



**Volta**  
Power Systems

# FLEX SYSTEM

User Manual



Volta Power Systems



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# WELCOME TO VOLTA

Experience camping like you've only dreamed of. Volta's automotive-grade, advanced energy storage systems deliver a true off-grid adventure without sacrificing the comforts of home.

## Freedom to Roam

Gain access to REAL off-grid capability without sacrificing the amenities you want. Volta Systems provide all the power you need including all-night air conditioning with none of the noise or emissions of a generator.

## Quiet and Clean

Ditch the loud, smelly generator and choose clean, high-performance power instead. Gain access to pristine wilderness without disrupting it with fumes and noise. Unlike generators, our environmentally-conscious power systems charge from solar, shore, or while you drive, using otherwise wasted energy. Leave no trace with a Volta System.

## More Power

Experience all the power you need. Volta Systems leverage the highest energy density on the market to deliver more power in less space and with less weight. Run 110V appliances simultaneously, including air conditioning, all day or overnight. Take the comforts of home on the road without having to compromise.

## More Confidence

Built on the same automotive-grade technology that powers electric vehicles, Volta Systems are easy to use, virtually maintenance free, and will last the lifetime of your vehicle.

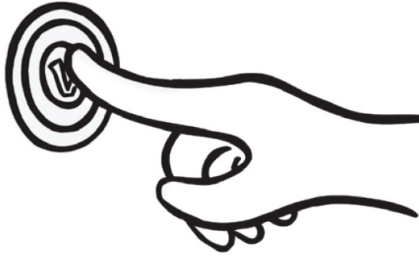
## More Safety

Protected by seven layers of safety, our systems are engineered and tested to meet rigorous auto-industry standards, ensuring a system that's safe and dependable for your whole family.

# QUICK START

## Turning On Your Volta System

To turn your system on, press the on/Off Pushbutton. After a few seconds of system checks, the On/Off Pushbutton and Touchscreen light up.



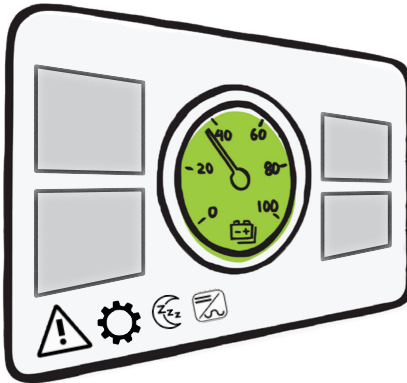
## Turning Off Your Volta System

To turn your Volta system off, press and release the On/Off Pushbutton, then allow the system a few seconds to power off. After it's powered down, the touchscreen and button will go dark.

## Using the Touchscreen

Monitor the State-of-Charge (SOC) and control the Volta System via the touchscreen.

The touchscreen turns on a few seconds after the pushbutton is pressed, a charge source is sensed, or the vehicle is turned on.



# INTRODUCTION

## About Volta Power Systems

Volta Power Systems provides exclusive access to safe, powerful, and simple energy solutions built with the latest in automotive-grade lithium-ion technology. RV OEMs trust Volta to deliver advanced power systems that meet environmental goals, drive profitability, and enhance end-user experiences like no other system can.

## Service and Contacting Volta Power Systems



**Warning:** Servicing instructions are for use by qualified personnel only. To minimize the risk of electrical shock, do not perform any servicing beyond what is specified in the operating instructions unless you are qualified to do so. Any unauthorized attempt to service the system may result in damage to the system, voiding of the warranty, and potential injury.

Except for extended periods of storage, no specific maintenance is required for the service life of the Flex Pack. In the event the Flex Pack has a breach of container integrity or has been submitted to abusive operating conditions (crush, short circuit, overcharge, over-discharge, submersion, evidence of combustion, exposure to fire, etc.), please contact your authorized Volta representative.

Phone support is available during normal business hours. Visit the Volta Power systems website for additional troubleshooting, Frequently Asked Questions, and instructional videos.

**Phone:** (616) – 226 – 4222

**Web:** [www.VoltaPowerSystems.com](http://www.VoltaPowerSystems.com)

## Return Policy

Returns are specific to the warranty terms and conditions of purchase.

## Definitions

Term	Definition
Volta System	The general term for the complete Volta energy system solution and its power distribution devices.
Flex Pack	Volta's second generation energy storage pack, composed of electrochemical lithium-ion cells.
Power Distribution Hub	The Flex Power Distribution Hub (PDH) encases the Flex System's required power distribution components in a compact design, making installation and connections simpler.
End User	The owner/operator of the product into which a Volta System is integrated.



Term	Definition
OEM	The company/organization, its staff, its subcontractors, or any other person working under its responsibility, its control, or appointed by it that is in charge of testing, using, or integrating the Volta System.
Volta Power Distribution Devices, Components, or Systems	These include but are not limited to the components that comprise the Volta System, such as inverters, chargers, and converters.
On/Off Pushbutton or Volta Pushbutton	Main system pushbutton that when pressed, turns on the Volta System.
SOC	State of Charge (SOC) indicates a percent of total pack charge.
Touchscreen	Main system display.
CAN	Controller Area Network is a bus communication system made for vehicle intercommunication. This bus allows different types of devices to communicate with each other in real time, without a host computer.
AWG	American Wire Gauge: A standardized wire gauge system.
Manufacturer Documentation	Supplemental documentation from the original manufacturer of components included in the Volta System.
RVIA	Recreational Vehicle Industry Association
120V or 120 VAC	Synonymous with 110 VAC when referring to household appliances, devices, or outlets

## System Maintenance

The Volta System and its components are maintenance free. However, depending on the integration of the Volta System, there may be components that are recommended by the OEM or upfitter that may require regular maintenance. For example, an OEM may recommend when to replace the belt on the secondary alternator. Refer to the OEM for recommended maintenance to ensure safe operation.

## Integrating Additional Components into the Volta System

Your Flex Pack is designed for connection and operation with Volta Power Systems equipment or Volta Power Systems approved equipment. Using the Flex Pack in other configurations may be unsafe and void the warranty. Opening the Flex Pack housing also voids the warranty.

If you plan to integrate additional components not provided by Volta, like a 48V air conditioning unit, contact Volta Power Systems and provide the component's

documentation or specifications. This allows Volta to assess if the component can safely integrate with the system. Volta may provide the appropriate interface or connection for your existing Volta harness.

Volta's assessment of these components are essential for the safe, reliable operation of the Volta System as well as the personal safety of the individual carrying out the work. It is the vehicle owner's responsibility to make sure that any equipment fitted complies with appropriate standards.

Any additional components of the Volta System shall:

- Ensure proper connections and circuit protection devices that meet component requirements and the ANSI/RVIA LV standard for Low Voltage Systems.
- Provide adequate support and strain relief for all connections.
- Confirm the component can be enabled/disabled by the Battery Management System.

# SAFETY

The user is responsible for safe use of the Volta System and Volta Power Distribution Devices or Systems. Before using the Volta System, Volta recommends that all users read this manual and fully understand all instructions.

## Warnings

The following symbol is used to denote a safety critical instruction or informational detail, which if not followed or fully understood, could result in death, serious injury, or voided warranty.



## Safety Guidelines

The following guidelines must be adhered to and also applied/considered when supplying any documentation to the end user.



**Warning:** Misusing a Flex Pack may result in damage, loss of product, and serious injury. Make sure to follow the safety rules listed below:

- Never short-circuit the power terminals of a Flex Pack.
- Do not reverse the polarity, or mix positive and negative connections, of the Volta System or connected power distribution components.
- Do not attempt to disable the Flex Pack safety devices or programming.
- Do not disassemble the Flex Pack.
- Do not submerge the Flex Pack.
- Do not incinerate the Flex Pack.
- Do not use a Flex Pack without its Battery Management System (BMS) fully functional.
- Do not subject a Flex Pack to excessive mechanical stresses beyond its intended application.

- Only use a Flex Pack in accordance with the guidelines set forth in this manual.
- Do not operate the Volta System or its power distribution devices or systems if the Flex Pack exhibits soot, scorching, or other evidence of thermal excursion.



**Warning:** The Volta System is designed for connection and operation with Volta power distribution devices, or equipment expressly approved by Volta Power Systems. This ecosystem of approved devices is a layer of safety within a Volta system. Use of other devices compromises this layer of safety. Use of the Volta System with other external devices could present a hazard and is expressly prohibited by Volta Power Systems. Use of unapproved devices results in voiding of the Volta Power Systems warranty.



**Warning:** Do not place a Flex Pack on, in, or near fires, or other high-temperature locations greater than 140°F (60°C). This includes intensive sunlight. Doing so may cause the Flex Pack to overheat and may result in a loss of performance and/or a shortened life expectancy.



**Warning:** Read and understand this User Manual before proceeding to un-crate, charge, install, or use the Volta System and Power Distribution Hub.



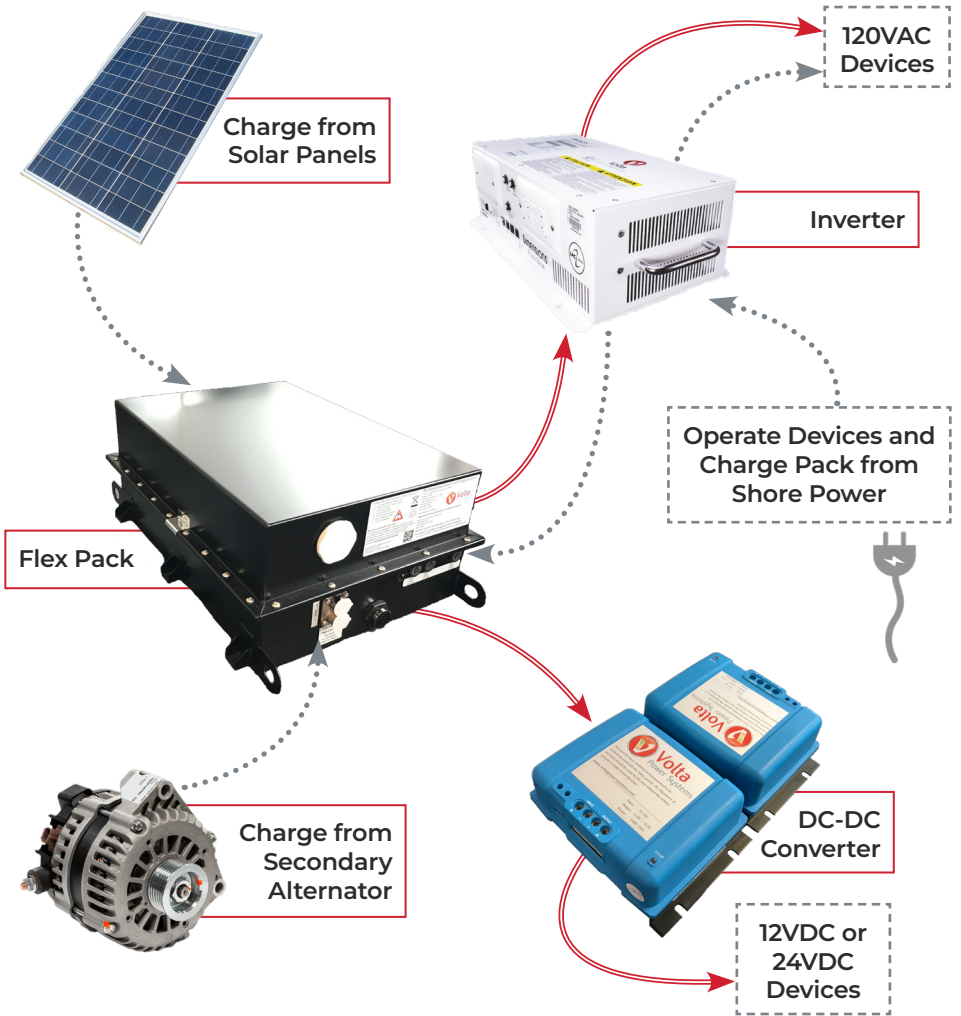
**Warning:** Careless handling of electrical components can be fatal. Never touch or use electrical components or appliances while feet are bare, while hands are wet, while standing in water, or while on wet ground.



**Warning:** Always remove jewelry and wear appropriate personal protective equipment (PPE) before handling or operating the Volta Flex Pack and Volta Power Distribution Devices or Systems.

# VOLTA SYSTEM OVERVIEW

The Volta System provides power to your vehicle's electrical systems using safe, powerful, and simple energy solutions built with the latest in automotive-grade Lithium-Ion technology.



*The appearance and availability of components in your Volta System may vary from what is shown.*

A Volta System typically contains an energy storage source (Flex Pack), an alternator for charging during driving operations, an inverter/charger for shore power charging and 120 VAC power distribution, and converters to create DC power at various voltages. To simplify the installation process, certain power distribution components may be combined into a Power Distribution Hub. Combining elements into a centralized hub makes the system integration easier. Your actual system may vary in size, complexity, power distribution devices used, or other application specific variations.

The Volta System and power distribution systems are similar in complexity to a vehicle engine or generator. Therefore, only Volta technicians or trained professionals with in-depth knowledge of Volta Systems should service these components.

## Flex Battery Management System

The safety control logic within a Flex Pack is contained in a system controller known as the Flex Battery Management System (BMS). The BMS optimizes pack performance and protects the pack against extreme operating situations. The BMS continually monitors pack performance, and in the case of abuse, neglect, or failures, it will shut off Volta power distribution devices and/or energy to the Flex Pack.

Information regarding the system, or pack status, is available from the Flex Pack via CAN communication. This information can be viewed on an OEM display by reading the CAN data stream. Contact your Volta representative for information about connecting a Volta system to a non-Volta display. In the absence of a display to read CAN data, the SOC gauge and pushbutton flash codes can assist in diagnosing system operation if the BMS detects any issues with the pack or system operation. *Refer to “Pushbutton LED Indicators” on page 18 and State-of-Charge (SOC) Flash Codes on page 21.*

## Volta System Components

Your Volta System may be configured with the following options:

- **Flex Pack:** The Flex Pack is the energy source for your Volta System. A 14-gauge steel housing protects the lithium-ion cells, and an internal Battery Management System monitors the system, balances the cells, and controls energy output.
- **Inverter/Charger:** The inverter changes the Flex Pack’s energy from direct current (DC) into alternating current (AC) to power the vehicle’s 120V AC devices (air conditioner, heater, cook top, etc.). The inverter also converts shore power (AC) to direct current (DC) for charging the Flex Pack.
- **DC-DC Converter:** The DC-DC converter drops the Flex Pack’s energy from 58V DC to power your vehicle’s 12V DC or 24V DC devices (vehicle electronics, lights, refrigerator, etc.).
- **Secondary Alternator:** The high-powered, secondary alternator provides charging power directly from your vehicle’s engine to the Flex Pack.
- **Solar Controller:** The solar controller regulates solar power input from

external solar panels into a stable, usable form of energy to charge the Flex Pack.

- **On/Off Pushbutton:** Press the On/Off pushbutton to turn on or off the Volta System.
- **Touchscreen:** Use the Touchscreen to monitor and control the Volta System.

## Temperature Limits

The Volta System is programmed with several operational temperature limits to protect the pack and prolong its life.

F°	C°	Limit	Description
140	60	Maximum storage temperature	Do not store the pack at or above this temperature. Doing so may result in a loss of performance and/or a shortened life expectancy.
134.6	57	High temperature fault	Volta System shuts down and does not function above this temperature.
125.6	52	High temperature fault recovery	If the pack reaches the high temperature fault limit (134.6°F or 57°C), the Volta System will not restart until it cools below this temperature.
116.6	47	Too hot to charge	Above this temperature, the Volta System powers devices, but the System will not charge, even if connected to shore power.
113	45	Too hot to charge recovery	If the pack reaches the too hot to charge temperature (116.6°F or 47°C), the Volta System will not allow charging again until it cools to this temperature.
68	20	Heating control off temperature	At this temperature, the pack heating control turns off if previously on.
62.6	17	Heating control on temperature	When the pack is below this temperature, the pack heating control is on to actively warm the pack.
46.4	8	Too cold to charge recovery	If the pack reaches the too cold to charge temperature (41°F or 5°C), the Volta System will not allow charging again until it reaches this temperature.
41	5	Too cold to charge temperature	Below this temperature, the Volta System powers devices, but the System will not charge, even if connected to shore power.
-4	-20	Low temperature fault	Volta System shuts down and does not function below this temperature.
-40	-40	Minimum Storage Temperature	Do not store the pack at or below this temperature. Anything at or below this temperature will need to be parked or stored in climate controlled storage.

*The values listed in this table represent approximate values that may vary by system specification, application, and environmental conditions.*



# VOLTA SYSTEM ON/OFF PUSHBUTTON OVERVIEW

## Turning On the Volta System

### Pushbutton



Press the On/Off pushbutton to turn on the Volta System and power your vehicle's electrical systems and devices. When the On/Off pushbutton is pressed to turn on the Volta System, a 2 to 5 second system check occurs. If all systems checks are successful, the Flex Pack's internal contactor engages, supplying power to all Volta components, turning on the Volta System.

Do not repeatedly press the pushbutton. After pressing the button, wait 30 seconds for all system checks to occur before pressing the button again.

## Turning Off the Volta System

Press the On/Off pushbutton to turn off the Volta System. After pressing the pushbutton to turn off the Volta System, a few seconds will pass before the pushbutton LED turns off and the Touchscreen or SOC gauge shuts down, signaling that the Volta System is turned off.

If the Volta System is off, and a charge source is detected, the Volta System enters Charge Only Mode. Refer to Charge Only Mode below for additional details.

## Shore Power Mode

In Shore Power Mode, the Flex Pack charges as necessary and maintains optimal temperature for charging and discharging. Also, if shore power is lost, the Volta System shuts down automatically. This mode is ideal for short term storage, when preparing for a trip in cold weather, or for any scenario where it is important for the system to shut down in case of shore power loss (power outage, accidental unplugging, or if a breaker or GFCI trips).

If the system is in Shore Power Mode, the AC loads in your vehicle (air conditioner, cooktop, outlets, etc.) are powered from the charge source. Exceeding the rated capacity of the charge source may result in tripped breakers or load shedding.

Depending on your upfitter or OEM configuration, DC loads may or may not be operational while in Shore Power Mode.

## Entering or Exiting Shore Power Mode

Press the Volta Pushbutton anytime you are connected to shore power. Or, connect to shore power with the Volta System turned off. When in Shore Power Mode, the Pushbutton LED flashes green continuously.

### Pushbutton LED Indicators

The Pushbutton LED flash codes and colors communicate basic system and fault states, including:

LED Color	System Status
Green	System on
Green Flashing	Charge Only Mode - System turned off and charge source connected
Green Fade On	Volta System is starting after pressing the pushbutton
Green Fade Off	Volta System is shutting down after pressing the pushbutton
Yellow Flashing (30 seconds then system shuts down)*	System fault causing shutdown. If possible, monitor the touchscreen before shutdown to assist in diagnosing the fault

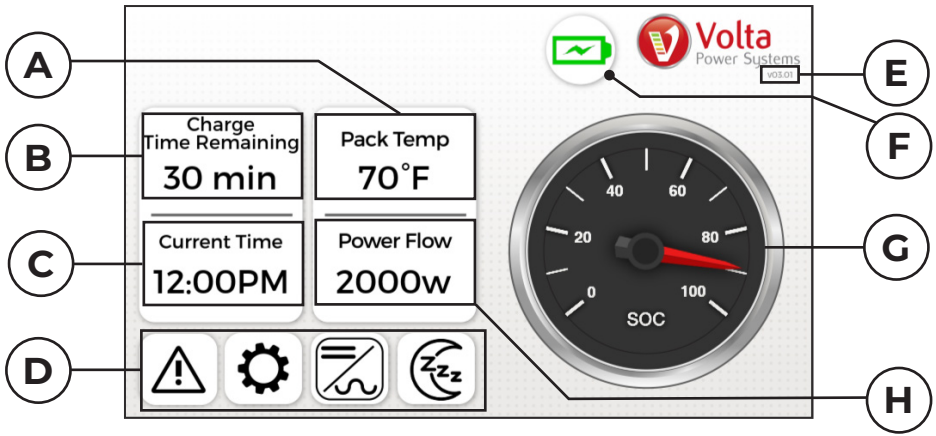
\* If a system fault is present and a charge source is connected, the LED remains dim yellow after blinking yellow for 30 seconds.

# TOUCHSCREEN OVERVIEW

Monitor and control the Volta System via the touchscreen. The appearance and availability of touchscreen features on your Volta System may vary from what is shown.

The touchscreen turns on a few seconds after the pushbutton is pressed, a charge source is sensed, or the vehicle is turned on.

## Home Screen



- A) **Pack Temp:** Displays the current temperature of the Flex Pack
- B) **Charge Time Remaining/Discharge Time Remaining:** Displays the approximate charge time or discharge time remaining in the Flex Pack. This value changes depending on the amount of load applied to the pack or the rate of charge. For more information on increasing the system runtime, *refer to Charging the System and Increasing System Runtime on page 26*
- C) **Current Time:** Displays the current time.
- D) **Menu Bar:** Touch the menu bar buttons to access the corresponding screens, including:



Alerts button: Refer to “Alerts Screen on page 21.



Settings button: Refer to “Settings Screen on page 23.



Inverter button: Refer to “Inverter Screen on page 24.



Sleep button: Press to put the Touchscreen to sleep. Touch the screen to turn it back on.



Home button: Access the Home screen.

E) **Screen Software Version:** Displays the current screen software version.

F) **System Indicators:** Appear to communicate system changes or statuses, including:



Alternator Charging: Flex Pack has commanded the alternator to charge. Flex Pack is ready for charging from alternator, or is currently charging from alternator.



Flex Pack Temperature Low: Flex Pack is too cold to charge.



Heating Pads On: Heating pads are on and actively warming the Flex Pack.



Pack Temperature High: Flex Pack is at or near the high temperature shutdown limit.



System Fault: System fault is active. Refer to the Alerts screen for details.



System Charge Status: Flex Pack is charging. This will appear on the display when there is a positive power flow.



System Charging Status: Flex Pack is connected to a shore charging source, but has a negative power flow.

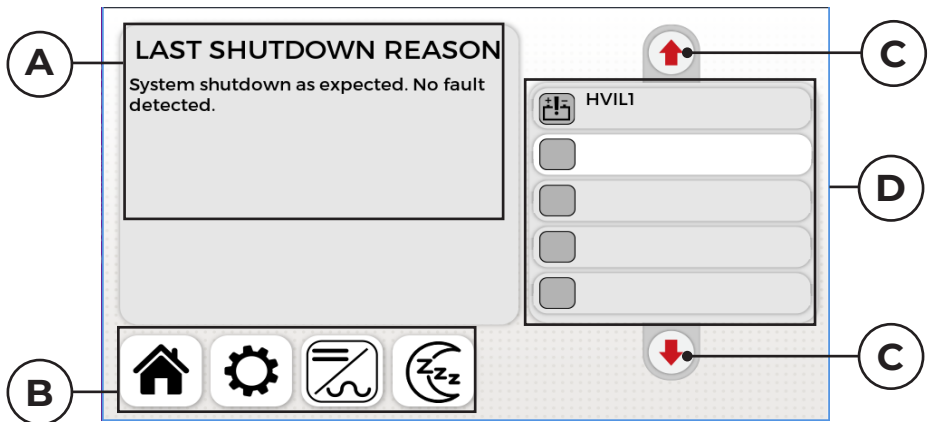
G) **State-of-Charge Gauge (SOC):** Displays the approximate SOC of the Flex Pack. The SOC gauge's flash codes and colors communicate basic system and fault states. **Refer to State-of-Charge (SOC) Flash Codes on page 21.**

H) **Power Flow:** Displays the power consumption (negative value) on the Flex Pack or the rate of charge (positive value) to the Flex Pack.

## State-of-Charge (SOC) Flash Codes

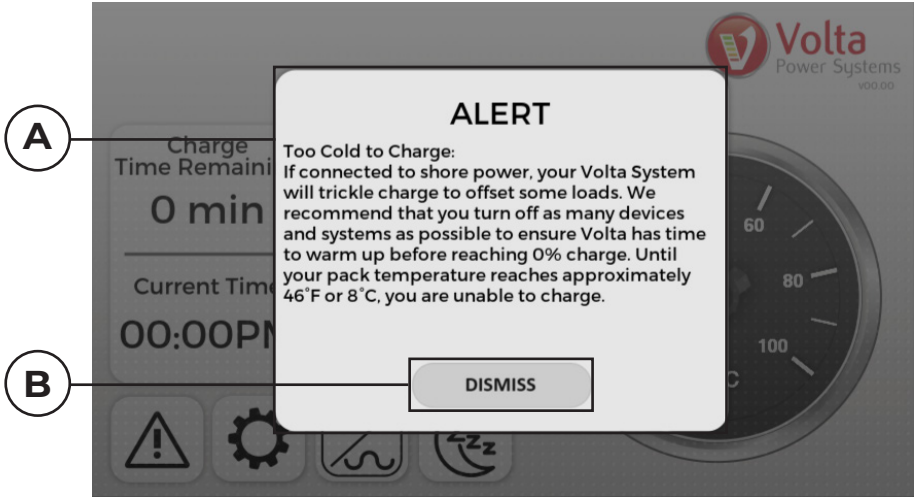
System State	Color	SOC %
Normal Operation	Solid Green	20 - 100%
Low SOC	Solid Yellow	Less than 20%
Very Low SOC	Solid Red	Less than 10%
System Empty	6 Red Flashes	0%
System Fault	Constant Red Flashes	0 - 100%
Too Hot to Charge	Yellow for 5 seconds, off for 1 second, repeats	0 - 100%
Too Cold to Charge	Blue for 5 seconds, off for 1 second, repeats	0 - 100%

## Alerts Screen



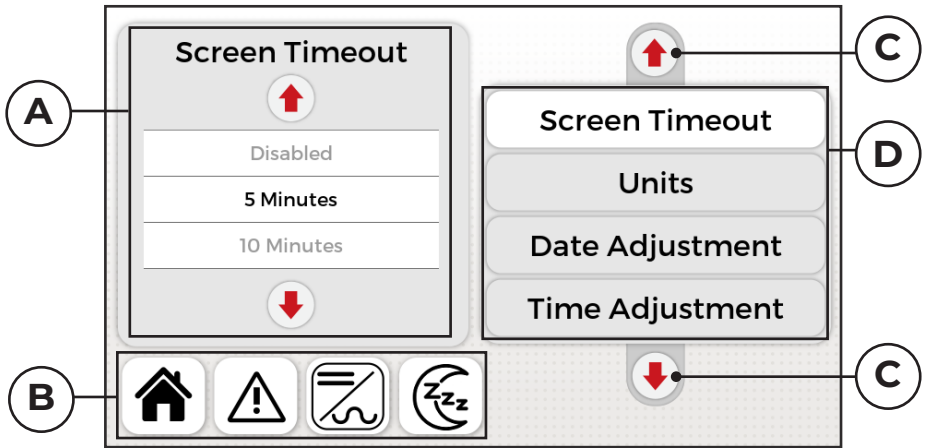
- A) Last Shutdown Reason:** Displays reason for previous shutdown.
- B) Menu Bar:** Touch the menu bar buttons to access the corresponding screens, including:
- Home button: Accesses the Home screen.
  - Settings button: Accesses the Settings screen.
  - Inverter button: Accesses the Inverter screen.
  - Sleep button: Puts the Touchscreen into sleep mode.
- C) Navigation Arrows:** Press to navigate the active alerts panel.
- D) Active Alerts:** Displays the current system alerts.

## Pop-Up Alerts



- A) **Alert Message:** Displays the system alert message. Follow the instructions for advice on how to resolve the alert.
- B) **Dismiss Button:** Press button to dismiss alert. If alert is not resolved, pop up will repeat until resolved.

## Settings Screen



- A) **Settings Adjustment Panel:** Displays the adjustable values or toggle buttons for the corresponding setting.
- B) **Menu Bar:** Touch the menu bar buttons to access the corresponding screens, including:
- Home button: Accesses the Home screen.
  - Alerts button: Accesses the Settings screen.
  - Inverter button: Accesses the Inverter screen.
  - Sleep button: Puts the Touchscreen into sleep mode.
- C) **Navigation Arrows:** Press to navigate the Settings Panel.
- D) **Settings Panel:** Displays the adjustable settings. Use the arrow buttons to scroll through the settings, the press the setting to adjust. *Refer to the Available Settings section below for details.*

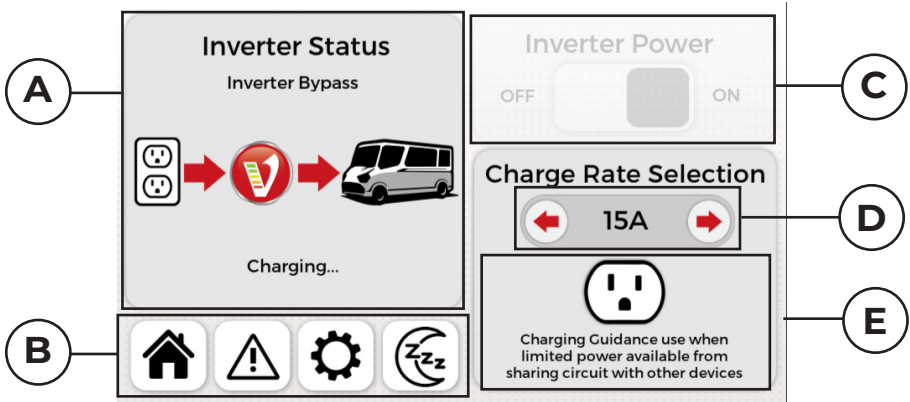
### Available Settings

Some screens require a password to edit the settings. These screens include settings that should only be adjusted by a Volta approved technician. The following screens have settings that are accessible to all users:

- Screen Timeout: The screen timeout value adjusts the time after inactivity before the touchscreen turns off. When disabled, the touchscreen never goes to sleep. Touch the screen to wake up the touchscreen.
- Units: Toggle the temperature units between °F or °C.
- Date Adjustment: Adjust the date (day, month, year).
- Time Adjustment: Adjust the current time (hour, minute, AM/PM, 12/24 hr).

- Theme: Toggle the touchscreen color theme.
- Screen Brightness: Adjust the screen brightness or toggle between Auto and Manual mode.
- Power Button: Toggle the Power Button dimming feature. When set to “Dim” the Volta System On/Off Pushbutton LED brightness decreases. Depending on the light levels within the vehicle, a dimmed Pushbutton LED may not be visible.
- Pack Version: The current Flex Pack software is displayed here.

## Inverter Screen



- A) Inverter Status:** Displays a description of the current inverter action or status.
- B) Menu Bar:** Touch the menu bar buttons to access the corresponding screens, including:
- Home button: Accesses the Home screen.
  - Alerts button: Accesses the Settings screen.
  - Settings button: Accesses the Setting screen.
  - Sleep button: Puts the Touchscreen into sleep mode.
- C) Inverter Power:** Toggles the inverter On or Off. Whenever the inverter is not needed (not using 120V devices), turn off the inverter to conserve Flex Pack SOC. If you are charging from shore, the inverter switch will be non-functional because power is being bypassed from the shore source. *Refer to “Charging the System and Increasing System Runtime” on page 26.*
- D) Charge Rate Selection:** Displays the current charge rate. Use the arrow buttons to raise or lower the charge rate. The charging guidance below the Charge Rate Selection aids in selecting the proper charge rate for your system based on usage and charge source.
- E) Charging Guidance:** Displays a description of the recommended use for the currently selected charge rate.



# STATE OF CHARGE (SOC) GAUGE

## SOC Overview



Your Volta System may be equipped with an SOC gauge.

The SOC gauge provides an approximate reading of how much energy remains in the pack. The flash codes and colors communicate basic system and fault states.

## SOC Gauge Flash Codes

System State	Color	SOC %
Loading System Data	Constant Blue Blink	0-100%
Normal Operation	Solid Green	20 - 100%
Low SOC	Solid Yellow	Less than 20%
Very Low SOC	Solid Red	Less than 10%
System Empty	6 Red Flashes	0%
System Fault	Constant Red Flashes	0 - 100%
Too Hot to Charge	Yellow for 5 seconds, off for 1 second, repeats	0 - 100%
Too Cold to Charge	Blue for 5 seconds, off for 1 second, repeats	0 - 100%

# CHARGING THE SYSTEM AND INCREASING SYSTEM RUNTIME

The Volta System accepts charge from the sources described in the following sections. Monitor the Touchscreen for any alerts that may prevent charging.

The Volta System only charges when required. There may be several factors preventing charging, even while connected to a charge source. The most common reasons are the Flex Pack is too cold to charge, or the BMS is inhibiting charge because of a high enough SOC.

## System Runtime

Similar to fuel tank levels responding to driving style, the time it takes to drain a Flex Pack from “Full” to “Empty” depends on usage. The two largest loads in a vehicle that affect the runtime are typically heating and cooling. The more the heating and cooling systems run to maintain the desired temperature inside the vehicle, the more energy is used.

To maximize runtime:

- **Turn off the inverter if 120 VAC loads are not required:** When 120 VAC devices (air conditioner, heater, cooktop, etc.) are not in use, turn off the inverter via the touchscreen. *Refer to “Inverter Screen” on page 24.*
- **Increase the thermostat in warm climates:** Increasing the desired vehicle temperature reduces the amount of time the air conditioner compressor needs to run in warm climates.
- **Decrease the thermostat in cool climates:** Decreasing the desired vehicle temperature reduces the amount of time the heating system needs to run in cold climates. Generally, heating using electricity uses almost twice the energy as cooling.

## Charging via Shore Power

Volta recommends a minimum 120V/30A rated shore power cord less than 50 ft. in length. The OEM should follow NEC or RVIA guidelines for the specific application requirements.

When plugged into shore power, the Flex Pack samples incoming power for a few seconds to ensure uniformity requirements are met. If incoming power meets the requirements, the Volta System turns on and begins charging the Flex Pack.

If the Volta System does not turn on, or the Flex Pack does not begin to charge, the incoming power is likely not meeting the Volta System requirements. This feature protects the vehicle from brown outs due to insufficient power. Additionally, the system may not accept a charge if plugged into an electronic surge protector.

The rate at which the Volta System charges from shore power depends on your system configuration and the settings chosen on the Touchscreen. *Refer to “Inverter Screen” on page 24 for details on changing the charge rate selection.*

## 120 VAC vs 240 VAC Outlets



**Warning:** Do not connect the Volta System to a 240 VAC outlet. Connecting to a 240 VAC outlet may result in permanent damage not covered by the Volta Power Systems warranty.

RV owners are familiar with 30A outlets, so they may want to install a 30A outlet at their home. Unless this outlet is specifically installed as an RV outlet, the electrician may mistakenly wire the outlet to be 240 VAC, which is typically used for home appliances, such as electric dryers. RV outlets are 30A 120 VAC, but home 30A outlets are commonly 240 VAC. Do not connect to a 240 VAC outlet.

## Charging via the Secondary Alternator

A Volta secondary alternator powers the vehicle's electrical features while simultaneously charging the Flex Pack when all of the following occur:

- The vehicle is running.
- The vehicle is maintaining a high enough RPM.
- The Volta System is turned on.
- The Volta System is within temperature limits.
- The State of Charge (SOC) is less than approximately 85%.

If the engine does not sustain a high enough RPM, the BMS sends a signal to turn off the alternator until the BMS determines it is appropriate to turn on the alternator.

## Charging via Solar Power

Your vehicle may be equipped with solar panels that supply additional energy to the Flex Pack when there is sufficient sunlight.

The available charge from solar power varies by the capacity and number of solar panels on your vehicle.

The secondary alternator or a shore power connection are more effective in charging the Flex Pack than solar power. The solar charging system is used to increase the time needed between Flex Pack charges.

## Charging via Generator

Similarly to charging via shore power, the Flex Pack can charge via connection to a generator. An on-board RV generator or a traditional generator can charge the Flex Pack if the generator meets the inverter/charger's requirements. Refer to the inverter's manufacturer documentation, which may be available upon request from Volta, for specifications and requirements.

When plugged into a generator, the inverter samples incoming power for a few seconds to ensure uniformity requirements are met. If incoming power meets the requirements, the Volta System turns on and begins charging the Flex Pack.

If the Flex Pack does not charge from a generator, this condition may be due to unclean or unstable power from the generator. While the Flex Pack is com-

patible with most generators, we do not guarantee charging capabilities due to variability that exists between generators.

The Volta System can be integrated with a generator using an auto-start and auto-shutoff feature, creating a hybridized charging system that increases efficiency for the Volta System and the generator.

## Recovery from Zero State-of-Charge

The Battery Management System shuts down the Volta System if the Flex Pack reaches a very low voltage limit or 0% State-of-Charge (SOC). When the Volta System reaches 0% SOC, the pushbutton LED flashes yellow, the SOC flashes red, and the system shuts down. Do not attempt to turn on the system until a charge source is connected. Perform one of the following recovery procedures:

### ***Recovery from Zero SOC - Shore Power***

1. Turn off the Volta System, if not off already.
2. Connect to shore power.
3. Ensure the appropriate charge rate is selected. ***Refer to “Inverter Screen” on page 24 for details on changing the charge rate selection.***
4. Charge the system to at least 20% SOC before returning to normal system operation and use.

### ***Recovery from Zero SOC - Alternator***

1. Turn off the Volta System, if not off already.
2. Start the vehicle.
3. Turn on the Volta System. Immediately drive and attempt to maintain the RPMs over 1500 to charge the system until the SOC indicates at least 20% SOC before returning to normal system operation and use.

Perform one of the recovery procedures as soon as possible. Failure to recover from a low voltage shutdown will result in further Flex Pack discharge, which may require service from a Volta technician.

Consider the Flex Pack temperature when recovering from zero SOC. The Volta System will not charge if the Flex Pack is too cold. ***Refer to “Cold Temperature Operation” on page 32 for additional details and strategies.***

# USING THE AUTO START SYSTEM



**Warning:** Do not start the vehicle engine in closed garages or other enclosed areas. Vehicle exhaust fumes are toxic.

## Auto Start System Overview

The Volta System may be integrated with an Auto Start System. The Auto Start System automatically starts and stops the vehicle's engine, allowing the secondary alternator to charge the Volta System.

The functionality and availability of the Auto Start System varies depending on the OEM and the model of Auto Start System installed on your vehicle. For complete instructions and specifications, refer to the manufacturer documentation.

# STORING VEHICLES WITH A VOLTA SYSTEM



**Warning:** Do not store the Volta System at low State-of-Charge. The system is designed with a limited energy reserve, in case the system is left on and the low voltage shutdown occurs. This reserve may last for three months until irreversible damage could occur. Neglecting system maintenance and allowing the Flex Pack to come to this state will result in voiding the warranty.



**Warning:** Failure to turn off the Volta System before storing your vehicle long term (greater than 3 months) will cause the Flex Pack(s) charge to deplete faster, even if all loads on the system are removed, which can cause permanent damage to the Flex Pack.

Storage methods vary by customer and environment. Refer to the following strategies for short-term or long-term storage. Also, *refer to “Temperature Limits” on page 16* for safe storage temperatures.

## Long Term Storage (Greater than 2 Weeks to a Maximum of 90 Days)

Preparations should be made to protect the life and performance of the Flex Pack when not in use. When leaving the vehicle in storage, turn off the Volta System by pressing the On/Off pushbutton.

To prepare for long-term storage:

1. Charge the Volta System to greater than 70% SOC as indicated on the touchscreen or SOC gauge.
2. Press the On/Off pushbutton and verify that the pushbutton LED and touchscreen or SOC gauge turn off, indicating the Volta System is off.
3. Turn on the Volta System every 90 days to verify the pack is maintaining a high State-of-Charge (SOC). If necessary, charge the system to above 70% SOC before storing the vehicle again. Never exceed 90 days between checks on the Volta System.

## Short Term Storage (Less than 2 Weeks)

If you are storing the vehicle, it is always best to unplug from shore power and turn off the Volta System by pressing the Volta pushbutton and verifying everything is off. If the vehicle is frequently used and you are between trips of two weeks or less, use Shore Power Mode.

In Shore Power Mode, the Flex Pack charges as necessary and maintains optimal temperature for charging and discharging. Also, if shore power is lost, the Volta System shuts down automatically. This mode is ideal for short term storage, when preparing for a trip in cold weather, or for any scenario where it is important for the system to shut down in case of shore power loss (power outage, accidental unplugging, or if a breaker or GFCI trips).

If the system is in Shore Power Mode, the AC loads in your vehicle (air condi-

tioner, cooktop, outlets, etc.) are powered from the charge source. Exceeding the rated capacity of the charge source may result in tripped breakers or load shedding.

Depending on your upfitter or OEM configuration, DC loads may or may not be operational while in Shore Power Mode.

### ***Entering or Exiting Shore Power Mode***

Press the Volta Pushbutton anytime you are connected to shore power. Or, connect to shore power with the Volta System turned off. When in Shore Power Mode, the Pushbutton LED flashes green continuously.

# USING THE VOLTA SYSTEM IN HOT AND COLD TEMPERATURES

Refer to “Temperature Limits” on page 16 for details on the hot and cold temperature operating limits.

The touchscreen displays the Flex Pack temperature and the following indicators to assist in hot or cold climate operation. Refer to “Installing MyVolta Bluetooth Module” on page 35 for additional touchscreen details.



Flex Pack Temperature Low: Flex Pack is too cold to charge.



Heating Pads On: Heating pads are on and actively warming the Flex Pack.



Pack Temperature High: Flex Pack is at or near the high temperature shutdown limit.

## High Temperature Operation

The Flex Pack is designed with passive cooling. The BMS shuts down the Flex Pack or prevents charging at elevated temperatures to allow the Flex Pack to cool.

The Volta System charges normally up to 116°F (47°C) and distributes power normally up to 134°F (57°C). At or above 116°F (47°C), the Flex Pack will not charge. At or above 134°F (57°C), the Battery Management System (BMS) shuts down the Flex Pack.

If the Flex Pack has reached high-temperature operating limits, it may take several hours for the pack to cool to normal operating temperatures. When attempting to cool the pack, park in the shade and ensure any vents designed to allow air to the pack are not blocked.

To protect the Flex Pack, avoid using or storing the Flex Pack at or above 134°F (57°C). Storage of the Flex Pack at elevated temperatures is not recommended, as it will reduce the lifetime and capacity of the Flex Pack.

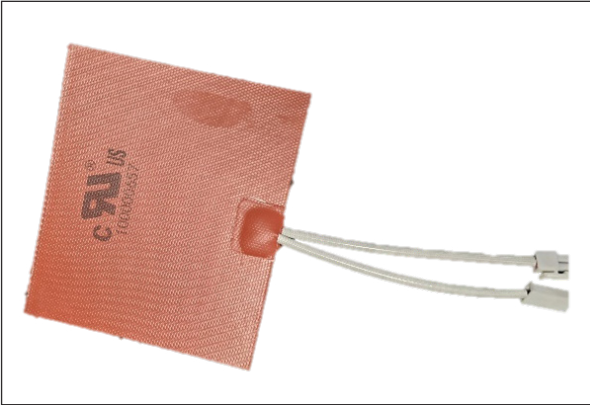
## Cold Temperature Operation

The Volta System is capable of operating below freezing temperatures and powers electrical systems as normal. However, if the Flex Pack temperature is too low, the system does not charge.

For system operation in cold environments, and to maintain the Flex Pack at charge-accepting temperatures, the energy storage modules inside the Flex Pack are equipped with internal heating pads (see photo). The internal heating system operates automatically when the Volta System is on and sufficient energy is available from the Flex Pack.



## Heating Pad



### ***Cold Temperature Operating Strategies***

When the Flex Pack is too cold to charge, monitor the Volta System SOC and touchscreen alerts to ensure precautions are in place to prevent the SOC from dropping to 0%. When cold, the pack's internal heating pads continue to draw power to warm the pack, which will cause the pack to lose power faster. Heating pads warm the pack at approximately 1 - 3 degrees Celsius per hour, so depending on the ambient temperatures, you may reach 0% SOC before the pack is warm enough to accept a charge.

If the Flex Pack is too cold to charge, the SOC flashes blue and a snow flake appears on the touchscreen.

Remember, before charging the vehicle, consider the charge source and ensure the appropriate charge rate is selected via the Touchscreen. ***“Inverter Screen” on page 24***

Refer to the following operating and charging strategies while in cold weather:

- If planning a trip during cold weather, connect the vehicle to shore power at least a day prior to leaving. Depending on the ambient temperature, connecting to shore power a day prior to leaving should allow sufficient time for the heating pads to warm the energy storage pack.
- Connect to shore power whenever possible. Depending on your system configuration, when too cold to charge and connected to shore power, the system will charge at a low current to offset minor loads, such as from the heating pads. When the Flex Pack warms enough to accept charge, the charge from shore power begins automatically.

- If shore power is not available, turn on the Volta System to warm the Flex Pack. When the Flex Pack warms enough to accept charge, turn on the vehicle and drive the vehicle to charge the Flex Pack via the alternator.
- If a charge source is not available, and the SOC is too low to activate the heating pads long enough to warm the Flex Pack, turn off the Volta System to limit power consumption. If possible, park the vehicle in a warmer location to raise the Flex Pack temperature, or contact Volta Power Systems for additional strategies to warm the Flex Pack to accept charge.

# INSTALLING MYVOLTA BLUETOOTH MODULE

The myVolta Bluetooth Low Energy (BLE) device enables users to access their Volta system's information from a Bluetooth-connected device.

If your system is not equipped with a Bluetooth module, you can purchase the Bluetooth module at [www.VoltaPowerSystems.com](http://www.VoltaPowerSystems.com).

The kit includes:

- Bluetooth Communication Module
- Adapter Harness

The Bluetooth module integrates with the existing State-of-Charge (SOC) gauge or Touchscreen display in your vehicle. The installation procedure varies slightly depending on if you have the SOC gauge or a Touchscreen. To install, refer to the video on [www.VoltaPowerSystems.com](http://www.VoltaPowerSystems.com) or follow these instructions:

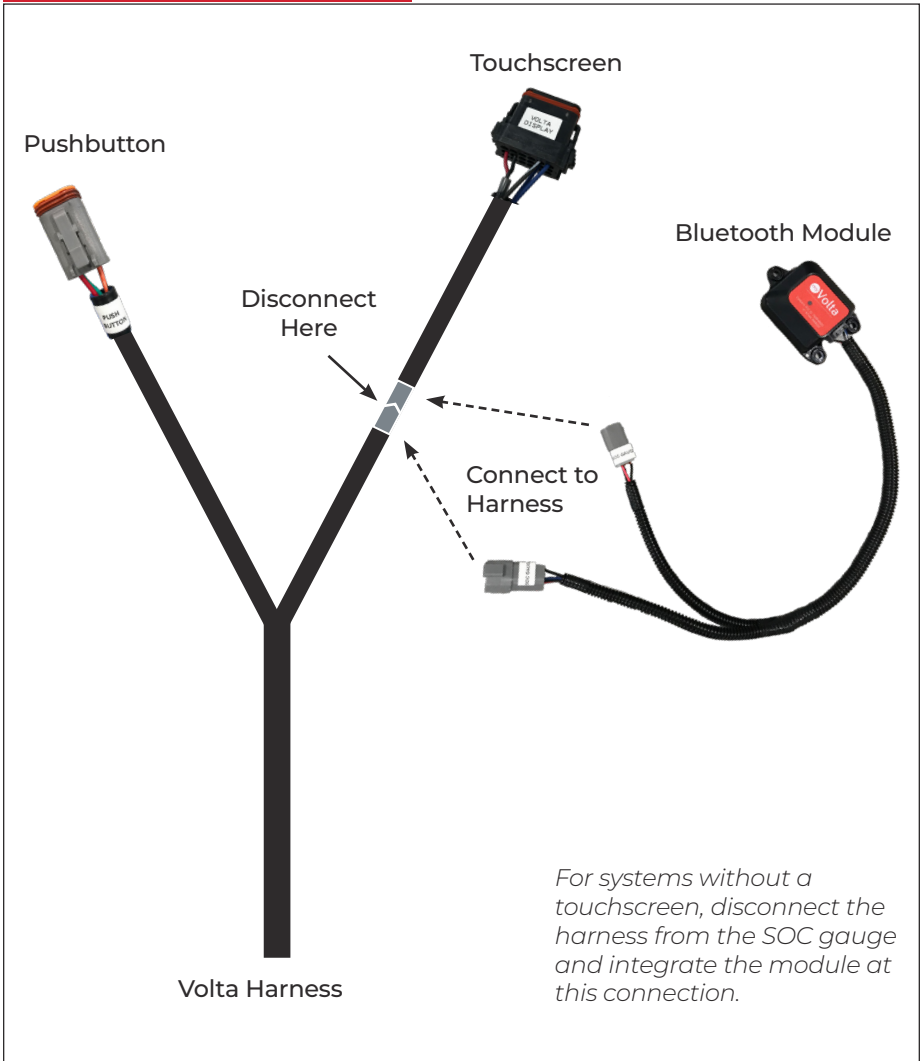


1. Locate the SOC gauge or Touchscreen, then turn off the Volta System via the On/Off button. Wait a few seconds for the system to shut down.
2. When the SOC gauge or Touchscreen and the On/Off button are no longer illuminated, remove any mounting hardware to access the back of the SOC gauge or Touchscreen.
3. Vehicles with Touchscreen Only:
  - a. The Bluetooth adapter harness is connected to the Touchscreen branch of the harness, but not directly to the back of the touchscreen. Instead, disconnect the touchscreen harness branch at the position shown in the graphic.
  - b. Connect the Bluetooth adapter harness to the Bluetooth module.
  - c. Connect the Bluetooth adapter between the connectors on the Touchscreen branch of the Volta harness. The adapter harness has three unique connections, ensuring the connections cannot be made in the wrong order or position.
4. Vehicles without Touchscreen (SOC Gauge Only):
  - a. Disconnect the Volta harness from the back of the SOC Gauge.
  - b. Connect the Bluetooth adapter harness to the Bluetooth module.
  - c. Connect the Bluetooth adapter between the back of the SOC gauge and the Volta harness. The adapter harness has three unique connections, ensuring the connections cannot be made in the wrong order or position.
5. Feed the harness and cables back into their original locations.
6. Remove the top layer of tape over the adhesive tape on the Bluetooth

module, then adhere the Bluetooth module to a suitable surface.

7. Reinstall the SOC gauge or Touchscreen and the On/Off button unit using the four screws.
8. Press the On/Off button to turn on the Volta system.
9. Follow the instructions in the myVolta app to pair your mobile device with the Volta system.

## Bluetooth Module Install



## MyVolta App

Download the myVolta app to your mobile device, then follow instructions in the app to pair with your Bluetooth module. You can view the following information from your Volta System in the myVolta app:

- Performance Data
- Estimated Runtime Remaining
- Charging Status
- Pack Temperature
- Warnings, Faults, or Errors

# TROUBLESHOOTING AND FAQs

## How long will my Volta System run?

Runtime is directly related to how much power you are using and how much energy your system can store. On the Volta touchscreen, you can monitor the Time Remaining indicator. This displays the approximate charge time remaining in the Flex Pack.

Overall, the more appliances, devices, and electrical systems you use, the quicker your State-of-Charge will deplete. On lighter loads, it's possible for the system to last for several days. *Refer to "System Runtime" on page 26.*

## Why is there a system delay after I press the On/Off push-button?

When the On/Off button is pressed to turn on the Volta System, a system check occurs. After all system checks are successful, the Flex Pack supplies power to all the Volta System components, turning the system on.

## Why won't my Volta System charge?

There may be several reasons why the Volta System isn't charging, even while connected to shore power:

- The State-of-Charge is too high. If you are attempting to charge the SOC to 100% from a SOC greater than approximately 90-95%, the system will need to deplete to below approximately 90-95% before the system begins to charge again.
- The Volta System is not turned on. If attempting to charge via alternator, turn the Volta System on first.
- The Flex Pack is too cold or too hot to charge. *Refer to "Using the Volta System in Hot and Cold Temperatures" on page 32.*
- The shore power connection does not meet the charging requirements controlled by the Flex Pack BMS. *Refer to "Charging via Shore Power" on page 26 for details.*
- The selected charge rate is not appropriate for the shore power connection. You may need to raise or lower the Charge Rate Selection on the touchscreen. *Refer to "Inverter Screen" on page 24.*
- If you're using a plug-in surge protector, but you're experiencing problems with your Volta System not connecting to the attached shore power, attempt the following test: Remove the surge protector and plug the shore cord directly into your vehicle. If your system is now able to receive shore power, it may be that your surge protector is not compatible with the Volta System.

## How can I tell if my solar panels are working?

Depending on your usage, and the size of your solar panels, it may be difficult to monitor the incoming charge.

The electrical systems in your vehicle likely draw more power than the solar panels generate, therefore solar power is not as efficient in charging the Volta System as connecting to shore power or the secondary alternator. Solar power is better used as a way to increase the time between charges.

In ideal conditions, some incremental charging can be experienced, but you shouldn't rely on your system's solar panels to charge your Volta system. If you have access to the LEDs on the solar controller, **refer to "Charging via Solar Power" on page 27 for details on the indicators.**

## Does the Volta System have to be turned on when charging?

No, the Volta System can be turned off while charging. If you press the On/Off pushbutton while it is charging via shore power, the Volta System enters Charge Only Mode. In Charge Only Mode, the electrical systems are off, the pushbutton LED flashes green, and the Volta System allows charging when necessary. If charging via the alternator, charging will stop if you press the On/Off button. **For more information, refer to "Shore Power Mode" on page 17.**

## Why can't I connect my phone to my Volta System?

To connect your phone to the Volta System to monitor performance data, runtime remaining, charge status, pack temperature, and other system data, you must have the Bluetooth Module installed in your vehicle and have the MyVolta app installed on your phone.

Your RV's OEM may have installed a Bluetooth module. If so, simply download the MyVolta app to your phone, then follow the instructions in the app to pair to the Bluetooth module.

If your RV is not equipped with the Bluetooth module, it is available for purchase from [www.VoltaPowerSystems.com](http://www.VoltaPowerSystems.com). **Refer to "Pushbutton LED Indicators" on page 18.**

To determine if you currently have the Bluetooth module installed:

- Check with your OEM or consult any OEM documentation provided with your RV.
- Attempt to connect the MyVolta app.
- Check behind the SOC gauge or Touchscreen to see if the Bluetooth module is connected.

## When do I need to adjust the selected charge rate? How do I adjust the charge rate?

Have you ever tripped a circuit breaker in your house after using too many electrical appliances at once? This happens when the amount of energy being pulled from the outlet exceeds what it's able to give.

The inverter/charger has an adjustable charge rate. You can adjust the Charge Rate Selection via the touchscreen in 5A increments. This allows you to adjust the charge rate to match the shore power source and to meet your system use requirements. *Refer to “Inverter Screen” on page 24 for details.*

## How do I dim my pushbutton LED?

To dim the pushbutton, go to the settings screen on the touchscreen. Scroll until you see the pushbutton dimming option, then toggle the setting on or off.





**Volta** Power Systems