



GEA
Guyana Energy Agency

INSTALLATION, OPERATION AND MAINTENANCE MANUAL
OF
SOLAR HOME ENERGY SYSTEM

Designed and Supplied by –



TABLE OF CONTENTS

- 1. Introduction**
- 2. Features of SHE system**
- 3. Components of the SHE system**
- 4. External features of the Charge Controller**
- 5. Installation guideline of the SHE system**
- 6. Regular maintenance of the SHE system**
- 7. Do's AND Don'ts**
- 8. Troubleshooting**
- 9. Procedure for any complaints**

1. Introduction

Guyana's Low Carbon Development Strategy 2030 is geared towards a massive expansion of renewable energy across the country. The Government of Guyana aims to provide affordable, stable and reliable energy to benefit both households and businesses.

To meet the basic daily electricity usage Solar Home Energy Systems (SHE systems) are provided to remote village communities. This system will provide power to 2 Nos. lights, 1no. fan and charge mobile devices such as a mobile phone and tablet. This has proven to be an effective means of delivering electricity at an individual level to dispersed households in remote areas.

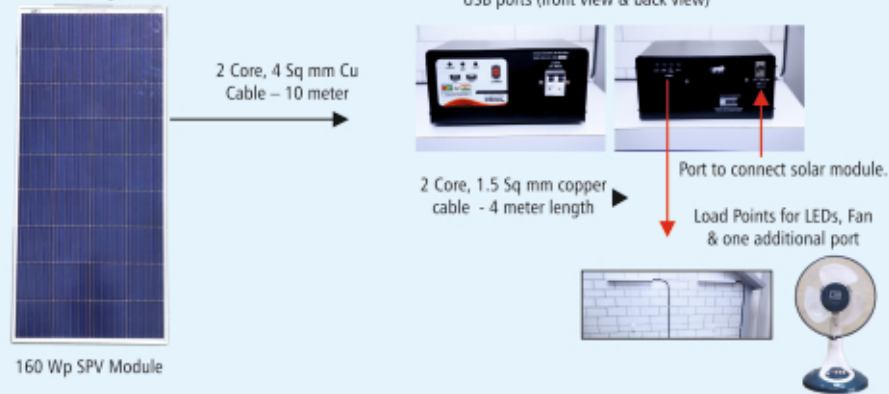
SHE systems are specifically designed for domestic usage with a 'Plug and Play' type of operation. This manual aims to educate beneficiaries about the components of the system, how to mount the panel & connect the devices to the system. The manual also highlights the operation and maintenance process of the SHE system.

2. Features of SHE System

Some of the features of the SHE systems are listed below:

- High performance, complete, and easy to install (Plug-n-Play kind of system) by anyone.
- The entire system is built to withstand extreme environmental conditions.
- All wiring, enclosures and outdoor fixtures are resistant to high humidity conditions, corrosion, insects and dust intrusion.

View of System



Do not connect any other electrical appliances on the Charge Controller as the entire system runs on direct current (DC).

3. Components of the SHE System

The solar home energy system is a DC (Direct current) system, which is easy to install and offers quick connections with less maintenance. The main Components are:








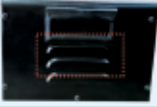
1. Solar photovoltaic module
2. Galvanized iron strip/angle
3. Charge Controller with inbuilt battery and USB ports for mobile charging
4. Batten tube LED lights
5. BLDC Fan
6. Interconnecting Cables

| Component | Picture | Description |
|---------------------------|---|---|
| Solar photovoltaic module |  | Solar photovoltaic module is used to convert energy from the sun into electricity. On the backside of the module a copper cable is attached to connect the solar module to the Charge Controller through XLR connector. |
| Charge controller |  | The Charge controller consists of battery and USB ports for charging mobile devices such as a mobile phone and tablet. The Charge Controller will manage the power going into the battery from the solar module. It ensures that the batteries are not overcharged during the day and that the power does not flow in reverse to the solar panels. The Charge Controller also has additional features like lightning and load control protection. |
| Batten tube LED lights |  | LED lamps produce light by using Light Emitting Diode Technology. They are more energy efficient than conventional lamps and have long life spans with no heat or UV emissions. |
| BLDC Fan |  | Brush-less direct current (BLDC) fans are regarded as the most efficient type of fans. BLDC fans consume up to 70 percent less energy to produce the same output as traditional AC fan types. |
| Cables |  | 1.5 Sq mm PVC insulated copper cables to connect Charge Controller with LED tube lights and the fan. |

The detailed specifications of SHE system are provided below:

| S. No. | Name of Asset | Specifications | Quantity |
|---------------|--|--|-----------------|
| 1. | SPV Module with 10 meter copper cable of 2 Core, 4 Sq mm size with XLR connector | Rating: 160Wp | 1 |
| 2. | Iron strip/angle | Material: Hot dip galvanized iron | 1 |
| 3. | Solar Charge Controller Unit with inbuilt Battery & 02 nos. USB Port for Mobile Charging | Charge Controller: 15 Amp. Battery: LiFePO4 Type, 12.8 V, 48 Ah USB Port: 1 Amp | 1 |
| 4. | Batten Tube LED Light | Rating: 9 Watt Type: Batten Tube White LED Max. current drawn: 0.8 Amp. Lumens Output: Minimum 100 lumens per watt with a permissible standard tolerance maximum of 3% as an instrumental error | 2 |
| 5. | BLDC Table Fan | Rating: 12 Watt Type: BLDC Motor RPM: 1100 rpm Max. current drawn: 1.2 Amp. Speeds: 3 variable speeds | 1 |
| 6. | Cable | 2 Core, 1.5 Sq mm PVC insulated Cu Cable of 4 meter length | 3 |
| 7. | Multi Pin USB Cable | Type B & C | 1 |

4. External Features of the Charge Controller

| External Features | Picture | Description |
|--------------------------|---|--|
| LED Indicators |  | Green LED - Indicates battery is charging. Yellow LED - Indicates low battery condition. Red LED - Indicates system fault. |
| USB Port |  | To charge mobile phone or tablet. |
| ON and OFF Switch |  | To switch ON and OFF the entire SHE system. When the switch is OFF, the Charge Controller gets isolated from all the externally connected appliances i.e., neither battery gets charged from solar module nor other appliances like fan, lights and mobile charging will work. |
| DC Main Circuit Breaker |  | Load DC MCB is used to switch ON and OFF only Charge Controller output power. When MCB is OFF, the connected electrical appliances will not work but the battery can be charged from the solar module. Load MCB is provided to protect the Charge Controller and battery during abnormal conditions like in-rush current (if any). |
| Load Connecting Ports |  | Located on the back side of the Charge Controller. It can be used to connect lights and the provided DC fan through cable mounted connectors. |
| Solar Module Connector |  | Located on the back side of the Charge Controller. It is used to connect the solar module to the Charge Controller with the XLR connector to enable battery charging. The female connector at cable shall be connected at the back side of charge controller. It will be push pull type & it will be locked after connecting. The connector can be unplugged by pushing the tap on upper side of the connector & pulling it out. |
| Charge Controller Holder |  | Located on both sides of the Charge Controller. It can be used to lift the Charge Controller from one place to other. |
| Ventilation System |  | Located on both sides of the Charge Controller. It is to provide natural ventilation and to remove excess heat generated inside the Charge Controller. |

5. Installation Guidelines of the SHE System

1. Mount the solar module at an inclination angle of 5 to 10 degree with a South-facing direction. Ensure that solar module is mounted in an open shadow-free area;
2. The galvanized iron strip/angle provided along with SHE system can be used to mount the solar module;
3. Connect the solar module to the Charge Controller by using the provided 2 Core, 4 Sq mm copper cable connected to the solar module. Ensure that the switch is ON and load MCB switch is OFF. The blinking Green light on the Charge Controller shows that the inbuilt battery is charging;
4. Charge the inbuilt battery for a minimum of 5 hours before the first use.
5. Once the inbuilt battery is charged, the appliances can be connected and be used.
6. Fix the LED tube lights on the wall by using the clamps, screws, and wall plugs (Provided along with SHE system) and place the fan on a flat surface. Saddles are also provided (along with nail) to fix the cables onto the wall.
7. Connect the LED tube lights and fan with Charge Controller by using the 2-Core, 1.5 Sq mm cable (Plug in type);
8. First switch ON the load DC MCB. The DC MCB is provided to protect the system during any abnormal conditions, so it is advisable to always keep MCB in ON position;
9. The ON position of MCB will provide power to the fan & light to enable use of these appliances;
10. Charge mobile phone or tablet by using USB ports and multi pin mobile charging cable; (only 1 mobile/tablet at a time)

6. Regular Maintenance of the SHE System

1. Clean the solar module once in a week with dry cloth only;
2. Keep the solar Charge Controller unit in close clean area away from direct sunlight, water, and fire;
3. For longevity of the system, avoid frequent plug in and plug out of the cables.
4. Switch OFF Charge Controller unit using ON/OFF switch (in case system is not used for a long duration - more than a week).
5. Charge the inbuilt battery at least twice in a week to avoid deep discharging.
6. Handle SHE system properly. Mishandling may break the components of the system.

7. Do's and Don'ts

Do's

1. Protect the SHE system from damage / misuse.
2. Ensure that solar module is mounted on a clean, flat, inclined, shade-free area.
3. Ensure all cables are properly connected.
4. Keep children away from the SHE system.
5. Connect only the lights and fan provided along with the SHE system.
6. To switch ON & OFF the LED light, use the hanging switch connected with the light.
7. To switch ON & OFF the fan and to change the speed, use buttons on the fan provided.

Don'ts

1. Do not try to disconnect cable attached to the solar module.
2. Do not open the charge control unit. Keep metal objects / hazardous objects away from the Charge Controller unit.
3. Do not use any type of chemical, acid and soap for cleaning of solar module.
4. Do not connect any other electrical appliances to the Charge Controller.
5. Do not plug in and plug out the cables frequently.
6. For charging of inbuilt battery, the ON-OFF switch must be in ON position.

8. Troubleshooting

| Problem | Indication | Solution |
|---------------------------------|---|---|
| Low battery condition | Yellow LED light blinking on Charge Controller | Charge the battery immediately. Note: Do not connect electrical load when yellow LED light blinks. |
| System fault | Red LED light blinking on Charge Controller | Restart the system by switching OFF and ON the Charge Controller unit through ON-OFF switch. If red LED light still blinking contact local technician to open Charge Controller unit and to check internal connections. |
| Inbuilt Battery is not charging | Green LED light is not blinking after connecting with solar module. | Check that the connector is properly inserted into the Charge Controller. If required re insert the connector. Ensure that the solar module is placed in an open shadow-free area and also ensure that adequate sunlight is available. If the battery is still not charging, contact the local technician to check continuity of the cable and output voltage of solar PV module. |
| Fan and lights are not working | | Check that connectors are properly inserted and if required re-insert the connectors. If still not working, contact the local technician to check continuity of the cable and output voltage. |

9. PROCEDURE FOR ANY COMPLAINTS

For any assistance in installing the SHE system and to register any complaints related to non-working of SHE system, contact village head (Toshao or CDO). For more information, suggestions and comments contact Guyana Energy Agency:

E-mail: gea@gea.gov.gy

Contact: (592) 624 5905, (592) 226 0394

Designed and Supplied by –



RAJASTHAN ELECTRONICS & INSTRUMENTS LIMITED

(An ISO 9001 : 2015 & 14001 : 2015 "MINI RATNA" Central Public Sector Enterprise)

2, Kanakpura Industrial Area, Sirsi Road, Jaipur-302034 (Raj.) INDIA