

Installation and User Manual

Module Kit Sun Wave 30
Module Kit Sun Wave 50



Table of Contents

<i>PRODUCT DESCRIPTION</i>	4
Features:	4
Component List:	4
Technical Deatails:	5
Packaging:	5
<i>SAFETY</i>	6
<i>DIMENSIONS</i>	7
<i>3 STEPS Mechanical Mounting Procedure</i>	8
<i>ELECTRICAL INSTALLATION</i>	9
Electrical Configuration	9
Cables and Wiring	9
Connect Battery	10
Connect Charge Controller.....	12
<i>MAINTENANCE PANEL</i>	12
Cleaning.....	12
<i>MAINTENANCE BATTERY</i>	13
General Battery Type	13
Flooded Batteries only.....	13
Discharging	13
<i>MAINTENANCE SYSTEM</i>	14
<i>SAMPLE FOR SOLAR HOME SYSTEM</i>	14
<i>TROUBLESHOOTING</i>	16
Trouble shooting list.....	16

Thank you for choosing Phaesun as your photovoltaic system provider. This manual contains important information pertaining to the mechanical installation and maintenance of our module Sun Wave, and contains safety information that you must read carefully and be familiar with before handling and installing. Phaesun does not assume responsibility and expressly disclaims liability for losses, damages, or expenses arising out of, or in any way connected with this Installation and User Manual.

PRODUCT DESCRIPTION

The Phaesun Module Kit Sun Wave is the ideal product to empower households and small shops. The 30W or 50W solar panel brings enough energy for illumination, running a fan, mobile phone charging, radio and TV. It makes you independent of gasoline and kerosene (also from the grid). The sun empowers you for free - every day

Features:

- *The Module Sun wave is very easy to mount; you need just a hammer to nail it down like a corrugated roofing sheet.*
- *"Do It Yourself" for installation no expert is necessary YOU can do it. The Installation guide will show you step by step how to install it.*
- *Extendable: with this 10A charge controller you can extend the system up to 150W*
- *Repairable: If any component is damaged you can change it with any other 12V component.*
- *Theft proof: The solar panel is integrated in the roof, nobody can remove the nails without a tool.*
- *Easy to transport: weight and size is designed for transportation by , bike, public, car or walking.*

Component List:

- *Module Sun Wave 30W or 50W 18V, ideal for charging 12V batteries*
- *10A Charge Controller*
- *10m Copper Cable 1,5mm² (Panel to Controller)*
- *1m Copper Cable 2,5mm² (Controller to Battery)*
- *Battery Clamps*
- *Crocodile Clamps*
- *Battery Screws M5*
- *Screw Driver*
- *Terminal Strip*

Module Kit Sun Wave 30, Module Kit Sun Wave 50

- *Roofing Nails*
- *Cable clips*
- *Installation and user Manual*

12V Lead Acid Solar Battery and LED Lights have to be bought locally

Recommended Battery:

Module Kit Sun Wave 30: 20-40 Ah

Module Kit Sun Wave 50: 30-60 Ah

Technical Deatails:

Module Sun Wave:

-30Wpeak 900 x 420 x 30mm 3,2kg 36 Poly Cells

-50Wpeak 1300 x 520 x 30mm 5,2kg 36 Poly Cells

Charge Controller: 10A 12/24V

- Protection against reverse polarity of solar modules*
- Protection against reverse polarity of connected battery*
- Short-circuiting at the module input (no fuse change necessary in case of short cut)*
- Short-circuiting at the load output (no fuse change necessary in case of short cut)*
- Protection against over charging*
- Reverse current protection at night*
- Over voltage and under voltage protection*
- Over load protection at load output*
- Deep discharging protection/low voltage disconnect*
- Battery status indicator in 4 steps*

Packaging:

All components are in a carton of:

Module Kit Sun Wave 30: 100x430x40mm Weight: 5,2kg

Module Kit Sun Wave 50: 1400x530x40mm Weight: 7,2kg

SAFETY

For your safety, do not attempt to work on a rooftop until safety precautions have been identified and taken, including without limitation fall protection measures, ladders or stairways, and personal protective equipment (PPE). For your safety, do not install or handle PV modules under adverse conditions, including without limitation strong or gusty winds, and wet or frosted roof surfaces.



PV modules can produce current and voltage when exposed to light of any intensity. Electrical current increases with higher light intensity. DC voltage of 30 Volts or higher is potentially lethal. The Module Sun Wave are designed for 12V/24V Systems. Never connect them to more than two in serial (24V system).

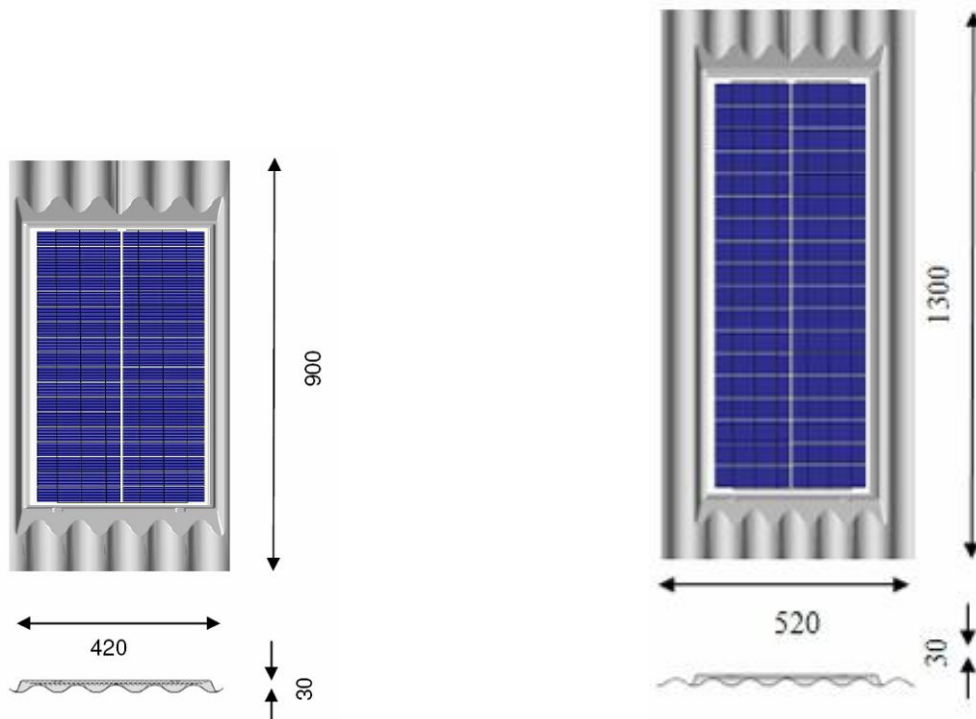


DIMENSIONS

The product is designed to fit perfect on a corrugated roof. A length of more than one meter (50W Panel) makes sure that you find a wooden truss below the existing roof for nailing. A width of only 520 mm (420 mm) ensures that it is easy to carry by one person. If the power of 50W is not enough for your house extend the system by adding further panels.

Module Sun Wave 30 (30W)

Module Sun Wave 50 (50W)



3 STEPS Mechanical Mounting Procedure

1) *Find a good place on the roof: The most important criteria is that it is a free of shadow and sunny area, no shadow in morning, evening or any season. It should be a place where you can inspect the panel easy if it is dirty or covered by something. At least it should be a place where you can mount it easy and you have enough space to add further panels.*

2) *Put Cable trough the overlapping area into the house: Lift the ridge sheet or an roofing sheet above the mounting place and push the cable into the inner side of the roof. Make sure that the cable touches no sharp edges. Create a pull relief to ensure that the cable is relaxed after final mounting.*



3) *Nail panel on the outside crests: Before nailing check if the roofing area used for the panel is even. The panel should not be bended. Please be careful that no existing nail or other deformed parts of the roof makes pressure on the backside of the solar panel.*



Now the panel is ready to be connected to the charge controller.

ELECTRICAL INSTALLATION

Electrical Configuration

This type of panel is called a 36 Cell Solar panel because that's the number of solar cells which are soldered together inside. This type of panel is used for charging 12V batteries. Be careful!! The output voltage of the panel is between 18V and 21V!! Never run loads direct with the panel. The load will be damaged by the high voltage. The higher Voltage is necessary to feed the current into the Battery.

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Cables and Wiring

The Module Sun Wave is provided with a 1m twin cable of 1,5mm² diameter. The red side of the cable is the positive (+) terminal and the black side the negative (-) terminal. For connecting the panel with the charge controller an extension is necessary. Recommended is a cable with the same cross section of 1,5mm² like the cable on the panel, with a maximum length of 10m (included). For longer distances use a cable with more than 1,5mm². To connect the extension with the cable of the panel we strongly recommend using the included terminal strip to ensure a good electrical contact (never twist it together only).

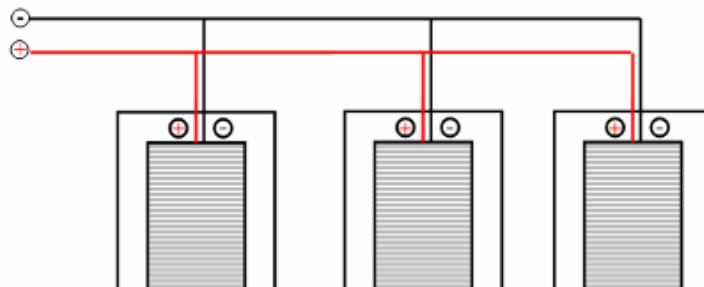


Cables should be fixed to the roofing structure in such a way that mechanical damage of the cable and/or the module is avoided. Do not apply stress to the cables. For fixing, use appropriate means, such as cable ties and the included wire nails.

The maximum number of PV modules that can be connected in parallel must be calculated in accordance with applicable regulations in such a way that the specified maximum system current of the PV module and all other electrical DC components will not be exceeded. For example: This 50W panel has a max. current of 3A. If you use a 10A charge controller you can run max. 3 panels in parallel, see picture below.

To supply current for a 24V System is also possible. The panels have to be connected in pairs (12V+12V serial connection)

Parallel Wiring (Current Additive)



Connect Battery

For connecting the battery there are different connectors included to the kit. The 1 m long cable has two cable rings, red and black, on the end. The diameter of the cable rings is 8 mm. Depending on the connectors of the battery you have to use different connectors.

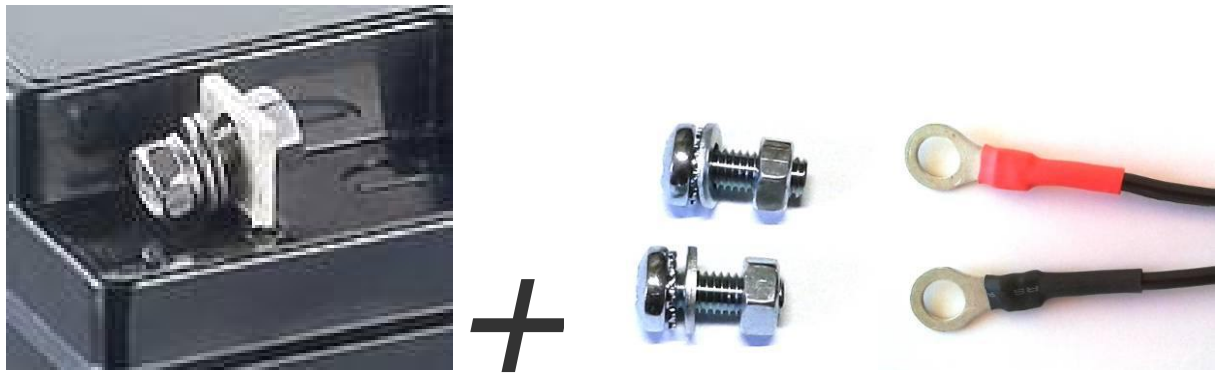


Please ensure that a toothed washer is between the battery and the cable ring. It helps to make a good electrical contact.

Screw Type:

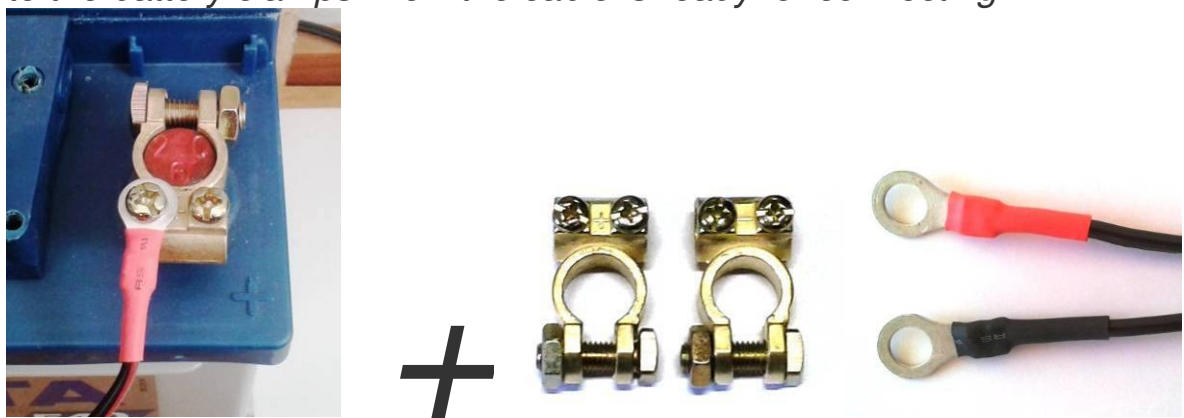
Use the battery cable as it is and connect it with the screws.





Pole Type:

This type of pole is typically used for car batteries. Install the cable rings to the battery clamps. Now the cable is ready for connecting.



Any type:

Connect the Crocodile clamp with the included screws to the battery cable. With this crocodile clamp you can connect nearly every pole type of battery.



Connect Charge Controller

The included charge controller has a detailed installation manual. Please follow the instructions exactly.

MAINTENANCE PANEL

General Phaesun recommends that PV systems be periodically inspected by user, or other qualified person. The purpose of the PV system inspection is to ensure that all system components are functioning properly. At a minimum, this inspection should confirm the following: – All cables and connector attachments are undamaged and properly secured – No sharp objects are in contact with the PV module surfaces – PV modules are not shaded by unwanted obstacles and/or foreign material – Mounting components are tightly secured with no corrosion defects should be addressed immediately.

Cleaning

Over time, dirt and dust can accumulate on the glass surface of the module, reducing its power output. Phaesun recommends periodic cleaning of PV modules to ensure maximum power output, especially in regions with low precipitation. In order to reduce the potential for electrical and thermal shock. Phaesun recommends cleaning PV modules during early morning or late afternoon hours when solar radiation is low and the modules are cooler, especially in regions with hotter temperatures. Never attempt to clean a PV module with broken glass or other signs of exposed wiring, as this presents a shock hazard. Clean the glass surface of the PV modules with a soft brush using soft, clean water with a recommended pressure less than 690kPa, which is typical of most municipal water systems. Water with high mineral content may leave deposits on the glass surface and is not recommended. Module Sun Wave may contain a hydrophobic anti-reflective coating on the glass surface to enhance power output and reduce dirt and dust build-up. In order to avoid module damage, do not clean PV modules with a power washer or pressure washer. Do not use steam or corrosive chemicals to facilitate the cleaning of modules. Do not use aggressive tools or abrasive materials that could scratch or damage the glass surface. Failure to comply with these requirements may adversely affect the PV module performance.

MAINTENANCE BATTERY

General Battery Type

Lead acid batteries are generally classified by application (what they are used for) and by construction (how they are made). Deep-cycle batteries are used for various types of applications specific such as RV, golf cars, renewable energy, and marine.

There are two popular construction types: flooded batteries (wet) and VRLA batteries (Valve Regulated Lead Acid). In the flooded types, the electrolyte is a solution of sulphuric acid and water that can spill out if the battery is tipped over. In VRLA batteries, the electrolyte is suspended in a gel or a fiberglass-mat (AGM technology), allowing these batteries to be mounted in a variety of positions.

Before getting started, be sure to identify the type of battery involved. This section addresses the charging and maintenance for both deep-cycle flooded and VRLA batteries.

Flooded Batteries only

Flooded batteries need water. More importantly, watering must be done at the right time and in the right amount or the battery's performance and longevity suffers.

Water should always be added after fully charging the battery. Prior to charging, there should be enough water to cover the plates. If the battery has been discharged (partially or fully), the water level should also be above the plates. Keeping the water at the correct level after a full charge will prevent having to worry about the water level at a different state of charge.

Depending on the local climate, charging methods, application, etc., Trojan recommends that batteries be checked once a month until you get a feel for how often your batteries are need watering.

Discharging

Discharging batteries is entirely a function of your particular application.

However, below is list of helpful items:

- Shallow discharges will result in a longer battery life.*
- 50% (or less) discharges are recommended.*
- 80% discharge is the maximum safe discharge.*
- Do not fully discharge flooded batteries (80% or more). This will damage (or kill) the battery.*

- *Many experts recommend operating batteries only between the 50% to 85% of full charge range. A periodic equalization charge (charging until 100% full) is a must when using this practice.*
- *Do not leave batteries deeply discharged for any length of time. Charge it next day.*
- *Lead acid batteries do not develop a memory and do not need to be fully discharged before recharging.*
- *Batteries should be charged after each period of use.*
- *Batteries that charge up but cannot support a load are most likely bad and should be tested. Refer to the Testing section for proper procedure.*

The charge controller stops discharging automatically at 50% for a long lifetime. Be carefully if you run loads directly on the battery poles (not on the output of the charge controller)- you can discharge the battery completely!!

MAINTENANCE SYSTEM

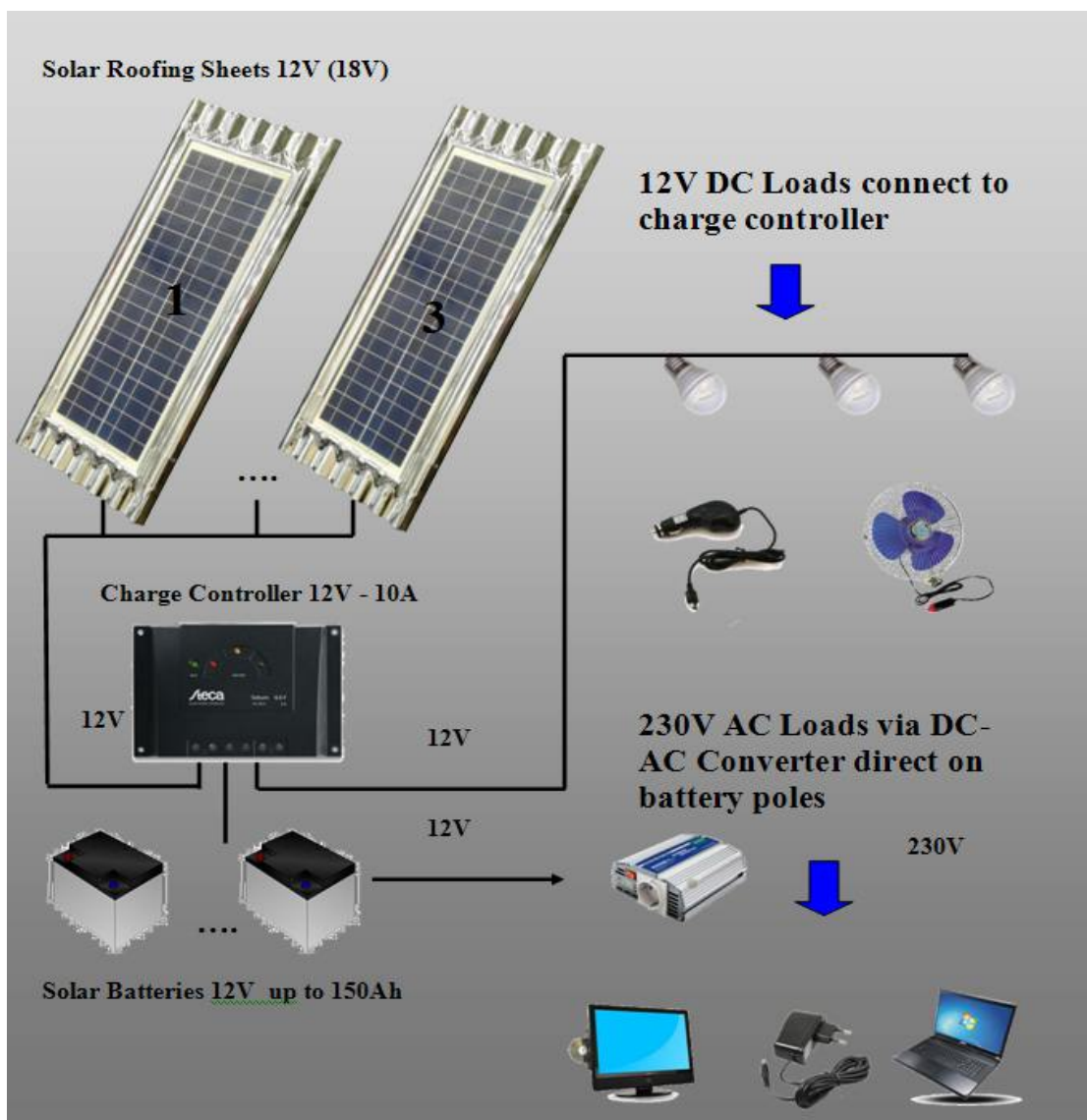
As with any mechanical or electrical appliance, PV systems require routine, periodic maintenance. System components may also need repair or replacement from time to time.

An efficient and long-lasting system will depend on a periodic check of system components and completion of any preventive maintenance as necessary. Talk with your system installer about routine and periodic maintenance. In the event of a system malfunction, effective troubleshooting and repair is necessary.

You may be able to carry out many routine inspections and maintenance tasks yourself. If, however, you are not the do-it-yourself type, or if there is a major problem with your system, you will need to locate a professional to do the work.

SAMPLE FOR SOLAR HOME SYSTEM

In the following picture a sample of a solar home system is illustrated. Solar panels feed via a charge controller current into one or more batteries. The illumination and small 12V loads are connected to the charge controller output. The controller will stop the loads when the battery is to low. AC loads with 110V or 230V need a DC-AC converter to run on a battery. Be carefully such loads consume mostly a lot of power! Most of the DC-AC converter have a over discharge protection which stops if battery voltage is below 11V (50% discharge).



TROUBLESHOOTING

If the system stops working there are a lot of reasons possible. First of all check the lights of the charge controller and refer to the charge controller manual. In the table you find further instructions to fix the failure.

Trouble shooting list:

<i>Symptom</i>	<i>Probable cause</i>	<i>Items to examine or correct</i>
<i>Completely dead, no display</i>	<i>No battery power</i>	<i>Battery disconnected, overly discharged, connected reverse, external fuse. Battery powers the charge controller, not PV</i>
<i>Battery is not charged</i>	<i>If solar module voltage is lower than battery voltage or if solar module is defective the battery cannot be charged.</i>	<i>Check if solar modul is connected with correct polarity or if short circuit at the solar input.</i>
<i>Battery displays jumps quickly</i>	<i>Battery voltage changes quickly. Large pulse currents cause voltage fluctuation.</i>	<i>Battery is too small or defective. Ask your dealer for technical assistance.</i>
<i>Red or yellow status LED is flashing, no output current</i>	<i>Battery voltage lower than power on setpoint,</i>	<i>This is normal operation. Output is off until the yellow LED stops flashing.</i>
<i>Charge current is lower than expected, PV current may be low as well</i>	<i>Battery is highly charged</i>	<i>Normal operation, current is reduced if battery voltage is at set point. >13.8V</i>
<i>Charge controller disconnect very early although it was a sunny day</i>	<i>Battery is at the end of lifetime, solar panel is dirty, cable or connection points are corroded</i>	<i>Check age of battery. Cheap battery works for 300 cycles, expensive high quality solar battery works for 1000 cycles. Check cables and connectors.</i>