

# ***SolarCache+* installation instructions**

**The *SolarCache+* system should be installed only by a suitably qualified person.**

## **Quick preview**

1. Please read these instructions right through before you begin the installation.
2. Assess the existing electrical wiring to make sure that it is suitable for the installation of a *SolarCache+* system.
3. Mount the power throttle in a suitable location.
4. Mount the *SolarCache+* controller in its chosen location.
5. Install the associated cables and make connections as per figures 1, 2 & 3. (Do not clip on the current transformers yet.)
6. Electrically test the circuitry and then energize the system.
7. Carry out the commissioning steps as described in section (f) below.

## General information

*SolarCache+* measures how much power is flowing through the electricity meter using a *current transformer* which clips around the live wire of the feed from the Grid. When there are more than 50 Watts being exported, it brings up the immersion heater (water heater), always adjusting the exact level so as to maintain the exported power below about 200 Watts. Electric appliances can be turned on and off in the house and *SolarCache+* makes the appropriate adjustment. *SolarCache+* also measures the amount of power being generated by the PV installation using a second clip-on current transformer. This information is displayed, but has no effect on the control of the water-heater.

*SolarCache+* comes in two versions. The standard version incorporates the display within the controller unit itself which is normally installed near to the consumer unit. The Bluetooth version of *SolarCache+* has a separate display unit which connects to the controller unit using a Bluetooth radio link. The controller unit is installed as before near to the consumer unit, and the display unit can be mounted in a more convenient place within a few metres of the controller unit. Bluetooth has a maximum range of 10 m in open space, but this is much reduced in a household environment, especially where the signal has to penetrate through thick walls.

## Component parts

The kit that you have received from DSM Energy Control Limited should contain the following components:

- one off *SolarCache+* controller unit;
- one off *SolarCache+* Blue Tooth display unit (Blue Tooth version only);
- one off power throttle;
- two off clip-on current transformers with phono plug terminations;
- one off plug-in power module for the Blue Tooth display unit (Blue Tooth version only);
- one off phono plug to open wire ended control signal cable;
- one off power plug to open wire ended power supply cable;
- one off length of 5-core 1.5mm cable; and
- PVC cable glands.

Please identify each of these components. Call 01223 440100 if there is a discrepancy.

You will also need screws and the appropriate wall fixings.

## Installation steps

### (a) Inspection

1. Assess the existing immersion heater circuit to ensure that it is a dedicated radial circuit fed directly from the consumer unit. Any other equipment which is also connected to this circuit must be disconnected and re-wired.
2. We recommend that the *SolarCache+* controller and associated AC circuitry is protected by a 30 mA RCD. Our chosen modular design allows the *SolarCache+* controller unit to be mounted away from the consumer unit in a more convenient position so that the display can be seen at a glance with ease.
3. The power throttle should be installed adjacent to the property's main consumer unit, incoming electrical supply, and the point at which the PV plant's dedicated supply circuit connects to the consumer unit.

## (b) Power throttle

4. **Warning:** the power throttle may run hot at times! Mount the unit on a non-flammable vertical surface and make sure that air is free to run through the vents. If in doubt, we recommend spacing the power throttle from the wall surface by 10 mm.

## (c) *SolarCache+* control unit

5. Remove the lid by gently pressing in the centre of the upper side of the base. The cover will release from the top, hinging at the bottom. Refit the lid by aligning the two locators at the bottom, gently pushing home at the top.
6. Mount the *SolarCache+* controller unit carefully on a flat surface so as not to distort the enclosure. Failure to do this may result in damage to the unit and poor fitting of the cover.
7. The cable entry slot is designed to allow the power and phono cables to be threaded through from the rear or from the bottom. The plugs may be inserted into their respective sockets prior to final fixing. We recommend that you first prepare and loosely fix the unit to the wall, and then, before tightening the fixings, thread the plugs through the cable entry slot and insert them into their respective sockets, starting at the top and working down.
8. Socket designations (see Figure 1):

E: *SolarCache+* low-voltage power supply input from the power throttle;

F: low-voltage control signal output to the power throttle;

G: socket for the clip-on current transformer which monitors the PV output; and

H: socket for the clip-on transformer which monitors the current at the electricity meter.

*Note: the unit shown in Figure 1 is a Bluetooth controller unit. The standard unit has a display board in place of the shown Bluetooth board, and a switch at the top right.*

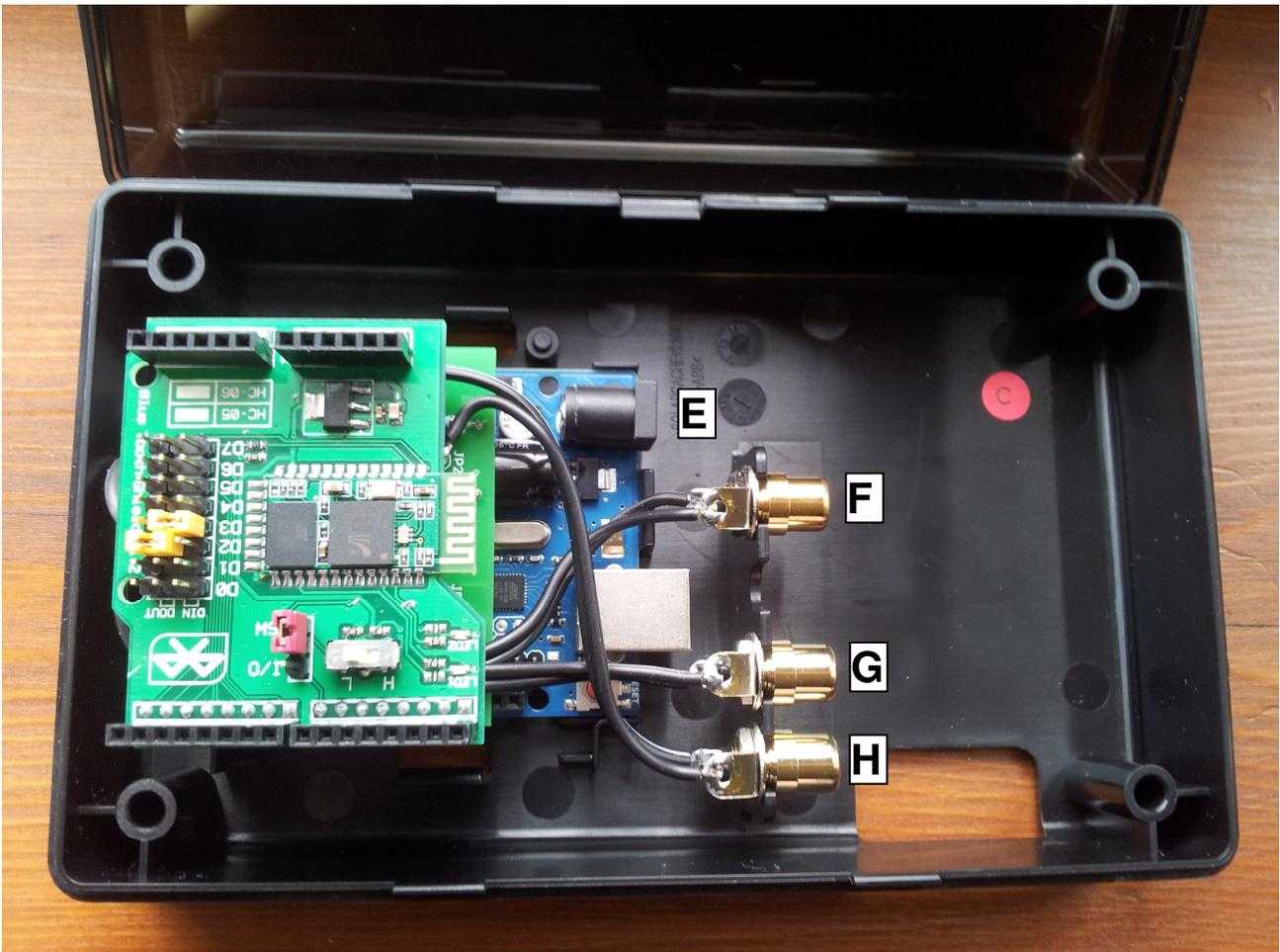


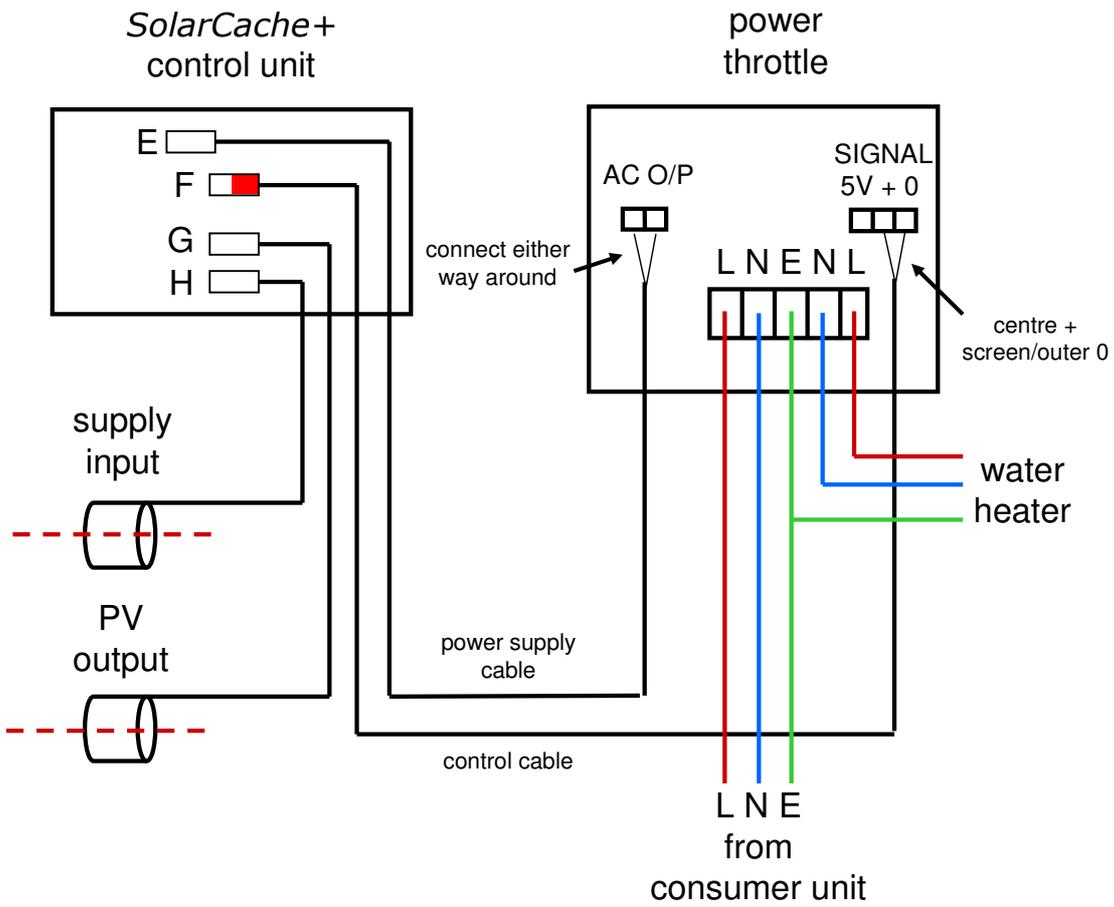
Figure 1

**(d) SolarCache+ low-voltage power supply**

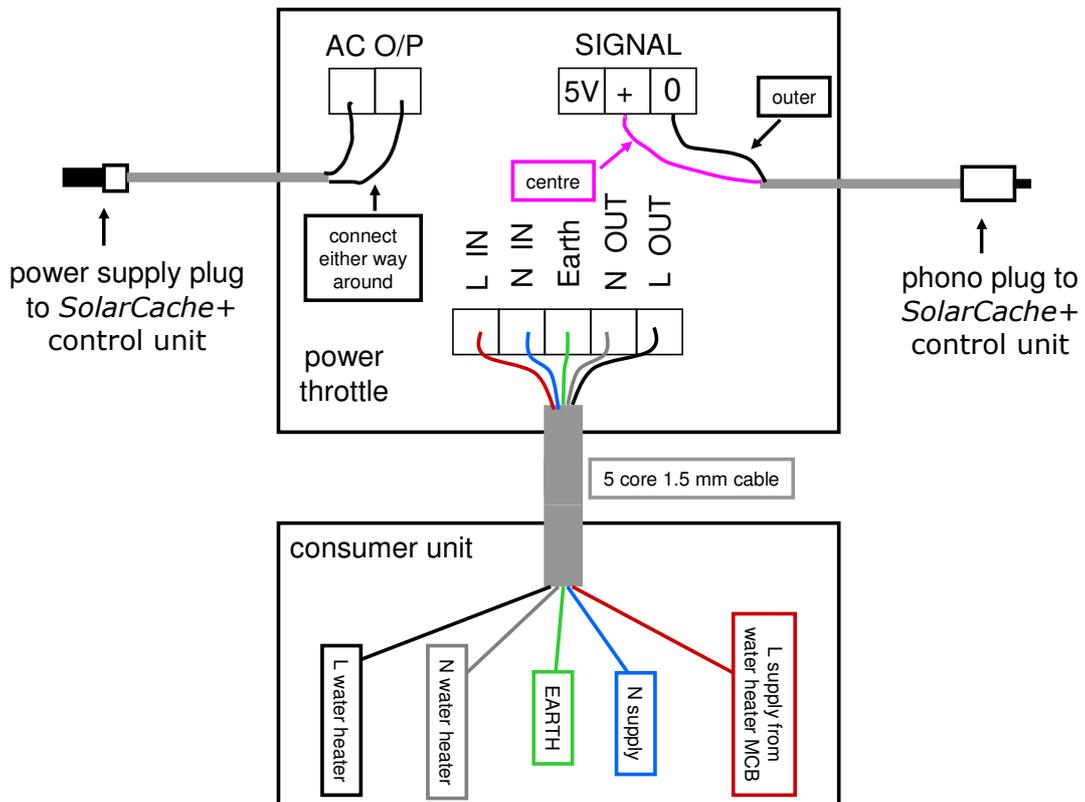
9. insert the supply lead plug end into socket E and connect the free ends to the AC O/P screw terminals within the power throttle.

**(e) Wiring & Connections (see the wiring diagrams Figures 2 and 3 below)**

10. A length of 5-core 1.5mm cable is provided together with PVC cable glands. Use this between the consumer unit and the power throttle, intercepting the dedicated water heater circuit. Make the connections as shown in the two wiring diagrams, Figures 2 and 3 below. At this stage, please leave both current transformers plugged in but unplipped.
11. British standard BS 7671: 2008 (amended 2011), regulation 537.3.2.1, allows the circuit-breaker in the consumer unit to act as the means for switching off the *SolarCache+* and associated circuits for maintenance purposes provided that you mount the power throttle near by the consumer unit. However, if you are mounting the power throttle some way away from the circuit-breaker (for example, in another cupboard or in a room away from the consumer unit), you will need to provide a double-pole isolation switch next to the power throttle as an means for local isolation. Alternatively, you can install a means of locking off the circuit-breaker.



**Figure 2**



**Figure 3**

## (f) Commissioning

12. Check that all AC electrical connections are complete and ready for energizing. Carry out appropriate electrical tests of your wiring, according to BS7671:2008 (amended 2011).
13. Switch on the immersion heater MCB in the consumer unit and the power throttle DP isolation switch (if fitted) to energize the system.
14. Slide the slider function switch, located on the top of the *SolarCache+* controller unit in the standard version or on the display unit in the Blue Tooth version, to the mid position. The legend “Heat: automatic” should appear in green at the bottom of the display. **You will need to carry out steps 18 to 20 first if you have the Blue Tooth version as the switch on the display unit will have no effect until the Blue Tooth link has been established.**
15. Make sure that the PV system is switched on and generating power. Clip the PV current transformer around the PV supply live wire. Take care to ensure that the magnet surfaces are clean and engage properly. After a few seconds, the yellow ‘Sun’ display should indicate the value of the power currently being generated by the PV plant. If the display reads zero, the current transformer needs to be unclipped and reversed so that the live wire feeds through from the other direction. (Note that the ‘Sun:’ display alternates every 6 seconds with the ‘Gen:’ display. The yellow bar, however, always shows how much power is being generated.)
16. Clip the electricity supply input current transformer around the live wire of the incoming electricity supply cable, between the supply cut-out fuse and the electricity meter, or between the electricity meter and the consumer unit (again ensuring that both magnet surfaces fully engage). If the PV system is generating more power than the house uses, the ‘Net’ display value will be green after a short time (allow up to a minute) indicating that power is being exported. If the house usage is greater than the generated power, then the ‘Net’ display value will be shown in red.
17. You can check that this current transformer is correctly installed by turning on a high power appliance, such as an electric kettle. The ‘Net’ display figure should increase and appear in red if power is being imported from the grid. If the opposite happens (i.e. the Net display goes down, or turns green), then the current transformer requires reversing so that the live wire feeds through from the other direction.

(Go to step 24 if you are not fitting the remote Blue Tooth display)

## (g) *SolarCache+* remote Blue Tooth display

18. As with the *SolarCache+* controller, remove the lid by gently pressing centrally on the upper side of the base; the cover will release from the top, hinging at the bottom. Use the plug-in power supply for the remote Blue Tooth display, again threading the plug through the lower cable entry slot and plug into the top socket.
19. For now, energize the remote display unit **near** to the *SolarCache+* controller unit. You may need to use an extension lead to provide the 13A socket.
20. With both controllers energized, an automatic synchronization process will take place. A red LED will blink rapidly in the controller unit, indicating that the unit is searching for the remote device. Having found the display unit, this LED will illuminate continuously, and a second LED will blink twice every few seconds unless the Blue Tooth link is interrupted.
21. Carry out the commissioning exercise as described in items 14 to 19 (but note that the slider switch is on the top of the display unit).

22. Once the display unit has been commissioned, position it in its desired location, carefully checking that that it remains within range (this is a maximum of 10 m without obstruction, although 5 m is more common inside a house).
23. The Blue Tooth remote display unit may be fixed to a solid surface, or it can be used 'free standing' if desired. If fixing, remember to choose a flat surface to avoid distorting the enclosure. Failure to do so may result in damage to the unit and poor fitting of the cover.

#### (h) Three-position slider function switch

24. The three-position switch is located on the top right-hand side of the standard *SolarCache+* controller or on the top right-hand side the remote Blue Tooth display unit. It is a slide switch and operates as follows:

**Left position:** the heater is fully on, and *SolarCache+* has no affect. The legend "Heat: continuous" appears in red at the bottom of the display, and the blue "Control:" bar should be at full length.

**Mid position:** the heater is controlled automatically by *SolarCache+*. The legend "Heat: automatic" or "Heat: 1-hr boost" (see below) appears in green (or yellow) at the bottom of the display. This is the normal position.

**Right position:** the heater is controlled automatically by *SolarCache+*. However, the heater is turned fully on between 2 am and 5 am (approximately) under the control of the internal clock. Note that this clock sets itself automatically to solar time after the first sunset-sunrise, or sunrise-sunset sequence, after switching on *SolarCache+*. The accuracy depends on the weather, time of year, and other factors, but the clock should be correct within about an hour of GMT (one hour behind BST). This switch setting is intended for Economy 7 users and **should not be used for the first 24 hours or so after switching on**. The legend "Heat: auto/night" appears in yellow at the bottom of the display. The number of hours (0 to 24) until the next night boost is also displayed after the "Control:" legend. The user can use this to check that the clock has set itself correctly. The legend changes to "Heat: eco7 boost" during the boost period, and the blue "Control:" bar should be at full length.

**Mid-left-mid movement:** if the switch is moved from the mid position to the left position and then back to the mid position, the heater is turned fully on for 1 hour. This is useful for all-electric systems to boost the heat. Repeat the process to cancel this function. During the boost period, the legend "Heat: 1-hr boost" will appear in yellow at the bottom of the display, and the blue "Control:" bar should be at full length.

**SolarCache+**  
the PV energy use maximiser