

# Sunpower Generator

OPERATION MANUAL



TM

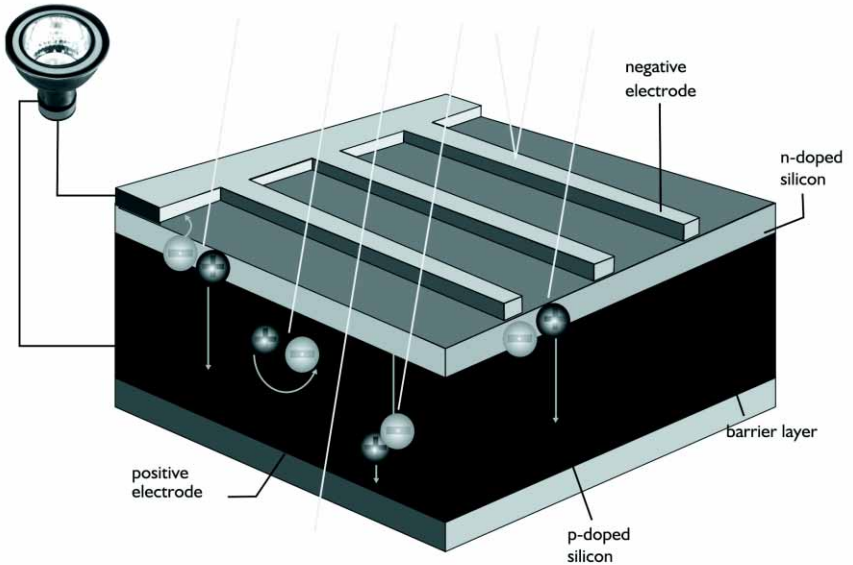
*sun driven*



Lifeway solar Sunpower Generator is a unique and innovative product running on solar energy - sunlight. A German Technology indigenized to suit our climate in India.

Today Generators are running either on diesel, petrol or kerosene. Lifeway Solar's Sunpower Generator will run on Sunshine and having advantages of zero noise pollution, no air pollution etc. Sunpower gives you clean green energy from the nature itself. Sunpower generators are easy to keep inside the room; the photovoltaic modules which are fitted on the rooftop will harness the sunlight. DC power produced from the panel is transmitted through thick copper cable to charge controller then to the tubular batteries for storage. During day time or in the night according to the demand this energy is drawn either as DC or convert in to AC through sinewave Inverter which gives the sufficient power to the utilities like lamps, fans, refrigerators, T.V etc.

## Lifeway Solar Structure and Principle function of a Solar cell



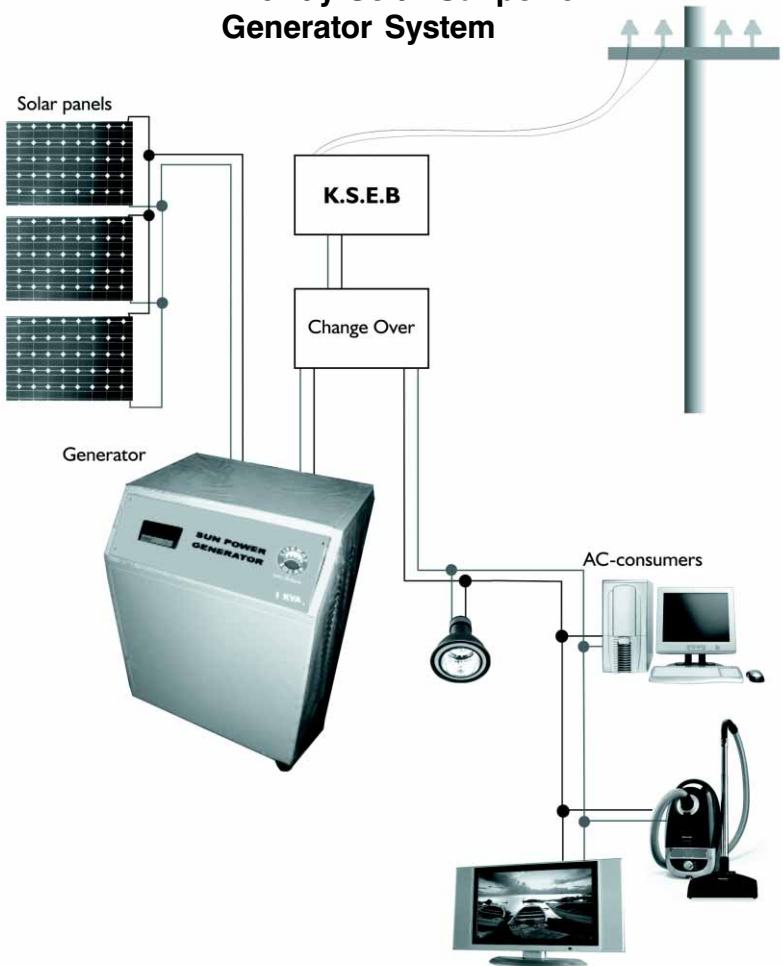
## Installation of the unit

LIFEWAY products are easy to install in your house or office. Since we are the pioneers in the market with this latest technology, Sunpower Generators are becoming the first choice for many in our country.

Our team of Engineers and technicians will guide every customer and will take the full responsibility to install P V panels on roof and will integrate the system which suits the requirements of the customers. The

configuration of the PV system shall be changed to suit the needs of the client from time to time as per the climatic conditions of the area where installation will be taking place.

## Lifeway Solar Sunpower Generator System



## Components of the Generator

### **Solar Panel:**

Solar photovoltaic panel will harness sun light and produce DC electricity.

### **Solar Charge Regulator:**

The charge regulator will control the battery and recharge the battery with the power from the solar PV module.

### **Solar Battery:**

The battery will get charged during the day time and provides the energy during night.

### **Sinewave Inverter:**

If there is a need for AC power, then an inverter is needed to transform / convert the DC power into AC power.

### **Consumer/ Equipments:**

Fan, Lamps like CFL or LED Luminaries, Television, Fridge, Washing Machine etc. Sunpower Generators are available in various capacities 500VA, 1 KVA, 2 KVA, 4 KVA. Other than 12V/ 500VA, 1 KVA and 2 KVA are in 24 V and 4 KVA in 96 V.

## Cable from Panel to Battery:

For photovoltaic system 12 V and 24 V systems, the maximum Voltage drop on a cable should not be more than 0.7 V. Therefore this table can be used to dimension the length of a DC cable.

## Lifeway Solar Cable Data

### Maximum length of DC-Cables 12V/24V

at a max. allowable voltage drop of 0.7V

Diameter	2,5mm <sup>2</sup>	4mm <sup>2</sup>	6mm <sup>2</sup>	10mm <sup>2</sup>	16mm <sup>2</sup>
Current					
2A	24,5m	39,2m	58,8m	98m	156,8m
4A	12,2m	19,6m	29,4m	49m	78,4m
6A	8,2m	13,1m	19,6m	32,7m	52,3m
8A	6,1m	9,8m	14,7m	24,5m	39,2m
10A	4,9m	7,8m	11,8m	19,6m	31,4m
12A	4,1m	6,5m	9,8m	16,3m	26,1m
14A	3,5m	5,6m	8,4m	14m	22,4m
16A	3,1m	4,9m	7,3m	12,2m	19,6m
18A		4,4m	6,5m	10,9m	17,4m
20A		3,9m	5,9m	9,8m	15,7m
22A			5,3m	8,9m	14,3m
24A			4,9m	8,2m	13,1m
26A			4,5m	7,5m	12,1m
28A				7m	11,2m
30A				6,5m	10,5m
32A				6,1m	9,8m
34A				5,8m	9,2m
36A				5,4m	8,7m
38A					8,3m
40A					7,8m
42A					7,5m
44A					7,1m
46A					6,8m
48A					6,5m
50A					6,3m

For photovoltaic systems, 12V and 24V systems, the maximum voltage drop on a cable should not be more than 0.7V.

Therefore, this table can be used to dimension the length of a DC-cable.

#### Background Info:

specific resistance of copper:  $\rho = 0,01786 \frac{\Omega \cdot \text{mm}^2}{\text{m}}$

Resistance of wires:  $R_L = \frac{\rho \cdot l}{A}$

Voltage drop of a cable:  $\Delta U = R_L \cdot I$

→  $\Delta U = \frac{\rho \cdot (2) \cdot l \cdot I}{A}$

cable: 1mm<sup>2</sup> and 56m long → 1 Ohm



## Warrantee

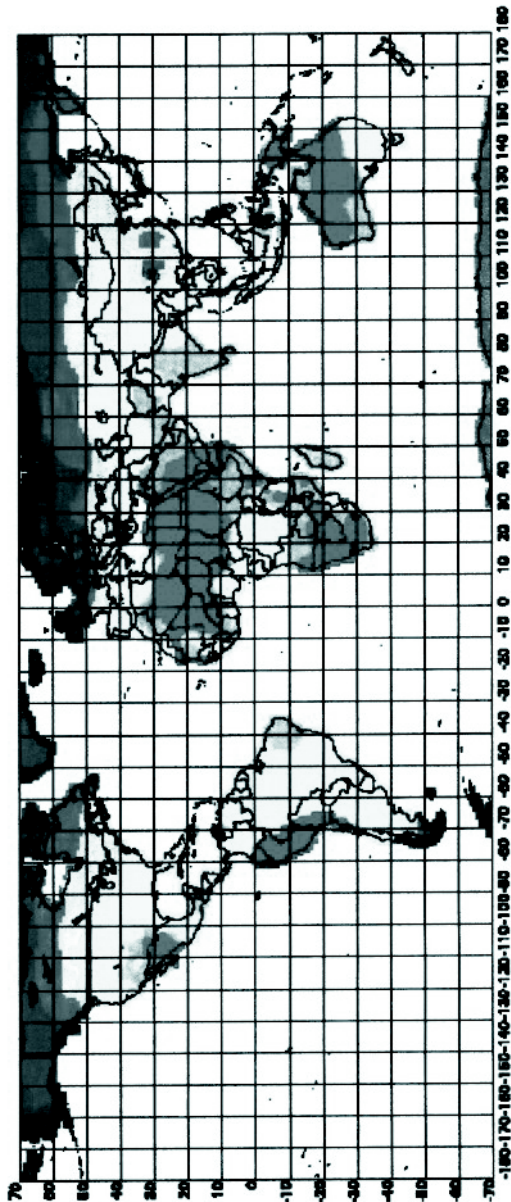
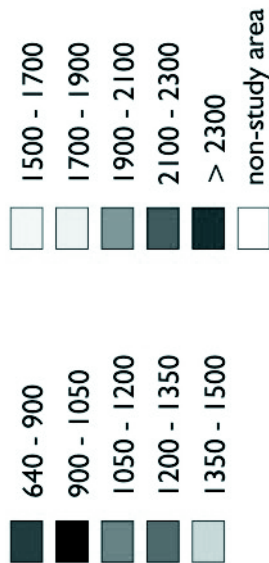
Lifeway provides one year guarantee for manufacturing defects and four years warrantee on entire system. 10 years for Photovoltaic modules and two years for Exide battery. AMC will begin from the second year onwards. Annual maintenance will be provided by our local distributors to the clients.

As a thump rule Solar irradiation over India is 1900 KWH / M<sup>2</sup> / per year. However it changes depending on the climate change. From 10 A.M to 4 P.M is considered as the harnessing time. When we are calculating a day's power production then we have to monitor that particular day's weather condition also.

## Maintenance and Operation Phase

1. Wash PV array, during summer days, when there is a noticeable buildup of dust, tree leaves on it.
2. Periodically inspect the system to make sure all wiring and supports stay intact.
3. On a sunny day near noon, review the output of the system (assuming the array is clean) to see if the performance of the system is close to the previous year's reading. Maintain a log of these readings so you can identify if the system performance is staying consistent, or declining too rapidly, signifying a system problem.

## Lifeway Solar Irradiation in kWh/m<sup>2</sup> per year (!)







## Before starting PV system testing

1. Check that non-current carrying metal parts are grounded properly. (array frames, racks, metal boxes, etc. are connected to the grounding system)
2. Ensure that all labels and safety signs specified in the plans are in place.
3. Verify that all disconnect switches (from the main AC disconnect all the way through to the combiner fuse switches) are in the open position and tag each box with a warning sign to signify that work on the PV system is in progress.
4. Verify that all combiner fuses are removed and that no voltage is present at the output of the combiner box.
5. Visually inspect any plug and receptacle connectors between the modules and panels to ensure they are fully engaged.
6. Check that strain relief's / cable clamps are properly installed on all cables and cords by pulling on cables to verify.
7. Check to make sure all panels are attached properly to their mounting brackets and nothing catches the eye as being abnormal or misaligned.



8. Visually inspect the array for cracked modules.
9. Check to see all wiring is neat and well supported.
10. Check home run wires (from PV modules to combiner box) at DC string combiner box to ensure there is no voltage on them.
11. Recheck that fuses are removed and all switches are open.
12. Connect the home run wires to the DC string combiner box terminate in the proper order and make sure labeling is clearly visible. Verify that the only place where the AC neutral is grounded is at the main service panel.
13. Check the AC line voltage at main AC disconnects is within proper limits (220 - 230 Volts AC).

### **LIFEWAY SOLAR SUNPOWER GENERATOR START UP TESTS**

1. Be sure that the system is off before proceeding with this section.
2. Test the continuity of all DC fuses to be installed in the DC string combiner box, install all string fuses, and close fused switches in combiner box.



3. Check open circuit voltage at DC disconnect switch to ensure it is within proper limits according to the manufacturer's installation manual.
4. If installation contains additional DC disconnect switches repeat the step 4 voltage check on each switch working from the PV array to the Lifeway sun power generator DC disconnect switch closing each switch after the test is made
5. At the point consult the Lifeway Sun power generator manual and follow proper startup procedure.
7. Confirm that the operating voltage is within proper limits according to the manufacturer's installation manual.
8. After recording the operating voltage at the Lifeway Sun power Generator close any open boxes related to the system.
9. Confirm that the Lifeway Sun power Generator is producing the expected power output on the supplied meter.
10. Provide the house owner with the initial startup test report.



## **SUNPOWER GENERATOR ACCEPTANCE TEST**

Ideal testing conditions are midday on cloudless August through May however cloudy and rainy days to be avoided. This test procedure accounts for less than ideal conditions and allows acceptance tests to be conducted on sunny summer days like in March, April and May. Due to climate change 2008 we had summer shower continuously in April 2008. So this fact also we have to consider in the coming years.

1. Check to make sure that the PV array is in full sun with no shading whatsoever. If it is impossible to find a time during the day when the whole array is in full sun, only that portion that is in full sun will be able to be accepted.
2. If the system is not operating, turn the system on and allow it to run for 15 minutes before taking any performance measurements.

**WARNING: IF POLARITY OF ONE SOURCE CIRCUIT STRING IS REVERSED, THIS CAN START A FIRE IN THE FUSE BLOCK RESULTING IN THE DESTRUCTION OF THE COMBINER BOX AND POSSIBLY ADJACENT EQUIPMENT.**

**List of Distributors in Kerala:****Kannur:**

M/s Suntec Industries,  
Kumar Building,  
Near LIC Main Branch, Talap  
Kannur  
Phone: 0497 - 2701490, 3255012

**Perumbavoor:**

M/s Vinayaka Electro World,  
Classic Tower, Near Syndicate Bank  
AM Road , Perumbavoor - 683541  
Phone : 0485 - 6451230

**Pathanamthitta:**

A.C Agencies,  
Pop. SBT Main Road,  
Kumbanad, Pathanamthitta  
Phone: 0469 - 2665975

**Thrissur:**

Manuelsons  
Century Wood crafts  
M.O Road Thrissur  
Phone : 0487- 2335974

**Muvattupuzha:**

M/S Savith Electro World  
Velloorkunnam Junction  
Surya Centre, Muvattupuzha  
Phone: 0485-6451230

**Changanassery:**

M/s Surya Solar  
Behind Municipal Bus Stand  
Changanassery  
Mob: Rajesh - 9447355178



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