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Introduction
Thank you for choosing an Endless Solar® Evacuated Tube Solar Hot Water System.

This manual is designed to give you an understanding of the basic operating principles of an Endless Solar® system for residential/domestic hot water applications.

Please take the time to read through this manual and feel free to contact Endless Solar if you have any questions.

Please keep this manual in a safe place with a copy of your invoice.

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Disclaimer
This document provides an overview of the Endless Solar Evacuated Tube Solar Hot Water System.

Endless Solar is not responsible for any loss or damage to any person or property of any type, whether direct or consequential, arising from the installation or operation of the solar hot water system or any of its components. Endless Solar has made every reasonable attempt to ensure the accuracy of the information provided. The content in this document is provided for information purposes only. Certain information in this manual is supplied by third party component manufacturers; accordingly Endless Solar cannot warrant that all the information is accurate. No claim is made as to the accuracy or authenticity of the content in this document. Endless Solar will accept no liability to any person for the information or advice (or the use of such information or advice) which is provided in this document or incorporated into it by reference.

Endless Solar is a supplier of components only. Each installation must be covered by the installer’s insurances, commercial terms and conditions and by the applicable OH&S requirements relevant to the type of work being conducted including, but not limited to, plumbing work, work on roofs and electrical work. Endless Solar do not accept any responsibility for any loss or damage to any person or property of any type, whether direct or consequential, arising from the installation, maintenance or operation of the solar hot water system or any of its components.
The Endless Solar Hot Water System

Endless Solar is a leader in next generation Evacuated Tube technology with its high performance solar hot water components. By installing Endless Solar, you will catch more of the sun’s energy wherever you are in Australia. Endless Solar components are designed to provide you with many years of reliable service, using the immense, free power of the sun.

The Endless Solar® Evacuated Tube Solar Hot Water System has been designed with the following principles in mind:

✓ High quality, long lasting components - They are tough, durable and designed for almost any Australian roof.

✓ Ease of installation with ‘Plug & Play’ functionality.

✓ Lightweight and modular.

✓ Low maintenance – no sacrificial anode to replace,

✓ Naturally resistant to freezing - The Endless Solar collector does not need glycol or chemicals in frost prone areas.

✓ Long warranties.

✓ Endless Solar Evacuated Tubes provide superior daily heat output due to the cylindrical absorber shape and excellent insulation properties of the vacuum.

✓ More efficient than traditional flat plate solar heaters - Save money on your water heating costs.

✓ Split System Design - storage tank is located on the ground – water is circulated through the collector on the roof using a low energy circulating pump.

✓ Low wind resistance – great for pitching at optimum angle without damage to system, roof or mountings.

✓ Stainless steel collector frame provides both strength and long term corrosion resistance.

✓ **Proudly Australian**: By choosing an Endless Solar hot water system you are doing your bit for the environment, and supporting Australian business.

✓ Super quiet, low energy circulation pump.

✓ Highly insulated marine grade stainless steel tanks
How Does it Work?

General Operating Principle

Endless Solar uses a 'split system' design - with solar collectors on the roof and highly-insulated hot water storage tanks at ground or floor level. The circulating pump draws cold water from the storage tank, passes it through the collectors where it is heated and then returned back into the storage tank.

The pump is switched on and off by a differential temperature controller. The controller determines whether the collector temperature is hotter than the water in the bottom of the storage tank, and activates the pump. Conversely, if the collector temperature is not hot enough the pump is deactivated. The controller will deactivate the pump if the water at the bottom of the tank reaches 75°C.

The system is designed to raise the temperature of the water prior to additional boosting (if required). This design reduces the use of purchased energy to heat the water. The system may be boosted by Electricity or Gas (NG or LPG).

Figure 1: Simplified Operational Diagram
How do Evacuated Tubes Work?

Evacuated Tubes consist of two layers of toughened, high impact resistant borosilicate glass with a vacuum between these layers. This evacuated layer in the tubes acts like a thermos flask retaining over 90% of the energy absorbed from the sun. This helps increase the efficiency of the collector and also protects it from the effects of cold air. As a result, an Evacuated Tube solar collector is the perfect system for very cold areas.

The sun’s energy that is absorbed by the tubes is transferred to your water via copper heat pipes located inside each tube. A small amount of evaporative liquid is inside each heat pipe. This liquid is turned to vapor by the sun and rises to the tips of the pipes which are inserted into a heat transfer manifold located on your roof.

Water is then pumped through this manifold absorbing the heat and stored in a water storage tank located below.

The secret to the brilliant performance of Evacuated Tubes is the superb insulation provided by the vacuum in between their glass walls. This ensures that the sun’s energy you are catching is not lost. Other systems lose heat energy when it’s cool outside.

Passive Tracking

The round surface of each tube passively tracks the sun as it moves across the sky. Evacuated Tubes have brilliant optical properties that allow them to catch more energy for more of the day. With ‘flat panel’ type collectors, solar radiation is reflected off the surface when the sun is at an angle to it.

Figure 2: Evacuated Tube Operation

Figure 3: Optical Properties of Tubes
System Maintenance

Endless Solar Evacuated Tube hot water systems have been designed to be virtually maintenance free however the following items should be considered from time to time.

General Safety

If the system is turned off for maintenance, or due to power outage, the collector header and plumbing pipes close to the manifold will be **extremely hot and can cause serious burns if touched**.

If extended maintenance is planned it is advisable to cover the collector to prevent continued heat production.

Extended Periods When No Hot Water Is Used

**Cover the Collector**

During extended periods of time where the hot water is not being used it is advisable to cover the collector. This will ensure that the collector will not heat water unnecessarily while you are away.

When covering the collector, pay particular attention to ensuring that the cover is securely fastened and will not be affected by high winds.

**Do Not Turn Off the Controller**

Do not turn off the power to the controller & pump during extended periods of time where the hot water is not being used.

**Check Controller, Pump & Flow Rate**

The general operating of the system should be checked regularly.

1. Check that the “Controller OK” Light is on.

2. Check that “Sensors OK” Light is on and **not** flashing.

3. If ‘PUMP ON’ light is illuminated, check that there is suitable flow rate shown in the glass window of the Flow Control Valve.

4. If ‘PUMP ON’ light is not illuminated, use the Pump test button to check the pump and flow rate.

   If you have any questions about this process, please contact Endless Solar.

Cleaning

Regular rain should keep the Evacuated Tubes clean, but if particularly dirty they may be washed with a soft cloth and warm, soapy water or glass cleaning solution. If the tubes are not easily and safely accessible, high pressure water spray is also effective.

Leaves

Leaves and other debris may accumulate between or beneath the tubes. Please remove these leaves regularly to ensure optimal performance and to prevent a fire hazard.

Loss of Vacuum

Under normal operating conditions the Evacuated Tubes maintain their vacuum. If there is accidental damage, it is possible for a tube to lose its vacuum – this will reduce the performance of the collector.

You can determine if a tube has lost its vacuum as one of the following will occur:
- The silver end of the tube will appear to be a clear or milky white;
- The glass of the tube will be warm to touch.

If either of these occur, have the tube replaced. Contact Endless Solar for further details.

**Broken Tube**

If a tube is broken it should be replaced as soon as possible to maintain maximum collector performance. The system will still operate normally even with a tube broken. Any broken glass should be cleared away to prevent injury. Contact Endless Solar for further details.

**Insulation**

Insulation should be checked annually for damage. UV stabilised insulation (or metallic wrap) should be used, otherwise deterioration can occur over time. A significant amount of energy can be lost if the insulation is inadequate or sub standard.

**Pressure Temperature Relief Valve (PTR Valve)**

The storage tanks are fitted with an 850kPa PTR valve, which is located on the side of the cylinder and is essential for its safe operation. We recommend you operate the lever on the PTR valve once every 6 months. It is important you raise and lower the lever gently. The PTR valve is designed to allow small quantities of hot water to discharge during heating to allow for hot water expansion.

The relief valve (PTR Valve) should be checked for adequate performance every six months and replaced at intervals not exceeding 5 years or more frequently where there is a high incidence of hard water or water deposits. Failing to do so will reduce the service life of tanks dramatically and can void the warranty.

**Temperature Limiting Device**

Temperature Limiting Devices should be checked every year (or as prescribed by the manufacturer) for correct temperature delivery and they should be replaced at intervals as prescribed by the manufacturer.

**Sacrificial Anode**

Every Endless Solar’s Vitreous Enamel tank is fitted with a sacrificial anode which plays a significant role in extending their life. For the warranty to remain active it is essential for the anode to be checked every year and to be replaced if it has been corroded significantly or every three years, whichever comes first. Failing to do so will reduce the service life of Vitreous Enamel tanks dramatically and can void the warranty.

**Troubleshooting**

Any system assessments, adjustments or repairs must be completed by a qualified tradesperson. For any problems that involve plumbing or electrical connections the services of a qualified professional **must** be employed.

The following is a general trouble shooting guide. For more information, contact Endless Solar.
No Hot Water:
If there is no hot water, it will generally be related to the gas or electric boosting system, and not the solar collector. The solar component of the system pre-heats water, with final boosting completed by the electric element or gas booster system.

Check that the boosting system is operational and all components and valves are configured correctly.

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

Ensure that there is no shading on the collector for the majority of the day.

Controller Error:

<table>
<thead>
<tr>
<th>Sensor Light</th>
<th>Normal Condition</th>
<th>Fault condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller OK Light</td>
<td>ON</td>
<td>OFF</td>
<td>Check Power Supply</td>
</tr>
<tr>
<td>Sensors OK Light</td>
<td>ON</td>
<td>OFF</td>
<td>Check that the roof Sensor is plugged in. Check the roof Sensor and Wire for Damage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing</td>
<td>Check the Tank Sensor and Wire for Damage.</td>
</tr>
</tbody>
</table>
Pump Not Working:
In good sunny weather the circulation pump should activate if the water in the storage tank is cool. This is indicated by the ‘PUMP’ light on the Controller. The pump may run very quietly, and so you may need to touch the pump to feel for motor operation (slight vibration), or look at the flow meter (the glass window with a small orange indicator inside).

The Controller has a green light to indicate the pump has power going to it. If the ‘PUMP on’ light on the controller is on and the pump is not circulating water:

- Check that the pump is plugged in and installed correctly
- Ensure that there is not an air pocket in the solar flow and return lines. It may be necessary to purge air from the solar flow & return:
  - After maintenance to the system
  - If air has had the opportunity to enter the system
  - If the collectors have been allowed to stagnate

Regular Releasing of Hot Water:
If during normal daily hot water use, the Pressure Temperature Relief (PTR) valve on the tank is regularly releasing hot water, it indicates there may be a problem. A few litres a day is normal.

Possible Causes:
- The system may be producing more hot water than is required. This may be apparent in the summer months, when solar radiation levels are high.
- A faulty PTR valve on the tank.
- Tank sensor not working or incorrectly installed.
Endless Solar Warranty Information

The owner and the installer must complete, sign and return the installation report form (supplied) within 30 days of installation. The owner must retain a copy of the installation report form. The installation report form is required to activate and approve all warranty claims. Installation report forms that provide false or misleading information may void the warranty.

The owner must retain a copy of the original purchase invoice to validate the warranty. This will form a proof of purchase and a record of the details of your warranty at the time of purchase. The warranty is valid only when the system is sold by an authorised distribution channel of endless solar.

This warranty does not apply to systems that have been altered in any way. This warranty does not apply to systems that are incorrectly installed. This warranty does not apply to system designs that have not been supplied by, or approved (in writing) by endless solar.

Warranty Conditions

Endless Solar will use its reasonable endeavours to obtain for the Buyer the benefit of any warranty from the manufacturer of any Products that are not manufactured by Endless Solar. This provision does not require Endless Solar to commence legal proceedings or incur legal costs. Endless Solar may make certain endeavours to ensure that the Products are sourced from reputable and qualified manufacturers based on appropriate product model or type certifications, by making preliminary enquiries about suppliers and by making preliminary checks or certifications. It is not practicable to test individual items for compliance or defects prior to supply.

This warranty only applies to the solar system/gas water heater/electric water heater product and does not apply to any additional electrical and/or plumbing parts supplied by the installer, or to any components and materials supplied as part of any plumbing kits provided with the system. This warranty does not apply to the installation; or any defects in workmanship by the installer.

The system is covered for the indicated period from the date of the original purchase shown on your invoice. Should a part of the solar system/water heater product be replaced during this period, only the balance of the original warranty will continue to remain effective.

The system must be installed by a licensed gasfitter/plumber and/or electrician in accordance with all installation instructions and all relevant legislation, statutory, state and local requirements in which the system is installed.

The system must be installed in a residential property for domestic hot water supply only.

This warranty is valid only when the system is installed with the pump and controller connected to a 240V power supply and operating at all times throughout the year.

This warranty is valid only when a fully completed Installation Report Form is returned and received by Endless Solar with 30 days of installation.

In situations where the system requires regular flushing, the drain cock for flushing must be fitted at the time of installation.

Manufacturers of system components may alter the design or construction of the components. Where any alterations have been introduced from the time the quote was accepted and the date of delivery, the system shall be considered fit for purpose provided that the components are of the
same or similar quality. If alterations of this type occur, this warranty will apply, and the alterations shall not be considered to be a defect.

This warranty shall be limited to the replacement or repair, at the option of Endless Solar of any components that fail as a result of manufacturing defects. Endless Solar is excluded to the extent allowable by law from responsibility for any consequential loss including:

- Injury to persons;
- Damage to property;
- Economic loss;
- Pain and suffering;
- Any legal or other damages flowing from any manufacturing fault/defect; and
- Claims for damage to walls, foundations, furnishings, roofs or other losses, directly or indirectly due to leakage from the water heater.

Endless Solar shall have no obligation to return any parts that have been replaced under this warranty.

**Warranty Exclusions**

THE FOLLOWING CIRCUMSTANCES SHALL BE EXCLUDED FROM THIS WARRANTY.

Damage to components caused by, but not limited to abnormal water supply, high water pressure, low water pressure, unsuitable water quality, faulty gas fitting, incorrect installation, plumbing and/or electrical wiring, or major variations in gas or electrical energy supply.

This warranty does not cover corrections arising from any incorrect installation and/or failure to comply with the installation instructions, statutory and regulatory requirements.

Circumstances where the system is sold, repaired or modified by any third party without the written consent of Endless Solar.

Damage to the collector where the system has been drained for a period without the collector being covered.

Accidental breakage.

Transport, freight, troubleshooting and labour costs.

Corrosion related damage or damage caused by environmental or atmospheric conditions.

This warranty does not cover the effects of sludge/sediment as a result of connection to a water supply from unfiltered sources i.e. spring, rainwater tank, dam, bore, river or other. This warranty does not cover the effects of the connection of the system to bore waters and highly mineralized waters.

This warranty is void where the components are exposed to water with characteristics that exceed the following levels:

| Table 1: Warranty - Water Characteristics |
This warranty is void where the components are exposed to water with pH levels outside the following range:

| pH Levels | 6.5 – 8.5 |

Both copper & stainless steel are susceptible to corrosion when high concentrations of chloride are present, and 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 waters in the reticulated supply.

**Limitation of Liability**

This warranty provides for the replacement or repair, at the option of Endless Solar, of any components that fail as a result of manufacturing defects. To the extent permitted by law the liability of Endless Solar for breach of this warranty, shall be limited to the terms of this warranty document. This warranty document must be read in conjunction with any Terms and Conditions of Sale document provided at the time of purchase.
Replacement or repair of components due to faulty manufacturing will be provided to the customer. The period for which replacement applies varies for different components and the details appear below. Replacement or repair excludes all transport, transport insurance, troubleshooting and excess labour costs.

Where the cost of repair and/or replacement exceeds the standard warranty labour rates (as defined by Endless Solar), such as (but not limited to) where there is difficult access to the collector and/or tank location, or the customer lives in a remote location, the customer will be required to pay the balance on any additional fees.

<table>
<thead>
<tr>
<th>Coverage Details</th>
<th>Coverage Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Parts</td>
</tr>
<tr>
<td>Collector (tubes, manifold, frames)</td>
<td>15 years</td>
</tr>
<tr>
<td>Air Vent</td>
<td>1 year</td>
</tr>
<tr>
<td>Tank (Stainless Steel) – Cylinder</td>
<td>15 years</td>
</tr>
<tr>
<td>Tank (Vitreous Enamel) – Cylinder</td>
<td>5 years</td>
</tr>
<tr>
<td>Tank – Electrical (element &amp; thermostat)</td>
<td>1 year</td>
</tr>
<tr>
<td>Tank – PTR</td>
<td>1 year</td>
</tr>
<tr>
<td>Pump</td>
<td>2 years</td>
</tr>
<tr>
<td>Controller (box and sensor leads)</td>
<td>2 year</td>
</tr>
<tr>
<td>Booster – Electrical</td>
<td>3 years</td>
</tr>
<tr>
<td>Booster – Heat exchanger</td>
<td>10 years</td>
</tr>
<tr>
<td>Flow control valve</td>
<td>1 year</td>
</tr>
<tr>
<td>Solar Plumbing kit (valves)</td>
<td>1 year</td>
</tr>
</tbody>
</table>
Installation Report Form for Warranty Activation

It is extremely important that we know who you are, when and where you purchased your Endless Solar hot water system and who installed it for you. In the unlikely event of a system malfunction we will need to speak with your installer and we will need to verify when you purchased the system and who you purchased it from. To enable us to process any future warranty claims quickly and efficiently, we ask you to please make sure the installation report form is completed in full and sent back to us with a copy of your proof of purchase. The installation report form should be included with your system, if you cannot find it please call us on 1300 889 585 or email info@endless-solar.com.au and we will send one out to you.

Serial Numbers

We recommend that you keep a copy of your invoice and serial numbers here for future reference.

<table>
<thead>
<tr>
<th>Invoice Number:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number:</td>
<td></td>
</tr>
<tr>
<td>Tank Serial Number:</td>
<td></td>
</tr>
<tr>
<td>Collector Serial Number:</td>
<td></td>
</tr>
</tbody>
</table>