



Carrickarnon  
Ravensdale  
Dundalk  
Co.Louth

Tel: 04293 58002 Email: [info@solarite.eu](mailto:info@solarite.eu) Web: [www.solarite.eu](http://www.solarite.eu)

## *Solar Water Heater Users Manual*

**Congratulations on purchasing a SOLARite Ireland™ solar water heating system. With minimal care and maintenance this will provide many years satisfaction of knowing that your hot water came from the sun, and not from the oil well.**

**Your system should be checked over every two years by a professional installer, and there are some quick checks you should make regularly yourself which are outlined here.**

**Thank you for taking social responsibility and taking part in a worldwide movement to reduce CO2 emissions. We hope you will follow this up with other environmental actions to reduce our impact on our climate and on the environment.**

### **Disclaimer**

Your system will have been installed and configured to work. Please ensure that anyone altering the system or the settings on the controller is qualified and fully understands your system. Please ensure that children do not have access to your controller or to any valves on the system. If you need to replace tubes on your roof, please ensure that all standard work safety practices are observed in doing such work.

Solar panels can bring water to steam temperature and accumulate extremely high pressure. Inadequate repair or maintenance can result in flood damage and /or injury for which we cannot be liable.

### **Overview**

Vacuum tube collectors on the roof convert sunlight to heat. As the temperature in the collector manifold rises the controller turns on the circulation pump and transfers the heat to a coil low in the hot water cylinder thereby raising the temperature of the water. Your central heating system and/or immersion heater will still be required to raise the temperature of the solar heated water (as necessary) to achieve the desired hot water temperature on days when there is insufficient sunshine.

The solar loop is a circuit carrying heat transfer fluid (usually water and anti-freeze) from the manifold at the top of your solar collector to the coil in the bottom of your cylinder. This is a separate closed circuit and the fluid in it is slightly pressurized. Water from this circuit never finds its way into the rest of the cylinder, but heats the water in your cylinder indirectly. The circuit contains a number of major components, which are explained below and are shown in the Solar Circuit Schematic diagram above.

## **Solar Collector**

The solar collector contains an array of 20 or 30 evacuated glass tubes (similar in construction to a Thermos flask). The outer side of the inner glass tube acts as the absorber surface and is covered with a 'selective' coating. This surface is within the evacuated space between the inner and outer tube wall and is protected from environmental degradation. The vacuum ensures that there is almost no heat loss to the atmosphere on a cold day.

Direct and diffuse solar radiation passes through the vacuum and is absorbed by the 'selective' coating on the tube surface and converted into heat. This heat is transferred to an internal heat-pipe by convection. The sealed copper heat-pipe transfers the heat via convection of its internal heat transfer fluid to a 'hot bulb' that indirectly heats a copper manifold within the header.

## **Cylinder**

The cylinder usually has a volume greater than a standard domestic hot water cylinder. This additional capacity allows the solar system to work more efficiently and stores water from the day to use later that night and the following morning or beyond. For that reason the cylinder is insulated with 50mm thickness of blow-moulded foam; this helps retain heat longer than standard insulated cylinders. The lower coil is connected to the solar circuit and the upper coil is connected to your existing boiler.

## **Controller**

The temperature controller constantly monitors the temperature difference between the solar collector manifold and the solar cylinder. This information is obtained from two temperature sensors: Sensor 1 located inside the collector manifold and Sensor 2 located in the middle of the hot water cylinder. Sensor 3 is located in upper part of the solar cylinder and is used to monitor the hot water supply temperature.

*It is recommended that the controller is left switched-on at all times*

## **Automatic Air Vent**

The automatic air vent valve releases any air trapped within the system without releasing fluid. Most of the air will be manually vented during installation by manual operation of the Pressure Relief and Automatic Air Vent valves.

When the system is first filled with mains water it will contain dissolved air. This air will come out of solution and form bubbles when heated. Over the first few days of operation, or after draining and refilling the system, this valve will discharge air automatically.

## **Pressure Relief Valve**

The pressure relief valve is the primary safety component. In the event of high-pressure build-up (e.g. during a power cut, the valve can automatically discharge fluid to maintain a safe system pressure. It is a statutory requirement on all pressurized systems. Due to the system design the pressure rarely exceeds 3 bar even during a power cut.

## **Filling Loop**

The filling loop is used to initially fill the solar circuit with water, or top-up the circuit again as required. Water by-laws require that the loop must not be permanently connected; therefore it will require re-connection if a top-up is required.

### **Flow Meter (optional)**

The flow meter indicates the fluid flow rate through the solar circuit in litres per minute. A flow rate of 4-8 litres per minute is recommended. This information can be programmed into the controller to measure the energy produced by the system.

### **Pressure Gauge**

The pressure gauge indicates the pressure within the solar heating system. This slightly fluctuates depending on the temperature of the heat transfer fluid. A pressure between 1 and 2 bar is normal (indicated by the black needle). The red pointer indicates the minimum operating pressure that should be maintained in the system. This is normally set at 1.5 bar.

### **Expansion Vessel**

The volume of the heat transfer liquid in the system will expand and contract with changes in fluid temperature. A diaphragm within the expansion vessel maintains a constant system pressure by compressing a fixed volume of air contained within the vessel.

In the event of a power cut, the water in the manifold of the solar collector will be turned to steam and this will push more water into the expansion vessel and raise the pressure in the system, sometimes to a figure close to 3 bar.

### **Circulating Pump**

When activated by the controller the pump circulates the heat transfer fluid around the system. The lowest pump setting will normally achieve the optimum rate of circulation for efficient heat transfer. The pump can be isolated from the system by closing the valves on either side. In common with all domestic circulators this unit will be hot when operating.

### **Non-Return Valve**

This valve has been incorporated to prevent reverse thermal circulation in the solar system when the controller has switched off the pump. An arrow on the valve indicates the direction of flow. It also prevents hot water from the cylinder thermo-syphoning up to the panel at night.

### **Heat Transfer Fluid**

The heat transfer fluid is water with a corrosion inhibitor and / or anti-freeze solution added. The anti-freeze should provide protection from extreme temperatures to -10°C. Secondary frost protection is provided through the controller, which will operate the pump if the manifold temperature falls below a pre-set level. When the heat transfer fluid does not contain anti-freeze, this temperature is normally set to 4°C.

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## **System Operation**

The system operation is fully automatic and does not normally require user intervention, unless the LED status indicator on the front of the controller is flashing red.

The controller can provide useful information on the amount of hot water in your system, the number of hours the pump has been operating etc. Please refer to the separate handbook for the controller for information on programming and reading the controller.

### **Making the Most of your Solar System**

On days of high solar availability there will be a considerable volume of hot water by midday. Using hot water then will make the collector work more efficiently for the rest of the day giving you more hot water for the evening. Using the washing machine, dishwasher or doing the washing up after lunch would be convenient ways of matching hot water demand to solar output. Even on days of low solar radiation the efficiency of the collector will ensure a significant contribution to the water heating. Stored water is preheated easing the load on the boiler or immersion heater.

# System Maintenance

## Every Month

Check the pressure gauge reading is between 1-2 bar. If the system pressure is below 1 bar, connect the filling loop and open the inlet valve (slowly) until the pressure reaches 1.5 bar. If further topping up is required at the next check examine the systems for signs of a leak.

## Every Year

Check the operation of the pressure relief valve by rotating the cap until a little liquid is discharged. Release the cap to re-seat the valve.

## Every Two Years (If you are not familiar with plumbing principles, this work should be done by a professional installer)

Drain and flush the solar circuit.

Remove and clean the strainer element (if supplied)

Remove the flowmeter and clean the glass tube (if supplied)

Refill the solar circuit with water and add 30% concentration of anti-freeze.

## Replacement of Tubes

In the unlikely event of a tube being damaged it is possible to replace individual tubes. Please contact SOLARite Ireland if this situation occurs.

# Troubleshooting

SYMPTOM	POSSIBLE CAUSE	ACTION
Controller screen is blank and the operation control lamp is off.	Controller power is switched off.  Blown fuse in controller switch box.  Blown fuse in controller.	Turn the controller back on.  Replace the 3 Amp fuse.  Switch off the controller. Remove the cable cover(white).Replace fuse and cover. Switch the controller back on.
888.8 displayed instead of the temperature.	Loose connection on sensor leads.  Faulty sensor.	Switch off the controller. Remove the controller cable cover (white). Check sensor terminal screws are secure. Replace controller cover. Switch the controller back on.  Change sensor.
Flow gauge reads zero even when the pump symbol on the controller is flashing (on indication).	No fluid in the circuit.  Blockage in the circuit.	Check the pressure gauge, if it reads less than 1 bar there is a leak or the pressure relief valve has opened. Slowly refill the system with water and inspect for leaks. If OK add antifreeze (if used).  Clean the strainer (if fitted)
Cylinder temperature falls by more than 5°C overnight.	Non-return valve bypass is open, or bypass valve has failed	Close valve or replace non-return valve
Pressure Gauge falls below 1 bar	Leak in the system or the pressure relief valve has opened.	Slowly refill the system with water and inspect for leaks. If OK add antifreeze (if used).

## Controller Settings

The controller settings affect the its operation. The user should not normally change them. If required, pressing the controller panel forward key down for more than 2 seconds will display the parameter values listed below.

These are the settings, which were programmed into your controller during commissioning.

FUNCTION	SETTING °C
Arr	
DTO	
DTF	
SMX	
EM	
OCX	
CMX	
OCN	
CMN	
OCF	
CFR	
OREC	
OTC	
OHQM	
HND 1	AUTO
HND2	AUTO
LANG	EN
PROG	
VERS	

### Recommended Parameter Settings

Date of Commissioning: .....

Engineer's name: .....

## Warranty

All the components of your solar water heating system are manufactured to the highest international standards and are guaranteed against defects in workmanship and materials for five years.

Components supplied by SOLARite Ireland, are guaranteed by that company, and the pipework, remaining components, and quality of installation are guaranteed by your installer who has been contracted by you to install your system.

This warranty does not affect your statutory rights.