

# Owner's Manual

## FLAT PANEL SOLAR HOT WATER SYSTEMS

**Version 3**

10 Nov 11

Unit J, 5 Butler Boulevard  
Burbridge Business Park  
Adelaide Airport SA 5950

[sales@hillssolar.com.au](mailto:sales@hillssolar.com.au)

**1300 363 386**

**[hillssolar.com.au](http://hillssolar.com.au)**

Hills Holdings Ltd ABN 35 007 573 417  
copyright © 2010 Hills Holdings Ltd



 **Hills Solar**



## REVISION RECORD

| Date        | Issue | Author                 | Description  |
|-------------|-------|------------------------|--|
| 02 Dec 2010 | 1.0   | David Muchan           | First Issue.   |
| 06 Oct 2011 | 2.0   | Michael Scragg         | Changes to warranty conditions   |
| 09 Nov 2011 | 3.0   | Kelly & Co.<br>Lawyers | Changes to warranty aspects to ensure compliance with new laws effective from 01.01.12 |
| 10 Nov 2011 | 3.1   | Hills Corporate        | Style  |



## TABLE OF CONTENTS

| Section  | Page   |
|--|--|
| <b>1</b>   | <b>INTRODUCTION..... 4</b>   |
| 1.1  | Important forms you need to complete ..... 4                             |
| 1.2  | Document overview ..... 4  |
| <b>2</b>   | <b>IMPORTANT INFORMATION ..... 5</b>                                     |
| 2.1  | Safety ..... 5   |
| 2.2  | Australian/New Zealand Standards ..... 5                                 |
| 2.3  | Qualified installers..... 6  |
| 2.4  | Water temperature ..... 7  |
| 2.5  | Water flow ..... 7   |
| 2.6  | Water quality ..... 8  |
| 2.7  | Corrosion from bore water and chlorinated pools and spas ..... 8         |
| 2.8  | Protection against frost ..... 8   |
| 2.9  | Collector specifications ..... 9   |
| 2.10   | Stagnation and excess heat..... 9  |
| 2.11   | Solar hot water system noise..... 9                                      |
| 2.12   | Cyclone areas ..... 10   |
| 2.13   | Hail prone areas..... 10   |
| 2.14   | Mounting frame ..... 10  |
| 2.15   | Safe tray..... 10  |
| 2.16   | Gas boosted systems ..... 10   |
| 2.17   | Electric boosted systems ..... 11  |
| <b>3</b>   | <b>SYSTEM OVERVIEW ..... 12</b>  |
| 3.1  | Hills Solar storage tanks and boosting ..... 13                          |
| 3.2  | RECs agents..... 13  |
| 3.3  | Payment of RECs..... 13  |
| <b>4</b>   | <b>MAINTENANCE..... 14</b>   |
| 4.1  | Service and repair ..... 14  |
| 4.2  | Owner maintenance..... 14  |
| 4.3  | Pressure and temperature relief valve / expansion control valve ..... 14 |
| 4.4  | Insulation..... 14   |
| 4.5  | Other components ..... 14  |
| <b>5</b>   | <b>TROUBLESHOOTING..... 15</b>   |
| 5.1  | No hot water ..... 15  |
| 5.2  | Reduced solar contribution ..... 15                                      |
| 5.3  | DIY investigation ..... 15   |
| 5.4  | Troubleshooting guide ..... 16   |
| <b>6</b>   | <b>WARRANTY ..... 19</b>   |
| 6.1  | Warranty..... 19   |
| 6.2  | Disclaimer ..... 19  |
| <b>APPENDIX A. WARRANTY DOCUMENT..... 20</b>         |  |
| <b>APPENDIX B. INSTALLATION REPORT FORM ..... 25</b> |  |



## **1 INTRODUCTION**

This manual details the owner's instructions for the Hills Solar APOLLO™ flat panel hot water systems.

If you are unsure of any information contained within this manual contact your Authorised Hills Solar Dealer. For technical support, contact your Authorised Hills Solar Dealer.

### **1.1 Important forms you need to complete**

There are two important forms we need you to complete (with the assistance of your installer/Authorised Hills Solar Dealer, as appropriate). These are located at the back of this manual, and can be posted or faxed to the address/number shown on the forms:

- Installation Report Form – returned to Hills Solar to register your details for warranty purposes.
- Customer Appraisal Form – returned to Hills Solar.

### **1.2 Document overview**

This manual contains the following sections:

Section 1—Introduction;

Section 2—Important Information;

Section 3—System Overview;

Section 4—Maintenance;

Section 5—Troubleshooting;

Section 6—Warranty and Disclaimer;

Appendix A—Warranty Document;

Appendix B—Installation Report Form; and

Appendix C—Customer Appraisal Form.

## 2 IMPORTANT INFORMATION

### 2.1 Safety

#### 2.1.1 General



**WARNING:** Access covers of water heating system components will expose 240V wiring and must only be removed by authorised persons.

**WARNING:** Care should be taken not to touch the pipework connecting the solar storage cylinder and solar collector as this may be hot. The pipework used throughout the system must be AS 1432 approved copper or other approved solar rated pipework.

#### 2.1.2 Hydrogen gas



**WARNING:** If the hot water system is not used for two weeks or more, a quantity of highly flammable hydrogen gas may accumulate in the water heater. To dissipate this gas safely, it is recommended that a hot tap be turned on for several minutes or until discharge of gas ceases. Use a sink, basin or bath outlet, but not a dishwasher, clothes washer, or other appliance. During this procedure, there must be no smoking, open flame, or any electrical appliance operating nearby. If hydrogen is discharged through the tap, it will probably make an unusual sound similar to air escaping.

**Note:** Hydrogen gas accumulation will only effect tanks fitted with sacrificial anodes.

#### 2.1.3 Gas booster safety



**WARNING:** Ensure that you do not touch the gas booster flue outlet or insert any objects into the flue outlet.

**WARNING:** Keep flammable materials, spray cans, fuel containers, trees, shrubs and pool chemicals etc. well clear of the flue outlet.

**WARNING:** Do not use the gas types other than that designated on the gas booster data plate. Do not use Liquefied Petroleum Gas (LPG) on appliances marked for use with Natural Gas (NG) or vice versa.

#### 2.1.4 Safety devices



**WARNING:** The water heating system is supplied with various safety devices including temperature sensors, overheat sensors and switches and a Pressure and Temperature Relief (PTR) valve. Ensure that you do not block or seal the PTR valve outlet pipe. These devices must not be tampered with or removed. The water heating system must not be operated unless each of these devices is fitted and are in good working order.

### 2.2 Australian/New Zealand Standards

Installation must be completed in accordance with the requirements of AS/NZS 3500.4:2003 and Australian Standard AS 5601-2004 for installation of the gas booster (in accordance with AG 601).

### 2.2.1 System compliance with standards

The Hills Solar flat panel solar hot water systems carry approval under AS/NZS 2712:2007 Solar and heat pump water heaters—Design and construction.

The flat panels have been tested to meet AS/NZS 2535.1:2007 requirements for thermal performance, and have been modeled for AS/NZS 4234:1994.

The solar collector has been tested and fully complies with AS/NZS 4020:2005 for use in contact with drinking water.

The electric and gas storage tanks are manufactured to Australian Standards AS 1056.1 and AS 3142.

### 2.3 Qualified installers

Installation must be completed by a qualified plumbing professional.

#### 2.3.1 Collector direction

A key factor to ensure optimum performance is the correct selection of angle and orientation of the flat panels, in relation to the installation site and the period during which maximum yield is possible. The flat panel system must be oriented so that the collecting surface faces the geographical north for the southern hemisphere, i.e. it should always face the equator. Any deviation in the orientation will result in a drop in performance. If a deviation from the correct orientation cannot be avoided, then the system's performance must be corrected by increasing the collector surface.

Figure 1 shows the possible directions for installing the Hills Solar flat panel systems; however, Hills Solar recommends North East to North West with North being optimal.



Figure 1 Collector orientation

### 2.3.2 Collector angle

Due to the operation of the system, Hills Solar flat panels perform best when installed at an angle equivalent to that of the latitude of the location of the installation +/- 2°. Table 1 shows the optimal collector angles for the major cities in Australia.

**Table 1 Collector angles**

| Location      | Latitude | Acceptable Range of Pitch | Optimum Angle |
|---------------|----------|---------------------------|---------------|
| Adelaide      | 35°      | 20 – 55°                  | 35°           |
| Alice Springs | 23°      | 20 – 43°                  | 23°           |
| Brisbane      | 27°      | 20 – 47°                  | 27°           |
| Canberra      | 35°      | 20 – 55°                  | 35°           |
| Darwin        | 12°      | 20 – 32°                  | 12°           |
| Hobart        | 42°      | 20 – 62°                  | 42°           |
| Melbourne     | 37°      | 20 – 57°                  | 37°           |
| Perth         | 32°      | 20 – 52°                  | 32°           |
| Sydney        | 34°      | 20 – 54°                  | 34°           |

To comply with AS/NZS 3500.4:2003, collectors incline angle deviation should not be greater than  $\pm 20^\circ$  from the latitude of the installation location.

### 2.3.3 Effects of shading

Collectors should be located so that shading does not occur for at least the 3 hours either side of 12 noon local standard time. Partial shading due to objects such as antennas or a small flue is not of concern.

### 2.4 Water temperature

Under AS/NZS 3500.4:2003 the temperature of the hot water being delivered from a solar system into the home to sanitary areas, either gas or electric boosted, is to be a maximum of 50 °C; therefore, to comply with these standards, the water flowing from the Solar Tempering Valve is to be set to a maximum of 50 °C.

### 2.5 Water flow

The maximum hot water flow rate from continuous flow gas boosters is limited to either 20 or 26 litres per minute (lpm). Gas storage tanks might have delivered greater flow rates and end users might be used to that from their previous system.

To ensure that the gas booster unit functions efficiently, it requires a minimum flow rate of 2.4lpm to ignite the burners. If you are experiencing changes in water temperature, this may be the result of using a showerhead that has a flow rate of less than 7lpm. It is advisable when using AAA-rated showerheads to use those with a minimum flow rate of 7lpm. It is also advisable to periodically check the showerhead to see if there is any build up of material inside.

## 2.6 Water quality

In areas with “hard” water (Calcium Carbonate  $\text{CaCO}_3 > 200\text{ppm}$ ), lime scale may form inside the collector. In such regions, it is advisable to install a water softening device to ensure the long-term efficient operation of the solar collector.

**Table 2 Water quality characteristics**

| Water Characteristic                 | Level               |                 |
|--------------------------------------|---------------------|-----------------|
| Total dissolved solids               | 600 mg/litre or ppm |                 |
| Total hardness (as $\text{CaCO}_3$ ) | 200 mg/litre or ppm |                 |
| Chlorides                            | 300 mg/litre or ppm |                 |
| Dissolved $\text{CO}_2$              | <b>Gas</b>          | <b>Electric</b> |
|                                      | 18 mg/litre or ppm  | Not Applicable  |
| pH Levels                            | 5.5 – 9.5           |                 |
| Saturation index (Langelier)         | +0.4 to -1.0 @ 65°C |                 |

## 2.7 Corrosion from bore water and chlorinated pools and spas

Copper is susceptible to corrosion when high concentrations of chloride are present; therefore, use of this system to heat chlorinated pool or spa water will void the Warranty. Chloride levels present in most reticulated public potable water supplies are safe for use in the solar collector provided there is no use of bore water in the reticulated supply.

## 2.8 Protection against frost



**WARNING:** The APOLLO™ flat panel solar hot water systems are not suitable for installation above an altitude above 600 metres or frost prone areas. The APOLLO flat panel solar hot water systems have **NO WARRANTY** for freeze damage when installed above an altitude of 600 metres or frost prone areas. Refer to Section 6 and Appendix A for warranty conditions.

To assist in the protection against frost or freeze damage, the Hills Solar controller turns the pump on when the temperature at the location of the sensor probe in the collector drops to 4°C. When the temperature at the location of the sensor probe in the collector rises to 6°C, the pump is turned off.

## 2.9 Collector specifications

Table 3 contains the collector specifications for a single panel collector.

**Table 3 APOLLO™ flat panel collector specifications**

|   |                     |
|---|---------------------|
| <b>Total Area</b>                             | 2.02m <sup>2</sup>  |
| <b>Number of Risers</b>                       | 10                  |
| <b>Water that Collector Holds</b>             | 1750ml              |
| <b>Absorber Surface</b>                       | 1.81m <sup>2</sup>  |
| <b>Total Dimensions LxHxW</b>                 | 2010mmx1010mmx110mm |
| <b>Collector Total Weight (without water)</b> | 38kg                |
| <b>Absorber</b>                               | Sun-Selective       |
| <b>Absorber Coefficient</b>                   | 95% ± 2%            |
| <b>Radiation Coefficient</b>                  | 5% ± 2%             |
| <b>Maximum Operating Pressure</b>             | 1000kPa             |

## 2.10 Stagnation and excess heat

Stagnation refers to the condition that occurs when the pump stops running due to circumstances such as a power blackout or pump failure. Stagnation can also occur when the tank 'high temperature protection feature' built into the Solar Controller is reached. This feature turns the pump off should the required maximum tank temperature of 65°C be reached at the cold sensor. This mechanism protects the tank from overheating when hot water is not being used or during long periods of high solar gain.

**Note:** The Automatic Air Vent on the collector provides an escape point for any air in the system, which may stop water circulating around the solar loop from the tank to the collector and back.

**Note:** In the unlikely event that you need to move the tank or drain the tank during the day, or where the system will be drained for a long period, then you will need to either cover the collector or remove the collector sensor on the roof to avoid overheating the collector sensor.

## 2.11 Solar hot water system noise

If there is a build up of pressure in the collector and a hot water tap is turned on, there may be noise, generally a boiling or popping noise, from the system when the built up pressure is released. The noise generated by the system is not uncommon in solar hot water systems and will not cause damage to the system.

## 2.12 Cyclone areas



When installing the Hills Solar collector, wind resistance and the resulting stress on attachment points must be taken into consideration. The frames are designed to withstand high wind speeds without damage. For areas with the possibility for high winds, additional reinforcement of attachment points may be required.

The frames described in this manual are not suitable for installations in cyclone rated areas and should not be installed in these areas. Refer to AS 1170.2 for the requirements of systems rated for cyclonic areas and AS/NZS 3500.4:2003 for cyclonic regions.

## 2.13 Hail prone areas

Hills Solar flat panels are able to handle significant impact stresses. Independent impact resistance testing demonstrates that the Hills Solar flat panels are able to withstand impact from hail up to 25mm in diameter and therefore, meet the requirements of AS/NZS 2712:2007.

## 2.14 Mounting frame

### 2.14.1 Frame material

The major components are made of 2.5mm thick galvanised steel making the frame both strong and corrosion resistant. It is important that the frame attachment points and fasteners are also of suitable structural strength and corrosion resistance.

## 2.15 Safe tray

The National Plumbing Code AS 3500.4:2003 requires safe trays to be installed on all storage tanks where, if there is a leak, property may be damaged. Installation of such trays must comply with Clause 4.4 and Sub clauses 1 to 5 of the Code.

## 2.16 Gas boosted systems

The Hills Solar storage tank is extremely well insulated to a level exceeding the required Minimum Energy Performance Standards (MEPS) thus minimising heat loss from the tank throughout both the day and the night. The tank is a storage vessel for the solar heated water. When solar gain is high, the water may be of suitable temperature for direct use. During such periods, the gas booster will not heat the water. For periods when solar contribution is insufficient to reach the required temperatures, or as the tank temperature drops due to hot water usage, the gas booster will automatically boost the water temperature to the required level.

**Points to note:**

- The gas booster operates when there is a minimum flow rate of 2.4lpm of water flowing through the booster. The use of water saving devices that have less than 9lpm flow rate or that have restrictors may interfere with the operation. To ensure correct operation, open the hot tap fully to check the gas booster comes on.
- The S20 gas booster requires a minimum of 120kPa water pressure and the S26 requires a minimum of 200kPa water pressure to achieve the maximum flow rate and function optimally. If the pressure is less than the required levels, a water pressure pump should be installed.
- Electronic temperature controllers will not work with Hills Solar systems and are not to be used.

**2.17 Electric boosted systems**

The Hills Solar electric boosted storage tank is fitted standard with a 3.6kW<sup>1</sup> bottom mounted booster element as standard, which is actuated via the preferred option of Off-Peak Tariff. The booster element ensures that if water has not been fully heated by solar radiation during the day, then it is heated overnight, but only by the difference between the tank temperature through solar heating and the thermostat set temperature on the tank. The two heating periods are complementary. If the storage tank is at a sufficient temperature through solar heating, then the electric booster element does not turn on.

If Off-Peak Tariff is not available, then the other option is to have Continuous Tariff with a Timer Switch installed to allow you to set when the booster comes on. It is recommended to be set to come on in the night to allow the Hills Solar collectors to heat during the day.

---

<sup>1</sup> 2.4kW elements and mid mounted elements are available for most electric boosted storage tanks.

### 3 SYSTEM OVERVIEW

The sun's energy that is absorbed by the panel is transferred to the water via copper risers located inside the panel. Water is pumped through the panel collecting heat from the absorber, the heated water is then returned to the storage tank.

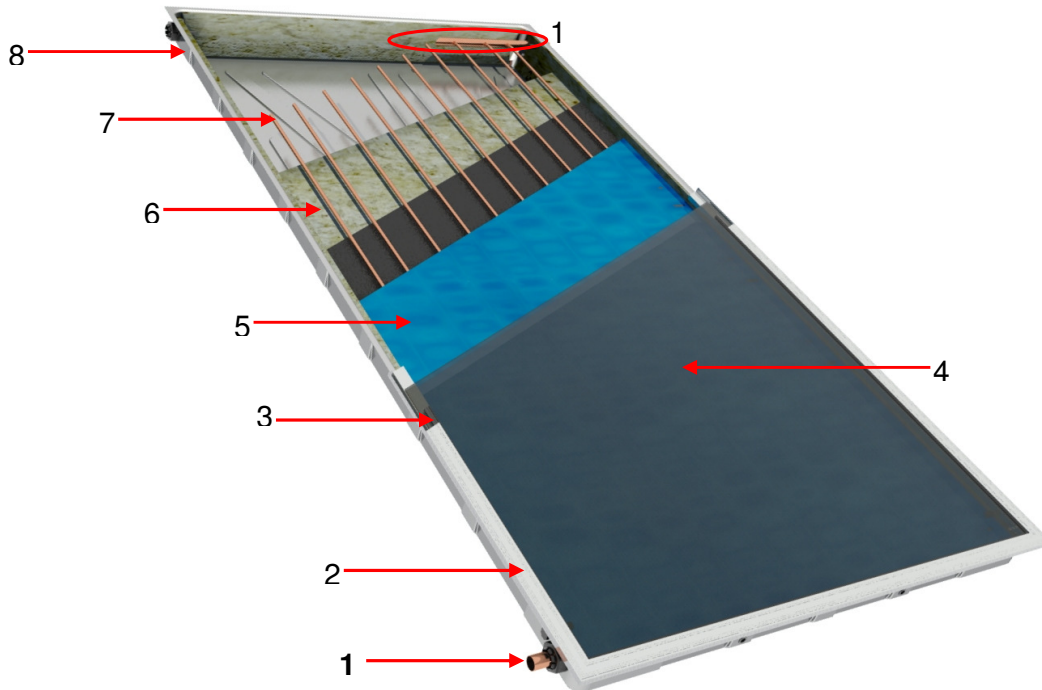


Figure 2 APOLLO™ flat panel collector cross section

Table 4 APOLLO™ flat panel collector components

| No. | Part                                       | Description  |
|-----|--|--|
| 1   | <b>Header pipe</b>                         | 22mm copper header pipe  |
| 2   | <b>Aluminium profile</b>                   | Electrostatically painted (Al Mg Si 05) for solar glass seating and supporting   |
| 3   | <b>Solar glass rubber seal</b>             | UV proofed EPDM  |
| 4   | <b>Tempered solar glass</b>                | Low iron, extra clear, with a stable coefficient of expansion and high light transmittance, can withstand adverse weather conditions   |
| 5   | <b>Tinox complete area absorber</b>        | Made of an aluminium sheet with a tinox coating, which ensures high absorbency and low radiation, this sheet covers the complete window area as well as the headers, which increases the collector's absorbency. The selective metal sheet is laser welded to the risers |
| 6   | <b>High density thermal insulation</b>     | 60mm thick layer of pre-pressed Rockwool with a covering of black glass fabric for the minimization of thermal losses. Rockwool insulation thermal conductivity: $\lambda=0.035$ W/m grd (DIN 56612 measured at 0°C)   |
| 7   | <b>Risers</b>                              | Copper riser pipes – 10 in each collector  |
| 8   | <b>External one piece aluminium trough</b> | Highly aesthetic, shaped by deep drawing method in a 400tn capacity press, made of naval grade aluminium alloy, rich in magnesium  |

### 3.1 Hills Solar storage tanks and boosting

- Hills Solar APOLLO™ Flat Panel systems use vitreous enamel lined mild steel storage cylinders and are manufactured to Australian Standards AS 1056.1 and AS 3142. The steel cylinder is encased in Colorbond®. The tank is insulated with high-density chlorofluorocarbons (CFC) free polyurethane to keep solar hot water hotter longer.
- Hills Solar storage tanks are designed to promote thermal stratification that prevents the mixing of incoming cold water with hot water at the top of the tank.
- In gas boosted systems, the gas booster heats water only when required, minimising energy wastage. The gas booster only switches on when the temperature of the water passing through the booster from the storage tank is less than 60 °C.

### 3.2 RECs agents

The RECs agents listed in Table 5 are able to process the renewable energy certificates. Contact the RECs trader that best suits your needs.

**Table 5 RECs agents**

| REC agent                   | Contact numbers  | Email/Web address  |
|-----------------------------|------------------|--|
| Greenbank Australia Pty Ltd | Ph: 03 9872 4744 | <a href="mailto:contact@green-bank.com.au">contact@green-bank.com.au</a>           |
| Green Energy Trading        | Ph: 03 9805 0700 | <a href="mailto:info@greenenergytrading.com.au">info@greenenergytrading.com.au</a> |

### 3.3 Payment of RECs

- Ask your Authorised Hills Solar Dealer how many RECs your system creates. Call or visit [www.orer.gov.au](http://www.orer.gov.au) for further information.

## **4 MAINTENANCE**

### **4.1 Service and repair**

Your Authorised Hills Solar Dealer is fully trained and equipped to provide service on your solar hot water system. If your system requires servicing, contact your Authorised Hills Solar Dealer. It is recommended that the system be serviced at least every five years.

#### **4.1.1 Sacrificial anode**

Sacrificial anodes should be checked by an authorised person at intervals not exceeding five years; or more frequently in areas where the water is classified as scaling water. Failure to do this may void warranty.

### **4.2 Owner maintenance**

Maintenance of the system includes the cleaning of the flat panels and the removal of material such as leaves from around the flat panels, as required.

**Note:** It is recommended that protective gloves be worn when performing maintenance on the collector.

Regular rain should keep the flat panels clean, but if they get particularly dirty, they can be washed with a soft cloth and warm, soapy water or glass cleaning solution.

Leaves may accumulate between or beneath the flat panels. Please remove the leaves regularly to ensure optimal performance and to prevent potential, but highly unlikely, fire hazard.

**Note:** The solar collector will not cause the ignition of flammable materials

### **4.3 Pressure and temperature relief valve / expansion control valve**

The pressure and temperature relief (PTR) valve and the expansion control valve (ECV) where applicable, must be either checked for performance or replaced by an authorised person at intervals not exceeding five years; or more frequently in areas where the water is classified as scaling water (refer to Section 2.6 and Table 2). Failure to do this may void warranty.

### **4.4 Insulation**

The copper pipes running to and from the collector must be insulated in accordance with AS/NZS 3500. This insulation should be checked annually for damage. Approved UV stabilised foam (or metallic wrap) should be used; otherwise deterioration may occur over time.

**Note:** Up to 60% heat loss may occur if the insulation is non-existent or sub-standard.

### **4.5 Other components**

Other components of the system such as the pump, storage tank and gas booster (where applicable) should be serviced/inspected by qualified technicians according to the manufacturer's maintenance guidelines.

## 5 TROUBLESHOOTING

Only the home owner may safely complete the inspection items listed in Section 5.3. Any other system troubleshooting, system adjustments or repairs must be completed by a qualified tradesperson.

### 5.1 No hot water

If there is no hot water, it will generally be related to the gas or electric booster, and not the solar collector. The solar collector pre-heats water, with auxiliary boosting by the electric element or gas booster system when required. Please contact your Authorised Hills Solar Dealer.



**WARNING:** Australian Standards require a minimum thermostat setting point of 60°C to prevent the growth of Legionella Pneumophila bacteria; therefore, the booster system must never be turned off or set below 60°C.

### 5.2

#### Reduced solar contribution

Solar contribution to your water heating is directly related to the available amount of solar radiation and the volume of hot water used. During the winter months and during periods of rainy or overcast weather, the amount of energy produced by the solar collector will be reduced.

If you believe that the solar contribution, as indicated by energy savings over time, has not reduced; there may be a problem with your solar heating system. This may be due to an incorrectly configured or damaged controller, a pump malfunction or a problem with the boosting system. In such cases, please contact your Authorised Hills Solar Dealer.

### 5.3 DIY investigation


The home owner may safely investigate the following items to try to diagnose problems with their system:

- Does the circulation pump appear to be operating? In sunny weather, the circulation pump should come on periodically. The pump will run very quietly, so you may need to touch the pump housing to feel for motor operation (slight vibration).
- Are the panels intact? If a panel has been damaged or broken, organise for a service call from your Authorised Hills Solar Dealer.
- Are there any apparent leaks in the plumbing to and from the collector? If so, organise a service call from your Authorised Hills Solar Dealer.

## 5.4 Troubleshooting guide

For any problems that involve plumbing or electrical connections, the services of a qualified tradesperson must be employed.

**Table 6 Troubleshooting guide**

| Problem   | Cause   | Remedy  |
|---|---|---|
| Insufficient or no hot water  | Electric booster not operating  | <p>Check to ensure the electric isolating switch(es) at the switchboard (usually marked 'Hot Water' or 'Water Heater') is switched 'On'.</p> <p>Check to ensure that the electric fuses for hot water at the switchboard are intact.</p>  |
|   | Insufficient gas supply for the gas boosted   | <p>Check to ensure the power cord of the gas booster is plugged in and the power point is switched 'On'.</p> <p>Check gas is available and turned On.</p> <p>Close the hot tap, wait for 10 seconds, and open it again. The hot tap must be opened enough to ensure that the flow rate is at least 2.4L/min to ensure the gas booster ignites.</p> <p>Check the isolating valve in the gas line is open.</p> <p>If there is a gas supply to other appliances in the rest of the house, try lighting another gas appliance.</p> <p>Refer to your plumber to ensure the gas line has been purged of air after installation.</p> |
|   | Incorrect solar system sizing   | Do you have the correct system size and configuration for your requirements? Refer to Hills Solar literature for information.   |
|   | Pressure and temperature relief (PTR) valve and/or expansion control valve (ECV) continuously discharging water   | <p><b>PTR valve:</b></p> <p>It is normal and desirable that the PTR valve allows a small quantity of water to be discharged during the heating cycle; however, if it discharges more than a bucket of water during a 24hr period or discharges continuously, there may be a problem.</p> <p>If the valve dribbles continuously, try easing the valve gear for a few seconds.</p> <p>If the valve discharges at high flows, especially at night, it may be a result of the water pressure exceeding the design pressure of the tank. Contact your Authorised Hills Solar Dealer.</p>   |
|  | <p>Never replace the PTR valve with one that has a higher pressure rating than is specified for your storage tank.</p> <p>If the valve discharges hot water at a high flow rate (dumps) there may be a serious problem. Switch off the power supply in the meter box (usually marked 'Hot Water' or 'Water Heater') or the isolating switch installed near the Water Heater and contact your Authorised Hills Solar Dealer.</p> |   |

| Problem                                  | Cause   | Remedy   |
|--|---|--|
| Insufficient or no hot water (continued) |   | <p><b>ECV:</b></p> <p>It is normal and desirable that the ECV allows a small quantity of water to be discharged during the heating cycle; however, if it discharges more than a bucket of water during a 24hr period or discharges continuously, there may be another problem.</p> <p>If the valve dribbles continuously, try easing the valve gear for a few seconds, if the discharge continues, contact your Authorised Hills Solar Dealer.</p>   |
| No water from the hot tap                | Restriction in the hot tap or failure of the cold water supply to the Water Heater                              | Check for water flow at the other taps and check the cold water isolation is fully open.   |
| Gas booster operating too frequently     | Insufficient sunlight – collectors shaded   | <p>Ensure trees or other objects are not shading the collector surface.</p> <p>Make sure the collector is clean.</p>   |
| High electricity or gas bill             | Excessive hot water consumption   | See remedy under 'Insufficient or no hot water'.   |
|  | Solar controller unit switched off  | If the solar control unit is switched off, there will be no solar heating resulting in the water being heated by the booster. Check the power outlet for the solar control unit to ensure it is switched on.   |
|  | Pressure and temperature relief (PTR) valve and/or expansion control valve (ECV) continuously discharging water | See remedy under 'Insufficient or no hot water'.   |
|  | Lack of solar gain  | <p><b>Reduced sunlight:</b></p> <p>Reduced sunlight due to overcast weather in summer or low solar contribution in winter will result in increased dependence on electricity or gas boosting. Higher electricity or gas bills under these conditions are normal.</p> <p>If the solar collectors are shaded by trees or other objects, or if the glass is dirty, the effectiveness of the collectors will be reduced. You will need to remove the trees or other objects shading them. If this is not possible, it is recommended to relocate the collector system. Contact your Authorised Hills Solar Dealer.</p> <p>Check the positioning and alignment of the solar collectors is in accordance with the location and alignment section of this document.</p> |
|  | High electricity tariffs (electric boosted systems only)  | The electricity tariff will determine the running costs of the system. It is important that you are aware of the applicable tariffs. Contact your electricity supplier to confirm available tariffs.   |
|  | Little or no water circulation in the solar flow and return loop  | There are a number of causes for little or no circulation in the solar flow and return loop, these causes must be investigated by a qualified trades person. Contact your Authorised Hills Solar Dealer.   |

| Problem                 | Cause  | Remedy  |
|-------------------------|--|---|
| Water flow fluctuations | One or more hot taps opened at the same time             | <p>More than one or two hot taps in use at the same time may cause a decrease in the hot water flow from the taps:</p> <ul style="list-style-type: none"> <li>• Is there more than one or two taps open, or are appliances such as a dishwasher or washing machine in use at the same time?</li> <li>• Ensure only one or two taps are on at any one time.</li> </ul> |
| Water hammer            | Vibration of hot and cold water plumbing in the premises | Have a plumber check the clipping of hot and cold water pipework. Install a pressure limiting valve and/or water hammer arrestor if required.   |



## **6 WARRANTY**

### **6.1 Warranty**

Hills Solar provides a warranty against defects in materials and workmanship in respect of the Hills Solar APOLLO™ flat panel hot water systems, subject always to Section 6.2 of this manual. This warranty is provided on the terms and conditions set out in the Warranty Document attached as Appendix A of this document.

### **6.2 Disclaimer**

This manual contains an overview of the Hills Solar APOLLO™ Flat Panel solar hot water systems, and instructions on how they should be operated and maintained. All instructions/recommendations set out in this document must be followed exactly. Further, from time to time, Hills Solar and/or its Authorised Hills Solar Dealers work with and/or recommend various installation and plumbing service providers to install, commission and certify correct operation of solar hot water systems, including the system described in this manual. Hills Solar is a manufacturer and supplier of solar hot water systems only, and is in no way responsible for the installation, commissioning or certification of its products by such third parties. Each installation of Hills Solar hot water systems is subject to the terms and conditions imposed by the party attending to the installation, as well as all applicable laws and regulations (including but not limited to occupational health and safety requirements prescribed by law which installers of Hills Solar hot water systems must comply with).

To the fullest extent permitted by law, Hills Solar and its Authorised Hills Solar Dealers are not responsible, and in no circumstances can be considered to be liable, for any loss or damage to any person or property of any type, whether direct, indirect, consequential or otherwise, arising from the installation, maintenance or operation of the solar hot water system described in this manual, or any of its components (including but not limited to loss or damage sustained where the system is operated in accordance with the instructions and recommendations set out in this document).



## APPENDIX A. WARRANTY DOCUMENT

### 1 Definitions

In this document:

- (a) **Australian Consumer Law** or **ACL** means the Australian Consumer Law set out in Schedule 2 of the CCA.
- (b) **Authorised Hills Solar Dealer** means the dealer, duly authorised by Hills to sell Products, from whom Products were originally purchased by an end user.
- (c) **CCA** means the *Competition and Consumer Act 2010* (Cth).
- (d) **Hills, Hills Solar, our** or **we** means Hills Holdings Limited ABN 35 007 573 417.
- (e) **Labour** means the handling, assembly and manufacturing processes performed by or on behalf of Hills in order to manufacture the Products, using the Parts.
- (f) **Manuals** means the manuals for the Products issued by Hills Solar, setting out instructions for the installation, servicing, maintenance and use of Products.
- (g) **Parts** means a part, material or component used by Hills in the manufacture of the Products (and irrespective of whether that part, material or component is manufactured by Hills Solar or a third party).
- (h) **Products** means the Hills Solar APOLLO™ Flat Panel solar hot water systems manufactured by Hills Solar.
- (i) **Warranty** means the warranty against defects described in clause 2 of this warranty document.
- (j) **Warranty Period** means the duration in respect of which Hills provides a warranty against defects in Parts or Labour (as applicable in the circumstances), as indicated in the following table.

**Table 7 Warranty Period**

| Major Part                               | Part                               | Domestic Use Warranty |         | Commercial Use Warranty |        |
|--|------------------------------------|-----------------------|---------|-------------------------|--------|
|  |                                    | Parts                 | Labour  | Parts                   | Labour |
| S20 and S26 solar compatible gas booster | Heat exchanger                     | 10 Years              | 3 Years | 5 Years                 | 1 Year |
|  | All other components               | 3 Years               | 3 Years | 1 Year                  | 1 Year |
| Solar storage tanks                      | Vitreous enamel (Glass) lined tank | 7 Years               | 3 Years | 1 Year                  | 1 Year |
|  | Stainless Steel lined tank         | 10 Years              | 3 Years | 5 Years                 | 1 Year |
| Components                               | Pump <sup>2, 3</sup>               | 1 Year                | 1 Year  | 1 Year                  | 1 Year |
|  | Controller                         | 1 Year                | 1 Year  | 1 Year                  | 1 Year |
|  | Sensor                             | 1 Year                | 1 Year  | 1 Year                  | 1 Year |
|  | Thermostat                         | 1 Year                | 1 Year  | 1 Year                  | 1 Year |
|  | Valves                             | 1 Year                | 1 Year  | 1 Year                  | 1 Year |
|  | Electric heating element           | 1 Year                | 1 Year  | 1 Year                  | 1 Year |
| Solar collector                          | Anode (where applicable)           | 1 Year                | 1 Year  | 1 Year                  | 1 Year |
|  | Flat Panel                         | 7 Years               | 1 Year  | 1 Year                  | 1 Year |
|  | Mounting frame                     | 7 Years               | 1 Year  | 1 Year                  | 1 Year |

<sup>2</sup> In order to comply with Queensland State legislation, a 2 year Warranty Period on the solar circulating pump and 1 year labour Warranty Period applies to domestic installations in Queensland only.

<sup>3</sup> In order to comply with Victorian State legislation, a 5 year Warranty Period on the solar circulating pump, solar controller and components within the gas booster, with a 1 year labour Warranty Period applying to domestic installations in Victoria only.



## **2 Warranty**

For the duration of the Warranty Period, Hills Solar warrants that all Products will be free from faults or defects in Parts and Labour, on the terms and conditions described in this document.

## **3 Hills Solar as provider**

The Warranty is provided by Hills Solar. Hills Solar can be contacted as follows:

- (a) By post – PO Box 69 Export Park, South Australia 5950.
- (b) By telephone – 1300 363 386.
- (c) By email – info@hillssolar.com.au

## **4 Terms and conditions**

- (a) The Warranty Period commences on the date the Products are installed by a licensed installer. Hills Solar and its representatives (including but not limited to Authorised Hills Solar Dealers) reserve the right to verify this date by requesting a copy of the installation report or certificate of compliance issued at the time of installation. If this certificate is unable to be provided by the end user, then Hills Solar is under no obligation to consider or continue its assessment of the Warranty claim made by that end user in respect of those Products.
- (b) In order for the Warranty to apply, the Products must be installed, commissioned, serviced, repaired and removed (as applicable in the circumstances) by an authorised and licensed trade person acting in accordance with the Manual and any other installation, maintenance or removal instructions issued by Hills Solar, all current Australian standards then in force which apply to such activities (which as at the date of this document are AS/NZS 3000:2007, AS/NZS 3500.4:2003 and AS/NZS 5601) and all other applicable laws, including all local government regulations and municipal building codes.
- (c) Products must be operated and maintained by end users in accordance with the Manuals and any other operating instructions issued by Hills Solar from time to time in order for the Warranty to apply.
- (d) The Warranty only applies to the Products, and does not apply to any additional or ancillary parts or components supplied by the installer (regardless of whether or not those are required for the Products to be installed or function correctly).
- (e) If a Warranty claim is successfully made, the balance of the Warranty Period remaining in respect of the original Products will apply to any resupplied or repaired Parts of the Products, and any resupplied Labour. For the avoidance of doubt, the Warranty Period takes effect from the date of installation of the Products, and is not interrupted or otherwise affected by a successful Warranty claim being made during this time.
- (f) The Warranty only applies to Products:
  - (i) connected directly to a reticulated water supply provided by a State or Territory government water utility provider; or
  - (ii) connected to an alternative water supply (such as private bore water, water from private dams or water from reticulated water supplies where the water chemistry is deliberately altered before supply to the Products),  
  
if the water characteristic levels are at or below the maximum limits specified in the following Table 8.

**Table 8 Water characteristic levels**

| Water Characteristic                   | Level               |                 |
|--|---------------------|-----------------|
| Total dissolved solids                 | 600 mg/litre or ppm |                 |
| Total hardness (as CaCO <sub>3</sub> ) | 200 mg/litre or ppm |                 |
| Chlorides                              | 300 mg/litre or ppm |                 |
| Dissolved CO <sub>2</sub>              | <b>Gas</b>          | <b>Electric</b> |
|  | 18 mg/litre or ppm  | Not Applicable  |
| pH Levels                              | 5.5 – 9.5           |                 |
| Saturation index (Langelier)           | +0.4 to –1.0 @ 65°C |                 |

Accordingly, the Warranty does not apply to faults or defects resulting from the connection of the Products to supplies of bore water, highly mineralized waters or in circumstances where water stored in the Product cylinder part exceed the levels listed in Table 8.

- (g) The Warranty does not apply to faults or defects resulting from the effects of sludge or sediment on the Products, which results from a connection of the Products to a water supply which is unfiltered (e.g. spring, dam, bore, river or other water). If the Products are installed at regional locations where regular flushing is required due to sludge or sediment build-up, the installer of the Products must fit a drain cock for flushing at the time of installation of the Products.
- (h) If Hills Solar or its representatives (including Authorised Hills Solar Dealers) determine that accessing the installed Products to assess a Warranty claim or perform Warranty repairs is dangerous, then the Warranty will not apply.
- (i) End users acknowledge that Hills Solar and other third parties responsible for manufacturing Parts may in their sole and absolute discretion alter the design or construction of their Parts, without notice and including between the date of purchase of the Products by the end user and the date of supply to that party. Provided such altered Parts are of acceptable quality and have the same or substantially similar features or functionality, and do not affect the features or functionality of the Products, which remain the same or substantially similar in all material respects, then the alterations to the Parts will not amount to a fault or defect in respect of which the Warranty applies.
- (j) The Warranty does not apply to accidental damage to the Products, or any abuse, accident or improper installation, connection, adjustment, repair or use of Products not in accordance with the Manual.

## **5 How to make a Warranty claim**

- (a) If an end user of Products identifies a fault or defect in the Products and considers that it may be entitled to make a claim under the Warranty it must contact its Authorised Hills Solar Dealer and provide it with all relevant information, as requested (which may include the return of the Products or any Parts). The Authorised Hills Solar Dealer may transmit this material to Hills Solar for assessment, as directed by Hills Solar.
- (b) If the original Authorised Hills Solar Dealer is no longer authorised by Hills Solar at the time the potential Warranty claim arises, is no longer in business or otherwise cannot be identified, located or contacted, the end user should contact Hills Solar directly.
- (c) If following Hills Solar's assessment it is determined that there is a defect or fault and the Warranty claim is valid, then Hills Solar will, without charge to the end user making the claim (and at Hills Solar's option):
  - (i) in the case of goods, including the Parts – repair, replace or supply equivalent goods, or pay the cost of any of those remedies to the end user; and



- (ii) in the case of services, including Labour – supply the services again or pay the cost of having the services supplied again.

## **6 Costs of Warranty claims**

- (a) Where the Product the subject of a Warranty claim is installed:

- (i) outside the metropolitan area of a capital city of Australia; or
- (ii) at a location that is not within a 25 km radius of an Authorised Hills Solar Dealer,

then the end user is responsible for all costs of returning the Products or any Parts to the Authorised Hills Solar Dealer or Hills Solar as directed, including but not limited to the costs of transport and insurance, and any travelling to the location at which the Product is installed undertaken by the representatives of Hills Solar or its Authorised Hills Solar Dealer in connection with the Warranty claim.

- (b) If the Product the subject of a Warranty claim has not been installed in the location recommended in the applicable Manual or relevant installation instructions, or has otherwise been installed in a manner or location that makes access to the Product difficult, then a service charge will apply and must be paid by the end user making or attempting to make a Warranty claim.
- (c) If any work is required to be undertaken by the representatives of Hills Solar or its Authorised Hills Solar Dealer to attend to a Warranty claim and gain reasonable access to the Product the subject of the claim (including but not limited to the removal of cupboards, doors, walls, or the use of special equipment to move components to floor level), this work will be charged to, and payable by, the end user making the Warranty claim.

## **7 Warranty exclusions and limitations**

- (a) If any of the following events occur, the Warranty will no longer be available to end users, and will be void, terminated and otherwise no longer effective (unless Hills Solar notifies end users in writing to the contrary):
  - (i) if a fault or defect in the Products has arisen as a result of abnormal water supply (such as high water pressure), faulty gas fitting, faults in plumbing or electrical wiring, or significant variations in the gas or energy supply relevant to the Products;
  - (ii) if the Product is purchased from a dealer or other trader that is not an Approved Hills Solar Dealer, or is repaired or altered by a third party that is not an Approved Hills Solar Dealer, without Hills Solar's prior written consent;
  - (iii) if the Product has been drained for a period without the solar collector component of the Product being covered, resulting in damage to the collector Part;
  - (iv) if frost or freeze damage has occurred to the Products as a result of the following:
    - where the electricity supply has been switched off or has failed;
    - where the Product has been installed at an altitude of greater than 400 metres;
    - where the Product has not been installed in accordance with the installation instructions of Hills Solar and/or the Manual; or
    - if the solar hot and solar cold pipes are not insulated in accordance with Australian Standard AS3500.4 (or its replacements); or
    - if the Product is used to heat chlorinated pool or spa water.
- (b) Hills Solar may in its sole and absolute discretion repair any faults or defects in the Products if the Warranty is terminated and no longer in effect pursuant to the terms of clause 7(a) of this warranty document. If so, Hills Solar, Hills Authorised Solar Dealers or their respective representatives providing the requested services will be entitled to charge the end user for the services provided, and the costs of any replacement Parts utilised in providing the services, and the end user must pay such costs on demand.



## **8 Applicable laws unaffected**

The Warranty is provided by Hills Solar in addition to its compliance with the requirements of any applicable legislation, including but not limited to the CCA. Therefore, Hills Solar advises end users who are consumers (as defined by the ACL) as follows:

*Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if goods fail to be of acceptable quality and the failure does not amount to a major failure.*

## **9 Exclusion and limitation of liability**

- (a) Subject to the matters set out in this document, and to the fullest extent permitted by law, in no circumstances will Hills Solar or Authorised Hills Solar Dealers be liable or otherwise responsible for any loss, damage or injury arising as a result of any fault or defect in any Products, whether sustained or incurred by the end user or any other party directly, indirectly, consequentially or in any other way.
- (b) For the avoidance of doubt, and to the fullest extent permitted by law, in no circumstances will Hills Solar accept or otherwise consider claims which relate to damage to walls, ceilings or foundations of buildings, outdoor furnishings or any other loss or damage which indirectly or directly results from Product leakage.
- (c) The Warranty is in addition to any non-excludable legal rights or remedies conferred on the end user in respect of the Products by the CCA, ACL or any other applicable laws. To the extent permitted by law, Hills Solar's liability for any such applicable non-excludable right or remedy is limited to the options listed in clause 5(c) of this warranty document.



**APPENDIX B.INSTALLATION REPORT FORM**

**Installation Report Form (page 1 of 3)**

After the completion of installation, the following form must be completed by the installer and faxed to Hills Solar within 5 working days of the installation date.

**PLEASE WRITE CLEARLY**

Customer Name: \_\_\_\_\_  
Installation address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Phone No: (Work) \_\_\_\_\_  
(Home) \_\_\_\_\_  
(Mobile) \_\_\_\_\_  
Fax number: \_\_\_\_\_  
Email Address: \_\_\_\_\_  
Invoice Number: \_\_\_\_\_

Installer Name: \_\_\_\_\_  
Installer License Number: \_\_\_\_\_  
Installation Date: \_\_\_\_\_  
Company name: \_\_\_\_\_  
Company address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Installer Phone No: \_\_\_\_\_  
(Mobile) \_\_\_\_\_  
Fax number: \_\_\_\_\_

Hills Solar Hot Water System Type (please circle):      ESTEEM™II      EXCEED™      APOLLO™

Hills Solar Collector Serial Number(s) located on the side or top of the collector: \_\_\_\_\_

Hills Solar Pump and Controller Combination Box Serial Number: \_\_\_\_\_

(If gas Boosted) Hills Solar Gas Booster Serial Number: \_\_\_\_\_

(If gas boosted) Hills Solar Storage Tank Serial Number: \_\_\_\_\_

(If electric boosted) Hills Solar Storage Tank Serial Number: \_\_\_\_\_

Authorised Hills Solar Dealer where system was purchased: \_\_\_\_\_



**This page is blank intentionally to facilitate faxing**



| <b>Installation Report Form (page 2 of 3)</b>   | <b>Please tick applicable</b> |           |
|---|-------------------------------|-----------|
|   | <b>YES</b>                    | <b>NO</b> |
| 1. Collector faces due North. If not facing North what is the aspect the collector is facing .....Estimated pitch of roof ..... °deg. |                               |           |
| 2. Collector is installed at an appropriate angle of above 20°deg.  |                               |           |
| 3. Collector is clear from the effects of shading between the hours of 9am to 3pm.  |                               |           |
| 4. Collector will not be struck by falling objects such as branches or falling fruit.   |                               |           |
| 5. Frame is secured to structurally sound roof.   |                               |           |
| 6. Air vent has been installed at the hot out (return) port of the collector as per manufacturers specifications.                     |                               |           |
| 7. All plumbing valves have been checked to be open to allow water flow.  |                               |           |
| 8. Solar flow and return lines are DN15 or DN20 (where required) copper (no plastic) olives used and plumbing is leak-free.           |                               |           |
| 9. Plumbing pipe runs are well insulated as per AS/NZS3500.   |                               |           |
| 10. Tank is fitted with PTR Valve and drainage for dumped water complies with AS3500.4:2003 and any local plumbing regulations.       |                               |           |
| 11. Collector sensor has been installed in the sensor well at the hot outlet (return) port of the collector.                          |                               |           |
| 12. Electric booster element has been wired up by qualified electrician.  |                               |           |
| 13. Pump, controller, sensor probes and all electrical connections are protected from water entry.                                    |                               |           |
| 14. Pump has been checked for operation by feeling the solar return line (copper piping) for heat and system has been bled.           |                               |           |
| 15. Flow Control Valve has been set to the specified rate.  |                               |           |
| 16. Collectors have been cleaned to remove any marks.   |                               |           |
| 17. Solar rated tempering valve has been installed.   |                               |           |
| 18. Gas delivery has been checked and booster has been commissioned (for Hills Solar gas boosted systems).                            |                               |           |
| 19. Water quality assessment conducted.   |                               |           |
| 20. Warranty document supplied to customer and the basic operation of the system explained.   |                               |           |



**This page is blank intentionally to facilitate faxing**

