

RAVOLT WHOLE-HOME POWER PLANT

System Operation and Maintenance Manual

Version 2.2023





WARNING



RaVolt provides safe, silent, and resilient electric power. Before using this product, it is very important to carefully read this manual and all of the warnings on this and the following page as indicated with an exclamation point throughout the manual. Keep this manual for future reference, and contact us with any questions before using or modifying this system!

Carefully read and comply with all safety directives, or personal injury or death may result.

Follow these directives for safe use:

CAUTION: Only qualified personnel/technicians can install and service this device.

To ensure safe and effective use of the RaVolt system, adhere to the following guidelines:

1. **Installation and Service:** The installation and servicing of the RaVolt device should only be performed by qualified personnel or certified technicians.
2. **Component Manuals:** The RaVolt system comprises various integrated components, including inverters, chargers, batteries, and other electrical equipment. Prior to undertaking any service on a RaVolt system, diligently review and comply with the guidelines provided in each component's respective manual.
3. **Climate Considerations:** For regions experiencing wet or snowy climates, the RaVolt units are thoughtfully designed to accommodate typical snow depths. In the presence of uncommon snow conditions, ice, or drifting snow, the unit's performance may be limited or even cease. When removing snow from around the RaVolt unit, exercise caution, and never approach a RaVolt unit that is submerged in water or melting snow.
4. **Solar Panels:** Exercise caution and refrain from touching damaged or operating solar panels. For maintenance procedures such as cleaning and clearing snow cover, please refer to the Photovoltaic Module component manual.
5. **Clear Space:** Ensure no items are placed in close proximity to the RaVolt unit or solar panels. Additionally, it is imperative to strictly prohibit climbing on the solar panels or allowing children to play near or on the RaVolt unit or solar panels.
6. **No Disassembly:** Under no circumstances should the RaVolt unit be disassembled. In the event of maintenance or repair needs, contact RaVolt or enlist the services of a professional power electronics service center. Improper reassembly may lead to injury, death, electric shock, or fire, and will void the warranty.

7. **Electrical Safety:** To minimize the risk of electric shock, a qualified electrician must disconnect all wires before engaging in any maintenance or cleaning tasks. Merely switching off the disconnects on the unit is insufficient to mitigate this risk.
8. **Cable Size and Inverter Operation:** Adhere to the system design specifications and electrical codes when selecting the appropriate cable size. Properly operating the inverter is essential to ensure efficient functioning.
9. **Battery Precautions:** Caution is to be exercised when using metal tools in the vicinity of the battery. Accidental drops may cause sparks or short circuits in the battery or other electrical components, potentially leading to explosions, injuries, or even fatalities.
10. **AC and DC Terminals:** When disconnecting the AC or DC terminals, strictly follow the installation procedure. For detailed instructions, please refer to the component manuals.
11. **Grounding:** Properly connect the system to a permanent, grounded wiring system, and strictly adhere to all local requirements and regulations during the installation process.
12. **No Generators:** Never connect a generator to the RaVolt unit without explicit written consent from RaVolt. Doing so will not only void the warranty but may also result in damage to the system, and pose serious risks to safety.
13. **Maintain Cleanliness:** Ensure vegetation remains below the level of the Photovoltaic modules (solar panels) to avoid interference. Under no circumstances should mowers discharge towards the solar panels or RaVolt unit, and avoid using string trimmers or other powered tools near the solar panels or electrical connections. Additionally, refrain from using pressure washers on the RaVolt unit or solar panels. For cleaning and maintenance instructions, please refer to the solar photovoltaic module manual.
14. **Watch Trenches:** Over time, trenches installed for electrical wires may sink, leading to uneven ground and potential tripping hazards. Should this occur, promptly add soil, compact it, and reseed to restore the trench to an even grade.

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Emergency Guide

There may be situations which occur that would create an emergency scenario for your RaVolt system. If you encounter any of the following signs, it could indicate an emergency:

1. **Smoke or Fire:** If you notice smoke or fire, immediately call the fire department without delay.
2. **No Power, Audible Crackling, Sparking, Alarms, or High-Pitched Whining:** These signs may indicate a potential emergency situation.

In the event of an emergency:

1. **Contact Emergency Services:** If you believe there is an emergency situation occurring, promptly call your local emergency services. After doing so, contact your local RaVolt Partner for assistance.
2. **RaVolt Monitoring Service:** If you have RaVolt monitoring service, we may also notify you if the system's monitoring status detects a potential issue. In such cases, we will use the contact information you provided for immediate notification.
3. **System Bypass:** If you suspect your system is malfunctioning, you can activate the "System Bypass" feature. This will exclude the solar and battery components, running your electrical loads exclusively off the backup power source.
4. **Shut Off Breaker and Call RaVolt:** If you decide to shut off the breaker for any reason, please call your local RaVolt Partner or contact our RaVolt Service line at 1-844-RAV-SERV (**844-728-7378**) immediately.

Your RaVolt Home Power Plant

Your RaVolt unit may have the following components:

- Inverters and Chargers
- Batteries
- Heating and cooling systems
- Power plug and RV connection (Optional)
- Load Center
- Service Entrance Disconnect
- PV Disconnects

To ensure your RaVolt system functions smoothly and maintains its warranty coverage, it is essential to use it as intended. Any usage outside of the intended purpose may impact or even void the warranty on RaVolt or its components.

If you are considering adding major electrical loads such as hot tubs, pools, tools, cooling or heating systems, stoves, electric vehicles, chargers, or other significant items, it is recommended to contact your local RaVolt Partner. They can assess your system's capacity and advise you on whether an upgrade is needed to support the additional loads effectively.

In case you plan to incorporate any generation sources like generators, wind turbines, solar panels, utility connections, or other sources, it's crucial to contact your RaVolt Partner as well. They will help determine the compatibility of these sources with your system and discuss any potential impacts on your warranties.

By following these guidelines, you can protect your RaVolt system's warranty and ensure its optimal performance for years. Do not hesitate to contact your local RaVolt Partner if you have any questions or need assistance with your system.

Normal Operation

To ensure your RaVolt system operates smoothly and stays within its intended capacity, it is essential to follow the specifications provided in the RaVolt Specification sheet.

Using the system above the designed capacity, either for short or long periods, can cause damage and may void or shorten the warranty. If you intend to add additional load or exceed the design values specified for the system, contact your RaVolt Partner. They can assess your needs and recommend any necessary upgrades to accommodate the increased usage effectively.

Normal Temperature Range

RaVolt is specifically engineered to operate within certain environmental conditions, including temperature and humidity. To maintain these conditions, your system may include heaters, vent fans, cooling systems, and generator(s).

However, despite these built-in features, there may be instances where the equipment is subjected to conditions beyond the allowable environmental operating ranges. When this occurs, the system's performance may be limited, or it might shut down temporarily to protect itself until conditions improve or the system is reset.

To ensure your system functions optimally and maintains its warranty coverage, it is essential to avoid certain actions:

1. **Changing Location:** Moving the system from its intended location can disrupt its environmental balance.
2. **Blocking Vent Ports:** Covering vent ports prevents proper ventilation and can affect the system's performance.
3. **Neglecting Maintenance:** Regular maintenance is essential to the system's health and efficiency.
4. **Disabling the System:** Tampering with the system can lead to problems in maintaining the right conditions.

Operating the system outside its allowable environmental conditions can have severe consequences, including:

1. **System Damage:** Components may be compromised, affecting overall performance.
2. **Shortened System and Battery Life:** Improper conditions can decrease the system's lifespan.
3. **Voiding of Warranties:** Non-compliance with environmental guidelines may void warranties.
4. **Potential Hazards:** Extreme conditions may lead to explosive situations, fires, serious injuries, or even fatalities.

In the event that your system is operating outside of the allowable environmental conditions, refer to the emergency section of this document for guidance.

Maintaining Your RaVolt System

Your RaVolt unit is made up of electrical components. All electrical components require periodic maintenance. Please refer to your component manuals for details and maintenance procedures and intervals.

You should keep your RaVolt unit clear of debris, vegetation, and wildlife. If fitted with filters, it is your responsibility to keep the filters clean and free of debris and blockage.

It is your responsibility to arrange for the electrical maintenance of your RaVolt unit and its components. This maintenance work can **ONLY** be performed by a qualified technician or electrician familiar with the unit and its operation. RaVolt can provide training to your qualified technician or electrician or arrange for annual maintenance for you at additional cost upon request.

In wet or snowy climates, RaVolt units are designed with equipment and vents above typical snow depths. Unusual snow conditions, ice, or drifting snow can cause the unit to limit or stop performance. Please take care in clearing snow from around the RaVolt unit, and never approach a RaVolt unit that is submerged in water or melting snow.

We recommend insuring your RaVolt unit on your homeowner's policy where possible. Insurance may also be required by your utility if you are grid-tied.

Backup Power Source

Your RaVolt unit may have a backup power source connection. This source can be used to power loads directly and to recharge your batteries.

If your RaVolt unit is backed by a generator, you must:

1. Ensure you keep an appropriate amount of fuel for your generator, which may be propane, natural gas, or diesel.
2. Ensure your generator is properly maintained according to its operating manual.
3. Ensure the generator is tested frequently to ensure it can operate when needed. The generator is pre-programmed to run an exercise cycle every monday at 8:00 AM for 20 minutes. If you do not hear the generator running its test multiple weeks in a row you should contact RaVolt and/or your generator installer.

You must purchase and arrange for backup generator fuel and maintenance yourself; RaVolt and RaVolt Partners do not provide generator fuel or maintenance.

If your system is backed up by the utility grid, you should:

1. Periodically test the backup power source by using the RaVolt bypass switching method and ensuring utility power is reaching your home or building, or
2. Confirm automatic switching to utility backup is regularly occurring by reviewing utility grid energy input on the RaVolt provided data monitoring application.

You must maintain a utility account and pay for any utility power usage yourself; RaVolt does not provide utility service or electricity.

Considerations When Using RaVolt

Your new RaVolt unit is your primary source of power for your home/property.

Your system has a maximum continuous power output and a maximum surge power output. This refers to the total of all electrical loads utilized simultaneously. During the system design phase of the installation, we have agreed upon a system configuration that matches your anticipated load usage.

In the event that you exceed the power output rating of your system, it will self-protect and temporarily shut off to give you an opportunity to turn off electrical loads that exceed the capacity. If this occurs repeatedly a load management system or sizing adjustments may be recommended.

There will be times during the day when your battery bank is fully charged and there is still available solar power. This discretionary solar power can be utilized to reduce the amount of energy drawn from your backup power source. If you shift load usage to these times of full battery capacity and available solar power, you will be optimizing your electrical usage. For example, washing/drying your clothes during daylight hours will allow you to utilize the discretionary solar you are producing instead of drawing from stored battery power when washing/drying clothes at night.

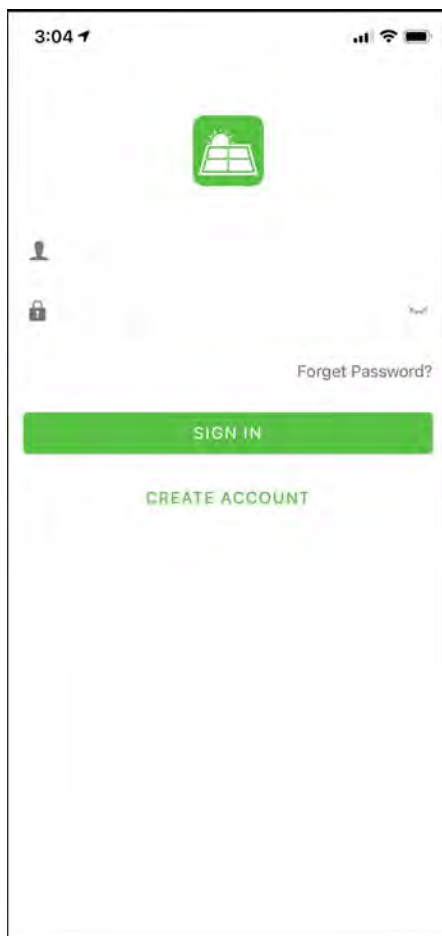
Data Monitoring System

Your RaVolt unit includes a data monitoring application provided on a best-effort basis by the inverter manufacturer. The monitoring application allows you to see solar energy production, battery capacity, energy usage, and other important information. You can set this up yourself, or a RaVolt technician will set up the app for your first usage.

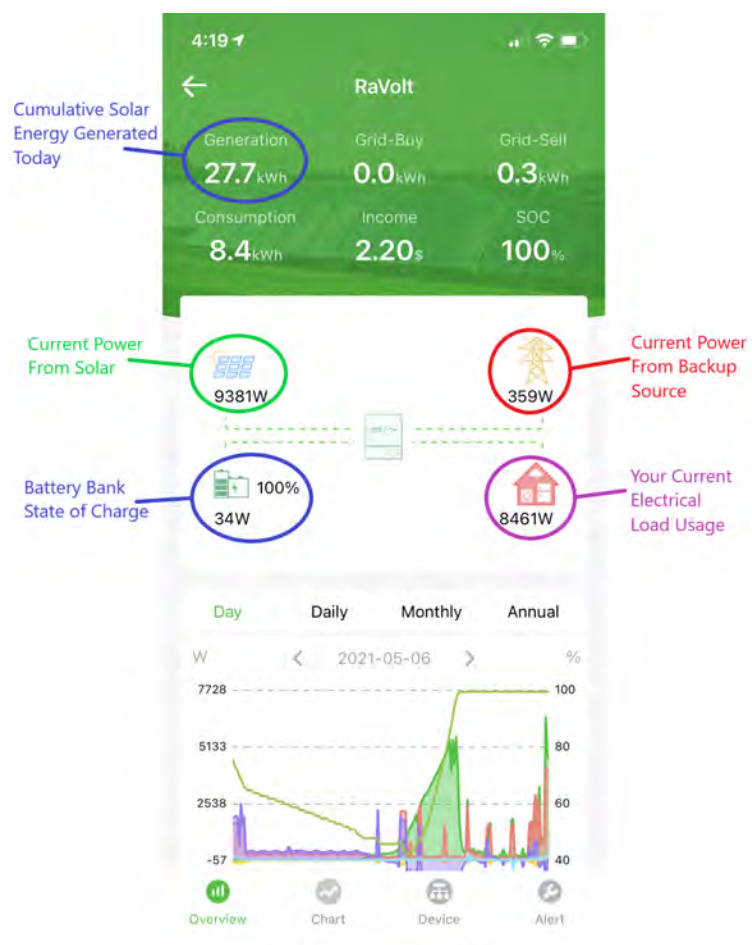
The mobile application is titled PowerView ES and the web browser is at pv.inteless.com or mysol-ark.com

Example Screens from Mobile Application:

Login



System Overview



Example Screens from Web Browser:



Shutting Down the System

It is strongly recommended to leave the system running at all times.

If leaving for extended periods, loads to the building or home should be shut off, but the RaVolt unit and solar equipment should remain operating.

Leaving the system running will ensure batteries maintain the required minimum states of charge, and that the environmental heating and cooling systems in the RaVolt unit, if present, operate continually to maintain the equipment in its allowable operating range.

If you need to shut the system off completely, please see the emergency section for procedures to shut down the system. To restart the system, follow the procedure for Resetting the RaVolt Unit.

Resetting Your RaVolt System

If your system is not operating correctly, it may need to be reset.

Your RaVolt system may be reset by removing all power sources and turning back on, per the following steps.

Step 1: TURN OFF ALL POWER TO SYSTEM

1. Switch off all loads on the system, this may be completed at the RaVolt unit load center or the service entrance to the building.
2. Turn off all AC disconnects on the exterior of the RaVolt enclosure, or feeding the RaVolt enclosure from the utility.
3. Turn off all Solar DC disconnects on the side of the RaVolt Enclosure (the switch should be vertical).
4. Turn off all battery breakers inside RaVolt enclosure(s) and on the Inverter(s)
5. Turn off the disconnect(s) where the backup propane/gas/diesel generator, if present, connects to the RaVolt unit.
 - a. This may be on the RaVolt enclosure, or on inverters mounted near or on the enclosure, or a breaker on the backup generator itself.
6. DO NOT disconnect solar panel plastic (MC4) connectors or wires which require tools to disconnect! They may still be under load and can cause dangerous or deadly electrical arcs or shock. Dc Disconnects will protect from incoming solar power if the above directions are followed



Step 2: Wait 60 Seconds

Step 3: Turn on Power to RaVolt in this order:

1. Turn on all Solar DC disconnects on the exterior of the RaVolt enclosure. These are typically marked on the enclosure exterior, or are breakers on the inverters mounted on the enclosure.
2. Turn on all battery DC disconnect switches on or near the RaVolt enclosure(s)
3. Turn on all AC disconnects on the exterior of the RaVolt enclosure, or feeding the RaVolt enclosure from the utility.
 - a. These may be on the RaVolt enclosure, or on inverters mounted near or on the enclosure, or at the utility service entrance, or at the home or building service entrance.
4. Turn on the disconnect(s) where the backup propane/gas/diesel generator, if present, connects to the RaVolt unit.
 - a. This may be on the RaVolt enclosure, or on inverters mounted near or on the enclosure, or a breaker on the backup generator itself.
5. IMPORTANT: Ensure all loads are off inside the building. Switch on load switch on the RaVolt system, Switch on the service entrance to the building.
6. Power should be ready to use, start by switching on a light switch or other small load.

Bypass the RaVolt Unit

In case your RaVolt unit fails to restart after a reset, follow these steps to ensure safety:

1. **Backup Propane/Gas Generator or Utility Grid Connection:** If the reset procedure doesn't work, you can bypass the RaVolt unit and power your system using the backup propane/gas generator or utility grid connection (if available). To do this, engage the Manual Bypass in the Load Center, located on the left side of the unit.
2. **"Dark Start" in the Morning:** If both the reset procedure and backup generator fail, the RaVolt unit may perform a "dark start" in the morning. This means it will automatically restart when solar power is restored, and the batteries have recharged to at least 25% of their total SOC (State of Charge).
3. **Seek Professional Assistance:** If you are unable to restart your RaVolt unit using the methods mentioned above, do not attempt any further actions. Instead, for your safety and to avoid any potential issues, please contact your local RaVolt Partner immediately.

Professional assistance is available, do not hesitate to reach out if you are unable to restart your RaVolt unit by the above methods, please contact your local RaVolt Partner.

Support Contact Info

Technical Support

Phone 1 (844) RAVSERV / 1 (844) 728-7378

Email service@ravolt.us

Hours 7 a.m. - 7 p.m. (EST)

Customer Service

Phone 1 (888) RAVOLT1 / 1 (888) 728-6581

Email info@ravolt.us

Hours 9 am - 6 pm (EST)

Sales/Referrals

Phone 1 (888) RAVOLT1 / 1 (888) 728-6581

Email sales@ravolt.us

Hours 8 am - 8pm (EST)

FINAL SYSTEM DESIGN AND OWNER ACCEPTANCE

RaVolt, LLC (“RaVolt” and “we” and “us” and “our”) has prepared this Final System Acceptance of your solar photovoltaic power system and lithium-ion energy storage system (“System”) that is installed at your site (“Site”) according to the RaVolt Power System Purchase and Installation Agreement (“Agreement”) for your review and approval.

Owner is responsible for operating the System in compliance with the “RaVolt Resilient Off-Grid Power System Operations and Maintenance Manual” and according to manufacturer instructions.

Owner acknowledges that Owner understands how the System loads were estimated and that System upgrades may be required if power needs significantly exceed estimates. RaVolt has estimated energy production from the System but makes no performance guarantee that the System will produce the amount of energy estimated. RaVolt makes no representations or warranties with respect to the System except as otherwise stated in the Agreement.

Owner agrees to the work performed and that Owner has reviewed the RaVolt Resilient Off-Grid Power System Operations and Maintenance Manual and received copies of equipment warranties and datasheets, and Owner understands Site specific installation considerations of the System.

Owner approval of this Final System Acceptance by signing below.

OWNER

RAVOLT, LLC

Owner Name (Print):

Name:

Owner Signature:

Signature:

Date:

Date:

Title:
