We Care Solar | Jan 2019

www.wecaresolar.org
WCS-SC3

We Care Solar Suitcase® User Manual
We Care Solar® promotes safe motherhood and reduces maternal mortality in energy poor regions by providing healthcare workers with reliable lighting, mobile communication, and medical devices using solar electricity.

The We Care Solar Suitcase® provides highly efficient solar energy systems to health facilities in areas without reliable electricity. Our durable, easy-to-use Solar Suitcases power medical lighting, mobile communication, and essential medical devices.
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About the Solar Suitcase

05 Solar Suitcase Contents
06 Solar Suitcase Overview
07 Main Battery and Solar Panel
08 Lights
10 Display Screen
Solar Suitcase Contents

**Solar Suitcase Installation**

- A. 1 Main Battery (Lithium Ferrous Phosphate 12 volt internal battery)
- B. 1 Homerun Cable (for connection from solar panel to Solar Suitcase)
- C. 1 Solar Panel Mounting Kit
- D. 1 Solar Suitcase and Light Mounting Kit
- E. 1 Tool Kit
- F. 1 Solar Panel (50-200 watts)

**Lights**

- G. 4 Lights
- H. 1 Light Expansion Box

*Note: As an optional configuration, the Solar Suitcase can come with just two lights and solar panels that fit inside the Solar Suitcase*

**Appliances**

- I. 2 Rechargeable Headlamps with Micro USB Cables
- J. 1 Fetal Doppler
- K. 1 AA/AAA Rechargeable Battery Charger
- L. 4 AA Rechargeable Batteries
Solar Suitcase Overview

- Installation & Service Info Sticker
- Display Screen: Showing the information of the Solar Suitcase
- Main Battery: Located behind the front panel
- Display Control Buttons
- Side Panel: Homerun cable, lights & expansion box connection panel
- Light Expansion Box
- 12v Sockets
- AA/AAA Rechargeable Battery Charger
- USB Sockets
- Main Power Switch
- Fetal Doppler
- Lights
- Rechargeable Headlamps
- Pocket For Your Phone
- Light Buttons
- USB Sockets (P.16 & P.20)
Main Battery and Solar Panel

Main Battery
Main battery stores electricity for powering the lights and charging appliances.

Main Battery
The main battery - Lithium Ferrous Phosphate (LFP) 12 volt internal battery - is located behind the display screen. It lasts for about 5 years and can be stored for months without harm to the battery.

Main Battery Replacement
After years of usage, if you notice the main battery is full at the beginning of the evening (you see 💡 on the display screen), but runs out of charge quickly (for example, the main battery cannot provide enough power for one light through the night), it is time to replace your battery.

The Solar Suitcase can be used with both LFP and Sealed Lead Acid batteries. However, Sealed Lead Acid batteries are less durable and will not perform as well as LFP batteries, and will need to be replaced every two years.

Refer to P.31 for instructions on how to replace the main battery.
Connecting the Lights

Tighten the locking rings so that the cables do not unplug when pulled on.

Connecting the Light Expansion Box

Light expansion box connector requires precise alignment.
Lights

Understanding the Lights

When the main battery is fully charged, it can power 4 lights throughout the night on the normal setting and up to 6 hours on the brighter setting.

⚠️ The lights can only be used with the Solar Suitcase
⚠️ The lights can be cleaned with a damp cloth

Understanding the Light Buttons and Light Expansion Box

Press to turn on lights. There are two settings for the lights.

1 press:
   - Normal

2 press:
   - Brighter

⚠️ If you see a red light, the light is poorly attached or damaged. For troubleshooting see P.29
Display Screen

Main Battery Status
Shows the percentage that the main battery is charged

When display shows ↑, the main battery is charging (power coming into the main battery)

When display shows ↓, the main battery is discharging (more power is leaving than entering the battery)

Flow In
Shows the flow of power into the main battery from the solar panel

Solar Panel Status
Shows that the solar panel is connected properly and it is getting power from the sun

Flow Out
Shows the flow of power out of the main battery to power the loads

Loads (Usage)
Shows which lights, sockets, and appliances are using power

- Lights
- USB sockets
- Light expansion box
- 12V sockets

Message Area
Shows messages about the Solar Suitcase, or errors if they occur

Display Screen Light Button
Push to turn on the back light for the display screen
Start-Up Steps
Start-Up Steps

For more details, refer to installation manual

Step 1
Install the solar panel in a sunny location and connect the solar panel to the homerun cable. Avoid shading.

Step 2
Connect the homerun cable to the Solar Suitcase

The cable is properly connected when the silver tab clicks into place.

Step 3
Connect two lights to the Solar Suitcase
Start-Up Steps

**Step 4**
Connect the light expansion box to the Solar Suitcase and additional two lights to the light expansion box.

**Step 5**
Turn on the system.

⚠️ **The main power switch should remain ON at all times, everyday.** The only time to turn the main power switch OFF is when the Solar Suitcase is being serviced or when troubleshooting to fix a problem.
Appliances

16 Rechargeable Headlamps
17 Fetal Doppler
19 AA/AAA Rechargeable Battery Charger
20 How to Charge Your Phone
Appliances

The Solar Suitcase comes with the following appliances:

- Micro USB cables for rechargeable headlamps
- AA rechargeable batteries and charger
- Rechargeable headlamps
- Fetal Doppler

You can charge your phone here.
Understanding the Rechargeable Headlamps

**A** On/off Button

*One click to turn on the headlamp*

*Long press to adjust the brightness*

**B** Charging Port

**C** Battery Status Indicator

*If it flashes orange, red, or white, it is time to charge the headlamp*

*If it flashes blue, press and hold for 4 seconds to unlock the lights*
Fetal Doppler

Understanding the Fetal Doppler

Heartbeat Display & Battery Indicator

On/off Switch & Volume Control

Speaker

Fetal heartbeat rate:
Normal: Between 120-160
Abnormal: <120 or >160

Battery indicator:

- : Fully charged

- : Empty battery

(Lo) (bat) : Not accurate

Heartbeat indicator:

: Accurate

: Not accurate

Ultrasound Probe

Ultrasound Probe Sensor
Place lubricant gel here. You can also use clean vegetable oil or KY jelly.

Loading AA Rechargeable Batteries into the Fetal Doppler

Step 1
Open the back cover
Press down and pull backward to open

Step 2
Place batteries
Make sure to match up the + & – symbols

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Using the Fetal Doppler

1. Find the position of the baby and locate fetal chest
2. Place gel, clean vegetable oil, or KY jelly where you will best hear the heartbeat
3. Turn on the fetal Doppler
4. Hold the probe for 5 seconds and adjust the volume up if needed
5. If you don’t hear the heartbeat, shift the angle of the probe and wait for 5 seconds
6. If you still don’t hear the heartbeat, move the probe slightly to find the heartbeat and wait for 5 seconds

Normal fetal heartbeat: Between 120-160

Do not move quickly

Turn off the fetal Doppler when done
### AA/AAA Rechargeable Battery Charger

For Fetal Doppler

#### Charging Batteries

1. **Step 1**
   - Place AA rechargeable batteries in battery charger
   - Use only size AA/AAA rechargeable batteries and make sure to match up the + and - symbols

2. **Step 2**
   - Plug the AA/AAA rechargeable battery charger into the 12v socket

3. **Step 3**
   - Read rechargeable battery indicator
     - **Charging**
     - **Fully charged**
Charging Your Phone

**Step 1**
Connect phone charger to your phone

**Step 2**
Plug phone charger into USB or 12v socket

**Step 3**
Place phone in pocket

You can also use a car charger to charge your phone
Maximizing Performance
# Maximizing Performance

## The Main Power Switch Should Remain ON at All Times

The only time to turn the main power switch OFF is when the Solar Suitcase is being serviced or when troubleshooting to fix a problem.

## When to Use Lights and Charge Appliances

It’s always best to charge appliances when the main battery is full and it is a sunny day.

<table>
<thead>
<tr>
<th>Battery State</th>
<th>Lights</th>
<th>Phone Charging</th>
<th>Appliance Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td>75%-100%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>50%-74%</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>0%-49%</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

⚠️ or only in an emergency

## Clean Your Solar Panel If You Can Do So Safely

- Safety first: ✓
- Water, yes: ✓
- Scrub, no: ✗
- Soap, no: ✗
Troubleshooting

24 Appliance is Not Functioning
  • One appliance socket is not working
  • One specific appliance is not working

27 System Performance is Poor
  • Lights turn off in the middle of the night
  • Lights turn off earlier than they used to

29 Light is Not Functioning
  • One or more lights do not work at all

30 System is Not Functioning
  • No appliances or lights work
  • No symbols on the display screen
  • Solar Suitcase is not operational

31 Replacing the Main Battery

32 Error Codes
Appliance is Not Functioning

- One appliance socket is not functioning
- One specific appliance is not working

Make Sure All Appliance Sockets Are Functioning

If one socket fails to charge, try to connect your appliance to another socket. If the appliance still isn’t working, follow the instructions below for that appliance (phone charging, rechargeable headlamp, or fetal Doppler).

Phone is Not Charging

1. Change to another charger or purchase a new charger

2. If that doesn’t work, it could also be that the battery in the phone doesn’t work and you need to replace it
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Appliance is Not Functioning

The Rechargeable Headlamp is Not Working

Check if the rechargeable headlamp is charging properly

When charging properly, the charging light should be flashing green. If the light is any other color than green, it is not charging.

Check that the rechargeable headlamp is being used correctly

Review P.16 of this manual on how to use the rechargeable headlamp. A few reminders:

Make sure the headlamp is switched on properly. Switch off headlamp after use.

If the charging light is blinking blue when you try to turn it on, it means the headlamp is locked. To unlock it, hold down the main (top) button until the blue light turns off and main light turns on (about 4 seconds).

If it still doesn’t work, it may need to be replaced. Contact the organization that delivered the Solar Suitcase to get information on where to get a replacement.
Appliance is Not Functioning

Fetal Doppler is Not Working

Step 1

Check the AA rechargeable batteries

- Make sure the AA rechargeable batteries are inserted correctly (+ to + and – to –)
- Make sure the AA rechargeable batteries are fully charged
- Replace the AA rechargeable batteries if they are old or damaged

Step 2

Check the usage

Review P.18 "Fetal Doppler" in the User Manual

- Be sure the on/off switch is turned on to use and turned off when done
- Make sure it is being used correctly
- Make sure you use lubricant gel, clean vegetable oil, or KY jelly
System Performance is Poor

- Lights turn out in the middle of the night
- Lights turn off earlier than they used to

**Step 1**

Check how old the battery is

LFP batteries last about 5 years. There is a sticker on the Solar Suitcase that tells you when the battery will likely need to be replaced.

**Step 2**

Make sure the system is not being overused during the day

<table>
<thead>
<tr>
<th>Battery Level</th>
<th>Lights</th>
<th>Phone Charging</th>
<th>Appliance Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td>75%-100%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>50%-74%</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>0%-49%</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

⚠️ or only in an emergency
Now check what is causing the lack of energy

Step 3

If there is bad weather...
Use the lights on the normal setting, not the brighter setting, and don’t charge appliances

If there is shade...
Trim the tree or move the solar panel to an area of the roof that is not shaded

If solar panel is dirty...
Wash panel with water and a soft cloth
Light is Not Functioning

- One or more lights do not work at all

**Step 1**
Check that the light connectors are inserted correctly and the locking nut is firmly tightened

**Step 2**
Check that the light button is on normal or brighter

- Normal:
- Brighter:
- Off:

**Step 3**
Check the light cable for damage

**Step 4**
Try swapping light connections to see if it is the light or the socket that is faulty

**Step 5**
If the faulty light is one that is connected to the light expansion box, check that the light expansion box cable is firmly inserted into the Solar Suitcase at light expansion box socket A or B
System is Not Functioning

- No appliances or lights work
- No symbols on the display screen
- Solar Suitcase is not operational

Step 1

If the Solar Suitcase is not operational, press main power switch to OFF. Wait 10 seconds. Press main power switch to ON.

Step 2

Check if the solar plug on the homerun cable is clicked in firmly

⚠️ The cable is properly connected when the silver tab clicks into place

Step 3

Check the homerun cable for cuts

If the wire inside is severely damaged or you can see the metal wire in the cable, wrap electrical tape around each separate negative and positive wire within the larger wire, then wrap tape around the whole bundle. Or call a technician.
Replacing the Main Battery

1. Turn main power switch to off

2. Remove two screws from front panel

3. Disconnect the wires from the battery and hold the battery while removing the Velcro strap

4. Remove the main battery and replace with a new one. Be careful not to damage the fragile circuit boards.

5. Reconnect the main battery and attach the Velcro strap tightly

6. Align small pin below fetal Doppler compartment and secure front panel with screws. Turn ON the main power switch.

! Ensure red terminal attaches to red terminal (+) on battery, and black terminal attaches to black terminal (-) on battery

! Align small pin
Error Codes

**Light 1 Error (11)**

There is an error with Light 1 attached to the Solar Suitcase.

Check Light 1 connection. Push in the cord and tighten locking ring.

Does error message go away?

- Yes
- No

Push Light 1 button to clear error. Then push Light 1 button again.

Does Light 1 work?

- Yes
- No

1. Connect Light 1 to Light 2 socket
2. Press Light 2 button

Does the display screen show Light 2 Error (21)?

- No
- Yes

1. Connect Light 2 to Light 1 socket
2. Press Light 1 button

Does the display screen show Light 1 Error (11)?

- No
- Yes

1. Reconnect Light 1 to Light 1 socket
2. Reconnect Light 2 to Light 2 socket

Does the display screen show Light 1 Error (11)?

- No
- Yes

Error was likely caused by a poor connection. Light 1 is now operational.

Yes

No

Light 1 cord or light likely damaged. Contact support.

Problem with Light 1 socket. Contact support.
Error Codes

Light 2 Error (21)

There is an error with Light 2 attached to the Solar Suitcase.

Check Light 2 connection. Push in the cord and tighten locking ring.

Does error message go away?
- Yes
- No

Push Light 2 button to clear error. Then push Light 2 button again.

Does Light 2 work?
- Yes
- No

1. Connect Light 2 to Light 1 socket
2. Press Light 1 button

Does the display screen show Light 1 Error (11)?
- No
- Yes

1. Connect Light 1 to Light 2 socket
2. Press Light 2 button

Does the display screen show Light 2 Error (21)?
- No
- Yes

1. Reconnect Light 1 to Light 1 socket
2. Reconnect Light 2 to Light 2 socket

Does the display screen show Light 2 Error (21)?
- No
- Yes

Error was likely caused by a poor connection. Light 2 is now operational.
There is a problem with Expansion Box A or the cable connected to Expansion Socket A. Look for a damaged cable or contact support.

**Error Codes**

**Expansion Socket A Overcurrent Error (A1)**

Too much power is flowing through Expansion Socket A

- Disconnect lights, appliances and phones from Expansion Box A

Does error message go away?

- Yes
- No

- Reconnect lights, appliances and phones to Expansion Box A
- Connect Expansion Box A cable to Expansion Socket B

Does the display show Expansion Socket A Overcurrent Error (A1)?

- Yes
- No

- Reconnect Expansion Box A cable to Expansion Socket A

Does the display show Expansion Socket A Overcurrent Error (A1)?

- Yes
- No

- System is now operational

Does the display show Expansion Socket B Overcurrent Error (B1)?

- Yes
- No
There is a problem with Expansion Box B or the cable connected to Expansion Socket B. Look for a damaged cable or contact support.
Error Codes

Expansion Socket A Overvoltage Error (A2)

Expansion Socket A voltage is too high

Disconnect lights, appliances and phones from Expansion Box A

Does error message go away?

Yes

No

Reconnect lights, appliances and phones to Expansion Box A

Connect Expansion Box A cable to Expansion Socket B

Does the display show Expansion Socket A Overvoltage Error (A2)?

Yes

No

Reconnect Expansion Box A cable to Expansion Socket A

Does the display show Expansion Socket A Overvoltage Error (A2)?

Yes

No

System is now operational

There is a problem with Expansion Box A or the cable connected to Expansion Socket A. Look for a damaged cable or contact support.
Error Codes

**Expansion Socket B Overvoltage Error (B2)**

Expansion Socket B voltage is too high

1. Disconnect lights, appliances and phones from Expansion Box B

2. Does error message go away?
   - Yes
   - No

   - No
     1. Does the display show Expansion Socket B Overvoltage Error (B2)?
        - Yes
          1. Reconnect lights, appliances and phones to Expansion Box B
        - No
          1. Connect Expansion Box B cable to Expansion Socket A

   - Yes
     1. Does the display show Expansion Socket A Overvoltage Error (A2)?
        - Yes
          1. System is now operational
        - No
          1. Reconnect Expansion Box B cable to Expansion Socket B

   1. Does the display show Expansion Socket B Overvoltage Error (B2)?
      - Yes
        1. System is now operational
      - No
        1. There is a problem with Expansion Box B or the cable connected to Expansion Socket B. Look for a damaged cable or contact support.
## Error Codes

<table>
<thead>
<tr>
<th>System Voltage Too Low (03)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>The voltage is too low to run the lights and charge appliances because the battery is too low</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>USB Socket Error (31)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>There is an error with one of the USB charging sockets</td>
</tr>
</tbody>
</table>
## Error Codes

### 12V Socket Overcurrent Error (41)

<table>
<thead>
<tr>
<th>Description</th>
<th>Actions (What to do)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too much power is flowing through one of the 12V sockets</td>
<td>Disconnect appliances and phones from 12V sockets. Error message will go away.</td>
<td>Connect appliances and phones one at a time to see if the error message occurs again. If yes, then that appliance or phone is not compatible or damaged.</td>
</tr>
</tbody>
</table>

### 12V Socket Overvoltage Error (42)

<table>
<thead>
<tr>
<th>Description</th>
<th>Actions (What to do)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage on one of the 12V sockets is too high</td>
<td>Disconnect appliances and phones from 12V sockets. Error message will go away.</td>
<td>Connect appliances and phones one at a time to see if the error message occurs again. If yes, then that appliance or phone is not compatible or damaged.</td>
</tr>
</tbody>
</table>

### 12V Socket Voltage Fault Error (43)

<table>
<thead>
<tr>
<th>Description</th>
<th>Actions (What to do)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is unexpected voltage on one of the 12V sockets</td>
<td>Disconnect appliances and phones from 12V sockets. Error message will go away.</td>
<td>Connect appliances and phones one at a time to see if the error message occurs again. If yes, then that single appliance or phone is not compatible or damaged. If the error message comes on when attaching any appliance or phone then there is a problem with the system. Contact support.</td>
</tr>
</tbody>
</table>
## Error Codes

<table>
<thead>
<tr>
<th>Error Codes</th>
<th>Description</th>
<th>Actions (What to do)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Too Hot (01)</strong></td>
<td>The system is too hot</td>
<td>Turn main power switch to OFF. Wait for the system to cool down. Turn main power switch to ON every few hours to see if the error message goes away.</td>
<td>The error message will go away when the system cools down. If after 24 hours the system still has the error message, contact support.</td>
</tr>
<tr>
<td><strong>System Too Cold (02)</strong></td>
<td>The system is too cold. Charging when the system is too cold might damage the battery.</td>
<td>Wait for system to warm up. Check every few hours to see if the error message goes away.</td>
<td>The error message will go away when the system warms up. If after 24 hours the system still has the error message, contact support.</td>
</tr>
<tr>
<td><strong>System Voltage Too High (04)</strong></td>
<td>An internal component such as the battery or charging circuit has failed</td>
<td>Turn lights off. Do not charge appliances or phone. Wait one hour to see if the error message goes away.</td>
<td>If error message does not go away after 24 hours, contact support.</td>
</tr>
<tr>
<td><strong>System Overcurrent (05)</strong></td>
<td>The system has detected an error. Most likely an appliance or phone is requiring too much power.</td>
<td>Disconnect appliances and phones. Error message will go away.</td>
<td>Connect appliances and phones one at a time to see if the error message occurs again. If yes, then that appliance or phone is not compatible or damaged.</td>
</tr>
<tr>
<td><strong>System Fault (06)</strong></td>
<td>The system has detected an error. Most likely an appliance or phone is requiring too much power.</td>
<td>Disconnect appliances and phones. Turn main power switch to OFF. Wait 10 seconds. Turn main power switch to ON. If error message goes away move to the solution step. If error message is still on, contact support.</td>
<td>Connect appliances and phones one at a time to see if the error message occurs again. If yes, then that appliance or phone is not compatible or damaged.</td>
</tr>
</tbody>
</table>
## Error Codes

<table>
<thead>
<tr>
<th>Error Codes</th>
<th>Description</th>
<th>Actions (What to do)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion Socket A Voltage Fault Error (A3)</td>
<td>Unexpected voltage on Expansion Socket A</td>
<td>Disconnect devices plugged into Expansion Socket A. Error message will go away. Reconnect devices to Expansion Socket A.</td>
<td>If error message comes back on when the device is reconnected, there is likely a problem with the device or the expansion box being connected. If the error message comes back on regardless of what is being connected, there is likely a problem with the system. Contact support.</td>
</tr>
<tr>
<td>Expansion Socket B Voltage Fault Error (B3)</td>
<td>Unexpected voltage on Expansion Socket B</td>
<td>Disconnect devices plugged into Expansion Socket B. Error message will go away. Reconnect devices to Expansion Socket B.</td>
<td>If error message comes back on when the device is reconnected, there is likely a problem with the device or the expansion box being connected. If the error message comes back on regardless of what is being connected, there is likely a problem with the system. Contact support.</td>
</tr>
</tbody>
</table>

For any error codes not listed above, please consult: [www.wecaresolar.org/resources/product-info/](http://www.wecaresolar.org/resources/product-info/) or your next level of support.
# Maintenance Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Technician</th>
<th>System Observations/Problems</th>
<th>Actions Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phone</td>
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<tr>
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# Maintenance Log

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What to do if the Solar Suitcase is not working well

- Review sections on Maximizing Performance (P.21) and Troubleshooting (P.23) in this User Manual.

- If you are unable to fix the problem with this information, call the number written on the sticker on the inside of the Solar Suitcase door.
  
  - If you are unable to reach anybody locally, you can also call or write directly to We Care Solar:
    
    We Care Solar  
    +1-510-766-0206  
    info@wecaresolar.org

Online Sources

For training videos on Solar Suitcase installation, use, maintenance, and repair, please visit
https://wecaresolar.org/solarsuitcase/instructional_videos/

Warranty

We Care Solar provides a warranty for two years on the base system. The base system includes: chassis, charge controller, lights, main battery, and solar panels (if purchased from We Care Solar). All warranty claims are dependent on proper installation and usage.

No appliances are covered under warranty. Appliances include: micro USB adapter, AA/AAA rechargeable battery charger, rechargeable headlamps, and fetal Doppler.