SMART SOLAR
Healthy Hot Water System

360° Sunlight Collector
High Efficiency even in cloudy day

No Copper Toxic
Healthy Hot Water

Smart Solar Controller
LCD Display with Auto heater

316L Stainless Steel
Marine Grade Standard

www.smartsolar.com.my
About Us

We are a team of 6 people with a combined five years' experience. Before now we found a lot of issue with the old flat panel solar system which was introduced in Malaysia around 1980. Using this old device, we noticed it has many defects, which includes, the efficiency of collector is low, water can't hot when cloudy day, water leaking cause by too many joint between the collector and tank, corrosion in copper pipe forming scale and sediment over the tank and collector, copper toxic that may harm our health. It requires high maintenance, and the last but not the least, it is an old technology at higher price.

With these problems, we saw the need for modernization in the solar hot water system in the country. With the urge for this immediate change, we decided to design a new solar hot water system which eliminated all the issues stated above. We jointly researched for more than two years to make this new and unique evacuated tube hot solar water heater, and fortunately this is the latest design best solar hot water system today.

At Smart Solar, our hot water systems are uniquely designed to work safe, efficiently, healthy and to last. Our components and products are produced using only the highest quality materials to ensure that our clients constantly get the best value for their money. We understand that health and safety are very important, so we have made our solar systems for just that. Smart solar hot water systems come with maximization to the very most out of the sun, it is a top range thermal collector with unrivaled reliability. Plus you get electric boosters to ensure that you won't run out of hot water with our ever reliable smart solar controller.

Our Mission is to provide you with the perfect amount of clean and hygiene hot water on demand anytime you need it, for the lowest cost possible.

If you're thinking of Healthy Hot Water, think Smart Solar!
## 4 SMART CONCEPT

**In Designing an ALLNEW**

Smart Solar Water Heater System

<table>
<thead>
<tr>
<th>More SAFETY</th>
<th>More HEALTHY</th>
<th>More EFFICIENCY</th>
<th>More LASTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOULD HAVE Temperature Display</td>
<td>SHOULD ELIMINATE Copper Toxic</td>
<td>INCREASE Sunlight Exposure Area</td>
<td>Use HIGH GRADE Corrosion Resistance Metal</td>
</tr>
<tr>
<td>SHOULD HAVE Automatic Heater Booster</td>
<td>Sediment &amp; Scale CAN BE DRAIN OUT Easily</td>
<td>MINIMIZED Heat Loss Over Solar Collector</td>
<td>DESIGN a Close Loop System</td>
</tr>
<tr>
<td>EASY to Install &amp; Working Independently</td>
<td></td>
<td>IMPROVE Heat Transfer Efficiency</td>
<td>REDUCE Human Error in Tank Welding</td>
</tr>
<tr>
<td>SHOULD HAVE Strong Build Structure</td>
<td></td>
<td>MAINTAIN Hot Water Overnight</td>
<td>APPLY Anti Corrosion Agent</td>
</tr>
</tbody>
</table>

### TO ELIMINATE

The **COMMON ISSUE**

Found in FLAT PLATE Solar Water Heater System:

- Copper toxic that may harm your health.
- Possible leaking cause by many pipe fixing connection between tank & panel.
- Water not hot enough during cloudy day.
- Need to manually turn on the backup heater.
- There is no hot water temperature display.
- The system is not smart.
- System performance affected by dirt and mold sticking on the glass.
- Once the glass is broken, it can't work properly.

We Are Proud to Introduce
THE LATEST
SMART SOLAR
Hot Water System with Heat Pipe Evacuated Tube Technology

Overall STRUCTURE

A. Storage Tank
1. Water Tank
2. Temperature Sensor
3. Pressure Relieve Valve
4. Drain outlet
5. Backup Heater Unit
6. City Water Inlet
7. Hot Water Outlet
8. Anode Rod

B. Solar Thermal Collector
9. Evacuated Heat Tube
10. Aluminium CPC Booster
11. Tube Holder

C. Solar Bracket
12. Main Frame
13. Flat Roof Support Bracket
14. Stainless Steel roof hooks
Our Solar System
ADVANTAGES

**Durable**
Each Evacuated Tube working independent. There is no leaking even being remove or broken.

**Smart Solar Controller**
You will know what is the temperature of your solar heater.

**Smart Temperature Control**
Schedule and Set preheast temperature if below the set point.

**Strong Bracket**
The weight of the storage tank can be evenly distribute on the roof and the special hook hang strong on the roof.

**No Copper Toxic**
Close Loop Hot Water System, Water Do Not pass through solar collector.

**Clean Water**
Sediment, scale can be clear up automatic by Smart Solar Controller.

**Pressurized Water Tank**
Hot water pressure same as city water. You can put anywhere even at ground area.

**Heat Pipe**
High efficiency In heat transfer to heat up the water. Modern electronic device like mobile phone or notebook use this concept too.

**Evacuated Tube**
Convert the sunlight radiation to heat and trap the heat inside the tube by the vacuum state in double wall glass like thermos.

**Polyurethane Foam Insulation**
Hot water can be keep overnight.

**CPC Fin**
Increase heat absorb ing efficiency by projecting sunlight 360°.to evacuated tube. Heating fast even on cloudy day.

**316L Stainless Steel**
316L Marine grade standard makes the storage tank over 15 years long service life.

**Reduce Human Error**
Automated High Tech welding machine.

**Active Tank Protection**
Magnesium Rod protect from rust and resolve odor. Prolong storage tank lifespan.

**Closed Loop System**
No water pass through Collector, means no leaking issue.

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The CORE TECHNOLOGY

**Evacuated Tube**

**Double Wall Glass**
The tube is essentially two glass tubes that are fused at the top and bottom and the space between the two tubes is evacuated to form vacuum. The tubes are made of Borosilicate Glass, a material which used in the manufacture of different kitchen glassware. Borosilicate Glass has the characteristic of being very strong and also has excellent light transparency (>92% @ 2mm thick).

**Heat Pipe**
The most efficient method to transfer heat inside tube and to boil the water inside tank is using heat pipe. This technology is also applied in our mobile phone, computer, and notebook for thermal control.

**Solar Absorber**
The absorber coating comprises a base layer of Aluminium on the outside of the inner glass tube followed by thin layer of the dark purple coloured ALN [AluminumCopper nitride] material. Vacuum is an excellent Insulator against heat loss and the aluminium silver coating minimal heat reflection. So the result is Solar Absorptance $a=0.94$ and emission ratio $e=0.06$.

**Aluminium Fins**
Transfer heat from inner glass coating to heat tube.

**Barium Getter Coating**
Barium getter "soaks up" any remaining gases in the evacuated chamber to maintain the vacuum over the 15-20 year life of the evacuated tube. It provides a clear visual indication of the vacuum status; if the silver-coloured barium layer turns white means the vacuum is lost and making it easy to identify as faulty tube.
How the Sunlight Generates Hot Water?

1. Sunlight hits the evacuated tube.
2. Purple coating of inner glass converts solar energy into heat.
3. Heat transfer to the heat pipe by aluminium fins.
4. The vacuum between the two glass tubes work as insulation to retain heat inside the tube.
5. Thermal liquid inside heat pipe changes into vapour and rises to the condenser.
6. When passing through the heat exchanger, the heat is absorbed by water in the tank.
7. The thermal liquid becomes lower temperature and returns to the base of the heat pipe.
8. Heat collection is a continuous circulation as long as the collector is heated by the sun.

How to Install Our System?

1. Solar Controller

System Monitoring Display: A clear display of the entire system as well as tank water temperature readouts.
Smart Control: Control the heater operation. When the temperature is below set point, and off above set point.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature measuring</td>
<td>0-100°C</td>
</tr>
<tr>
<td>Accurate</td>
<td>+/−2°C</td>
</tr>
<tr>
<td>Heater Control Relay</td>
<td>1 pcs</td>
</tr>
<tr>
<td>Power supply</td>
<td>AC240V &amp; DC12V</td>
</tr>
<tr>
<td>Electric Heater</td>
<td>1500W (10A)</td>
</tr>
<tr>
<td>Dimension (mm)</td>
<td>86 x 89 x 16</td>
</tr>
<tr>
<td>RSP</td>
<td>RM 488</td>
</tr>
<tr>
<td>Evacuated Heat Tube System</td>
<td>Flat Heat Plate System</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><strong>✔ Close Loop System</strong></td>
<td><strong>Open Loop System</strong></td>
</tr>
<tr>
<td>Water Flow in Storage Tank. There is no copper corrosion issue and no clog issue.</td>
<td>Water Flow through Flat Plate. Copper corrosion happens may cause copper toxic and clog happen in the riser tube.</td>
</tr>
<tr>
<td><strong>✔ 316L stainless Steel</strong></td>
<td><strong>304 Stainless Steel</strong></td>
</tr>
<tr>
<td>Marine Grade Stainless Steel that have high resistance and protection in corrosion.</td>
<td>Normal Grade Stainless Steel</td>
</tr>
<tr>
<td><strong>✔ Leaking Protection</strong></td>
<td><strong>Possibility Leak Issue</strong></td>
</tr>
<tr>
<td>No Pipe Fitting connect the tank and the evacuated tube. Therefore, the chance of water leakage is virtually zero.</td>
<td>There are Copper Compression Fitting connect the pipe between flat plat and tank. Thermal expansion and contraction at outdoor environment will cause leak issue.</td>
</tr>
<tr>
<td><strong>✔ Most Efficient System</strong></td>
<td><strong>Old System</strong></td>
</tr>
<tr>
<td>Water Temperature can reach over 90 degrees Celsius (°C) in sunny day, cloudy day can reach 40-50 Celsius (°C). High efficiency 360° CPC sunlight collector booster.</td>
<td>Only 50-60 Celsius (°C) in sunny day, during cloudy day need electric heater to assist. Less Effective because sunlight only hit Flat Surface.</td>
</tr>
<tr>
<td><strong>✔ High Heat Retain</strong></td>
<td><strong>Low Heat Retain</strong></td>
</tr>
<tr>
<td>Heat Retain, the vacuum state between inner and outer layer glass create &quot;Thermos Effect&quot;.</td>
<td>Heat loss due to uninsulated between copper plate and glass in Heat Plate panel.</td>
</tr>
<tr>
<td><strong>✔ LCD Temperature Display</strong></td>
<td><strong>No Such Feature</strong></td>
</tr>
<tr>
<td>Tank equip with temperature sensor. You can clearly know what is the temperature inside your tank.</td>
<td>Don’t have sensor</td>
</tr>
<tr>
<td><strong>✔ Smart Heater Control</strong></td>
<td><strong>Manual Switch</strong></td>
</tr>
<tr>
<td>Auto Switch on Heater when the temperature below set point and auto switch off when the temperature above set point.</td>
<td>Need manual switch on when there is no hot water. Forgot to close may cost a bomb to your electric bill.</td>
</tr>
<tr>
<td><strong>✔ Active Protection</strong></td>
<td><strong>No Protection</strong></td>
</tr>
<tr>
<td>Magnesium Rod use as anode rod to maximize anti-rust protection to prolong the lifespan.</td>
<td>No such feature.</td>
</tr>
</tbody>
</table>
### Specification

<table>
<thead>
<tr>
<th>AVANT-GARDE SERIES</th>
<th>SS-150</th>
<th>SS-200</th>
<th>SS-300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank Capacity (Liters)</td>
<td>150</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>Overall dimension (LxWxH)</td>
<td>1520 x 1987 x 1200</td>
<td>1850 x 1987 x 1200</td>
<td>2400 x 1987 x 1200</td>
</tr>
<tr>
<td>Overall Weight (KG)</td>
<td>73</td>
<td>89</td>
<td>115</td>
</tr>
<tr>
<td>Overall Weight (Full)</td>
<td>229</td>
<td>295</td>
<td>421</td>
</tr>
<tr>
<td>Multifunction Frame</td>
<td>Slope and Flat Roof</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of User</td>
<td>4</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

### STORAGE TANK

- Inner Tank Diameter & Material: ϕ360mm, SUS316L
- Outer Tank Diameter & Material: ϕ460mm, 304 Stainless Steel
- Heat Exchange Socket: SUS316L Stamping Molding
- Insulation Material: 50mm High Density Pressure Injected Polyurethane Foam
- Tank Protector: Magnesium rod
- T&P relief valves: 6 Bar / 99°C
- Water PIPE Inlet/Outlet: 3/4 in. Stainless Steel Socket
- Backup Heater System: 1500W DN25 Incoloy 800 Backup Heating Element
- Smart Solar Controller: Water Temperature Sensor/Smart Schedule Clean*

### HEAT PIPE EVACUATED TUBE COLLECTORS

<table>
<thead>
<tr>
<th>Quantity (pcs)</th>
<th>12</th>
<th>15</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Technology</td>
<td>Dry Contact Heat Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube Material / Thickness</td>
<td>Borosilicate glass / 1.6 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube Length</td>
<td>1800 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer / Inner Tube Diameter</td>
<td>58 mm / 47 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube Coating</td>
<td>SS-CU-ALN/AIN Absorptive Coating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum</td>
<td>P &lt;5*10^{-7}Pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absorptivity Coefficient</td>
<td>95%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emissivity Coefficient</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Pipe</td>
<td>ϕ8mm TU1 Copper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunlight Booster</td>
<td>360° CPC (Compound Parabolic Concentrators), Mirror Polish Aluminum Fin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Specification subject to change without prior notice.

### Installation Location

- Flat Roof / Ground Area
- Slope Roof
- Tested Quality & International Standard

Our professional consultant is ready to provide you with the best of smart solar solution
For further information, visit www.smartsolar.com.my

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See How It Work at: Smart Solar Malaysia

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