Solar System Control Using EcoSolar UVR 61 Solar Controller and One Shot Back up Heating Controller

Overview

The UVR 61 Solar Controller is a multi function controller which automates the solar water heating system. Temperatures within the solar collector, the bottom and the top of the cylinder are monitored and displayed on the clear LCD screen. The backup heating system is managed automatically and can also be initiated manually using the "One Shot" controller.

1. Ideally the backup water heating systems should remain off.
2. If the water is not up to temperature the solar controller will turn on the water heating at the predetermined time
3. Outside of the heater initiated times, the user should monitor the water temperatures at the top of the hot water cylinder (usually T3).
4. If the cylinder temperature has been limited, at this temperature the solar system will shut down
5. If the water temperature is below the predetermined set point, press the boost switch, the green neon on the "One Shot" will turn on
6. The over ride button should only be used if there is significant water consumption
7. If all the water has not been heated to 60 ^{O}C for a period of 7 days boost the cylinder water temperature using the lowest electric element.
8. If the cylinder has two electric elements, the top element is used to boost the water temperature, the bottom element is only used for Legionella control or if a full cylinder of water is required. The bottom element may/may not be controlled with a "One Shot" controller if it isn't the main isolator should remain switched off and only switched on as required above.
9. If you go away on holiday the Home / Away button should be set to Away, this will stop the cylinder from being heated everyday.

System Control

The UVR 61 Solar Controller is a multi function controller which automates the solar water heating system. Temperatures within the solar collector, the bottom and the top of the cylinder are monitored and displayed on the clear LCD screen. The solar heating pump is normally off and only turned on when the collector is warmer than the bottom of the cylinder, i.e. there is heat to recover from the solar collector.

The solar controller also has a defrost function which is initiated in open loop systems where the water in the cylinder is circulated through the solar collector. The defrost function is initiated if the collector temperature has dropped to a point where there is a potential of freezing, in which case, the controller turns on the pump to circulate water from the cylinder to the collector to raise the collector temperature.

The Solar Controller also has the capability to data log and download to a PC, temperatures around the system, solar radiation and the heat being recovered from the collector, these require the optional sensors and flow meter to be installed, together with a USB interface.

The Solar Controller has four buttons of quadrant appearance located to the left of the LCD display. Pressing the left and right buttons allows the user to scroll through the different temperatures being monitored, the fault diagnosis screen and the two programming screens.

The up and down buttons are only used during system programming and should not be used by the occupier. Generally, T1 is the temperature in the top of the solar collector, T2 is the temperature in the bottom of the hot water cylinder and T3 is the temperature in the top of the hot water cylinder. Please note the installer is able to change the sensor designation to suit a particular installation so the installer should advise you on this.

The UVR61 controller can also automatically control a solar water heating system to heat several different hot water cylinders from the same controller, the cylinders are prioritised. The controller can also automatically control wetback boilers, turning on a pump to recover heat from the fire only when there is heat to be recovered, i.e. the fire is hot. Multiple arrays of solar collectors in different locations can also be controlled, such as when collectors cannot be installed facing North and are instead installed facing East and West. The controller has an internal daily timer which is able to control 3 outputs, this function is often used to automate the backup heating. The controller will determine if there is sufficient hot water available at a predetermined time of day and automatically turn on and off the heating as required. The 6 sensors are able to be data logged via the optional D-Logg which can download through a USB port to a computer, providing daily graphs of the data and system performance and can also be exported in to Microsoft Excel.

Backup Water Heating

The backup water heating system needs to be managed to maximise the use of the solar heating system, minimise the energy consumed heating water, and minimise the risk of Legionella. The backup heating system is normally electric elements although gas, diesel and heat pump systems are also common. Cylinders with electric elements, larger than 200 litres capacity, will generally have two elements, one at low level the second at high level. Under normal circumstances the backup heating source is turned off and is only turned on when additional hot water is required or to minimise the risk of Legionella.

The UVR61 controller automatically turns on the water heating at a predetermined time of day. The controller usually controls the top element. If you go away on holiday the Home / Away button should be set to Away, this will stop the cylinder from being heated everyday.

Outside of the heated times, the user should monitor the weather and water temperature in the top of the cylinder (T3), over a short period of time they will determine the temperature below which additional hot water is required, this temperature will vary from household to household and depend upon hot water consumption. If the water does need to be heated the user should press the boost button on the EcoSolar “One Shot” controller. This controller will heat the water and automatically turn off the heating once the water is up to temperature, the user will not need to turn it off. The over-ride switch on the “One Shot” controller turns on and keeps on the electric elements. Under normal use the boost operation should suffice, however, if there is significant hot water usage the user may want to consider using the over-ride button.

In cylinders with multiple elements, with the “One Shot” connected to the top element, using the boost feature will heat only the top portion of the cylinder, which may be sufficient for normal usage. Using the over-ride feature will maintain the water in the top of the cylinder at the set point temperature, however this will consume significant energy and savings will be reduced.

Legionella Control

Unless the hot water cylinder is being heated regularly to greater than $60^{O}C$, there is a risk of Legionella establishing itself in the hot water cylinder. In order to minimize this risk the water should be heated to $60^{O}C$ for 6 hours once a week. This function can be manually managed or EcoSolar are able to supply controllers or timers that take care of this function for you.

If you are managing this yourself we recommend that the water is heated at the same time each week this way the management will hopefully become habitual. If the cylinder has two immersion heaters the lower one should be initiated to maximise the amount of water heated.

Please note that the above will limit but not prevent Legionella from establishing its self in the hot water cylinder. The shower head is most at risk most pipework is also a risk area. All the pipework should be regularly flushed to limit the establishment of Legionella this is the case on all hot water systems, more so where tempering valves are installed as the water downstream of the tempering valve only reaches $45^{O}C$ which is an optimum temperature for Legionella growth.