

SP12-LCD Solar Differential Controller Instructions



- ❑ **Low Voltage (6 to 14V DC) Solar Water Controller.**
- ❑ **3 Temperature Probes included, extra length leads available.**
- ❑ **Full LCD display of Temperatures and status.**
- ❑ **DC Outputs to both Pump and Overheat valve etc.**
- ❑ **Fully user-configurable settings with popular defaults pre-loaded.**
- ❑ **Frost Protection option.**
- ❑ **USB cable supplied to upload readings to PC.**
- ❑ **Very low Power Consumption...<2Watts**
- ❑ **Allows identification of installation problems e.g. Thermal Circulation.**
- ❑ **Manual switching capability.**
- ❑ **Also available as an EAST/WEST controller on request.**

✓ This fully user-configurable unit is designed to switch on a 12-volt DC pump when heat is available in the solar collector, and off again when the collector has insufficient heat to benefit. This is managed by the device calculating the difference between the collector PANEL and the BASE of the hot water tank.

✓ It operates using three temperature sensors. Standard length Leads are 5 metres (panel), Tank Top and Base are 1 metre each. Longer leads can be supplied at £2 per additional metre of three-core cable.

✓ The PANEL sensor (longer lead) should be placed in a dry position in contact with the metal pipe work of the solar collector. Most such panels will have a sensor pocket built in.

✓ The 'BASE' sensor must be able to read the temperature of the water towards the bottom of the hot storage tank so should be placed in a dry position in contact with a heat conducting area of the tank or pipe work. Typically this would be 150mm diagonally above the cold-water inlet to the tank.

✓ The optional third 'TANK' sensor should be placed near the top of the tank to report the temperature of the water available for your shower or bath. This temperature is not used in the unit's calculations.

✓ Ideally the leads should be kept apart from any mains wiring to prevent electrical interference, which could cause intermittent temperature reading errors.

✓ The 12V unit has a standard 5mm x 2.1mm power socket and operates on 6 to 14 Volts DC. The unit powers the pump and valves directly so the supply voltage needs to match the pump's voltage and wattage requirements. Suitable DC plugs and Mains adaptor power supplies are available from Solarproject.co.uk website.

- ✓ The logic is managed by a powerful micro-controller. When the collector temperature is at least 6 deg C hotter than the tank, the pump switches in by making a connection with the 12-volt negative contact of the pump (via RED and YELLOW wires). When heat is no longer present the pump will turn off until it again detects sufficient heat in the collector.
- ✓ This 6 deg C differential allows for the inevitable cooling between collector and tank, thereby ensuring that heat is not pumped out of the tank at night or in dull weather.
- ✓ The pump leads may safely be extended by 25 feet so the Controller circuit can be placed in a convenient safe and dry area. It is usually placed close to the hot water tank.
- ✓ This model includes an OVERHEAT relay, which is triggered if the tank BASE temperature exceeds 60 deg C. This relay provides a DC power feed using the RED and GREEN output wires. It is not necessary to connect to this if not required.

Wiring (see back page for diagram)

Power is supplied via a standard 2.1 or 2.5mm power Jack Plug (as fitted to most normal power supplies). A 12 Volt DC source of at least 1 Amp is recommended and must be adequate to meet the power needs of your pump plus any other motorised valves or attachments. The Controller uses under 2 watts, or 0.2 of an Amp.

Outputs to the Pump are the RED (positive +) and YELLOW (negative -)
 The Overheat output shares the RED (pos) and uses the GREEN as its negative.
 Outputs will be at whatever voltage is supplied to the Controller, normally 12V

Commissioning Your System:

The PUMP and OVERHEAT outputs can be tripped manually to assist the setting up of a new solar installation. Once tripped the pump/valve will continue to run until the controller is restarted

The SP12LCD is supplied with the typical optimum settings as defaults and do not have to be changed for most users. However, there is the option to change any of the following settings to allow for fine tuning of your system.

DEFAULT SETTINGS (all adjustable by user)

- | | |
|---|------------------------|
| 1/ Temperature Differential to switch pump on:- | + 6 deg Celsius |
| 2/ Temperature Differential to switch pump back off again:- | +4 deg Celsius |
| 3/ Tank-Base Temperature to switch on the OVERHEAT output | +60 deg Celsius |
| 4/ Panel Temperature to start pump for Frost Protection | +5 deg Celsius |

ON-and- OFF Differentials:

The Controller looks for sufficient heat in the panel before tripping the circulation pump to transfer the energy into your tank. To allow for initial heat losses in the pipe-work the system waits until there is a 6 degree C difference between the COLLECTOR and tank-BASE probes.

In order to optimise heat collection the pump is left on until the difference drops below 4C since the pipe-work will now be hot.

Overheat

On strong sunny days in mid-Summer there can be more energy collected than a system can usefully manage. If the controller thinks there is a risk of boiling the water tank or panel it can switch a diverter valve or second circulation pump to move the excess heat away. This is managed by measuring the tank-BASE temperature. Water stratifies in a tank so a reading of around 60C at the base is likely to indicate a temperature close to 100C in the panel. Boiling in the panel will disrupt circulation and create steam so should be avoided.

By observing your system in these conditions you can select the optimum value for this setting if the default is not perfect for you.

If your system has no OVERHEAT capability then it is OK to leave the outputs disconnected.

Frost Protection

This “FREEZECHECK” setting is optional and switches the pump on if a temp below the value (5C) is detected in the panel. This is to guard against the panel and pipe-work freezing where pure water is being used in a ‘Direct’ plumbed system using Evacuated Tube panels. This is only efficient because Evac Tubes do not radiate significant heat.

Freezecheck is not recommended if antifreeze solution is available. Nor is it economic to use with a Flat Plate Collector as these radiate large amounts of heat to the atmosphere and would quickly chill the hot tank.

If this function is not required the best way to disable this function is to set the FREEZECHECK value to a negative number, such as -10 (MINUS 10C) or even lower.

Display Contrast- If you decide to run the controller on a much lower voltage than 12V you may adjust the display contrast using the small brass screw on the blue box at the top left of the display card.

How to adjust SETTINGS

1/ Remove the four screws holding the cover of the black Controller case.

2/ Hold the SELECT button and briefly press RST (RESTART).

3/ Continue holding SELECT until MENU-Select/Down is displayed.

4/ Press DOWN or UP to scroll through the menu options, SELECT to choose the item.



MANUAL PUMP –Manual Over-Ride switches pump on, while reporting the three Probe Temperatures.

MANUAL OVERHEAT – As above, this powers the OVERHEAT output.

MANUAL BOTH – Powers both PUMP and OVERHEAT outputs.

Once you’ve finished, Pressing RST- RESTART reverts to normal running

RESET DIFFERENTIAL –change the ON-differential value for tripping PUMP.(Default 6C)

RESET OVERHEAT –max BASE temperature before OVERHEAT relay is tripped on.(Default 60C)

RESET FREEZECHECK- change minimum panel temp before pump trips on to prevent frost damage.(5C)

RESET OFFDIFF- change the differential needed to stop the pump as panel cools. (Default 4C)

RESET DEFAULTS- Returns all settings to FACTORY DEFAULT.

5/ The current values will be shown when you select any of the DIFFERENTIALs , OVERHEAT or FREEZECHECK. Long-press UP or DOWN buttons will change the values, hold down SELECT button until SAVED is shown on the display.

Either press RESTART RST to restart the controller or wait 6 seconds to return to the adjustment menu to repeat the process. SELECT to save as before and RESTART after SAVED is displayed. For reassurance, the controller will briefly display the new values during the boot process.

-End-

SP12LCD Temperature Differential Controller - Wiring Diagram

