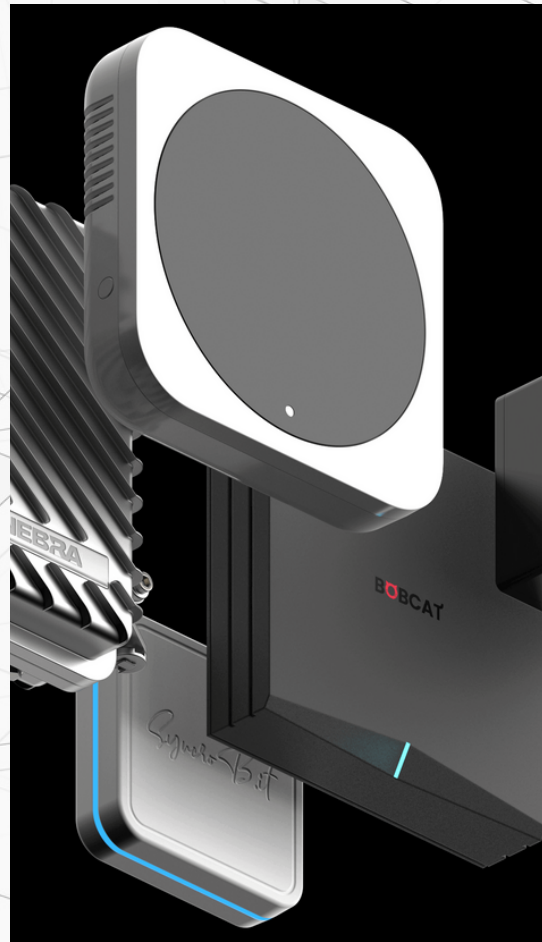


IoT Off-Grid



User Manual

NEMA 4X Certified Outdoor Solar Helium Enclosure
Steel Pole Ties

www.IotOffGrid.com

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Preface

This document details the user instruction to set-up IoT Off-Grid products. Users should read this document thoroughly and completely before setting up the products. Ignoring the instructions of this document may result in device failure or even injury. This document is geared towards the users of outdoor solar helium enclosures, IoT Off-Grid electronic peripherals or IoT sensor devices. Instructions should be followed as mentioned and in a case of difficulty following the instructions or setting-up, reach out to user@iotoffgrid.com.

User Manual Version - V2.10 (November 2021)

Intellectual Property Rights

We, our affiliates and our licensors will own all right, title and interest in and to all Products. You will be and remain the owner of all rights, title and interest in and to Customer Content. Each party will own and retain all rights in its trademarks, logos and other brand elements (collectively, "Trademarks"). To the extent a party grants any rights or licenses to its Trademarks to the other party in connection with this Agreement, the other party's use of such Trademarks will be subject to the reasonable trademark guidelines provided in writing by the party that owns the Trademarks.

Symbols and Conventions Used in the Documentation

The following symbols and conventions are used throughout this document. Please pay attention to each of the conventions to understand this documentation clearly.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injuries.



Prohibition icons indicate actions that must not be performed.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injuries.



Sharp icon indicate this action or item should be carried out with care due to the presence of sharp corners.



Fire Hazard icons alert you to the possibility of a fire.



Electrical Hazard icons alert you to possible electrical shocks.



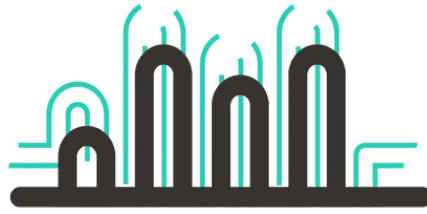
Require two people to carry out the instructions.

IMPORTANT

IMPORTANT indicates a potentially hazardous situation which, if not avoided, may result in damage to property or loss of product functionality.

NOTE

NOTE specifies the operating environment, conditions for installation, or special conditions of use.



IoT Off-Grid

We are a technology company that produce IoT(Internet of Things) applications focused on renewable energy implementations. During recent years, there have been a large interest in IoT devices and the capabilities they have to facilitate a number of very important tasks with high efficiency and low cost. Early detection of forest fires, remote monitoring of water bodies, health and wellness monitoring devices and the list goes on. However, while there are a number of applications, these systems achieving the wider adaptation into common use have been slow due to certain network and coverage limitations. However, the emergence of the Helium network has renewed interest on the capabilities of IoT devices.

The Helium network is a decentralized LoRaWAN(Low-Power Wide Area Network) which uses radio waves for communication. Due to the low power of the communication signals, the devices that can be used in this network can be both small in profile and less power intensive. Currently, thousands of Helium HotSpots are being deployed all over the world at a rapid pace, which would provide a thorough and dependable network for IoT devices. In addition, the Helium network is built on their Blockchain technology which can provide great versatility.

At IoT off-Grid, we research and develop IoT applications based on the Helium Network coverage that are suitable for off-grid applications. The initial products we have developed are the off-grid Helium Miner enclosures that are powered by solar energy and can be used to deploy anywhere in the world that has at least 5 hours of adequate sun light. In the expansion of the Helium network there will be more and more need for the deployment of miners to hard to reach places that have no infrastructure. Further, the density of the miner increase it will be less profitable to deploy miners in densely populated areas and it would be an added incentive to deploy miners into rural areas with less coverage, maximizing the profits in the process for the hosts. More over, inline with our company's goal of facilitating wider real world application driven IoT devices, the expansion of Helium network to rural areas is vital. Thus, we hope our devices would provide much needed tools to facilitate the LoRaWAN coverage, further increasing potential for our own success.



helium



Warranty

This device comes with an one year limited warranty which covers manufacturers defects of the modules in the system. The users are responsible for the proper assembly and use of the device to claim the warranty, and any misuse that may result in damage to the system or malfunctioning of a module may void the warranty.

One Year Limited Warranty*:

- NEMA 4X enclosure Module
- Charge controller Module
- Power regulator Module
- Solar Panel Module
- Battery Module (*Limited Warranty of six months only)

Warranty will be void in following instances:

- Intentional physical damage to the system.
- Defects due to accidental falls or drops.
- Defects due to the incorrect assembly.
- Use of outside components within the current carrying circuitry.

Product Liability Disclaimers

In no event shall our company be liable for any direct, indirect, punitive, incidental, special consequential damages, to property or life, whatsoever arising out of or connected with the use or misuse of our products.

Safety Instructions

This product is made with industrial grade material and can cause serious harm when handles incorrectly. Please wear proper protective equipment such as working gloves, eye-protection, closed-toe shoes and suitable working garments when working with the system.

Solar Panel Module



This part contains sharp corners that can cause serious damage if not handled with care and caution. Produce high current that can give shock or create sparks that can start fires.



Structure Module



This part contains sharp corners that can cause serious damage if not handled with care and caution.



Battery Module



This part contains Li-Ion battery components and should take utmost care not to damage or short circuit. Improper use may cause electric shock or even fires and explosions.



Power Regulation Module



This part carry significant current through the device. Misuse may result in electric shock and fires.

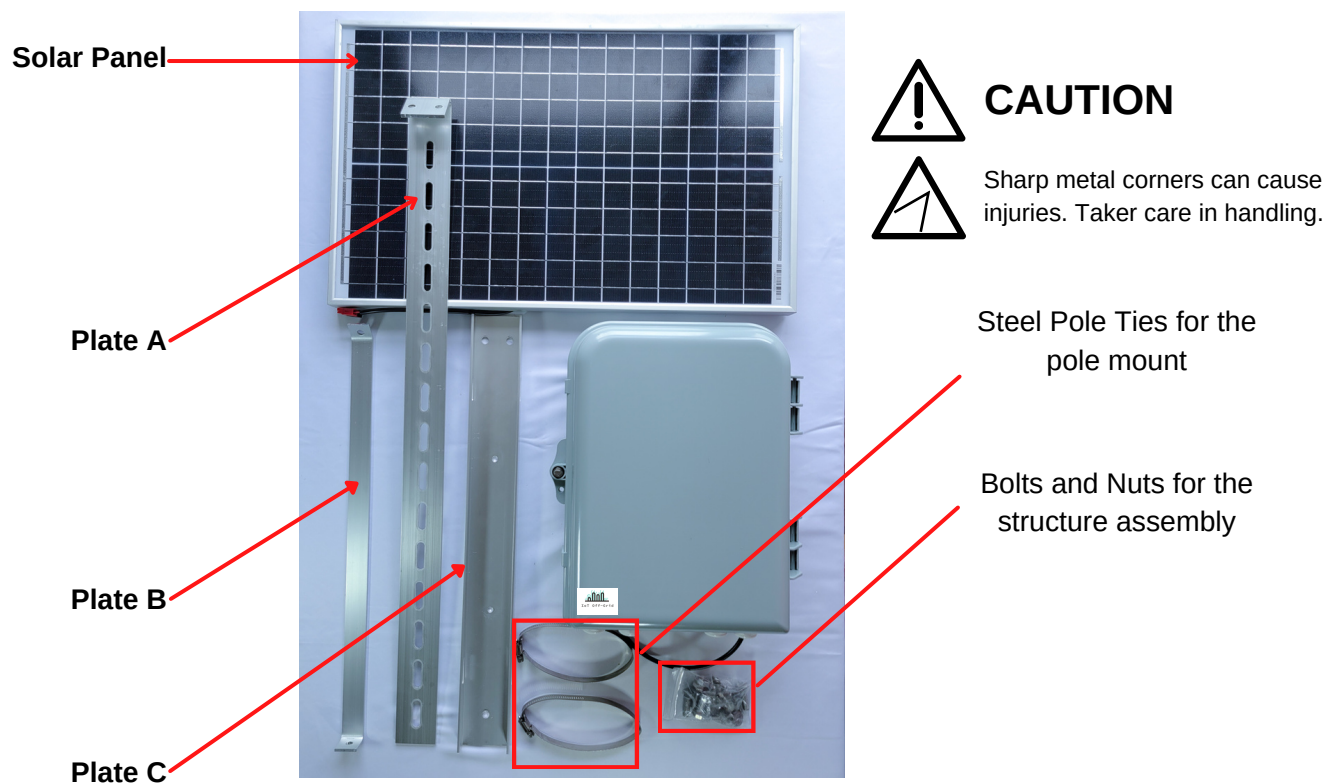


IMPORTANT

NEMA 4X certified outdoor solar Helium enclosure is a device that generates and stores electricity, when working with such types of devices it is important to work at a dry environment and prevent contact of water with the electrical components. Failure to prevent contact of water with electrical components may cause electric shock or fires.

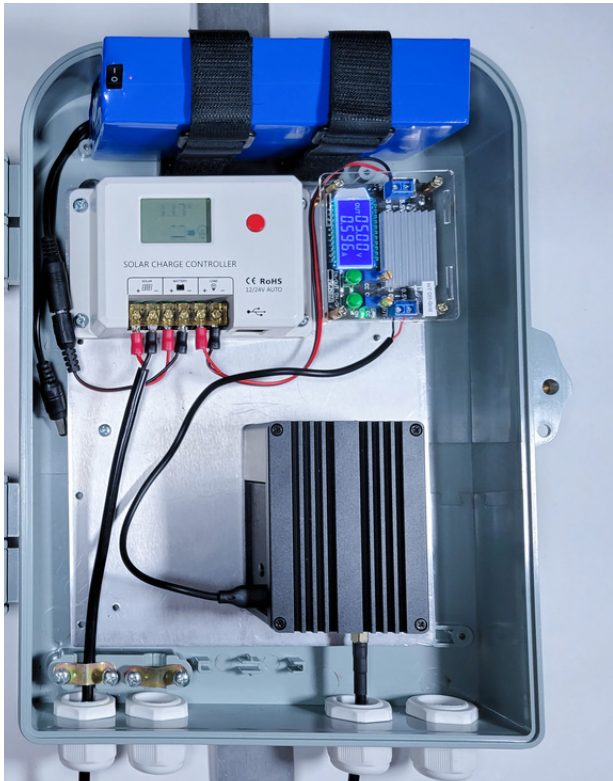
Package Includes

- 1x IP66 NEMA 4X PC+ABS Weatherproof Miner Enclosure or Weatherproof Enclosure
 - Solar Charge Controller
 - DC Regulator
 - Battery Module
 - Door Locking Key
 - Velcro
- Solar Panel Module
 - Solar Panel
 - 2x Bolts
- Structure Module
 - Two Aluminum Panel
 - 2x Steel cable ties
 - 6x Bolts, Nuts and Washers



Update on the New Version

New version of the solar enclosures carry the Renogy Wanderer charge controller. The instructions on the manual **may refer to the older charge controller but is still applicable for the new Renogy charge controller.**



Old Version
White Charge Controller



New Version
Black Renogy Charge
Controller

Setup Guide

Instructions following would provide necessary information to put together the outdoor solar Helium enclosure.

Tools Required for Assembly:

- Philip head screw driver
- Pair of pliers

Additional Items needed:

- Waterproof/Weatherproof tape
- Reflective thermal insulation (Optional)

Step 1:

Unboxing the Packaging

1. Carefully open the packaging box with a box cutter.
2. Take out the contents inside the box that are wrapped with bubble wrap.
3. Keep the content separately to assemble in the next sets.



Be careful with the aluminum pieces that have sharp corners!

Step 2:

Battery - Charge Controller - Power Regulator Connection

1. Take the enclosure setup and place it on a sturdy and level surface.
2. Use the **plastic enclosure key** included in the **PARTS BAG** to open the enclosure by turning the key **counter clock-wise**.
(This lock is a screw lock and needs few rounds of turning the key to dislodge the screw)
3. **Gently pull on the latches** on the either side of the screw lock to open the door.



4. Locate the **wire 1** coming out of the battery module.

5. Connect **wire 1** with with the **wire 2** coming out of the charge control module.

(Please note that the charge control module might be different from the illustrated. However, the process will be the same.)



6. To power the charge control module turn the on/off switch on the battery module to **ON status**.

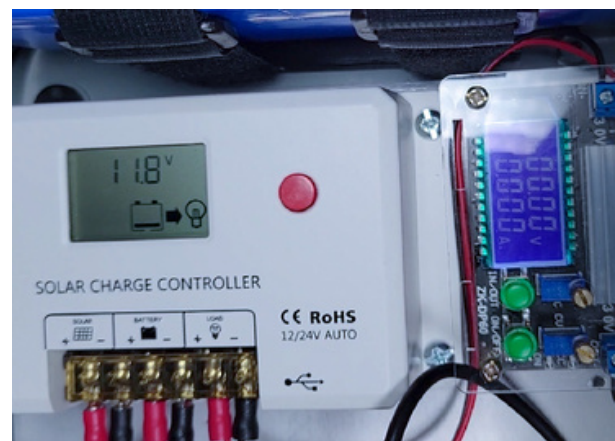
Small RED LED lights up when battery is ON.



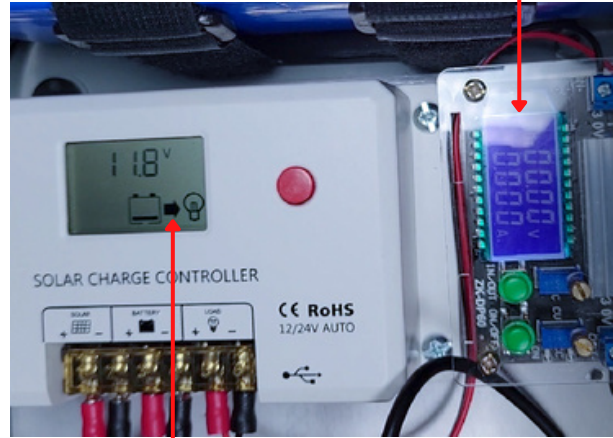
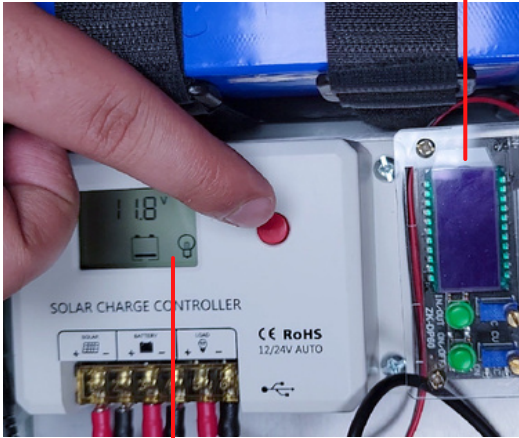
7. Device should get powered upon turning the battery module **ON**(as seen in the image on right).

Charge Controller Display - ON
Power Regulator Display - ON

If **only the Charge Controller display is ON** press the **RED Button** to power up the Power Regulator.



When Power Regulator is receiving power, its back-lit display will be **ON**



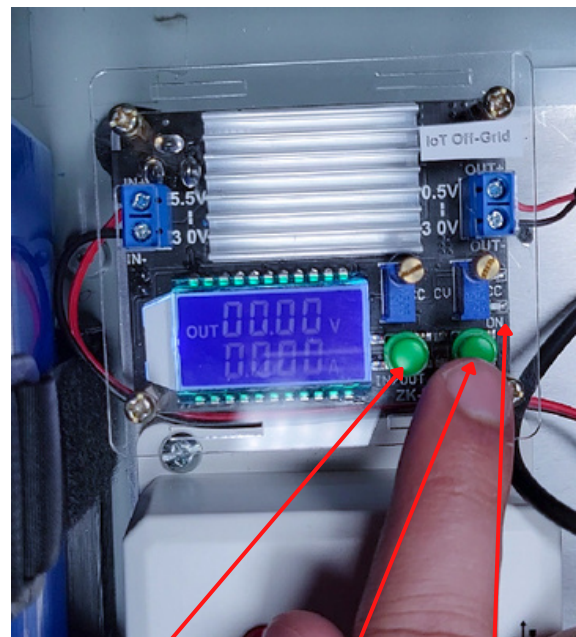
RED BUTTON on the Charge Controller controls the power to the load/Power Regulator.
Arrow from the Battery icon to Bulb icon indicates supply of power to the Power Regulator

NOT REQUIRED WITH THE RENOGY CHARGE CONTROLLER

8. Once the Power Regulator is **ON** and **receiving power**, perform the Power Out Test.

Power Out Test

- Press the **ON/OFF BUTTON** on the Power Regulator.
- Check for the **GREEN LED** that indicate **ON-state**
- **Verify** the **ON-state** indicate **correct voltage** for your device (this voltage is preset to particular hotspot you ordered for).
- After verifying, keep the device in **OFF-state**.



Voltage/Temperature Switch

ON/OFF BUTTON

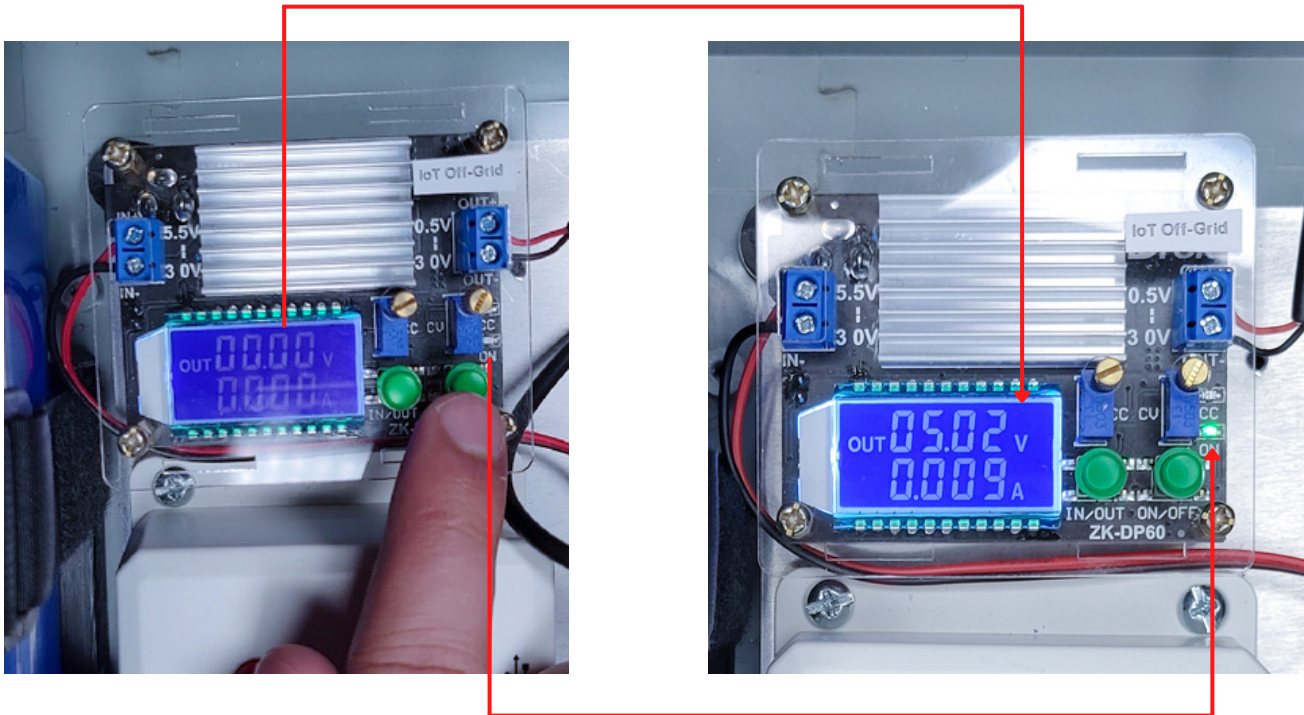
GREEN LED

Voltages Rating for specific Miners:

Rak/SenseCap/MNTD - 5.0V Bobcat/Nebra/Syncrobit - 12.0V

To connect your cellular modem like RUT, please check pages A1 and A2 (last two pages of the manual).

When the **ON/OFF BUTTON** is pressed and is in **ON-state**, LED display will show the out voltage.



In **ON-state**, GREEN LED will light up.

Step 3:

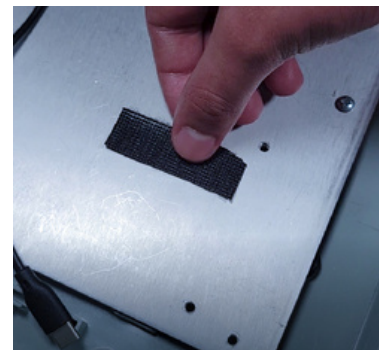
Introducing the Helium Hotspot into the Enclosure

1. We recommend using the **industrial strength stick-on Velcro** included in the package to attach the hotspot inside the enclosure.
2. Cut the Velcro piece to **appropriate shape and size**.

IMPORTANT

Use a large size piece that cover at least **40%** of the surface of the hotspot to ensure firm attachment.

3. **Clean the surface** of the aluminum plate and the surface of the hotspot to stick the Velcro.
4. **Detach** the Velcro piece into its loop and hook halves.
5. Take one Velcro piece, **remove the sticker cover** and attach it to the aluminum plate in the enclosure.



6. Take the other Velcro piece, remove the sticker cover and attach it to the hotspot surface.

NOTE

For **Bobcat miner** you can attach the Velcro to the Mounting Plate hotspot comes with.



7. **Attache** the hotspot to the aluminum plate to **firmly fix** the Velcro together.

8. Bring the enclosure upright to see whether the hotspot is securely attached.



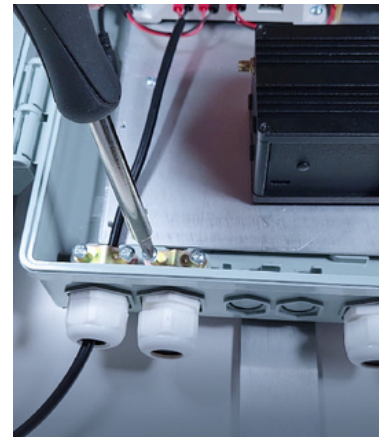
CAUTION

Take care to prevent fall and damage of the hotspot incase of a loose attachment.

Step 4:

On-Boarding Antenna Cable

1. First **unscrew one of the screws** on the cable holder clip.



For Weatherproof (Non NEMA certified) Enclosures

Just feed antenna wires through one of foam sealed cable feeds. See red circle in the picture. Please seal around foam sealed cable feeds with waterproof tape. You can now skip to **Step 5**.



2. Unscrew the **cable gland head** (as seen in the image).



3. Push out the **rubber seal** that sits inside the cable gland.



4. Take the antenna cable and pass through the **RP-SMA connector side** through the cable gland head.



5. Take the rubber seal from earlier (#3) and **punch a hole in the center** of the cap using a screw driver.



Be careful with this step to prevent any harm by sharp points of the screw driver



6. Push through the RP-SMA connector of the antenna wire **through the rubber seal**.



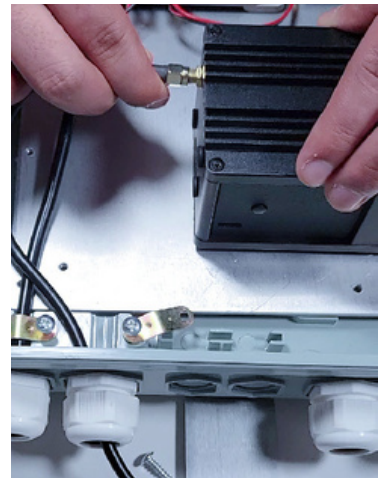
7. Feed the Antenna connector **through the cable gland** and **secure the rubber seal** as seen in the image.



8. Tighten the cable gland head.



9. Attach the antenna cable to the hotspot.



10. Secure the antenna wire with the cable clip.



11. **Tighten** all the cable glands both **outside gland head** and the **inside gland nut**.

NOTE

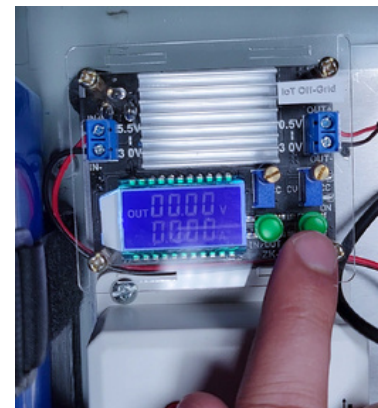
You can connect the **other end of the antenna cable** to a suitable **outdoor antenna** to be used with the unit at this stage.



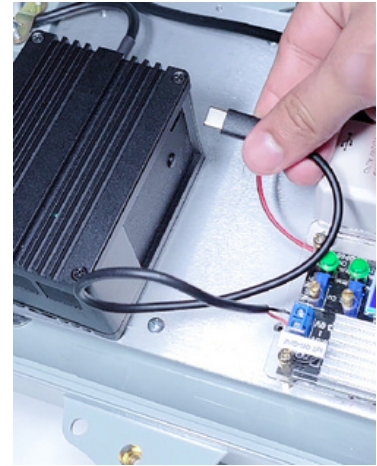
Step 5:

Hotspot Power-up

1. **Before** connecting your hotspot to power, make sure that the **Power Regulator** is in **OFF-state**
 - **Voltage shows - 00.00V**
 - **GREEN LED is OFF**



2. Connect the wire marked **Wire 3** to the miner.



3. Turn the **Power Regulator** to **ON-state**

- **Voltage** shows - non-zero value
- **Current** shows - non-zero value
- **GREEN LED** is ON



Step 6:

Systems Check

Now that everything is powered up do a **FULL SYSTEM REBOOT** by turning **OFF** the switch on the battery and turning it back **ON**. Upon turning the battery **ON**, charge controller, power regulator and hotspot, all should power up without an issue.

If your reboot is not successful please contact our support via info@iotoffgrid.com or our live support at our web site(fastest option).

1. Now that the hotspot should be powered up. **Connect** to the hotspot via the **Helium app** and set up wifi connection

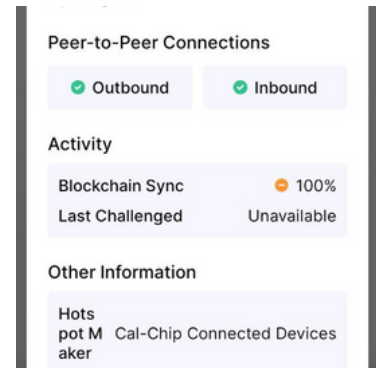
WiFi connection can be either **outside WiFi** from a building or a **4G Hotspot** housed inside the enclosure.

2. Run diagnostics to see whether both **inbound** and **outbound** connections are good.

NOTE

If either **outbound/inbound** connections are down **wait for 5-10 minutes** and check again.

If it persists, please power cycle by turning **OFF** and **ON** the **Power Regulator**, and check again.



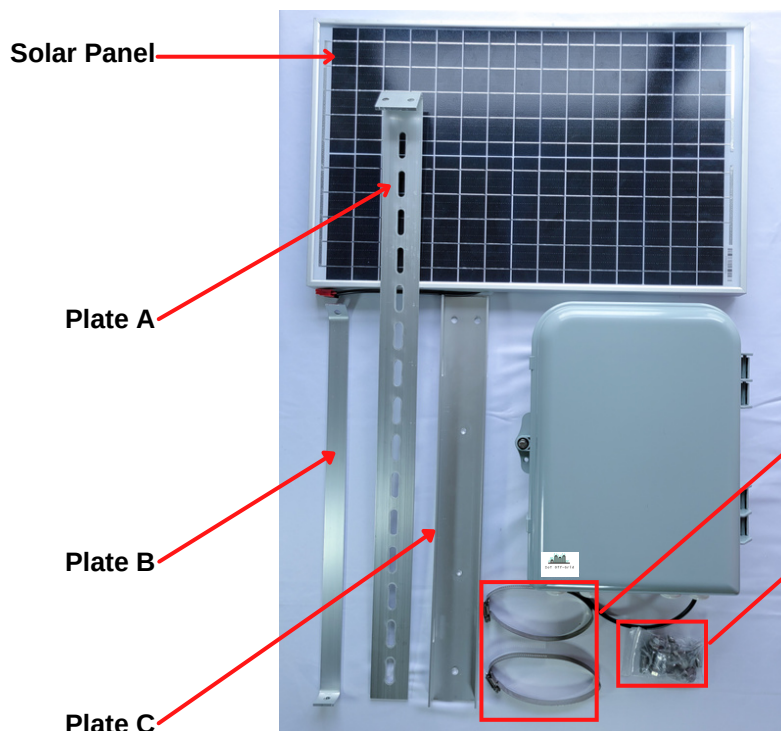
3. Once it is **verified hotspot is operating well** from the enclosure power supply, you can close the enclosure.



4. Use the **enclosure key** to tighten the **lock screw** of the enclosure.

Step 7:

Assembly of the Aluminum Frame



CAUTION



Sharp metal corners can cause injuries. Taker care in handling.

Steel Pole Ties for the pole mount

Bolts and Nuts for the structure assembly



CAUTION



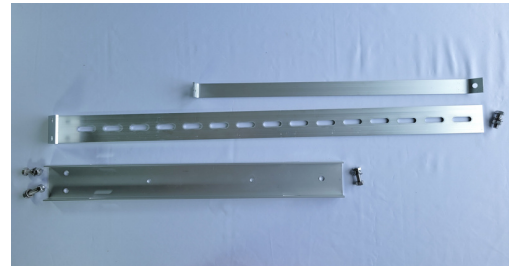
Sharp metal corners can cause injuries.
Taker care in handling.

1. **Three plates** for the structure module can be put together first using **four sets of bolt, nut, lock washer and flat washer** you can find in the packet of nuts and bolts.
2. Three plates can be arranged as seen in the **image to the right** to be assembled.



NOTE

The flat washer should be on hex head of the screw while the lock washer should be on the side with the nut



3. Attached the four bolts to the three plates as seen in the images.



4. Make sure to **tighten them firmly**.

5. Completely assembled structure should look like **this image to the right**.



6. Get the enclosure unit and **Use the key to lock the box**.

7. **place it flat on a surface** to get access to the nuts in the back of the enclosure as visible from the Image.

8. **Remove the nut and the washer in the center of the aluminum plates**.



9. Insert the **exposed bolts into the two screw holes** available in the **U bar** on the structure unit. **Refer to the images** to orient the enclosure properly into the structure.



10. Use the **previously removed nut and washer** to **fix the enclosure to the structure unit**.

Structure with the enclosure attached should **look like the image to right**.



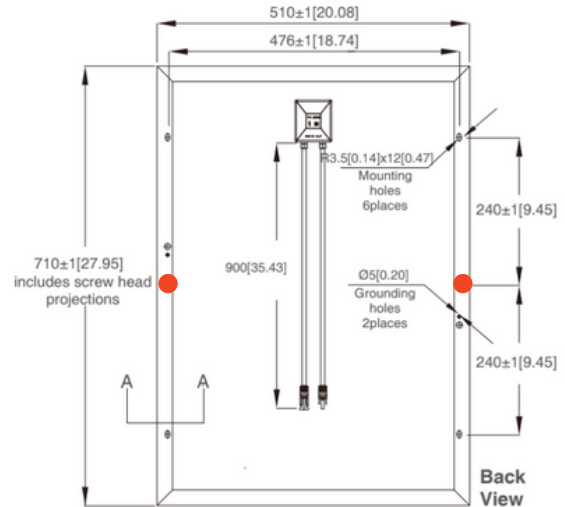
11. To **attach the solar panel to the structure**, place the **solar panel flat on a surface**.

12. Use the 20mm **M6 hex head bolts** from the **packet** and place it **under the screw hole on the solar panel on the side of the wire box.** For 60W panel, use the marked red screw holes for the hex bolts.



NOTE

This is a tricky fit, but it can be done!
The bolt is little longer than the width of the solar panel aluminum, but can be put to place by slanting the screw and guiding it in.



13. Do the same on the **other side of the panel**.



14. Place the panel on the **inclined face of the structure with the bolt going trough the top most opening as seen on the image.**

The wire box of the panel should go on the top side of the structure for 30W and on the side for 60W panels.

15. The **bolt in the bottom of the panel** has to go through an **opening on the aluminum bar at the bottom of the structure.**

16. **Tighten the nuts** onto the bolt along with the **washers included.**



14. **Final setup should look like this.**



Step 8:

Pole Mounting of the Enclosure



Require two people to carry out the instructions safely.

IMPORTANT

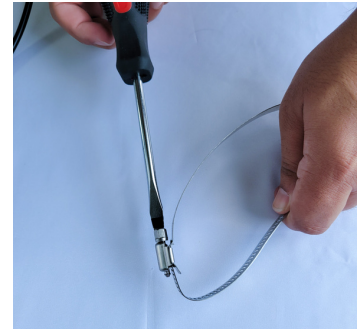
One person should **hold the enclosure assembly in position** while the other **secure it to the pole with the U bolts**.

1. Get the **steel pole ties**.
2. **Unscrew the screw to detach the steel tie**.
3. Guide the **steel pole tie through the holes** openings to in the U bar.
4. Have **someone hold the unit** close to the mounting pole while **another person wrap the steel ties around the pole**.
5. Guide the **steel cable through the tightening screw** and **tighten it to attache the unit to the pole** firmly.



IMPORTANT

For best performance keep the **panel facing South** direction to obtain most possible amount of solar radiation.



Step 9:

Connecting the Solar Panel Wire to the Enclosure

1. Connect **Wire 4** coming out of the enclosure to the **wire of the solar panel**. Make sure the connectors are fully connected like in the picture. For 60W units, MC4 connectors are included. Attach male to female (There is only one way to connect.)



NOTE

The connectors are very firm. To detach the cables, please wiggle out the connectors slowly.

Step 10:

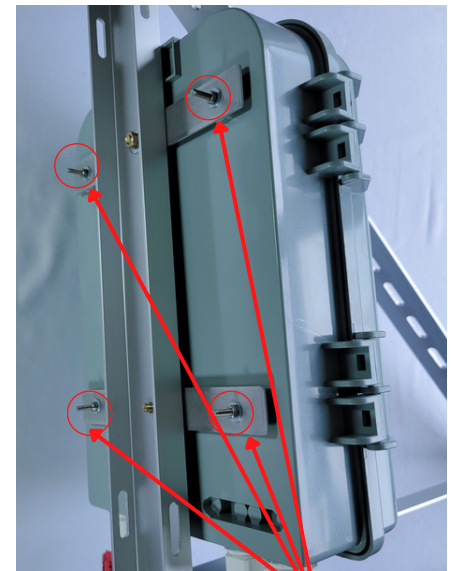
Connecting an Antenna

1. Best option to **attach an antenna** would be to **mount it on to the pole**, solar enclosure is attached to

OR

Attaching the antenna to the structure itself with a user modification suitable.

2. Upon mounting, **before attaching the antenna cable** that come out of the enclosure to the antenna, **open the enclosure door** and **power OFF** the miner using the **ON/OFF button** on the **Power Regulator**.



Holding Nuts

NOTE

When attached to the frame, **enclosure door can only be open few inches** and **only be wide enough to reach the ON/OFF button** on the **Power Regulator**.

If you need more space please **detach the two holding nuts in the back** to remove the enclosure from the frame.

3. Connect the antenna to the antenna cable coming out of the enclosure.
4. Press the ON/OFF button to power up the hotspot.
5. Close the enclosure and secure the door.

IMPORTANT

Please use **suitable lightning arresters** with the antenna to **prevent any harmful static build up during storms.**

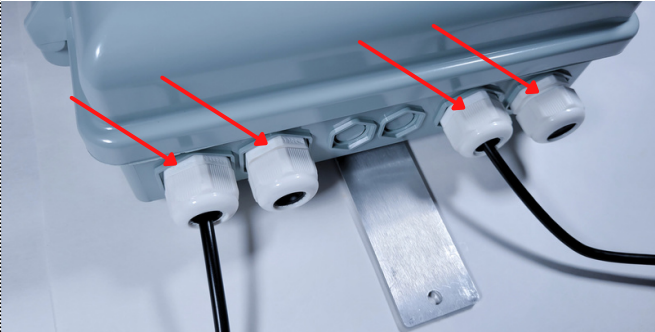
Now Your Outdoor Solar Helium Enclosure is Up and Running!!!

IMPORTANT

Weatherproofing and Waterproofing

- Please use the provided **waterproof tape** to **tape around all four cable glands and the solar panel wire plug**. In case of Weatherproof enclosures (Not NEMA certified ones), please seal around the enclosure door and foam sealed cable feeds with waterproof tape.

Failure to do this will introduce moisture inside the enclosure.

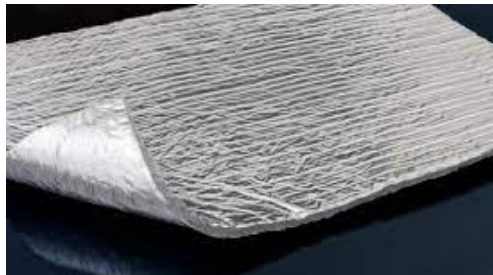


- When setting up the **enclosure in very humid climates**, please place few **dehydrating silica gel packets** inside the enclosure and close it.

This remove any ambient moisture from the inside of the enclosure

- Please use **reflective thermal insulation** and **cover the outside** of the enclosure unit with it.

This would significantly reduce any heat build up in extremely hot climate.



For Best Performance

- Keep the **panel facing South**.
This provide maximum possible solar radiation to the panel.
- Make sure there's **no shade on the solar panel**.
- Optimal scenario is panel **overlooking sky from East to West**.

For Support

For any questions related to support, please reach out to us at
info@iotoffgrid.com.

Troubleshooting Guide is available online at
www.IotoffGrid.com