

## Maintenance:

- The power output of the solar module can be increased if it is cleaned from time to time.
- Keep the battery box and the appliances clean. Make sure that no water harm the battery box or the appliance.
- The battery have to be replaced, after many years of use This should be done by an authorized service person.

## Annex 1

### fosera Appliances:

fosera appliances are designed to reach a high life span.

In addition to that fosera appliances are extremely efficient. Through this efficiency the appliances can be used many hours every day without the need of a very expensive solar system.

The fosera appliances ensure that they can operate at any voltage of the system and in a very wide range of temperatures.

Most appliances are designed for indoor use. Protect them from rain and direct sun.

List of available and planed fosera appliances:

Appliance	Output	Max. Current [A]	Lifespan [h]	Remarks
fosera lamp 50	50lm	0,1	20000	Brightness similar to 2 kerosene lamps
fosera lamp 100	100lm	0,2	20000	Brightness similar to 15W incandescent
fosera lamp 200	200lm	0,4	20000	Brightness similar to 25W incandescent
fosera phone charger	350mA	0,4	10000	Can charge nearly any cellphone
fosera radio	0,3W	0,1	20000	Multi band receiver
fosera TV	10"	2A	10000	Date of issue not known jet
fosera cooler	50l	1A	10 years	Date of issue not known jet

## Annex 2:

### Available fosera Systems:

Following fosera systems are available. All systems can be combined and paralleled in an intelligent way.

Available fosera systems:

Name	Module size [W]	Battery size [mAh]	Max. current [A]	Daily Output [Ah]	Number Outlets	Remarks
fosera PSHS 2800	1,5	2800	1,2	1,2	4	
fosera PSHS 4200	2,5	4200	1,2	1,8	4	
fosera PSHS 7000	5	7000	2	3,6	4	Available June 2010
fosera scandle	1	1200	1,2	1	1	Available July 2010
fosera Light	1	1200	1,2	1	1	Available Sept. 2010

fosera scandle and fosera light are small complete solar systems with built in charge control and battery. They allow to connect one radio over the blue connector socket. This connector socket can also be used to parallel these products among each other or with the fosera PSHS.

## System Sizing:

To size the system it is important that the daily discharge is not higher than the daily output of the system.

### Example 1:

A family needs in their home 2h of of bright light in the main room. They need as well 3h a small little light in the bedroom. They also like to listen every day 3 hours of radio. Every third day they have to charge a cellphone. It takes 3h to charge it.

They chose fosera lamp 200 for the main room and fosera lamp 50 in the bedroom. The phone charger will need to charge every 3rd day 3 for 3h. This means it works in the average 1h per day.

Calculation of the daily discharge:

fosera lamp 200:  $2\text{h/d} * 0,4\text{A} = 0,8\text{Ah/d}$

fosera lamp 50  $3\text{h/d} * 0,1\text{A} = 0,3\text{Ah/d}$

fosera phone charger:  $1\text{h/d} * 0,4\text{A} = 0,4\text{Ah/d}$

fosera radio  $2\text{h/d} * 0,1\text{A} = 0,2\text{Ah/d}$

Total daily discharge	1,7Ah/d
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### Example 2:

An old single lady needs 3h of light (50lm) and she likes to listen to 6h of Radio.

fosera scandle 50  $3\text{h/d} * 0,1\text{A} = 0,3\text{Ah/d}$

fosera radio  $4\text{h/d} * 0,1\text{A} = 0,4\text{Ah/d}$

Total daily discharge	0,7Ah/d
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For her a fosera scandle lamp would be a good solution. If she likes a ceiling lamp she could use also fosera light.

### Example 3: (example how to extend the system)

The family from example 1 is very happy with the fosera system. After the next harvest they decide to have now 2 more lamps in two more rooms. They will chose fosera lamp 100. Both lamps will operate for 2h. One of the sons have bought an additional cellphone.

**FOSERA PSHS User Manual**

fosera lamp 100 2h/d * 0,2A = 0.4Ah/d	
fosera lamp 100 2h/d * 0,2A = 0.4Ah/d	
fosera phone charger: 1h/d * 0,4A = 0,4Ah/d	
<u>Total daily discharge</u>	<u>1,2Ah/d</u>

To generate enough additional power it would be possible to use one more fosera PSHS 2800. Probably they decide to take one more fosera PSHS 4200 to have light reserves for even more power in the future.

## Instructions: fosera Pico Solar Home System PSHS

Thank you for buying the Solar Home System PSHS of fosera. This system has been developed carefully according to German engineering standards. If it is used in the designated way, it will supply electric light and other services for many years. The system uses most modern and long lasting li-battery technology. The solar module is made out of crystalline silicon in well proven glass based encapsulation. The lamp is using long lasting LEDs with highest efficiency. The system is designed with an intelligent plug system. This does allow self installation by the user. Fosera PSHS is the first system which can grow with the demand of the user. Its unique modular design allows to add several fosera PSHS systems in parallel.

### Security Advice:

- The battery box must only be opened by trained and authorized persons. If the box is opened by other persons the warranty is lost.
- Make sure that the box is never damaged.
- All components of the system (except the solar module) are designed for indoor use. Protect these components from rain and direct exposure of sunlight.
- The battery contains a high amount of electrical energy. It is important that any short circuit is prevented. Any repair, change and addition of the electric system must be only done by authorized persons. Make sure that cables do not get damaged. If cables are damaged, make sure that they get repaired and replaced.
- Don't use loads which are not designed and certified for the system.
- Use only Fosera Modules to charge the battery. Other modules or chargers are not allowed.
- Use for parallel connection only the special Fosera cable for paralleling the system. This special cable is limiting the current which flows between the systems.
- The PSHS and the appliances are designed to operate in a range of 0 to +50°C. Lower or Higher temperatures can reduce the capacity and life span of the battery.

### Content:

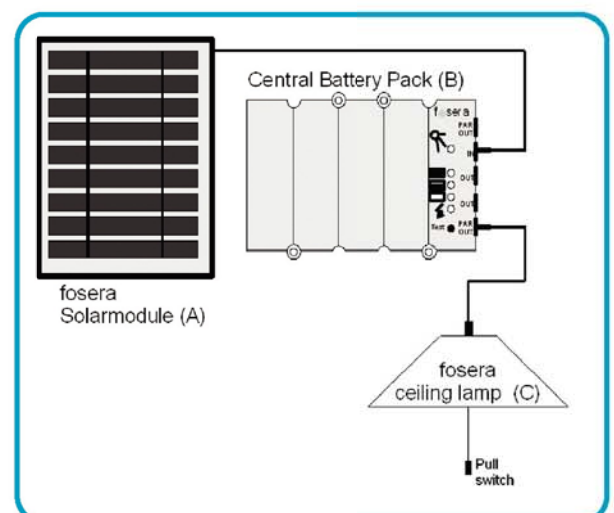
The package should contain the following components:

- Solar Module (A)
- Central Battery Box (B)
- High efficient Fosera LED Lamp (C)
- Instructions

Check carefully if all components are included.

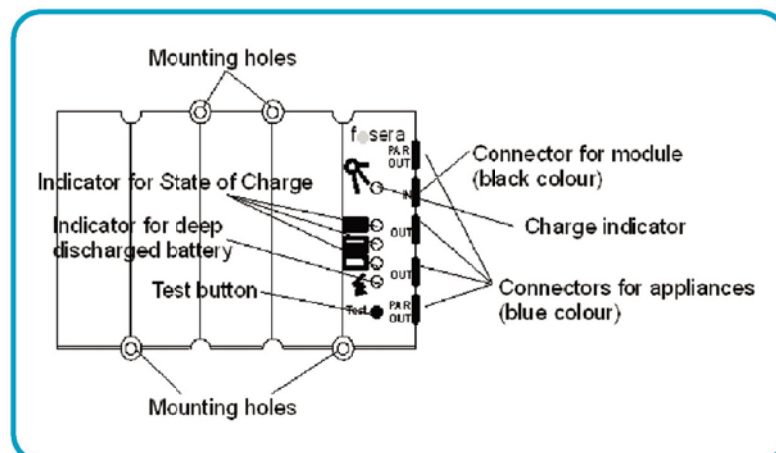
Following additional components can be connected:

- fosera cell phone charger
- fosera Radio
- further fosera lamps



## Installation:

1. Mount the central battery box on to the wall. Use the drill template on the packing carton. Don't mount the box on or close to burning material such as wood.
2. Mount the solar module on a sunny place outside. Make sure that the solar module is completely in the sun and not shaded. Even if the module is partly shaded it will bring none or a strongly reduced power output. The module should look face the northern hemisphere to the south and in southern hemisphere to the north. The tilt angle should be selected according to the location. The angle should be at least 20 degrees to make sure that the rain can wash dirt from the module. Make sure that the solar module is strongly fixed to be stable at strong storms.
3. Connect the module to the central battery box. Therefore plug the black jack into the black socket in the battery box.
4. Place the lamp and the other appliances (e.g. Phone charger) to the place where you wish them to be. Make sure that the cable does not get too long. For cable extension use only Fosera cables. The cable must be passed in a way that it could not be damaged.
5. Connect the cable of the lamp or the other appliances (e.g. Radio, Phone charger etc. ) into the blue sockets of the battery box.
6. Check the status of the system by pressing the test button:
  - If the lowest deep discharge LED (red) is on, the system need to be charged first before the appliances can be used.
  - If one or several of the middle "State of Charge LEDs" (red, yellow and green) is on, the appliance can be used. The more LEDs are on the more energy is in the battery.
  - At daytime the yellow charging LED should be on. It indicates that the system is charged and well connected to the module.
  - If several systems are used in parallel, please use the fosera parallel cable.



## System Explanations:

Function of the LEDs: Please note: To save energy, the LED only lights during the "TEST" Button is pressed.

LEDs name (For position see drawing above)	Colour	Function
Charge Indicator	Yellow	Lights as soon as battery get charged. Should be "ON" always at day time
State of Charge Indicator	Green	Glooming means "battery nearly full" Very bright means "battery completely full"
State of Charge Indicator	Yellow	If only Yellow and Red State of Charge LED is "ON" means "battery medium charged"
State of Charge Indicator	Red	If only Red State of Charge LED is "ON" means "battery low charged"
Indicator Deep Discharged Battery	Red	If "ON" battery is completely empty. All appliances will be switched "OFF"

## Increasing the System:

To increase the number of appliances and the total power of the system it is possible to use several fosera PSHS systems in parallel.

Please note for parallel connection:

- To parallel the system use the "PAR OUT" blue output connector at the top or the bottom of the system.
- Use only the special fosera paralleling cable. This cable balances the energy flow between the system. It also limits the max. current flow.
- Make sure that the appliances on both systems have similar power and similar energy consumption.
- Make sure that both systems have the appropriate module be well connected.
- It is possible to connect several fosera systems with different module and battery sizes.

Circuit diagram for parallel connection:

