

SENZTEK

smart energy management



SolaSmart Plus™ USER GUIDE



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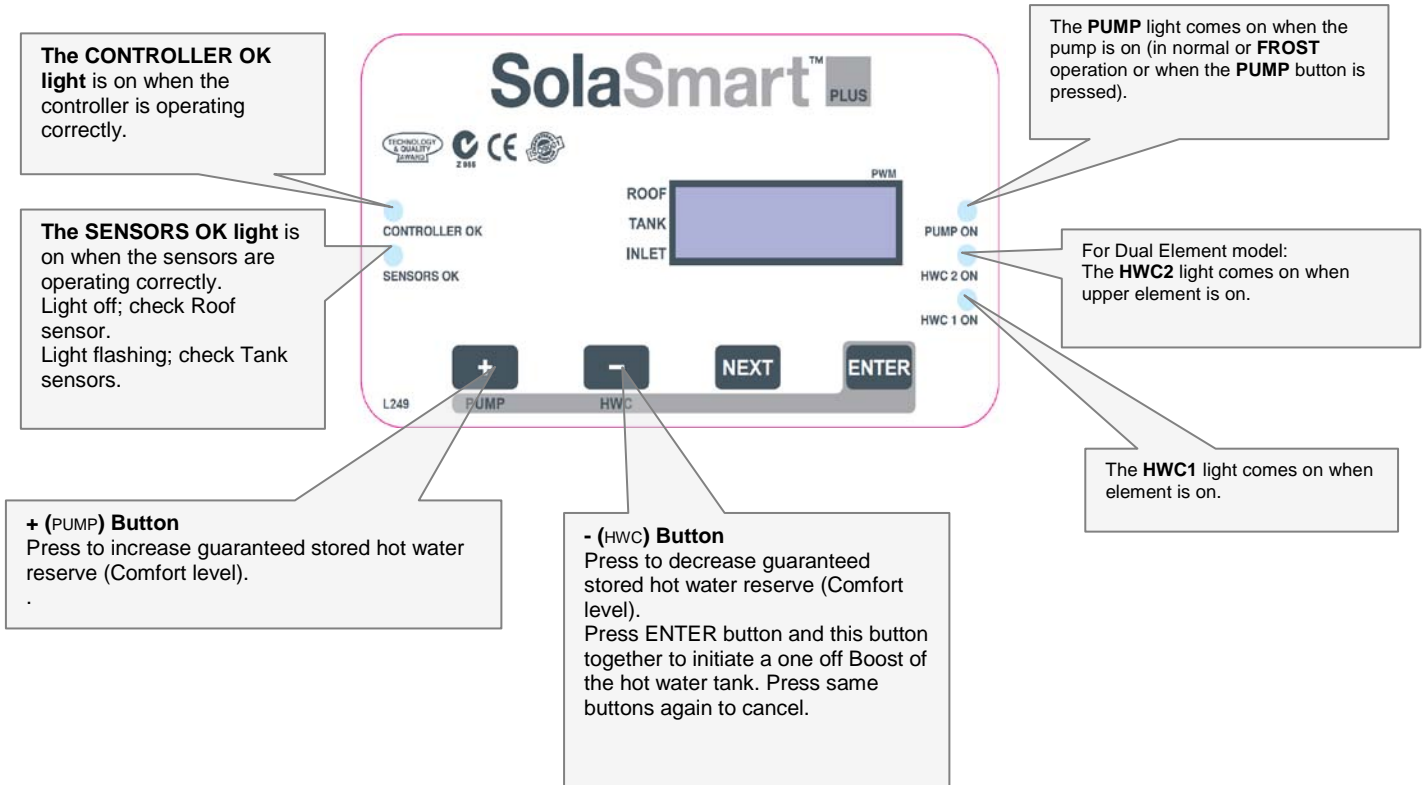
For technical help contact your installer or maintenance technician.

Installer Details:

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THE DISPLAY PANEL



- The 3 sensor temperatures will cycle through Roof – Tank – Inlet. Indicated by the single dot next to label on the display.
- Pressing the NEXT button will cycle through an extended range of screens including the time, what heating profile the controller is using, what speed the pump is running at (%) and diagnostics. These are explained later in the manual.



CAUTION:
 The SolaSmart-Plus™ has no user serviceable parts.
 Dangerous Voltages present inside enclosure during operation.
 Protective enclosure must only be opened by qualified personnel.
 Remove ALL power sources before removing protective cover.



SOLAR CONTROL

Differential The SolaSmart™ solar harvesting works by turning the pump on when the **difference** between the temperature at the solar hot water collector (ROOF) and the lower part of the tank (INLET) is at a set level 'Pump On'

The pump turns off when the difference is less 'Pump Off' (Collector has cooled and/or tank has heated up). This process repeats as the tank heats up.

FROST The **FROST** function 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 the water by 2-3°C. Only a small amount of warm water is needed to protect the collector and plumbing.

When the unit is in Frost Mode, the **PUMP** light will come on.

Topout The Topout temperature is the maximum temperature that the system will allow the tank to heat to.

Topout Simple: The standard Topout method (Topout Simple) stops the solar pump from working when the tank reaches Topout temperature. Topout also works with the collector (roof) temperature so that BOTH the Tank and the Collector must be below their respect maximum temperatures. The solar harvesting cannot re-start until the collector cools down also (often after sun down).

Advanced Topout: Advanced Topout function is an alternative to Topout Simple that will allow the system to re-start solar harvesting if the tank temperature falls below Topout but the Collector is still at Stagnation temperatures.

This function can only work safely if the solar return pipe is below the upper tank sensor (Tank).

Recovery is achieved by a three stage system which includes pulsing water through the collector, the delay between pulses allows the dissipation of heat in the pipes such that any steam should condense and not be present when the water re-enters the tank and thus avoiding steam implosions (loud banging noises in tank).

Also the Advanced Topout delays the onset of Stagnation with a 3 stage system of actions.

BIOSAFE AND BOOST FUNCTIONS

**Collector
BioSafe**

During BioSafe the pump is run for two minutes once the tank is above the target temperature to sterilise the collector pipes.

BioSafe

BioSafe runs periodically according to the settings. When heating for BioSafe sterilisation the controller will start heating with the upper element (in a dual element tank) first before completing the cycle by then heating with the lower element. The BioSafe examination will continually reset while the tank temperature is above BioSafe levels, so the sterilisation will only occur if the tank has not attained BioSafe conditions over a 1 week period.

For installations where the Inlet (lower tank) sensor is below the electric element, this is known as a 'Mid Element' configuration and the BioSafe will run every 24 hours

BioSafe uses the Real Time Clock to determine when it should run and is therefore immune to power outages of less than 14 days.

Boost

This is a 'one –off' operation that will reset when the Boost target temperature is attained.

Boost can be initiated when the hot water is below the maximum boost temperature (with a Solar installation this temperature might already be surpassed). It can be cancelled by selecting Boost again, a toggle action.

TARIFF TABLES

Introduction The Tariff Tables allow the controller to be setup in such a way as to minimise the home owners electricity cost by matching the houses hot water use and expectations to 4 different time bands for each day. Thus not heating too much hot water. There are 3 to choose from to best suit the user.

Because the user can 'turn down' the profile with the comfort control feature (the tables here = 100% user comfort setting) the table must represent the likely **maximum** expected stored reserved hot water.

The options are;

1. MAX - non over rideable by user comfort control
2. High
3. Med
4. Low
5. Off – will not heat during this time period

Table 1 shows all the variables in Tariff Table. Only entire tables can be selected on stand-alone SolaSmart-Plus™ controllers. These individual Tariff table settings are fully adjustable with the optional accessory DisplaySmart-Plus™

H1
(Standard)

	Band 1	Band 2	Band 3	Band 4
Band Start Time	7:00	9:00	15:00	23:00
Hot Water Level	High	High	High	High

H2
(Night On)

	Band 1	Band 2	Band 3	Band 4
Band Start Time	7:00	9:00	20:00	23:00
Hot Water Level	High	High	High	Max

H3
(Night Off)

	Band 1	Band 2	Band 3	Band 4
Band Start Time	7:00	9:00	20:00	23:00
Hot Water Level	High	High	High	Low

Comfort Control

The Comfort Level is an easily adjustable user control that allows the efficiency vs guaranteed hot water storage balance of the system to be managed. The control is easy to adjust and can be altered at anytime to suit changing circumstances, weather, guests in house and such.

The **+** and **-** buttons on the front panel will by default adjust the 'comfort level' and the 7 segment display will indicate what the comfort % setting is after each update. There are also optional external devices which can adjust this value in addition to the front panel of the controller.

The Comfort Control manages the electric boost heating only.

- Set higher for more guaranteed hot water
- Set lower for more savings

This control was included as a solution to the problem that different users have different hot water usage vs savings expectations.

The Comfort Level percentage is not a direct temperature control; rather it uses sophisticated computer logic to determine the best temperatures and which sensors or elements in conjunction with the selected HWC profile to realise an optimised system for the user's expectations of stored hot water.

At first it might be best to start with a maximum or high setting and gradually reduce over some time (maybe days) until the best balance is found.

Comfort set to 0% = Holiday mode and the tank will not heat with the electric elements except if BioSafe sterilisation is required.

Note: The last Comfort setting is written to permanent memory 5 minutes after the last adjustment. If power is removed before the 5 minutes has elapsed the setting will revert to the previous stored value.

DISPLAY AND DIAGNOSTICS

Introduction

The Display is normally a scrolling display of 3 screens. Every 5 seconds the display scrolls to the next screen.

Screen 1: Roof °C

The dot next to the "ROOF" will be lit up when the Roof Temperature is on the display. If the sensor is faulty, "Opn" or "Shrt" will be displayed depending on the fault condition.

Screen 2: Tank °C

The dot next to the "TANK" will be lit up when the Upper Tank Temperature is on the display.

Screen 3: Inlet °C

The dot next to the "INLET" will be lit up when the Inlet (Lower Tank) Temperature is on the display.

Note: To view screens 4-6, press **NEXT**. This will activate advanced diagnostics mode for 10 minutes, after which time it will revert to the temperatures only

Screen 4: Shows the speed of your variable speed pump (0 to 100%). Only applies when using a PWM pump.
PWM Duty Cycle %

Screen 5: Time is shown in HH:MM format.
Time

Screen 6: Segment 1:
Diagnostics Solar Rule that is currently active

- = IDLE
- Φ = Frost
- δ = Differential
- τ = TopOut (D1 Stage 1, D2 Stage 2 , D1 & D2 Stage 3)
- β = Collector BioSafe
- E = Error

Segment 2:
 HWC Rule that is currently active

- = IDLE
- ρ = Reheat
- β = BioSafe
- 0 = Boost
- E = Error

Segment 3:
 Active Element: Λ = Lower, Y = Upper

Segment 4:
 Active Tariff Band: 1 to 4

E.G. $\delta\rho\upsilon 2$ = The solar pump is running (differential), the tank is using an element to heat the tank (reheat) and that element is the upper It is time period 2.

Procedure for Setting the Time and Hot Water Profile:

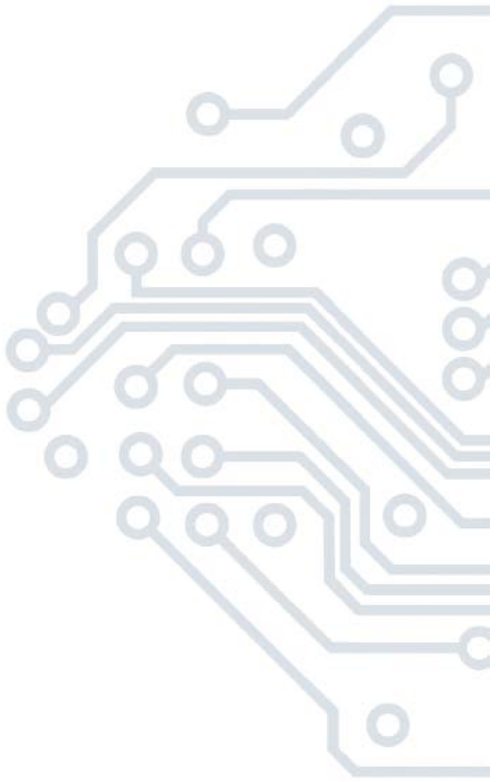
1. Press and hold **ENTER** for 10 seconds
2. The 'Hours' digits flash
3. Adjust with **+** and **-**
4. Press **NEXT**
5. The 'Minutes' digits flash
6. Adjust with **+** and **-**
7. The present Hot Water Profile number will flash e.g. H3
8. Adjust with **+** and **-**
9. Press **NEXT**
10. Press **ENTER** to save and exit

TROUBLE SHOOTING GUIDE

Before you call for repair or servicing check the following table

Also note down any observations at the time of the fault, especially the 3 sensor temperature readings (on the display) and if possible what the Status screen was displaying.

Symptom	Possible Cause	Solution
No operation, no lights ON	⇒ No power/fault	⇒ Check mains outlet is switched on
Sensor O.K. light OFF	⇒ Roof sensor not detected ⇒ Possible broken sensor cable	⇒ Check sensor is plugged in at controller ⇒ Call for repair
Sensor O.K. light flashing	⇒ Inlet or Tank sensor not detected	⇒ Call for repair
Pump not running, while sunny outside. Pump light ON	⇒ Pump damaged or disconnected. ⇒ Pump timer has turned pump off ⇒ Controller fault	⇒ See if pump has become unplugged ⇒ Wait one minute for the pump to restart. ⇒ Call for repair
Pump not running, while sunny outside. Pump light OFF	⇒ System in Topout	⇒ Check diagnostics display if controller is in Topout, the first digit will be τ if in Topout. If so then this is normal.
Pump is running continuously	⇒ Pump is cavitating ⇒ Special Installation ⇒ Airlock in pipe	⇒ If pump sounds like stones are passing through it, the pump may be cavitating and so not moving water. Call for repair ⇒ Long pump times may be normal for a variable speed pump or a special installation.
Pump only comes ON when Roof sensor is above 100°C	⇒ Advanced Topout method	⇒ Normal operation for Advanced Topout.
Pump only comes ON for few seconds every few minutes	⇒ T2 Advanced Topout and recovery method in action	⇒ Normal operation for Advanced Topout and Recovery. This prevents banging in tank (steam implosions)
HWC light stays on too long (more than 6 hours)	⇒ HWC power not getting to element ⇒ Element open circuit (blown) ⇒ Excess water draw off or leak	⇒ Read tank temperature ⇒ If < 50°C issue will be interrupted power or a faulty element. Call for repair ⇒ If > 50°C issue will be tank thermostat will not allow controller to reach target temperature (usually in BioSafe heating). Arrange for tank thermostat to be adjusted to maximum by qualified personnel only



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