

Manual

EN

Handleiding

NL

Manuel

FR

Anleitung

DE

Manual

ES

Användarhandbok

SE

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# 1 GENERAL DESCRIPTION

## 1.1 Solar home system

The SHS 200 is a smart solar charge controller and power distribution system designed for off-grid electricity access. It is used with solar panels and a battery to power DC appliances (12V).

## 1.2 MPPT solar charger

By using Maximum Power Point Tracking (MPPT) technology, the SHS 200 ensures that every drop of available power is rinsed out of the panels and harvested for storage. Especially in case of a clouded sky, when light intensity is changing continuously, a fast MPPT algorithm will improve energy harvest by up to 30% compared to PWM charge controllers.

## 1.3 Load output

The SHS 200 offers nine USB ports for charging of phones and other USB appliances (tablets, hair clippers, radios, etc.) as well as two DC ports for the operations of lamps or other 12V appliances (TV, alarms, etc.). The first of the DC ports is a standard DC port, conform to the Lighting Global standard for "12V" DC ports, while the second one offers a more strictly regulated 12V output for some sensitive appliances.

## 1.4 PAYG enabled

The SHS 200 features a keypad for low-cost and reliable offline pay-as-you-go activation. It is equipped with the [OpenPAYGO Token](#) technology - an agnostic PAYGo algorithm which allows distributors to work with their preferred PAYGo platforms (e.g. PayOps, Paygee, Angaza) - or even their own proprietary platform.

## 1.5 Smart battery management

Smart multi-stage charging and load disconnect features maintain the health and extends the life of the battery. Internal temperature sensor to compensate charge voltage according to temperature. The SHS 200 is compatible with lead-acid and lithium battery technologies ([Victron SuperPack](#)).

## 1.6 LCD screen

The LCD screen Display parameters such as usage statistics, battery state of charge and agent diagnostics. Easy navigation and adjustable languages (English, French, Swahili).

## 2 IMPORTANT USAGE INSTRUCTIONS

**SAVE THESE INSTRUCTIONS** - This manual contains important instructions that shall be followed during installation and maintenance.



**Danger of explosion from sparking**

**Danger of electric shock**

- It is advised to read this manual carefully before the product is installed and put into use.
- This product is designed and tested in accordance with international standards. It should be used for the designated application only.
- Install the product in a heatproof environment. Ensure therefore that there are no chemicals, plastic parts, curtains or other textiles, etc. in the immediate vicinity of the equipment.
- Ensure that the equipment is used under the correct operating conditions. Never operate it in a wet environment.
- Never use the product at sites where gas or dust explosions could occur.
- Ensure that there is always sufficient free space around the product for ventilation. The product and battery should be kept from direct sunlight exposure. These components should be kept in a shaded and cool area. They are intended for indoor use only.
- Refer to the specifications provided by the manufacturer of the battery to ensure that the battery is suitable for use with this product. The battery manufacturer's safety instructions should always be observed.
- Protect the solar modules from incident light during installation, e.g. cover them.
- Never touch uninsulated cable ends.
- Use only insulated tools.
- The installer of the product must provide a means for cable strain relief to prevent the transmission of stress to the connections. Make sure the connectors used for the solar panel and appliances have sufficient ratings and do not generate excess heat.
- In addition to this manual, the system operation or service manual must include a battery maintenance manual applicable to the type of batteries used.
- The device, battery and solar panels should never be discarded into the environment.

## 3 INSTALLATION AND OPERATION INSTRUCTIONS

### 3.1 General

Mount vertically on a non-flammable substrate, with the USB terminals facing downwards. Observe a minimum clearance of 10 cm under and above the product for optimal cooling. Mount close to the battery, but never directly above the battery (in order to prevent damage due to gassing of the battery).

### 3.2 Solar panels

The solar panel should be put in direct sunlight, absolutely no part of it should be shaded, even partially. Ensure the panel is placed in a location where no shading will occur at any time during the day.

The solar panel should be cleaned regularly; dust can have a very significant impact on performance. It can be cleaned using a wet cloth or sponge.

If using the device with solar panels above 100W, the device must be installed vertically using the wall mount. And extra care should be taken so that its installation location is shaded and well ventilated.

The product is designed for use with one or several solar panels comprising each of 36 cells in parallel with a peak power output of up to 200Wp (Watt peak) in total.

The controller will operate only if the PV voltage exceeds battery voltage ( $V_{bat}$ ).

- PV voltage must exceed  $V_{bat} + 2V$  for the controller to start.
- Maximum open circuit PV voltage: 24V

### 3.3 Battery

The product is designed for use with a 6 cells lead-acid battery with a 12V nominal voltage and a capacity of up to 160Ah. The battery terminal type is M6.

Voltage: 12V nominal, real voltage in the range of 9VDC-15VDC during use.

Current: Charge up to 14A. Discharge up to 20A. This is subject to the actual battery used and its size (the current might be limited to reduce battery aging and ensure safety).

### 3.4 Cable connection sequence

- First: connect the battery
- Second: connect the solar array (pay specific attention to avoid reverse polarity)
- Third: connect the cables to the loads

The system is now ready for use.

### 3.5 Operating and storage conditions

- Operating Temperature: 5°C-35°C
- Storage Temperature: 0°C-45°C
- Relative humidity: 0% to 90% non-condensing
- Operating Altitude: up to 3000m
- Storage Altitude: up to 6000m

## 4 USER INTERFACE GUIDE

### 4.1 Keypad layout



### 4.2 Menu map



Check the status of the 12V port.



Check the status of the USB ports.



Display basic statistics regarding device usage (press any key to see the next one or (Cancel) to exit).



Shows the level of illumination of the panel (approximate). This is not an absolute value but mainly a relative indicator to help find the optimal position.



Shows an approximation of the level of charge of the battery (in % of the maximum charge).



Displays the number of days left in the device before activation expires. If the device is fully activated, it is shown as such.



Goes to the activation menu.



Goes to the Service menu. It should only be used by technicians. When pressed twice it displays the Registration Code.



Key used to cancel and go back to last menu

### 4.3 Activation Menu and Activation process

The activation menu is used to add time or credits to the device in time or credit mode. If the device is fully activated this menu is not useful. The device can be activated with the following procedure:

1. Access the activation menu by pressing the (Lock) button
2. Send the code to your PAYG platform.
3. You should receive an answer giving you the activation (answer) code
4. Press the (Lock) button again
5. Enter the activation code and press (Lock) to validate
6. It should now show the number of days or credits added, press (Lock) again to return to the main menu.

## 5 TROUBLESHOOTING

### 5.1 Error message shown on screen

Below is an explanation of the reasons why a particular error message would be shown on the device screen. Alerts are critical issues; the device will try to auto-protect but the source of the issue should be removed before continuing using the device. Warnings are less serious but can still require action to fix them.

#### Alerts

##### Over Temperature (FR: Surchauffe):

- Using the SHS 200 in an overly hot place
- Using the SHS 200 directly exposed to sunlight
- Using the SHS 200 in a place with inadequate ventilation.

##### Battery Overvoltage (FR: SurVoltage Bat.):

- Connecting the solar panel (or another power source) on the first output port
- Using an incorrect battery type (for example a 12 cells battery instead of a 6 cells)
- Using a battery that has been overcharged before

##### Battery Overcurrent (FR: SurCourant Bat.):

- Using too many appliances drawing too much power at the same time (more than safe for use with the selected battery).
- Connecting the solar panel (or another power source) that is able to provide a lot of current on the first output port

##### USB Overcurrent (FR: SurCourant USB):

- Using an USB appliances that exceeds the maximum current supported by the port. One can try using the appliance on the last (furthest to the right) USB port since it supports a higher current.

##### DC12 Overcurrent (FR: SurCourant DC12):

- Using a DC12 appliances that exceeds the maximum current supported by the port. One can try using the appliance on the top DC12 port since it supports a higher current.

#### Warnings

##### Panel OverVoltage (FR: SurVoltage Pan.):

- Using a solar panel that is inappropriate for use with the SHS 200 (for example a 60 cells solar panel instead of 36 cells)
- Using a power source that is not a solar panel and that has a voltage that is too high
- Using an approved solar panel, but in a situation with very low outside temperature (close to 0 degrees Celsius) that can cause the panel to produce an overly high voltage.

##### Battery UnderVoltage (FR: SousVoltage Bat.):

- Using an overly discharged battery (well below the low battery cut voltage)
- Using an incorrect battery type (for example with 2 cells instead of 6 cells)





## 5.2 Device not active

If the device is showing “Not Active, Please Activate”, it means that the device should be activated. To do so press the (LOCK) key to access the Activation Menu and follow the procedure described in the section above.

## 5.3 Low battery

If the device screen shows “Low Bat.” and the USB ports and lights are turned OFF, it means that the battery is discharged, and the device is preventing further use of it to avoid damages.

This can happen in case of overuse or in case of low amount of incoming solar power (cloudy weather or poorly positioned solar panel). Check that the solar panel is positioned in full sun and allow the battery to charge without using the device for a couple of daylight hours and then use it as little as possible until the battery reaches a high state of charge (over 80% after the charge is finished at night).

Do not in any case try to connect anything directly to the battery to bypass that protection as it will permanently damage the battery.

If the weather is good and the usage is low and this problem still persists, the problem might come from the solar panel, in that case, refer to the section below for further information on how to solve the problem.

## 5.4 Solar panel level always low

If the solar panel indicator is low (below 40%) even when there is a lot of sun shining on the solar panels or if battery never reaches a high level of charge, there might be an issue with the solar panel positioning or cleanliness.

First, check if the solar panel is cleaned. A thin layer of dust or a small (even just 1cm wide) piece of dirt or leaves on the panel can significantly impact its performance. Use a wet cloth to clean the panel thoroughly.

Second, make sure that no part of the solar panel is in the shade, a small shadow on any part of the solar panel can reduce its production a lot. Make sure that no tree, branch or construction will make a shadow on the solar panel at ANY TIME OF THE DAY.

If, after those steps, the solar panel indicator is still low, please contact your technical services for more information on how to solve the issue.

## 6 TECHNICAL DATA

SHS 200 MPPT	
Battery voltage	12Vdc
Nominal PV power	50 to 200Wp total (36 cells)
Maximum PV open circuit voltage	24V
Maximum charge / discharge currents	14A / 20A
Peak efficiency	96%
Suitable battery capacity	Up to 160Ah
Compatible battery technologies	Sealed lead-acid, Victron SuperPack (lithium)
Absorption / float voltages	14.4V / 13.75V (configurable)
Temperature compensation	Yes (automatic)
Automatic load disconnect	Yes (configurable low state of charge disconnect)
Operating temperatures	0 to 40°C (derating from 35°C)
Humidity	90%, non-condensing
Protections	Reverse polarity protection on battery, overvoltage protection on battery, undervoltage protection on battery, overcurrent protection on battery, overcurrent protection on outputs.
PAYG	
Remote activation	Unlock codes sent to end-user via SMS to activate the system
Compatible PAYGo platforms	PaygOps, Angaza, Paygee
Token technology	Free and secure open source token system ( <a href="#">OpenPAYGO</a> )
ENCLOSURE	
PV terminals	5.5 x 2.1mm connector or external extension cables
Battery cables	Included (14 AWG - 1m) / suitable for M6 battery terminals
USB outputs	9 USB ports Voltage: 4.75V - 5.25V Overall maximum of 10A across all ports Individual maximum of 1.5A for ports 1 to 8 and of 3A for port 9
Standard 12V DC outputs	1 port Voltage: 10.5 to 15V (according to Lighting Global standard) Current: Up to 9A
Regulated 12V DC outputs	1 port Voltage: 11V to 12.25V Current: Up to 4A
Operating temperatures	0 to 40°C (derating from 35°C)
Color	Standard: black enclosure and blue keypad Customizable co-branding (minimum order quantity: 1000 units)
Dimensions (h x w x d)	148 x 204 x 67 mm
Netweight	0.39kg
Protection category	IP 41
STANDARDS	
Other	CE

Distributor:

Serial number:

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