intelligent measurement technology

SolaStat™-AAE

An Intelligent Technology Solution for Water Heating

INSTALLATION GUIDE

FOR QUALIFIED PERSONNEL ONLY

CE ISO9001 REGISTERED SUPPLIER TECHNOLOGY & QUALITY AWARD Z985

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For technical help contact your distributor.

Distributor Details:

www.aaesolar.com.au

www.senztek.com

BEFORE YOU BEGIN INSTALLATION

Assemble the components you will need

The SolaStat™ Controller is supplied with the following components:

- ⇨ Roof sensor
- ⇨ Tank sensor
- ⇨ Inlet Sensor
- ⇨ Mains Cable
- ⇨ Pump Cable
- ⇨ Associated screws
- ⇨ Mounting guide
- ⇨ Screw covers

Assemble the tools you will need

You will need the following tools to install the SolaStat™:

- ⇨ Philips1 screwdriver for lid screws
- ⇨ Pozi 2 screwdriver for mounting screws

Note: These tools are needed to mount the SolaStat™ only, and other tools may be needed for the remainder of the installation including the sensors.

READ THESE SAFETY PRECAUTIONS and LIMIT OF LIABILITY BEFORE YOU BEGIN

The following pages contain instructions for qualified personnel only. They involve potentially hazardous adjustments and high voltage mains wiring information.

General Safety Precautions:

The following general safety precautions should be noted:

This installation guide is for the installation of SolaStat™ Controllers only and is not an installation guide for any other part.

- ⇨ The complete installation should be checked at least annually for damage or malfunction.
- ⇨ All servicing must be carried out by an authorised service agent only.
- ⇨ All aspects of the installation must comply with local electrical and plumbing regulations (and any special solar hot water regulations).

Continued on next page

BEFORE YOU BEGIN INSTALLATION, CONTINUED

Installation Precautions:

Installers need to ensure the following:

- ⇨ The Controller must be installed away from water sources such as rain, leaking pipes, or wet floors and must not be installed in damp areas like bathrooms.
- ⇨ Make sure the Controller is installed away from direct sunlight, flammable liquids or radiant heat sources.
- ⇨ Power leads must face directly down, not sideways or upwards.
- ⇨ Ensure the Controller is in a safe environment for users to inspect display panel.
- ⇨ Follow instructions carefully when mounting sensors. Incorrect sensor mounting can lead to a poorly controlled solar hot water system with safety issues (e.g. overheating; over pressure damage to the plumbing; freezing damage to the solar collector).
- ⇨ The unit settings are factory programmed to optimise efficiency and safety. Alteration of the programmed values can lead to dangerous conditions and/ or damage to parts of the solar hot water system.

CAUTION:
Dangerous Voltages may be present. The SolaStat™ has no user serviceable parts.
Protective enclosure must only be opened by qualified personnel.
Remove ALL power sources before removing protective cover.

Continued on next page

BEFORE YOU BEGIN INSTALLATION, CONTINUED

Electrical Precautions:

When undertaking electrical installations, please note the following

- All mains voltage electrical work must be carried out by a qualified electrician, especially external power outlet socket installation.
- A readily accessible disconnect device, overcurrent device and RCD Protection rated to suit the size of the pump plus 5VA must be incorporated in the power supply wiring. The overcurrent device for a 1500W, 240Vac pump must not exceed 10Amps.
- Sensor leads should be kept 300mm away from mains and comms cables.
- Do not use mains power extension cords unless approved by the manufacturer. Water resistant plugs and sockets should be used.
- The SolaStat™ controlled output (PUMP) will be connected to the input power supply wiring and are not isolated from it. Supply voltages will be output through that outlet during activation.
- Always use the unit within specified voltage and load ranges. Never use with damaged leads, plugs or sockets.
- Do not allow the sensor cable to come within 10mm of the high voltage connectors or components inside the enclosure.
- Comply with all local and relevant electrical regulations.

Warning

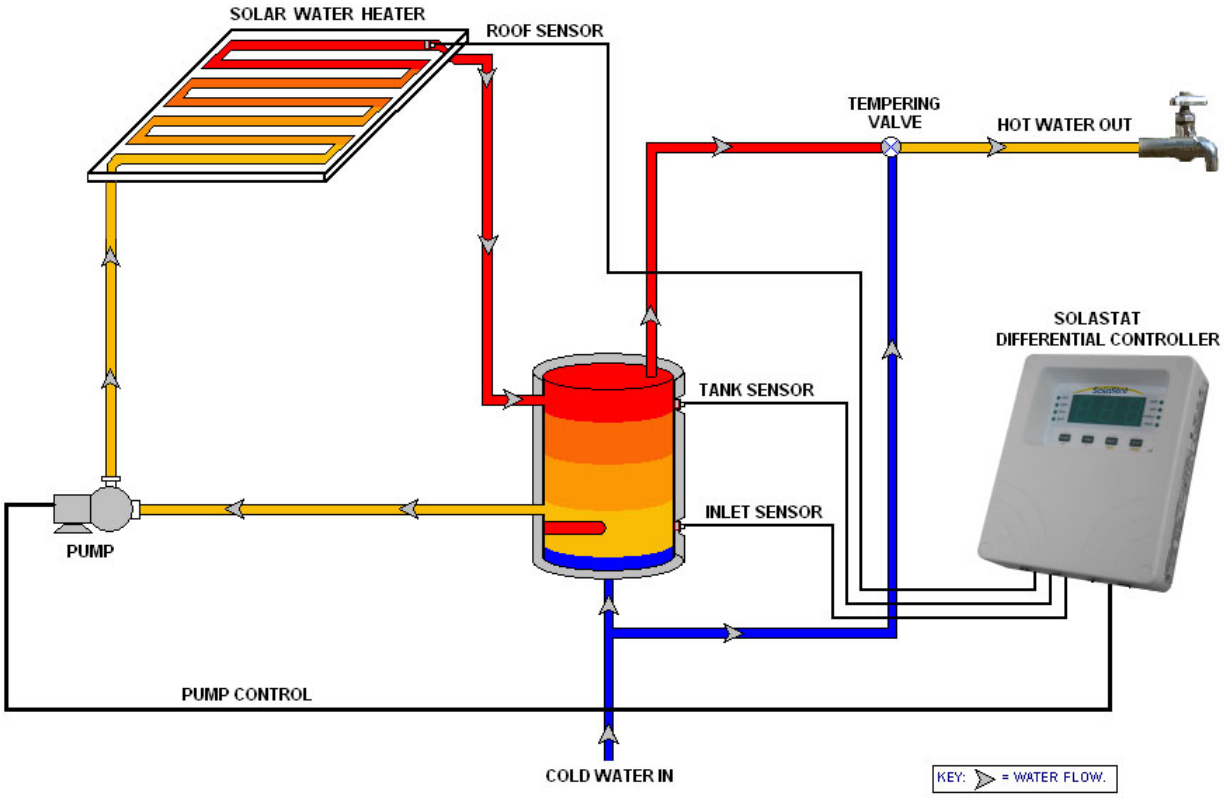
These products are not designed for use in, and should not be used for, applications which are in conjunction with items that are critical to any person's health (e.g. life support systems).

In any critical installation, an independent fail-safe back-up system must always be implemented.

INSTALLING THE SOLASTAT™ CONTROLLER

Overview

The diagram below shows how the SolaStat™ is connected to the Hot Water Cylinder (HWC), the collector, and the three sensors (ROOF , TANK and INLET).



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INSTALLING THE SOLASTAT™ CONTROLLER, CONTINUED

Where to mount the SolaStat™

The SolaStat™ Controller should be mounted so that:

1. It is against a flat surface with sufficient strength to hold the enclosure and any additional weight from the plugs, sockets and cables,
2. Power leads face down not sideways or up.
3. It is safe for users to inspect,
4. The display can be easily read and buttons accessed, and
5. Allowance is made for cable runs, location of power outlets and lengths of wires.

Mounting the SolaStat™

Note: In general, you should not need to open the Controller unit during installation unless the installation is for a Hot Water Cylinder with two elements.

Follow these steps:

1. Allow for the enclosure dropping 5 mm (1/5 inch) from screw centres once mounted (keyhole mounting).
2. Place the drill guide template against wall, checking for level alignment. Four screws are supplied: two chipboard screws and two combination plasterboard/ wood screws.

   All four mounting holes should be used with at least two firmly secured into wood.

   The outer plastic plasterboard anchors will self tap into plasterboard and their inner metal screws fix into the centre of the plastic anchors.
3. Mark and drill/ screw as appropriate leaving the heads of the screws above the surface by approximately 3 mm (1/8 inch).
4. Place the unit over the four screw heads. The unit should slide down 5mm into the ‘key’ slots and become secured to the wall. You will need to adjust the screw height to obtain a secure fit.

MOUNTING THE SENSORS AND CONNECTING WIRING

Introduction

The locations and way that the sensors are mounted is critical to ensure the SolaStat™ -

- ⇨ operates correctly and at greatest efficiency;
- ⇨ protects the system against damage from extreme temperatures, and
- ⇨ displays hot water readings are accurately.

If the TANK and/ or INLET sensor is not mounted correctly –

- ⇨ There may be inaccurate Topout sensing, which could lead to damage to the Hot water cylinder or other components
- ⇨ Hot water readings on the display may be inaccurate

If the ROOF sensor is not correctly mounted –

- ⇨ The unit may not be able to detect FROST settings (this can lead to the collector panel bursting)

Please follow the instructions below carefully.

Positioning the ROOF Sensor

The ROOF Sensor should be fitted into a metal immersion 'pocket' just inside solar collector in the hot water outlet pipe.

Apply plenty of heat transfer compound (available from your distributor) between the sensor and the lining of the hot water outlet pipe.

Seal the sensor with neutral cure sealant and install external lagging. The cable should also be insulated from the bare pipe.

Positioning the TANK Sensor

The TANK Sensor should be fitted into a metal immersion 'pocket' in the upper region of the Hot Water Cylinder (HWC) (typically 1/3 of the way down from the top of the HWC, or the first possible place below 1/3 of the way down.

If a 'pocket' is not available, then bond the sensor against the metal wall of the tank (not the outside cladding or insulation).

Apply plenty of heat transfer compound (available from your distributor) between the sensor and the lining of the 'pocket' (or between the tank and the sensor).

Continued on next page

MOUNTING THE SENSORS AND CONNECTING WIRING, CONTINUED

Positioning the INLET Sensor

The INLET Sensor should be fitted into a metal immersion 'pocket' above the HWC electric element near the bottom of the tank (usually just above the element).

If a 'pocket' is not available, then bond the sensor against the metal wall of the tank (not the outside cladding or insulation).

Apply plenty of heat transfer compound (available from your distributor) between the sensor and the lining of the 'pocket'. (or between the tank and the sensor).

Precautions

Please note:

- ⇨ Removing or cutting the cladding may void the hot water tank warranty.
- ⇨ The sensor must not be immersed in water.
- ⇨ Sensor leads should be kept 300mm (12 inches) away from mains and communications cables.
- ⇨ Make sure the right sensors are mounted in the right places!

Continued on next page

MOUNTING THE SENSORS AND CONNECTING WIRING, CONTINUED

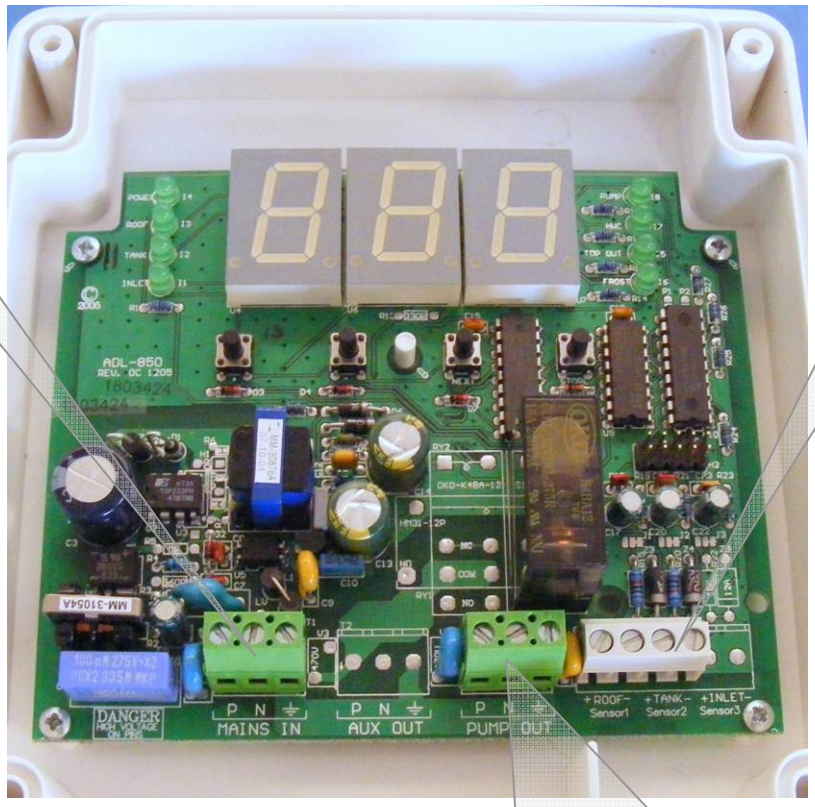
Connect the Wiring

The SolaStat™ is normally supplied pre-wired, hence wiring inside the controller should not be necessary.

However, if needed, the wiring diagrams below show you how to wire the unit for single and dual elements.

1. Connect the wiring from the Controller to the ROOF sensor, the TANK sensor and the INLET sensor;
2. Connect the mains wiring;
3. Connect the wiring from the Controller to the pump.

The unit can also be installed with the wiring entering from behind the unit.



POWERING UP

Before you Connect the Power

Before you power up, make sure you have

- ⇨ Read the safety instructions, warnings and liability statements,
- ⇨ Completed installation, and
- ⇨ Securely mounted the unit in place before you connect power to the unit.
- ⇨ Checked that no water, metal shavings or other electrical hazards are anywhere near the plug, socket and/ or surrounding environment

Notes:

- ⇨ The Power outlet socket must be installed by a registered electrician
- ⇨ The SolaStat™ must be installed by a qualified installer.
- ⇨ Ensure suitable over-current protection and RCD Protection for the SolaStat™ is in place.

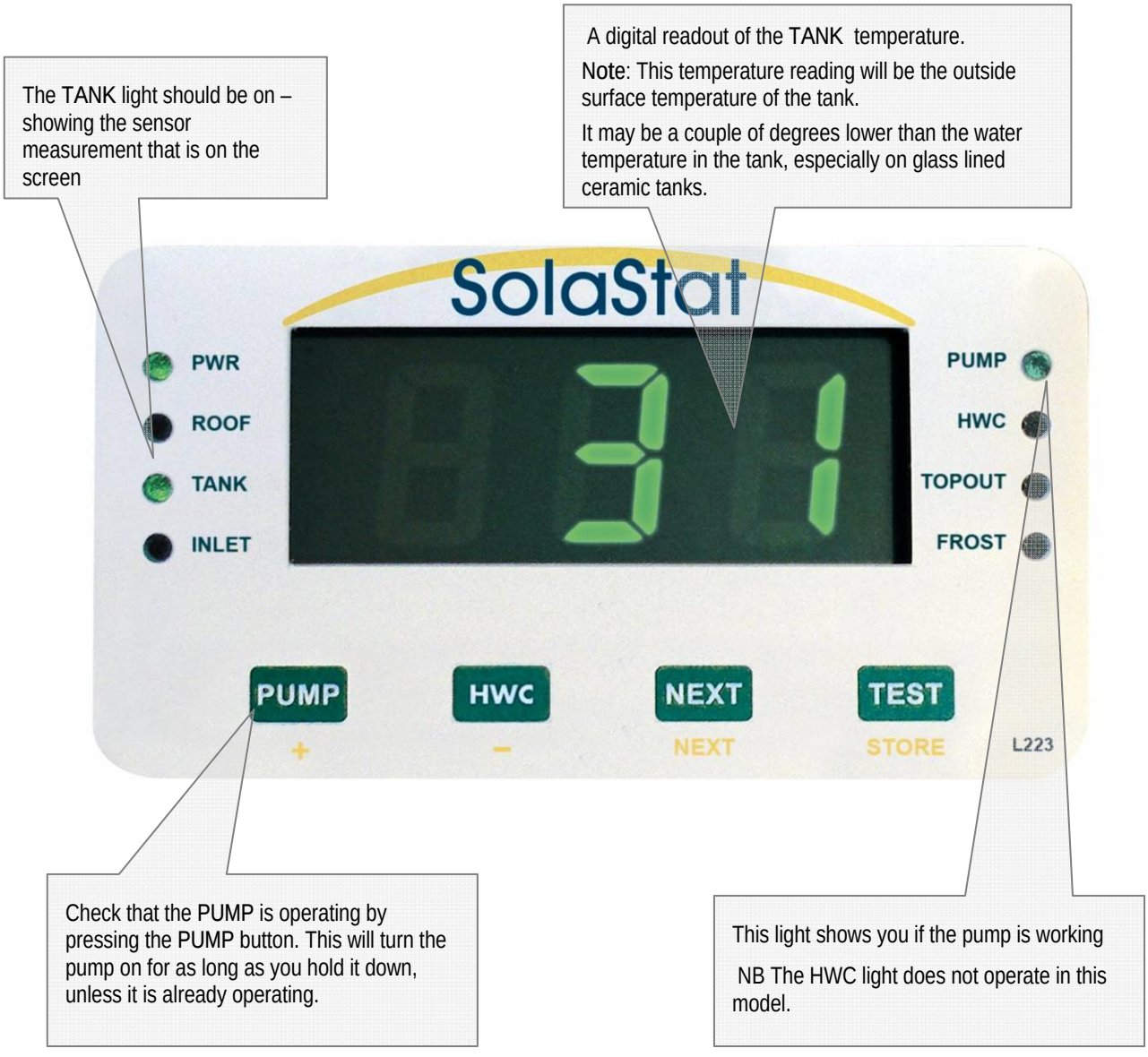
Continued on next page

POWERING UP, CONTINUED

What you will see

When you power up the unit, it will look like the picture below.

Check that the PUMP is operating by pressing the PUMP button. This will turn the pump on for as long as you hold it down, unless it is already operating



POWERING UP, CONTINUED

Final Checks

The SolaStat™ is now fully installed and should be working.

It is best to observe some solar hot water pump cycles, but this will depend on the sun shining.

Check all functions are working correctly before leaving the installation.

The SolaStat™ settings have been factory set to the standard settings for your area and requirements.

These can be adjusted by a qualified installer, using the instructions in the '**Programming the SolaStat™'** section on pages 17-23 in this manual.

See '**Trouble Shooting'** section on page 26 of this guide if the system is not working correctly.

PLUMBING TIPS

Overview

This section will help you to ensure the plumbing associated with the SolaStat™ will enable the system to be operated safety and to maximum efficiency.

All plumbing installations should be carried out by registered and qualified plumber; and all regulatory and local standards must be applied. Best plumbing standards must be used for all plumbing work associated with installation and maintenance.

All parts including the pump must be rated for the elevated temperatures found in solar hot water systems.

The information provided here provides feedback from experienced solar hot water professionals, but does not represent a complete guide to plumbing a system.

Tempering Valve

Water from solar hot water collectors frequently reaches very high temperatures. It may exceed 100°C [212°F](under pressure).

A tempering (or mixing) valve must be installed if required by local regulations.

It is used to ensure the supply from the tank does not burn end users. The tempering valve must be appropriately rated to handle extreme temperatures.

Installation must be to best plumbing practice and the manufacturer's specifications.

Non return valve

Hot water rises and cold water falls. If the solar collector is colder than the tank (e.g. at night) the hot water from the tank can thermo-siphon up to the collector. The collector then radiates the heat to the cool night air and the cooler water descends back to the tank.

To stop this loss of hot water at night or during cloudy skies, a 'one way' or non-return valve needs to be fitted.

The failure of this non-return valve is a common problem with solar hot water systems. Some key points are:

- ⇨ It is critical to make sure that the orientation of the valve is as per the manufacturer's directions.
- ⇨ Make sure there are no debris caught in the valve as that could cause the valve not to close.

Continued on next page

PLUMBING TIPS, CONTINUED

Pressure Relief Valves

Solar hot water systems can run much hotter than standard domestic hot water systems. Hotter water expands more, and needs high quality pressure relief valves to ensure the tank or other components do not burst under pressure.

A qualified plumber can recommend the best practice solution for each installation for pressure relief valves, including the number and placement of them.

Air Relief Valves

Air locks can occur within the piping system (as well as the pump). These can increase the pressure that the pump is working against, to the point where the pump can no longer circulate the water.

To avoid this, air relief valves should be fitted (especially in low pressure systems).

Your registered plumber should install the air relief valves to the highest point of both the feed to, and the return from, the solar water collector.

About Pump Cavitation

If the water pressure drops and/ or the temperature of water being pumped rises, cavitation can occur at the pump. This is especially likely in low pressure systems.

Bubbles form when the water is sucked into the pump's impellor; and they collapse again when the water is ejected out of the impellor.

This can make a rumbling/ cracking noise (like stones are passing through the pump). It can cause damage to the impellor and other sensitive components; and it also results in less volume of water being moved.

Your SolaStat™ has an automatic timer setting, which can help to minimise cavitation.

The timer is normally factory set to switch off the pump after every 10 minutes operation, for a period of one minute. This helps any accumulated air to escape from the pump.

This feature can also help prevent the pump from running for extended periods in a 'locked up' state.

Continued on next page

PLUMBING TIPS, CONTINUED

Pump Cavitation

To prevent cavitation:

- ⇨ Make sure the pump is appropriate for the installation
- ⇨ On a variable speed pump, make sure the setting is correct – a slower speed that still has enough head pressure is best, as it will minimise the pressure difference at the pump.
- ⇨ Mount the pump as low as possible relative to the tank, so the water pressure from the tank feeding in to the pump is maximised.
- ⇨ Lower the resistance to water flow to the pump (use wider – at least ½ " diameter pipes; reduce the number and 'sharpness' of s-bends, etc)

If cavitation at the pump remains a problem, you may need to consider:

- ⇨ Installing a larger pump with a larger impellor to reduce the vacuum at the impellor
- ⇨ Converting the system to mains pressure

ABOUT THE PUMP SETTINGS

Introduction

The SolaStat™ works by turning the pump when the difference between the temperature at the solar hot water Collector (ROOF) and the temperature in the TANK, is at a certain level.

The pump turns on when the difference between these two temperatures is high (i.e. the temperature at the solar hot water Collector is significantly higher than the temperature at the tank sensor (TANK).

The pump turns off again when the difference gets less (i.e. the water in the tank has been heated up.

For example, using the standard settings:

PUMP ON = 12°C [21°F] and PUMP OFF = 6°C [10°F]:

- ⇨ When the solar hot water collector (ROOF) water temperature is 12°C [21°F] higher than the TANK, the pump turns on. This transfers hot water from the collector to the tank, and transfers cooler water from the bottom of the tank to the collector.
- ⇨ This makes the temperature in the Tank heat up; and the temperature in the Collector on the ROOF cool down.
- ⇨ When the difference in the two temperatures reduces to 6°C [10°F[, the pump switches off, allowing the water in the collector to heat up again.

About the setting

For standard domestic hot water systems, the recommended settings are relatively large (e.g. PUMP ON = 12°C [21°F] and PUMP OFF = 6°C [10°F].

This causes the pump to transfer hotter water over shorter periods of time.

For lower temperature systems (like swimming pools or under-floor heating), these temperatures settings should be set lower (e.g. PUMP ON = 5°C [9°F] and PUMP OFF = 2°C [3°F].

This causes the pump to transfer more water at lower temperatures.

Continued on next page

ABOUT THE PUMP SETTINGS, CONTINUED

Adjusting the Setting

If you increase the PUMP ON value, the solar heater will heat up more before the heat is transferred to your hot water tank.

Hotter water will enter your tank, but it may take longer to heat the water to that level; or on dull days, the temperature difference will not be enough to activate the pump (and the energy in the water within the collector will be lost).

If you increase the PUMP OFF value, then the difference in the temperature of the water coming from the solar collector compared with the tank is greater when the pump turns off (the water entering the tank will be hotter than the water already in the tank).

This will reduce heat losses in pipes, but less energy may be transferred.

PROGRAMMING THE SOLASTAT™

Default Settings

The SolaStat™ settings have been factory set with the pre-set values specified in the Programming Table at the end of this manual. These settings should not require any changes.

Caution: incorrect settings of these values could damage the solar collector and/ or the pump.

However, the settings can be changed by a qualified installer, using the instructions in this section. Any changes in settings should be entered in the Programming table at the end of the SolaStat™ User Manual

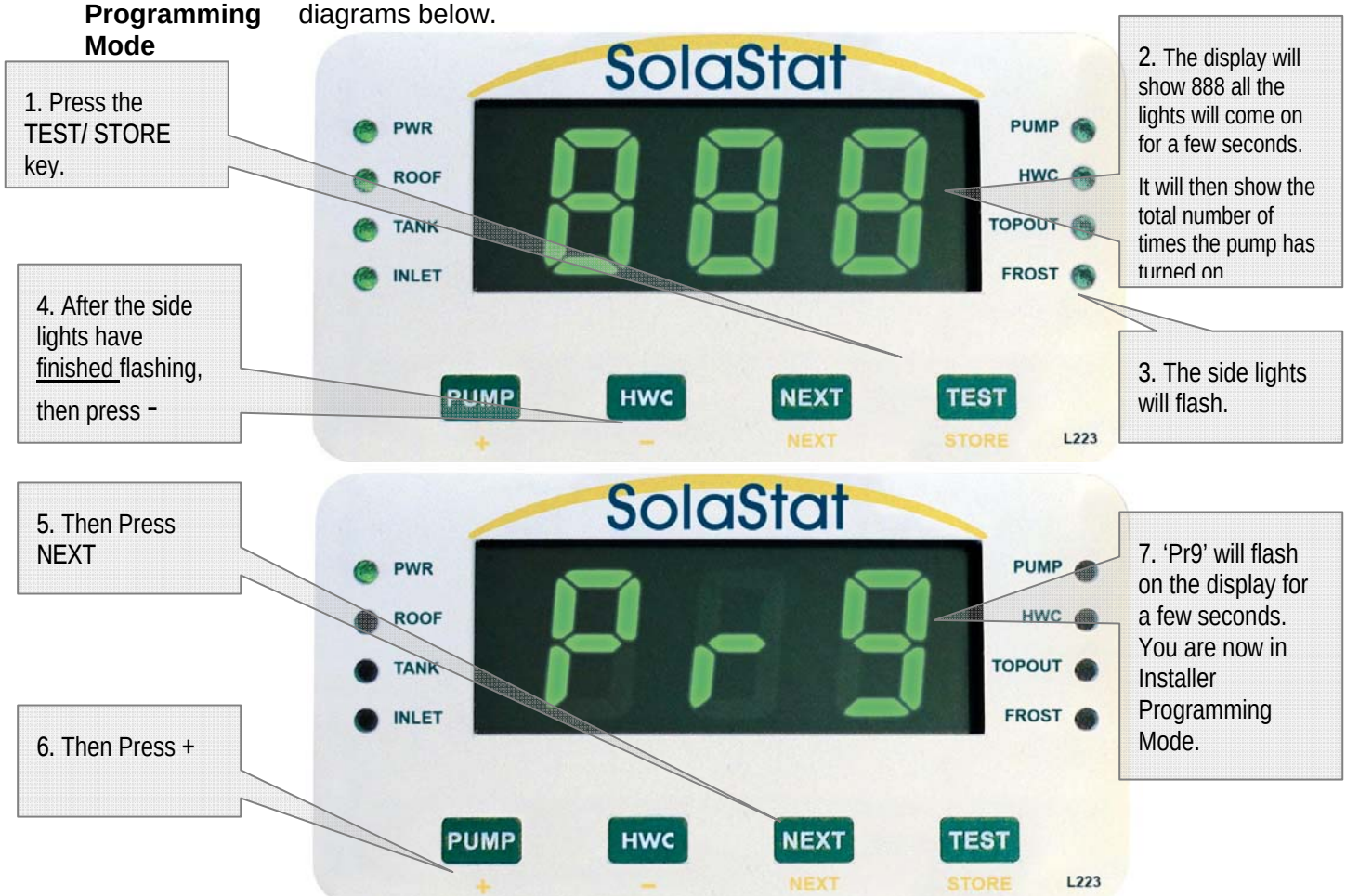
Important Notes

Note that if no keys are pressed for one minute during programming, then the unit will exit from programming mode, and you will need to re-enter Programming Mode.

Important: The writing at the bottom of the keys is your guide during programming.

Enter Installer Programming Mode

To enter Installer Programming Mode, follow the steps shown in the diagrams below.



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PROGRAMMING THE SOLASTAT™, CONTINUED

Enter Adjustable Values

When you have entered the Installer programming mode, the Pump light will be on. The unit is now ready to accept the 'Maximum' Value entry, and subsequent values.

After each key press, you have one minute to press another key before the unit times out. Remember that while you are in Installer Programming Mode, the screen will flash 'Pr9' every 10 seconds.

The settings are programmed in the following order. Press next, when you have adjusted each setting, to move to the next setting. If you wish to go back, keep pressing **NEXT** until you return to that setting.

1. **PUMP OFF** Temperature
2. The **PUMP ON** Temperature
3. **HOLDOF**F timer (not programmable in this model)
4. **Reheat Lower** (not programmable on this model)
5. **Reheat Upper** (not programmable on this model)
6. **BioSafe** (not programmable on this model)
7. **TOPOUT** Temperature
8. **FROST** Value
9. Select **CELSUIS** or **FAHRENHEIT**

.

NB. While you're in Programming Mode, 'Pr9' will flash on the display screen every 10 seconds

Use the + and – keys to change the setting value.

Use the NEXT button to proceed to the next setting, and repeat until all values are entered

You can press 'STORE' at any time to save all values and exit programming mode to automatic operation.

Continued on next page

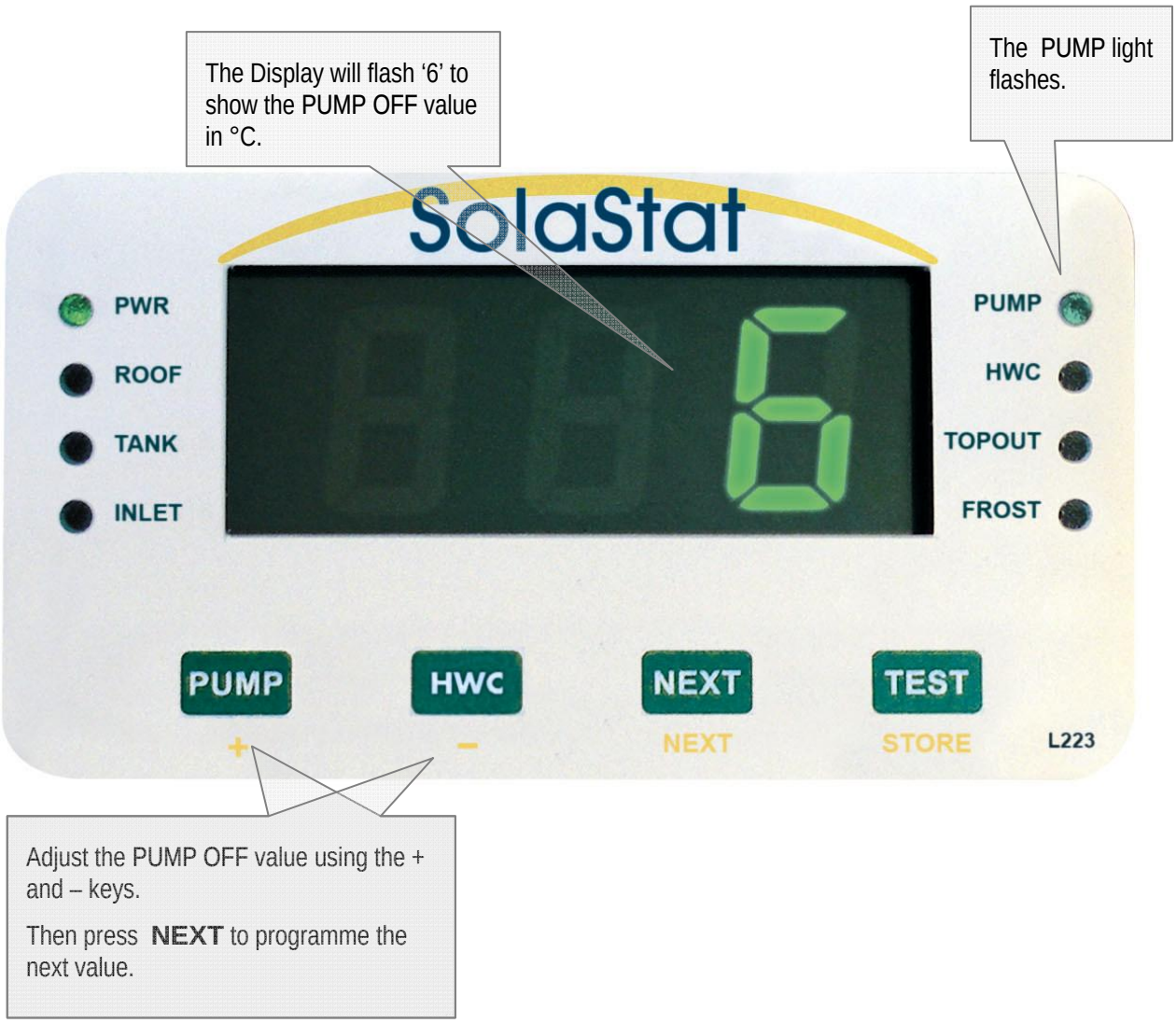
PROGRAMMING THE SOLASTAT™, CONTINUED

Adjust the PUMP OFF Temperature

The **PUMP OFF** Temperature determines the temperature at which the pump will be turned off, to allow the water in the cylinder to heat up fully (i.e. make sure that the warmer water in the cylinder is not diluted with colder water).

The Standard Value is 6°C [10°F], and the range is 1°C – 20°C [33.8°F – 68°F]

Note: Further information on PUMP OFF Settings is included on pages 15-16 under ***About the Pump Settings***.



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PROGRAMMING THE SOLASTAT™, CONTINUED

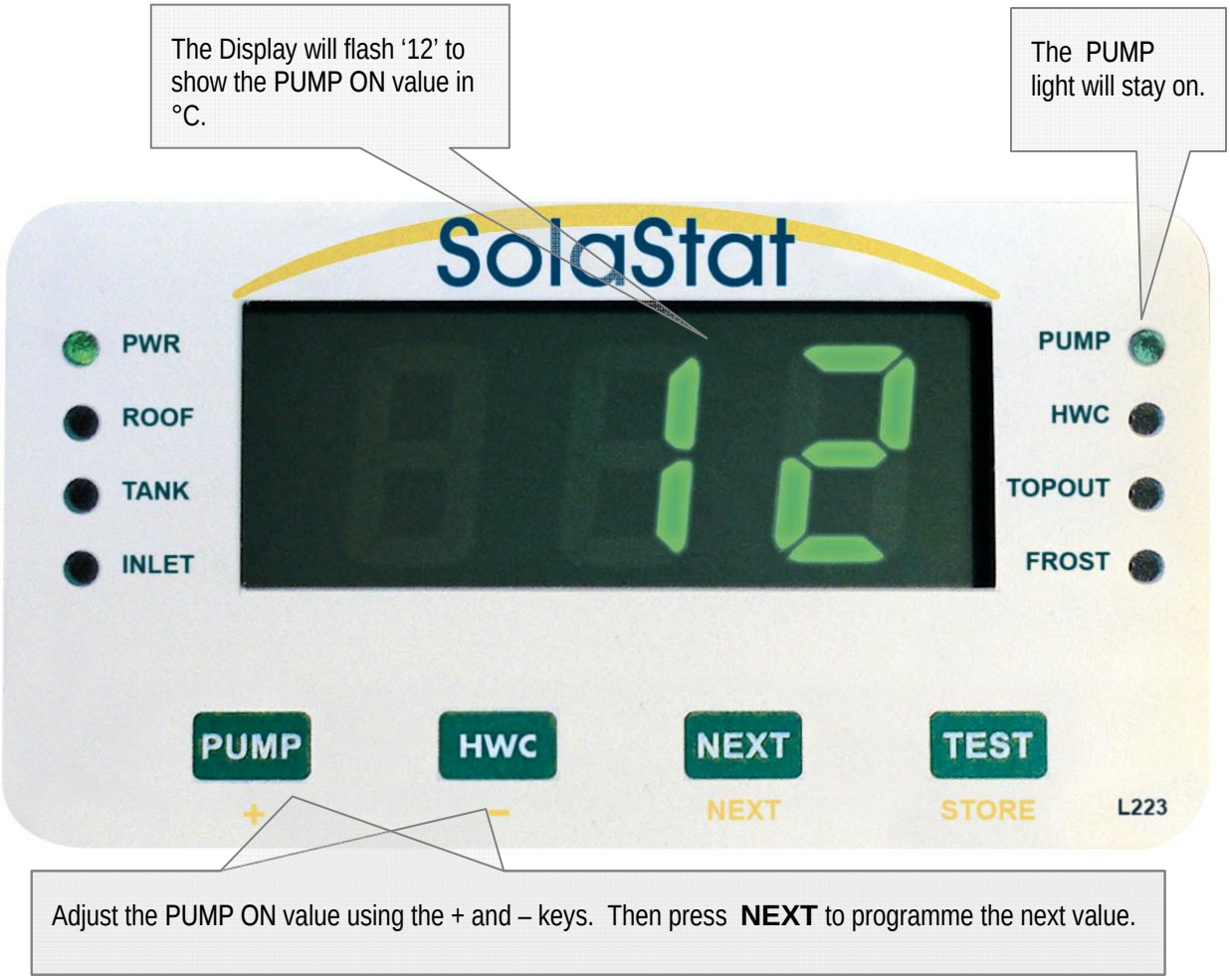
Adjust the PUMP ON Temperature

The **PUMP ON** temperature determines the temperature of the tank that will activate the pump, to transfer water into the hot water cylinder.

The Standard Value is 12°C (53.6°F), and the range is 2°C – 21°C (35.6°F – 69.8°F)

It is always set to a higher level than the PUMP Off temperature.

Note: Further information on PUMP ON Settings is included on pages 15- 16 under ***About the Pump*** Settings.



The Next four programmed values

The next four programmed values – Holdoff Timer, Reheat Lower, Reheat Upper and BioSafe are not operational in this model.

To bypass these values, you need to press NEXT four times to move on through each of these to the next programmable value – Topout Temperature.

Continued on next page

PROGRAMMING THE SOLASTAT™, CONTINUED

Set the Topout Temperature

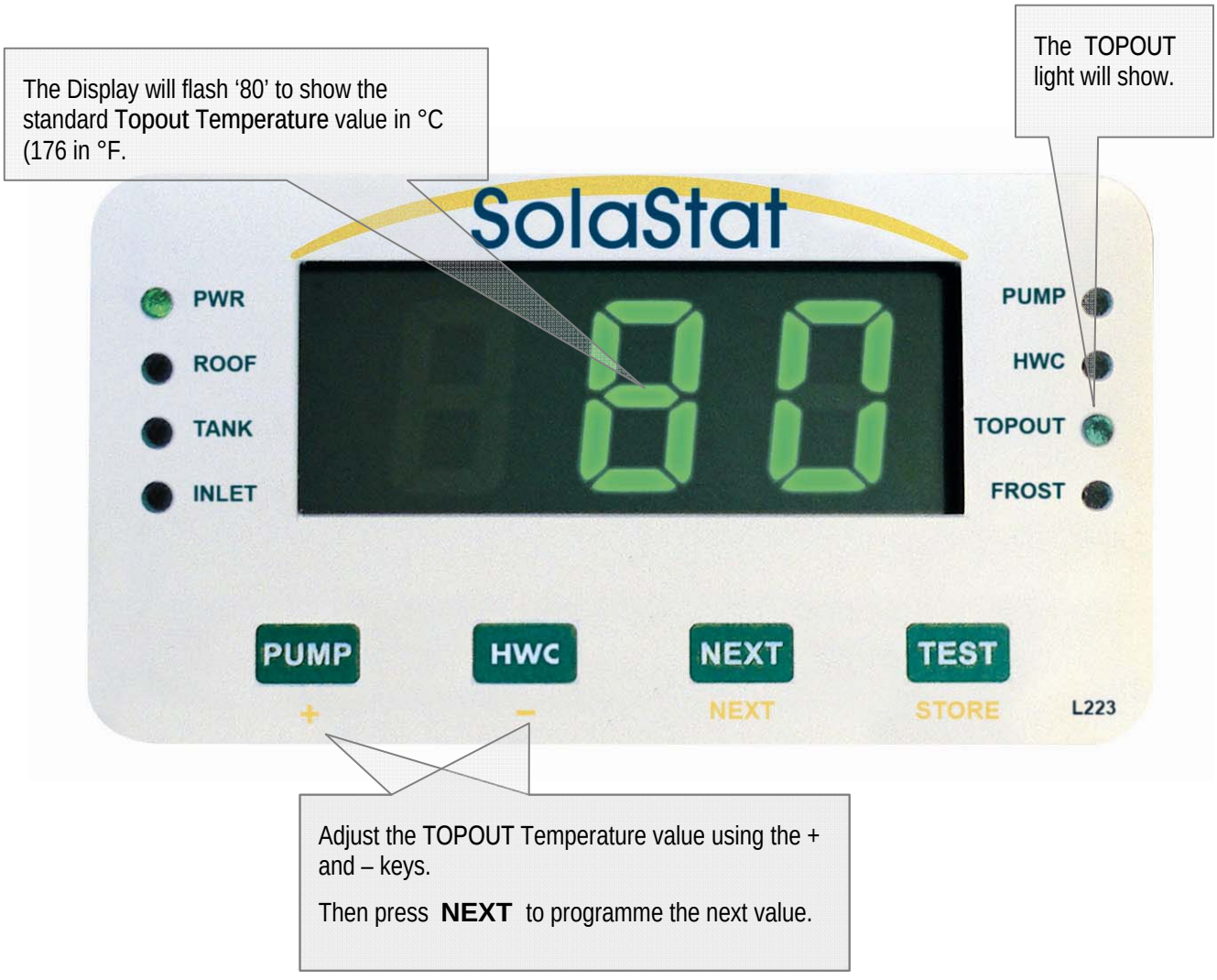
The Topout temperature is the maximum temperature that you will allow in the cylinder. Very high temperatures in the cylinder can cause damage (especially for ceramic lined tanks) – both from heat, and from high pressures on plumbing fittings.

This feature is designed to stop hotter water from the collector entering the cylinder if the temperature is already high – until the water in the cylinder has cooled down to a safe level.

When the maximum tank temperature is reached (Topout Mode), 'Tp' will appear in front of the temperature value.

The Topout value is usually set at a value somewhat lower than the water tank manufacturer's maximum temperature.

The Standard Topout temperature is 80°C [176°F]; and the range is 1°C – 120°C [33°F – 248°F]



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PROGRAMMING THE SOLASTAT™, CONTINUED

Adjust the FROST Value

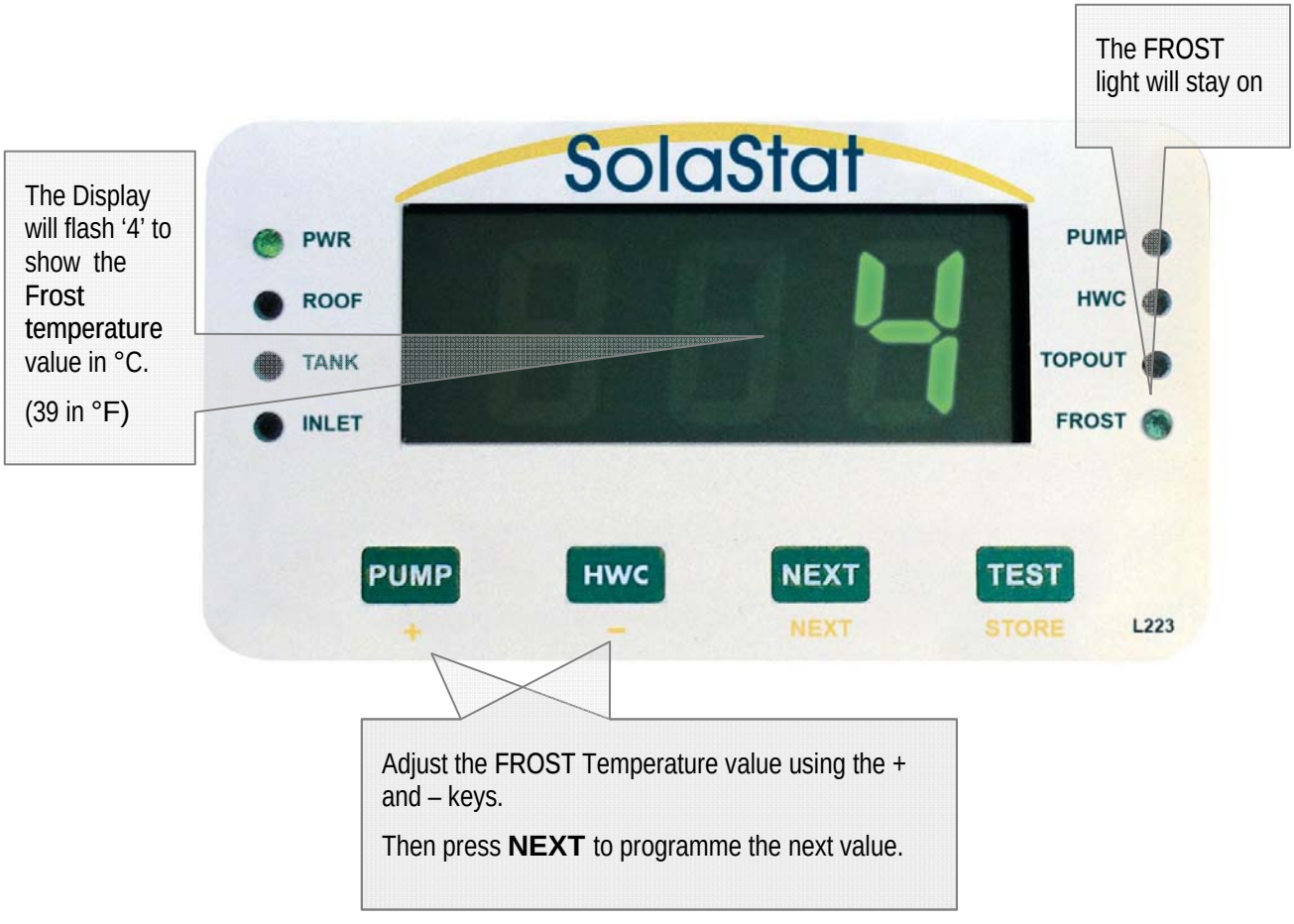
The Frost value is installed in some (but not all) units.

It is designed to protect your collector and hot water system from freezing and bursting. When this temperature is reached, the pump will come on just enough to raise the temperature of water by 2 - 3°C [3.5 - 6 °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 light will come on.

The Standard Frost temperature is 4°C [39.2°F]; and the range is 1°C – 10°C [33.8°F - 50°F].



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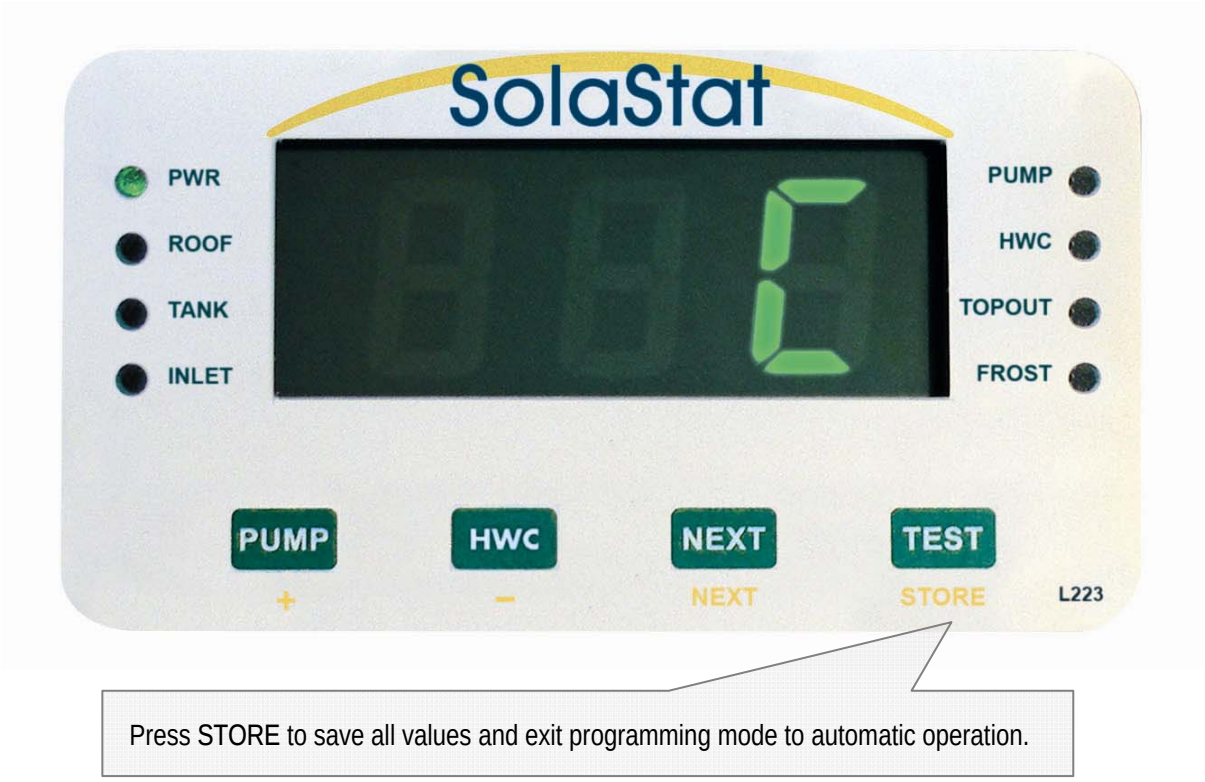
PROGRAMMING THE SOLASTAT™, CONTINUED

Selecting Celsius or Fahrenheit

You can select whether temperatures are given in Celsius or Fahrenheit using the next programmable value.

Use the + or – button to toggle the setting between Celsius and Fahrenheit.



Completing and storing the Programming

All values are now stored. You can check the values simply by continuing to press the **NEXT** key to scroll repeatedly through all the values set.

When you are sure all the values are correct, write these values down in the table within the User Guide.

Now press **STORE**. This will permanently save those values to memory.

The unit will then return to automatic operation. (NB if no key is pressed during programming for a full minute, the unit will save and exit automatically).

SENSOR MAINTENANCE

Lengthening Sensor Wire

The sensor wire can be lengthened within certain guidelines:

- ⇨ The absolute maximum cable length is 100m.
- ⇨ Over 20m, care must be taken to avoid electrical interference being picked up.
- ⇨ In noisier electrical environments, screened cable may be required.
- ⇨ Firmly attach wires to each other by either soldering (heatshrink over each joint) or by quality screw terminals. Joints must be kept dry.
- ⇨ Wire normally used for lengthening is twin 0.5mm stranded speaker wire.

CAUTION:
Dangerous Voltages may be present. The SolaStat™ has no user serviceable parts.
Protective enclosure must only be opened by qualified personnel.
Remove ALL power sources before removing protective cover.

Replacing a Sensor

If a damaged sensor needs to be replaced then the cover of the enclosure will need to be opened unless the choice is made to join the wires externally (see Lengthening Sensor Wire section above).

Remove the mains power supply. Make sure no other power source is feeding back through other connections.

1. Remove the four screw covers on each corner of the lid of the enclosure. This will require a fine tipped tool such as a screw driver. Be careful not to damage the lid. Always press the tool away from you to avoid injury if you slip.
2. Remove the four screws that hold the lid on.
3. Unscrew the damaged sensor from the terminal block.
4. Loosen the cable clamp for the sensor leads.
5. Carefully pull the wire back through the opening in the bottom case.
6. Thread the new sensor wire back through where the old one came from.

Continued on next page

SENSOR MAINTENANCE, CONTINUED

Replacing a Sensor, continued

7. Place the wires of the new sensor into the terminal block where the old sensor came from and retighten the screws.
8. Do not allow the sensor cable to come within 10mm of the high voltage connectors or components inside the enclosure. Tighten the screws on the cable clamp.
9. Replace the lid, replace the four screws and tighten.
10. Push in four new screw covers available from your distributor or Senztek. Note: there are locating lugs to ensure correct orientation.
11. Reconnect the SolaStat™ and turn on the power.
12. Check that the sensor is reading correctly.

Sensor Resistances

The table below has the correct resistance values of the sensor at different temperatures. The sensor must be removed from the SolaStat™ to measure these values correctly.

Follow the above procedure to remove a sensor.

Sensor Resistances		
Temperature	**Resistance in kΩ**	A 'short' circuit can be caused by the sensor wires being connected together. Check the wires are not partially cut and that moisture is not getting into the sensor causing corrosion.
0°C (32°F)	27.25	
25°C (77°F)	10.00	
50°C (122°F)	4.162	
75°C (167°F)	1.925	An 'open' circuit can be caused by the sensor wires being broken. Check the wires are not broken and that moisture is not getting into the sensor causing corrosion.
100°C (212°F)	0.973	
Above 150°C (302°F) or 'short' 'SSd' on display Sensor light on	<0.300	
Below -40°C (-40°F) or 'open' 'SSd' on display Sensor light flashing	>200	

TROUBLE SHOOTING GUIDE

Symptom	Cause	Solution
No operation, no display and no lights (No Power Light)	⇨ 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) ⇨ Unit faulty	⇨ Switch off power while mains power is in brown out condition. ⇨ Switch off power for 10 minutes, switch on power and see if unit is operating. If not, unit needs repair. Contact your supplier.
Display on, pump not running, but sunny outside. Pump light ON	⇨ Pump damaged or disconnected. ⇨ Pump timer has turned pump off	⇨ See if pump has become unplugged ⇨ Wait one minute for the pump to restart.
Pump is running continuously	⇨ Pump is cavitating ⇨ Special Installation ⇨ Setting is incorrect ⇨ Airlock in pipe	⇨ If pump sounds like stones are passing through it, see section under Plumbing Tips ⇨ Long pump times may be normal for a special installation ⇨ Check programming for pump ON and Pump Off ⇨ Check that air relief valves are correctly installed and operating
Hot water drops significantly at night, yet little or no draw off be user	⇨ System is reverse thermo-siphoning ⇨ System is in a high frost area ⇨ Tank is losing heat	⇨ The non-return valve is not fitted correctly or is malfunctioning ⇨ Discuss non-frost sensitive options with your energy provider ⇨ Install better insulation on hot water tank
HWC light never comes on	⇨ HWC control is not available on this model.	⇨ Normal operation

Symptom	Cause	Solution
Display on, pump not running, but sunny outside. Pump light OFF	⇨ Roof sensor reads Hi on display ⇨ Sensor not mounted properly ⇨ Water not hot enough yet	⇨ Normal Operation, pump disabled ⇨ Check that the ROOF senor is thermally bonded to the solar panel outlet ⇨ Check the temperatures of the ROOF and TANK. They need to be higher than the difference programmed for PUMP ON (standard 12°C). Wait.
Pump runs at night **FROST light on**	⇨ Frost outside	⇨ Normal operation
Pump runs at night **No FROST light showing**	⇨ System is reverse thermo-siphoning	⇨ The non-return valve is not fitted correctly or is malfunctioning
Display on, pump will not operate, but sunny outside. Pump light OFF; TOPOUT Light on.	⇨ Topout Temperature exceeded	⇨ If the TANK temperature is greater than the programmed Topout value (standard (80°C) then the system is working correctly.
'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. **ROOF light flashing**	⇨ Wire to Roof sensor broken. ⇨ Roof Sensor damaged. ⇨ Roof Sensor below -40°C (-40°F)	⇨ Repair wire ⇨ Replace Roof Sensor ⇨ Check Outside temperature
SSd' on display. **ROOF light ON**	⇨ Wire to Roof sensor shorted. ⇨ Roof Sensor damaged. ⇨ Roof Sensor above 142°C (302°F)	⇨ Repair wire ⇨ Replace Roof Sensor ⇨ Check Collector has water in it
'SSd' on display. **TANK light flashing.**	⇨ Wire to Tank sensor broken. ⇨ Tank Sensor damaged.	⇨ Repair wire ⇨ Replace Tank Sensor
'SSd' on display. **TANK light is ON.**	⇨ Wire to Tank sensor shorted. ⇨ Tank Sensor damaged.	⇨ Repair wire ⇨ Replace Tank Sensor
'SSd' on display. **INLET light flashing.**	⇨ Wire to Inlet sensor broken. ⇨ Inlet Sensor damaged.	⇨ Repair wire ⇨ Replace Inlet Sensor
'SSd' on display. **INLET light is ON.**	⇨ Wire to Inlet sensor shorted. ⇨ Inlet Sensor damaged.	⇨ Repair wire ⇨ Replace Inlet Sensor

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

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.

Adjustable Values	Function	Light indication	Pre-Set Value	Range
Pump Off	The temperature difference between the Roof and the Tank that will turn the pump off	Flash Pump Off value in °C	6°C [42.8°F]	1-20°C [33.8 - 68°F]
Pump On	The temperature difference between the Roof and the Tank that will turn the pump on	Pump On value in °C	12°C [53.6°F]	2-21°C [35.6 – 69.8°F]
Holdoff Timer	How long the timer will override the pump coming on (as long as the tank temperature is above Reheat Lower)	HWC on, Timer value in hours (approx)	OFF	(Not programmable in this model)
Reheat Lower	The tank temperature at which the heating element will automatically start to reheat the water in your cylinder.	HWC slow flash Lower value in °C	OFF	(Not programmable in this model)
Reheat Upper	The temperature (in the tank) at which the heating element will automatically stop reheating the water in your cylinder.	HWC fast flash Upper value in °C	OFF	(Not programmable in this model)
BioSafe	BioSafe target temperature	No lights (except Power) BioSafe value in °C	OFF	(Not programmable in this model)
Topout	Maximum allowable tank temperature before the pump is de-activated to protect system from overheating	Topout on, Value in °C	80°C [176°F]	1-120°C [33.8 - 248°F] <1°C = OFF
Frost	Minimum allowable panel temperature before the pump is activated to protect system from freezing damage.	Frost on, Value in °C	4°C [39.2°F]	1-10°C [33.8 - 50°F] >10°C = OFF
Celsius or Fahrenheit	Display temperature in Celsius or Fahrenheit	Temperature in either Celsius or Fahrenheit	C	C or F

Enter the programmed values in the corresponding table at the back of the User Guide.

SPECIFICATIONS

Power Supply.

Supply Voltage	85 – 264 Vac (high) OR 22 – 85 Vdc (medium) (must be specified at time of ordering)
Max power usage	5VA + external loads.
Relay Outputs.	Pump: 10A (240Vac) Resistive for pre-wired option 16 A (240 Vac) Resistive for permanent wired option 1HP (240Vac) Inductive (motor) HWC: 10A (240Vac) Resistive for pre-wired option 16 A (240 Vac) Resistive for permanent wired option

Sensors.

Display range	-20 ~ +139°C [-4 ~ + 282 °F]
Control Range	-40 ~ +150°C [-40 ~ 302 °F]
PVC Sensor	-40 ~ +105°C [-40 ~ 221 °F]; 4mm [0.16 inch] diameter, UV resistant. (Standard Models)
Teflon Sensor	-40 ~ +250°C [-40 ~ 482 °F]; 4mm [0.16 inch] diameter, UV resistant. (Special Order)
Accuracy	+/-1°C @ 25°C; +/- 1.8°F@ 77°F

EMC and Safety Compliances.

Emissions	EN 55022-A, CTick.
Immunity	EN 50082-1.
Safety Compliance	EN 60950, CTick.

General Specifications. (Unless otherwise stated in other input specifications.)

Operating Temperature	0~50°C [32 ~ 122 °F]
Operating Humidity	90% RH Max. Non-Condensing
Enclosure Construction	Polycarbonate - Impact Resistant UL94 V-2 Non Burning, UV Stabilized Water resistant or rear entry option available.
Dimensions (excluding glands and cables)	L=167mm [6 ½ inches], W=142 [5 ½ inches], H=40mm [1 ½ inches],
Weight	= 1000grams [35 oz]

(Standard model + sensors + packaging, without power plug, pump socket and HWC socket)

Product Liability. This information describes our products. It does not constitute guaranteed properties and is not intended to affirm the suitability of a product for a particular application. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.

Regrettably, omissions and exceptions cannot be completely ruled out. No liability will be accepted for errors, omissions or amendments to this specification. Technical data are always specified by their average values and are based on Standard Calibration Units at 25°C, unless otherwise specified. Each product is subject to the 'Conditions of Sale'.

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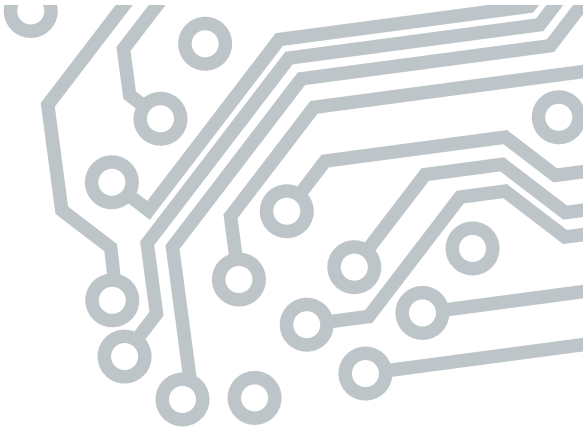

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