li>• Connection with flow meter defect</li> <li>• Sensor wire broken</li> <li>• Sensor defect</li> </ul>	<ul style="list-style-type: none"> <li>• Check cabling</li> <li>• Exchange pump</li> <li>• Check the float of the flow meter moves when the system runs (if visible)</li> <li>• Check wire</li> <li>• Check wire</li> <li>• Check sensor resistance, if necessary exchange sensor</li> </ul>

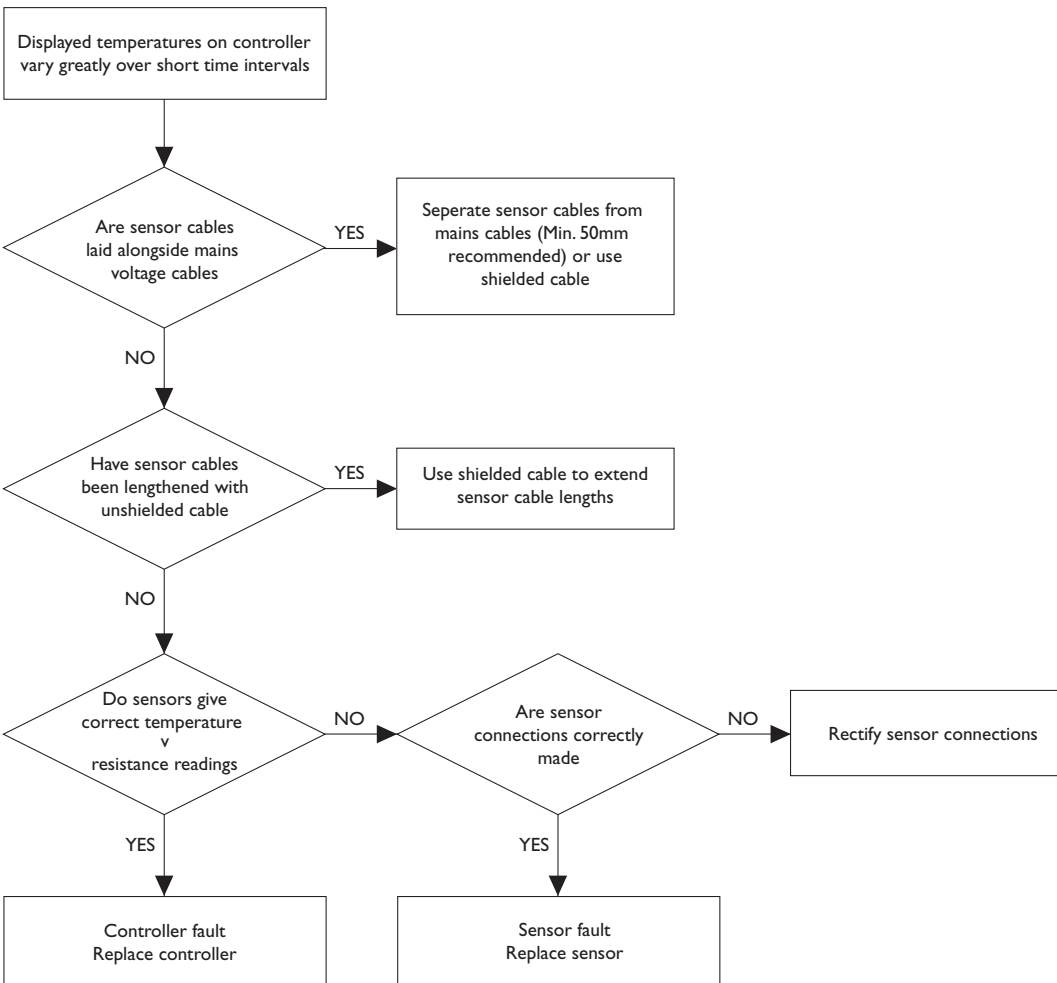
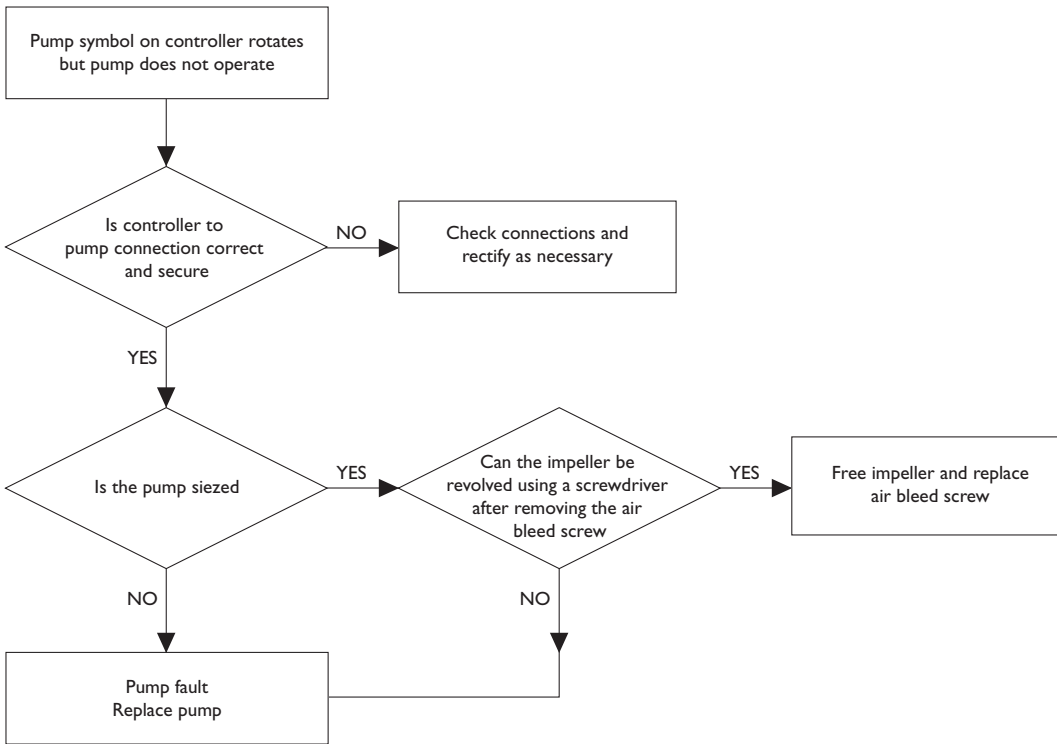
## 5.0 Fault finding



Resistance table PT1000.

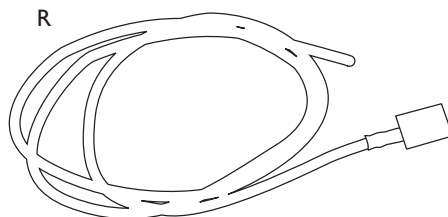
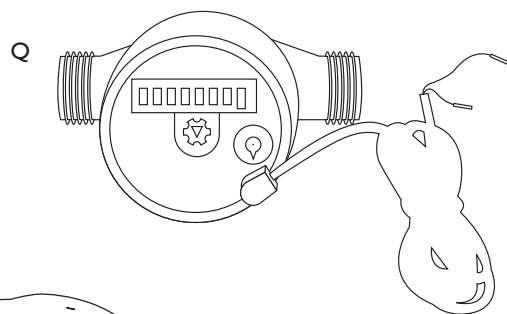
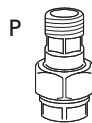
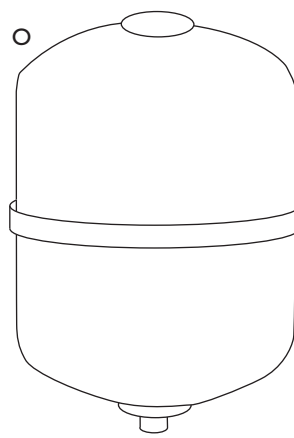
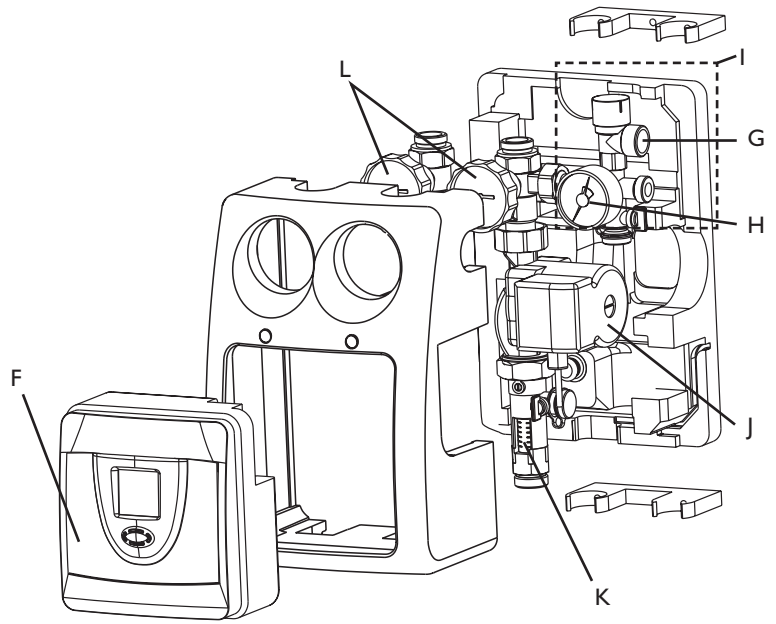
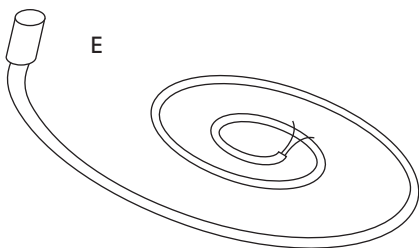
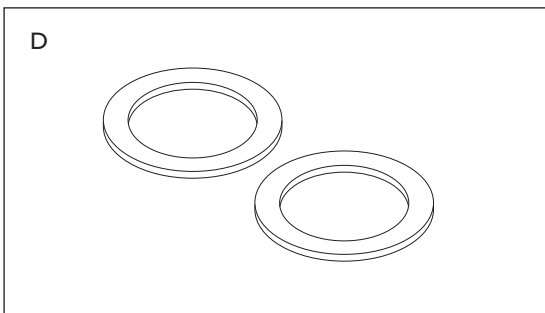
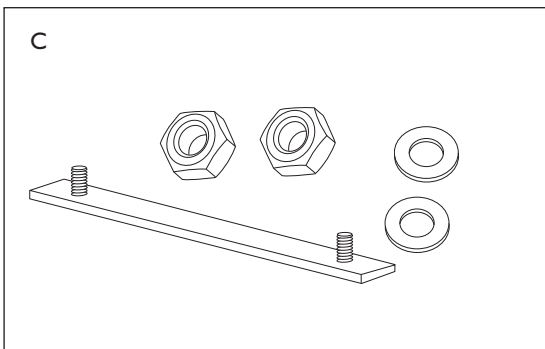
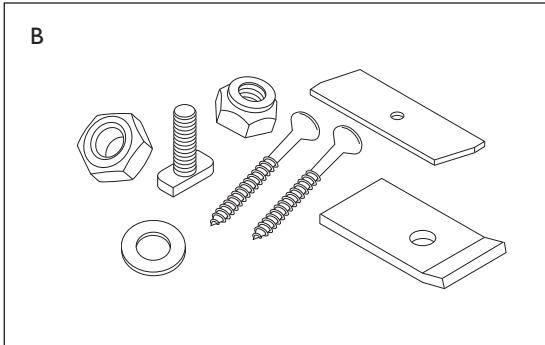
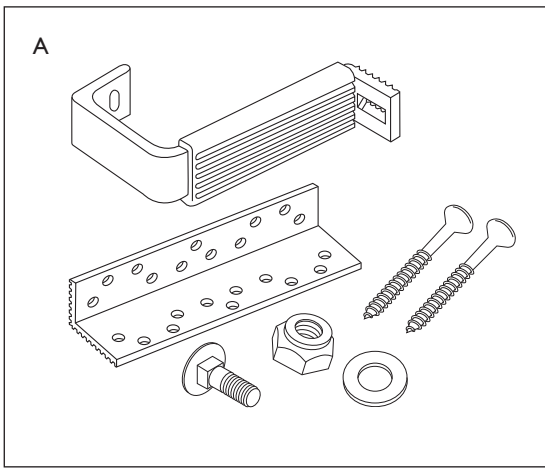
The correct function of temperature sensors can be checked on the basis of the following temperature resistance table with a resistance measuring instrument:

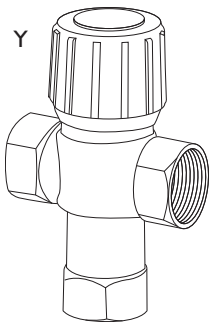
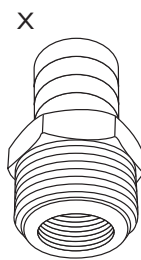
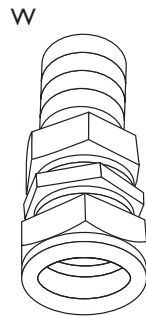
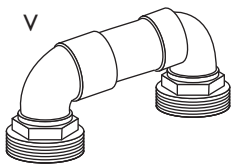
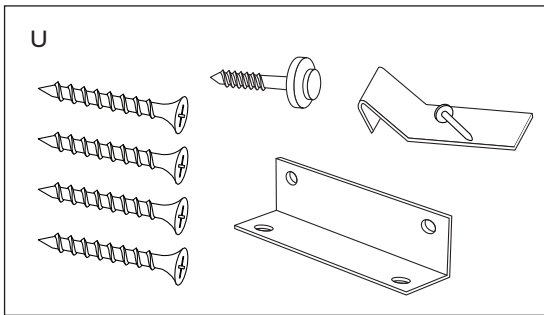
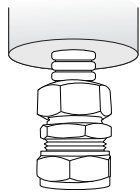
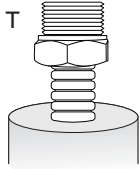
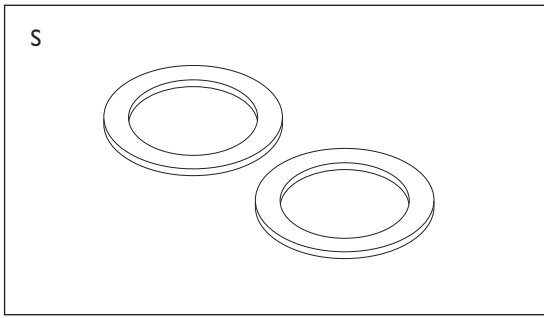
Temperature in °C	Resistance in Ohm
-30	882
-20	921
-10	960
0	1000
10	1039
20	1077
30	1116
40	1155
50	1194
60	1232
70	1271
80	1309
90	1347
100	1385
120	1461
140	1535
200	1758



## 6.0 Spares

Diagrams not to scale





## 6.0 Spares

### 6.1 Spare parts

A number of Spare Parts are available should any part of the Potterton Solar system require replacement. Use only genuine parts obtained from Potterton, use of other non Potterton parts may cause system malfunctions and will invalidate the warranty. Fitting of any spare parts must be carried out by a competent installer or authorised service engineer or agent.

Description	Code No.
<b>A</b> Roof bracket assembly (On roof panels) (comprising roof bracket, roof bracket console, cup square bolt M8 x 25, M8 washer, M8 hex self securing nut and 2 off self tapping screws No6 x 60 long)	5119532
<b>B</b> Collector panels fixings kit (On roof panels) (comprising 2 off No6 x 60 self tapping screws, cup square bolt M8 x 25, M8 washer, M8 hex nut, M8 self securing nut, M8 x 30 hammer head bolt, mounting part top, clamping piece)	5119533
<b>C</b> Extension assembly (On roof panels) (comprising clamping piece extension, mounting part extension, 2 off M8 hex nut, 2 off M8 washer)	5119534
<b>D</b> Connection washer (On roof panels) (comprising 2 off flat sealing washer)	5119535
<b>E</b> Temperature sensor	5119536
<b>F</b> Solar differential temperature controller (complete)	5122978
<b>G</b> Pressure relief valve	5119538
<b>H</b> Pressure Gauge	5119539
<b>I</b> Safety Group (complete)	5119540
<b>J</b> Solar primary circulating pump	5119541
<b>K</b> Flow meter assembly	5119542
<b>L</b> Temperature gauge	5119543
<b>M</b> Solar heat transfer fluid 10 litre drum	5119544
<b>N</b> Solar heat transfer fluid 20 litre drum	5119545
<b>O</b> Solar expansion vessel 24 litre	5119548
<b>P</b> Expansion vessel self-sealing connection	5119779
<b>Q</b> Flow Meter (for solar gain module)	5122979
<b>R</b> Sensor (for solar gain module)	5122980
<b>S</b> Connection washers (for in roof panels)	5122981
<b>T</b> Flexible connection hose (2m) + insulation	5122982
<b>U</b> Roof bracket kit for in roof panels (comprising roof bracket, self tapping screws 5x60 sealed plumbing screws 4.5x35, metal retainer and roofing nails)	5122983
<b>V</b> Connection adaptor for in roof panels	5122984
<b>W</b> 1" BSP male / 3/4" female adaptor fitting	5129783
<b>X</b> 1" BSP male / 3/4" male adaptor fitting	5129784
<b>Y</b> Thermostatic blending valve	5122985

NOTE: The solar cylinders have their own set of spare parts available. Information on these can be found in the separate cylinder installation instruction manual.

### 7.1 Standard Warranty Terms & Conditions

Solar Collectors 10 Years  
Solar Control Station 2 Years

To receive your free warranty please complete the form supplied with the Potterton Solar system within 30 days of installation, or simply call heateam, the service division of Baxi Heating UK Limited on 08700 603 261

#### **Our promise to you**

If you experience a fault with your new Potterton Solar system, we aim to provide a safe and high quality repair service supported by our dedicated national network of highly skilled engineers. If your installer can't resolve the problem for you, we will do everything we can to get an engineer out to you as quickly as possible. Nothing in this warranty will affect your statutory consumer rights.

#### **What you need to do if you experience a problem with your Potterton Solar system**

You should always contact your installer first because the fault may not be related to the Potterton Solar system. If your installer confirms that the fault is within the Potterton Solar system itself and he/she decides they cannot repair it our friendly customer service team is on hand to help. Simply call our service division heateam on 08700 603 261 to book an engineer visit or for any general advice that you may need. Our contact centre is open Monday to Friday 8am - 6pm, weekends and Bank Holidays 8.30am - 2pm, excluding Christmas Day and New Years Day.

#### **When calling heateam you must have the following information to hand: -**

- Potterton Solar system serial number
- Potterton Solar system model number
- Your installer name, address details and contact details
- Proof of purchase (if you do not have the Potterton Solar serial number)

### What this warranty covers

- Free of charge repair or replacement of components found to be faulty from manufacture.
- Free of charge replacement of the complete assemblies provided always that the failure is related to a manufacturing fault that cannot be repaired or is beyond repair.

The warranty runs for from the date your product is installed.

### What this warranty does not cover

- Potterton Solar collectors that are installed damaged or damaged during installation. If a Potterton Solar collector is found to be damaged on delivery then it must not be installed, simply return it to your supplier for replacement under warranty.
  - The warranty will become invalid if the failure is due to frost, transient voltages, lightning strikes or any act of vandalism or mis use.
  - This guarantee does not cover the effects of scale.
  - Tampering or modification will invalidate this warranty.
  - The installation must be in an appropriate location and its use is restricted to potable water.
  - Due to the varied locations Potterton Solar collector/s can be installed Baxi Heating UK Ltd will only carry out warranty repair/replacement to Potterton Solar collectors which have safe access provided that meets current Health & Safety working at heights requirements. Heateam will cover the cost of any safety equipment required to meet this standard after the first 30 days of installation up to 2 years and will appoint a contractor to carry this work out. Prior to this contact your installer. Heateam accept no liability for any third party damage.
  - Repairs to Potterton Solar systems which haven't been installed and commissioned properly, as set out in the installation and commissioning instructions.
  - Any other defects or failures, either in the connected system or outside of the Potterton Solar system itself.
  - Installations within commercial settings for which this Potterton Solar system was not designed.
  - Reimbursement of any third party repair or replacement costs that we haven't been told about and agreed with you in advance.
  - Compensation for consequential losses (e.g. loss of earnings, business losses, stress and inconvenience) arising from a product breakdown, including repair delays caused by factors outside our reasonable control.
-

All descriptions and illustrations provided in this leaflet have been carefully prepared but we reserve the right to make changes and improvements in our products which may affect the accuracy of the information contained in this leaflet. All goods are sold subject to our standard Conditions of Sale which are available on request.

**Potterton**

A Trading Division of Baxi Heating UK Ltd, a division of Baxi Group.

Brooks House, Coventry Road, Warwick. CV34 4LL

After Sales Service and Technical Enquiries 08700 603261

Our contact centre is open Monday to Friday 8am to 6pm,

Weekends and Bank Holidays 8.30am to 2pm.

We are closed Christmas Day and New Years Day.

Website [www.potterton.co.uk](http://www.potterton.co.uk)

Comp No 3600 5983 - Issue 1 - 5/07

A division of **BAXI GROUP**



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