smart energy management

SolaStat<sup>™</sup>-2-3

An Intelligent Technology Solution for Water Heating

# USER GUIDE





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For technical help contact your installer or maintenance technician.

**Installer Details:** 

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# INTRODUCING YOUR SOLASTAT<sup>™</sup> CONTROLLER

About Your SolaStat™ Controller	Your SolaStat <sup>™</sup> Controller has a microcomputer, which intelligently and automatically controls water flow and energy inputs into your hot water system. Your SolaStat <sup>™</sup> will balance water flow and energy inputs from solar, and electrical sources so you can minimise your energy costs. It has two main aims: To make sure your hot water is being heated cost-efficiently. To make sure you don't run out of hot water when you need it.			
How Does It Work?	Your SolaStat <sup>™</sup> Controller works by measuring and comparing the temperature at three different places in the system: the collector ( <b>ROOF</b> ), the top of your hot water cylinder ( <b>TANK</b> ) and the bottom of your hot water cylinder ( <b>INLET</b> ). If the temperature at the <b>ROOF</b> is higher than the <b>INLET</b> temperature by a pre-set amount, then the pump turns on automatically to transfer heated water from your solar collector to your hot water cylinder, and replace it with			
	Cooler water from the bottom of the cylinder. This makes the hot water cylinder heat up and the collector on your roof cool down. When the temperature difference reduces to the pre-set level again, the pump automatically stops.			
	It can also optimise the timing of heating your water, so heat is only applied to the water in your cylinder when necessary, not all the time.			
	The SolaStat <sup>™</sup> is also designed to protect your hot water system from very high or freezing temperatures, as well as make sure that safe water conditions are maintained ( <b>BioSafe</b> ).			



### THE DISPLAY PANEL





#### SAVING POWER WITH SOLASTAT<sup>™</sup>

Three Tools to Achieve Power Savings	So	SolaStat™ has three tools to help you save power:				
	1.	Controlling the amount of hot water that enters your tank.				
		You can alter the amount of water entering your tank using the PUMP function.				
		Your SolaStat™ is set to make the pump automatically turn on or turn off, depending on the temperature in the tank, at the inlet and at the collector.				
	2.	Controlling the activity of the heating element.				
		To ensure that the water in your tank is not heated by electricity unnecessarily (for example, when the water from your collector is already hot enough), the heat applied to the element is computer controlled.				
	3.	Running BioSafe as a background activity.				
		To protect your hot water from harbouring bacteria, hot water tanks need to be run at $60 ^{\circ}C/140 ^{\circ}F$ for at least one hour every 72 hours.				
		Rather than the traditional method of running your tank continuously at				

Rather than the traditional method of running your tank continuously at 60 °C/140 °F, and using up valuable energy doing so, your SolaStat<sup>™</sup> Controller 'remembers' when your tank was last heated to 60 °C and makes sure than it heats up to that temperature once every 72 hours for at least one hour.



#### USING YOUR SOLASTAT<sup>™</sup>

Reading the<br/>DisplayThe Display Lights show where the current display temperature is being read<br/>from: ROOF, TANK, or INLET.

To find out the temperature on the other sensors, press the **NEXT** button. The display light will confirm which sensor is being read.

Note that the Sola-2-3at<sup>TM</sup>- ST is factory set to display temperature in degrees Centigrade/ Celsius. The Sola-2-3at<sup>TM</sup>- 2F is factory set to display temperature in degrees Fahrenheit. These settings cannot be changed. Refer to the label on the side of the enclosure and the box.





#### **USING YOUR SOLASTAT™**, CONTINUED





#### USING YOUR SOLASTAT<sup>TM</sup>, CONTINUED

Manual/UserTo manually start a reheat of the water in your tank, press the HWC button.ReheatPress the HWC button again to turn it off.

However, if Reheat is already on, pressing the HWC button will not turn it off.





#### USING YOUR SOLASTAT<sup>TM</sup>, CONTINUED

**Testing Mode** Pressing the **TEST** button will make sure the display panel and all lights in the system are working.

All the lights will stay on, and '888' will be shown for about two seconds.

Then all lights will flash and the display shows how many times the pump has been activated (up to 999) for three seconds.



Continued on next page



#### **USING YOUR SOLASTAT™**, CONTINUED

Smart'Smart Shutdown' is a mode that your controller will enter to minimiseShutdowndamage. It can be activated when the temperature at the ROOF sensor isModeless than -40 °C/-40 °F or more than 142 °C/288 °F.

This may occur because:

- there is a fault in the sensor wiring, OR
- the Solar Collector has reached a very high temperature.

If Smart Shutdown Mode is activated, you will see SSd on the display as shown on the screen below.

**SSd** on the display shows the controller is in Smart Shutdown Mode – i.e. there is a fault condition.



The ROOF sensor temperature may reduce to a safe level by itself and the uniit will return to normal operation. 'SSd' will no longer appear on the display.

This is a normal condition and it is not necessary to contact your installer or maintenance technician unless 'SSd is on the display for more than 12 hours.



#### USING YOUR SOLASTAT<sup>TM</sup>, CONTINUED

#### Lockout Mode The Lockout Mode is activated when the water temperature in the collector is less than 20°C/68°F. In this case, the collector will not contribute any useful heat, even to cold water. In this (Lockout) mode, the controller will not turn on the pump even if the correct temperature differential is reached. However, if a frost condition is detected, this Lockout Mode is overridden and the pump operates to protect the system from freezing. Frost Mode The **FROST** value is set by your installer. It is shown in the Programming Table on Page 11. This function is designed to protect your collector and hot water system from freezing and bursting. When the **FROST** temperature is reached, the pump will come on just enough to raise the temperature of water by $2-3 \ C/4-6^{\circ}$ F. Only a small amount of warm water is needed to protect the collector and plumbing.

When the unit is in Frost Mode, the **FROST** and **PUMP** lights will come on.

**CAUTION**: Do not turn the power off when the **FROST** light is on.





## **TROUBLE SHOOTING GUIDE**

Symptom	Cause	Solution		
No operation, no display and no lights.	No power/fault.	Check mains outlet.		
		Check fuses.		
POWER light ON but no display or corrupted display.	Power brown out (mains power not running at full voltage).	<ul> <li>Switch off power while mains power is in brown out condition.</li> </ul>		
	Unit faulty.	Switch off power for 10 minutes, switch on power and see if unit is operating. If not, unit needs repair. Contact installer.		
Display on, pump not running, but sunny	<ul> <li>Pump damaged or disconnected.</li> <li>Pump timer has turned pump off</li> </ul>	See if the pump has become unplugged.		
ON.	<ul> <li>Pump timer has turned pump on.</li> </ul>	<ul> <li>Wait one minute for the pump to restart.</li> </ul>		
Pump is running	Pump is cavitating.	If pump sounds like stones are		
commuousiy.	Special installation.	passing through it, the pump may be cavitating. Contact your		
	<ul> <li>Setting is incorrect.</li> </ul>	installer or maintenance		
	<ul> <li>Airlock in pipe.</li> </ul>	<ul> <li>Long pump running times may be</li> </ul>		
		normal for a special installation.		
		<ul> <li>Contact your installer or maintenance technician.</li> </ul>		
Hot water drops significantly at night, yet little or no draw off	<ul> <li>System is reverse thermo- siphoning.</li> </ul>	The non-return valve is not fitted correctly or is malfunctioning.		
be user.	System is in a high frost area.	<ul> <li>Discuss non-frost sensitive options with your energy provider.</li> </ul>		
	I ank is losing heat.	<ul> <li>Install better insulation on the hot water tank.</li> </ul>		
HWC light never comes on.	Collectors are heating tank to greater than adjustable values.	<ul> <li>Normal operation.</li> </ul>		
HWC light flashing.	<ul> <li>HWC Reheat Upper adjustable value has not been reached.</li> </ul>	<ul> <li>Wait for the tank to heat up to Reheat Upper temperature.</li> </ul>		
	Tank Thermostat incorrectly set	<ul> <li>Contact your installer or maintenance technician.</li> </ul>		
'Lo' on display.	■ Sensor below -20 °C/-4 °F.	Check outside temperature.		
'Hi' on display.	■ Sensor above 139 °C/284 °F.	Check collector has water in it.		
'SSd' on display.	<ul> <li>System is in 'Smart Shutdown' Mode.</li> </ul>	<ul> <li>Contact your installer or maintenance technician if the display shows' SSd' for more than 12 hours.</li> </ul>		

Note: When power is removed, the internal timer will keep running for at least 7 days.

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# **PROGRAMMING TABLE**

Your installer may enter special programming information for your controller in the table below. Settings can be changed by a qualified installer or maintenance technician.

Programming Table for Adjustable Values							
Adjustable Values	Function	Light indication	Pre-Set Value	Range	Installation Values		
Pump Off	The temperature difference between the Roof and the Tank that will turn the pump off.	PUMP Flash	6°C 11°F	1-20°C 2-36°F	℃ °F		
Pump On	The temperature difference between the Roof and the Tank that will turn the pump on.	PUMP On	12°C 22°F	2-21°C 4-38°F	℃ ℃		
Holdoff Timer	How long the timer will override the element coming on (as long as the tank temperature is above Reheat Lower).	HWC on	4 hours	1-23 hours >23 hours = OFF <1 hour = thr	hours		
Reheat Lower	The tank temperature at which the heating element will automatically start to reheat the water in your cylinder.	HWC slow flash	40°C 104°F	1-70°C 34-158°F <1°C = OFF Set Holdoff Timer to thr = OFF	°C °F		
Reheat Upper	The temperature (in the tank) at which the heating element will automatically stop reheating the water in your cylinder.	HWC fast flash	55°C 131°F	2-90°C 36-194°F Set Holdoff Timer to off = OFF	℃ ℉		
BioSafe	BioSafe target temperature.	No lights (except PWR)	60°C 140°F	50-70°C 122-158°F <50°C = OFF	°C °F		
Topout	Maximum allowable tank temperature before the pump is de-activated to protect system from overheating.	TOPOUT on	80°C 176°F	1-120°C 34-248°F <1°C = OFF	°C °F		
Frost	Minimum allowable panel temperature before the pump is activated to protect system from freezing damage.	FROST on	4°C 39°F	1-10°C 34-50°F >10°C = OFF	°C °F		





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