



# Installation Manual

## Coral Smart Battery

SB14A

Part of the Pika Energy Island™





**Coral Smart Battery**

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Serial Number:

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RCP Number:

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# Section 1: Introduction

## About this manual

This Installation Manual provides instructions and recommendations for installing and commissioning the SB14A for simple, reliable energy storage with optional solar charging. SB14A is a Smart Battery kit designed to work with the Pika Islanding Inverter and other REbus™-compatible components of the Energy Island system from Pika Energy.

This Installation Manual includes full details on installation, wiring, safety, inverter integration, and other key aspects of installing SB14A. The companion document to this Installation Manual is the SB14A Operation Manual. Please reference the Operation Manual for complete information on user-configurable features including Device Settings and Operational Modes. Some information on user-configurable features is included here, but is comprehensively detailed in the Operation Manual.

## Symbols used in this Manual

	<b>WARNING:</b> This indicates a fact or feature very important for the safety of the user to prevent injury or death and/or which can cause serious hardware damage if not applied appropriately.
	<b>CAUTION:</b> Presents information to prevent damage to this product
	<b>EARTH GROUND SYMBOL</b>

## About the Coral 14A

SB14A is an efficient, easy-to-install Smart Battery kit that enables commonly-available Deep Cycle batteries to be used for efficient grid-connected, solar-coupled energy storage systems for backup power and other applications. SB14A is designed to work seamlessly with Pika Energy's Pika PV Link optimizers and Pika Islanding Inverter to form the Pika Energy Island system for grid-tie solar-plus-storage.

All Pika Energy products use the REBus™ 380VDC nanogrid to connect energy sources, storage, loads and the grid. The REBus nanogrid automates the flow of power to enable plug-and-play setup and operation of Pika Energy equipment. For more information about REBus, visit [pikaenergy.com](http://pikaenergy.com).

In the diagram below, a REBus compatible Pika Inverter is directly connected to PV Link optimizers and high voltage energy storage on the DC (REBus) line, shown to the left of the inverter. To the right of the inverter are AC lines: 240VAC for grid and home loads, and critical load support up to 50A.

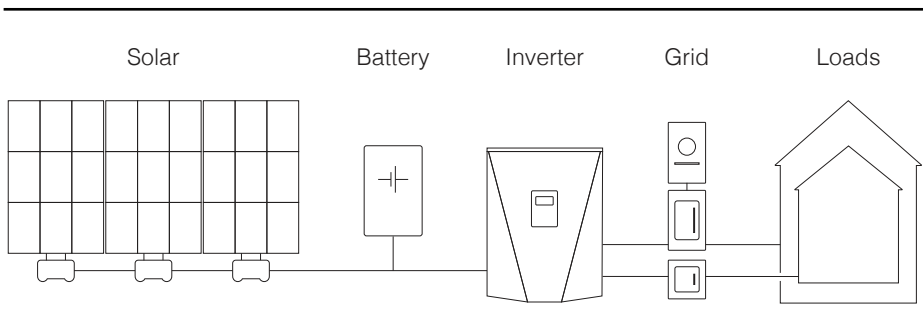


Fig 1. Example Energy Island

SB14A is designed to be used with Pika Energy-approved 12V, size 22' AGM deep cycle batteries. DO NOT use flooded batteries, lithium batteries, or any other battery type in the SB14A.

## **Series Connection**

For high efficiency and less line loss, unlike conventional Deep Cycle battery systems, the batteries within SB14A are wired entirely in SERIES.

Each SB14A assembly requires twenty-four (24) batteries, which are connected into six strings of 48V each. The six substrings are connected in SERIES using touch-safe PV-type connectors to ensure safety.



## **Section 2: Compliance**

Install in accordance with all locally applicable codes.

### **Note on DC Wiring and NEC**

Some electricians or installers may be unfamiliar with DC wiring in a residential setting. Please note the following:

1. NEC 215.12(C)(2) for correct DC wiring coloring.
2. NEC 210.5(C)(2) for identification of DC conductors more than 50V, see

### **REbus wiring conventions**

For all REbus DC wiring please observe the following coloring convention. Mark or flag all conductors as appropriate. It is recommended that REbus plus conductors NOT be green, white, gray or black. It is recommended REbus minus conductors NOT be green, white, gray or red.

<b>Wire</b>	<b>Color</b>
REbus + (RE+)	Red
REbus - (RE-)	Black or Blue
Ground (GND)	Green or bare wire

## Section 3: Safety instructions

### IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS!

The unit is to be wired using methods in accordance with the National Electrical Code, ANSI/NFPA 70, and other codes as applicable.

## General Warnings



**WARNING:** DO NOT ATTEMPT TO SELF-INSTALL INVERTER. A QUALIFIED SOLAR INSTALLATION PROFESSIONAL OR ELECTRICIAN MUST INSTALL AND COMMISSION PIKA ENERGY EQUIPMENT. CONTACT PIKA ENERGY FOR A LIST OF AUTHORIZED INSTALLERS IN YOUR REGION.

**SHOCK RISK:** HIGH VOLTAGE ELECTRICITY

**WARNING:** To reduce the risk of injury, read all instructions and caution markings before installing SB14A. Consult installation documentation for all other REbus devices on the system.

**WARNING:** SB14A must be installed by trained and qualified technicians, and in accordance with all instructions.

**WARNING:** Electrical installation in the United States shall be done in accordance with all local electrical codes and/or the National Electrical Code (NEC), ANSI/NFPA 70.

**WARNING:** Electrical installation in Canada shall be done in accordance with all local electrical codes and/or the Canadian Electrical Code.

**WARNING:** Connecting the Pika Energy Island to the electric utility grid must only be done after receiving prior approval from the utility company and installation completed only by qualified personnel/licensed electrician(s).

**WARNING:** This equipment is NOT intended for use with life support equipment or other medical equipment or devices.

## Safety Shutdown

The Pika Energy Island system can signal to connected devices on REbus to shut down and limit output voltage to a safe level. The red Safety Shutdown button on the front of Pika Islanding Inverter activates a Safety Shutdown. An external shutdown button may also be installed, given appropriate labeling. See the section titled “External Safety Shutdown Switch” in the Islanding Inverter Installation manual.

**To enter a Safety Shutdown, press and hold the red button on the front of the inverter. The Safety Shutdown LED will illuminate and the LCD screen will indicate a Safety Shutdown has been initiated.**

In a system configured to provide backup power, the DC bus will remain energized on loss of AC grid power. Upon entering a Safety Shutdown, a shutdown signal will be transmitted to all devices connected to REbus. In Safety Shutdown, the Islanding Inverter will disconnect from the grid, stop sourcing power to REbus, and immediately disable all sources on REbus by sending a global shutdown signal. All PV Link optimizers will disconnect their output. The Safety Shutdown LED will be illuminated to show that the inverter has entered a Safety Shutdown. DC bus voltage will be displayed on the inverter screen.



**WARNING:** UNLESS THE SYSTEM IS IN A SAFETY SHUTDOWN, LIVE VOLTAGE MAY BE PRESENT, EVEN WHEN THE POWER GRID HAS FAILED AND THERE IS NO SOURCE OF POWER FROM THE SOLAR PANELS. TO ENSURE THE DC BUS IS NOT POWERED, ALWAYS ACTIVATE SAFETY SHUTDOWN BEFORE PERFORMING EMERGENCY OR SERVICE WORK. ALWAYS USE A APPROPRIATELY RATED MULTI-METER TO VERIFY THAT NO VOLTAGE (AC OR DC) IS PRESENT.

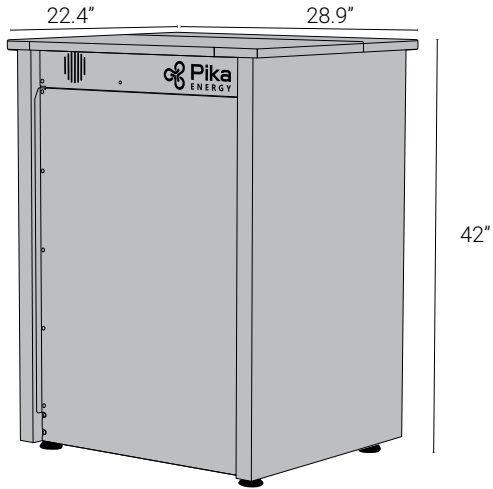
## **Section 4: Installing the Smart Battery**

### **Getting to Know the SB14A**

The SB14A is shipped from Pika mostly assembled. All wiring required to assemble the SB14A is included with much of it integrated into the structural side panels. This wiring is color-coded to help avoid assembly confusion and product damage resulting from miswiring.

#### Materials received in Coral shipping box.

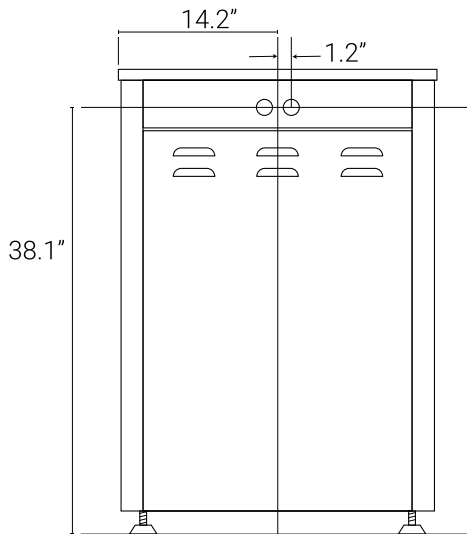
1. The unit
2. 6x Battery trays
3. 6x Shelf joists
4. 18x Short cables for battery substrings
5. 48x Rubber terminal caps
6. 1ea Installation and Operating Manuals
7. 1x Extra hardware kit



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*Overall product view*

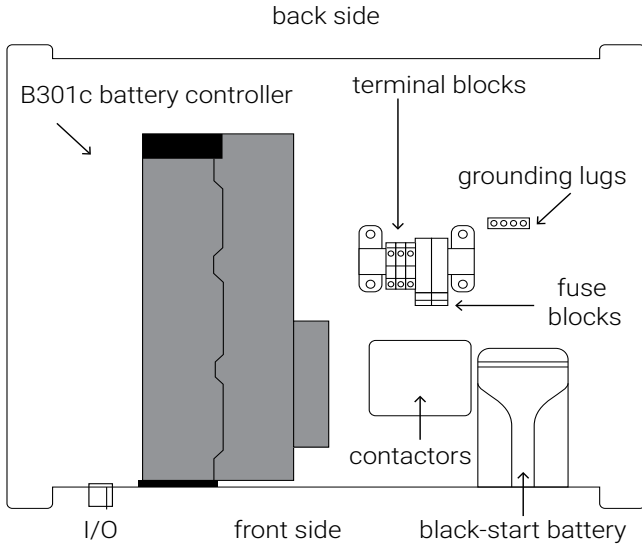
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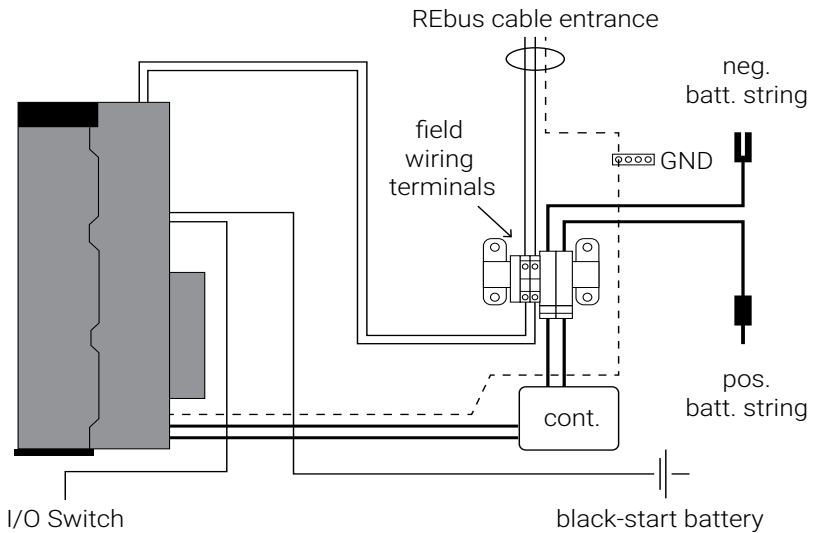
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*Rear view of Coral showing knockout locations*

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Wiring tray layout



Wiring tray wiring diagram

## Location and clearances

The SB14A is designed to be installed in protected indoor locations only. Do not install where it will be subject to rain, ice, dripping water, or other environmental factors.

The SB14A weighs approximately 1100 pounds when assembled complete. Install only on a sturdy floor surface such as a quality concrete slab. Consult a structural engineer if necessary to ensure sufficient support.

The SB14A is designed to be installed in a clean, well-ventilated location. Ensure that the minimum clearances of the table below are met. Do not allow vents to become blocked. It is recommended to keep and maintain a general purpose dry chemical fire extinguisher within 20' of the SB14A.

Ensure the following minimum clearances:

Clearance	MINIMUM dimension
Back	1.5"
Sides	3"
Top	24"
Front	36"
Bottom	2" (Do not remove leveling feet)

## Grounding

Unit must be grounded according to local codes. Follow instructions in assembly sequence below. Tools and supplies needed

## Assembly Sequence

SB14A ships assembled on a standard pallet. Before beginning installation, remove protective packaging and inspect for damage and completeness.

### 1: Remove wiring tray and shelving

1. Remove and save the 10 M4 x 8mm screws attaching the 2 cover pieces to the cabinet

2. Remove the front cover by lifting the front edge (like a car's hood) to about 60 degrees and slide forward. Set aside.
3. Remove the rear cover by lifting vertically and set aside in a safe place
4. Remove and save the 8 M4 x 8mm screws (4 front and 4 back) attaching the wiring tray to the side panels
5. Remove and save the 6 lock-nuts (3 front and 3 back) attaching the wiring tray to the front and back bulkheads
6. Remove the wiring tray by lifting it straight up out of the cabinet and set aside in a safe place.
7. Remove the front bulkhead by removing and saving the 10 M4 x 8mm screws that attach the front bulkhead to the side panels.
8. Set the bulkhead aside.
9. Remove the 4 joists that make up the top shelf by removing and saving the 8 (2 per joist) ¼"-20 x 1-5/8" SHC screws that attach them to the left and right side panels.
10. Repeat Step 1.9 for the middle shelf

## 2: Rough in field wiring

1. Install Pika Islanding inverter per installation manual instructions
2. Disable the inverter per instructions on page 48 of the Pika Islanding/X7601 Inverter Installation Manual
3. Turn off AC breaker to the inverter
4. Ensure Pika X7600/X11400 series inverter DC breaker designated for the SB14A is in off position. Refer to "DC Breaker Sizes and Selection" on page <?> of Pika Islanding Inverter installation manual.
5. Determine location of the SB14A unit and run the appropriate 10 ga DC rated wiring from the inverter to the center of the unit. For wiring knockout locations, see Rear view of unit above.
6. If hidden wiring is desirable, mount wiring no higher than 40 inches (1m) above the floor

## 3: Locate and level unit

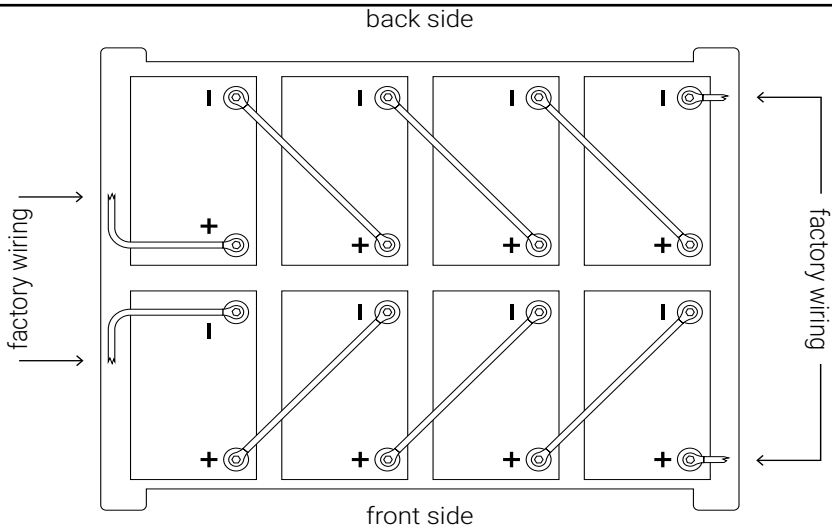
1. Place the level on the floor in the desired location to determine the slope of the floor and the lowest and highest areas within the unit's footprint
  - i. If unit will be located against a wall, fix the rear adjustable foot (on the wall side) in a position that agrees with the information obtained in step 3.1
2. Place unit in desired location maintaining the clearances in the table above
3. With the level on the rear sleeper, adjust the rear feet until the sleeper is level



- i. These leveling feet are accessible from the sides only
4. Place the level so each end rests on a different sleeper and is over two leveling feet
5. Adjust the front leveling foot under the level until a level reading is reached
  - i. The front feet are accessible from the sides and front
6. Place the level across the front sleeper and adjust the last leveling foot until true
7. Tighten the jam nuts up to the captive nuts on the bottom of the sleepers to hold the leveling feet in place

## 4: Install first tier of batteries

**Note:** The wiring of the 3 battery substrings (one per level) at the back of the unit will mirror the wiring of the substrings at the front of the unit. The layout of batteries, and their attachment scheme is the same for each tier and is depicted below:



*Configure and wire each level of batteries in this manner*

1. Before loading batteries, slide a terminal cap onto the ring terminal end of all factory installed wires, such that the ring terminal protrudes at least 1 inch.
2. Place a battery holding tray on the lowest, rearmost shelf. It should nest between the structural framing members
3. Place the first battery in the rightmost cavity, the second battery in the leftmost cavity,

then fill in the center cavities

- i. The batteries should be oriented with their terminals to the right as viewed from in front of the unit
4. Swab the button terminals with battery terminal protectant and fasten the ring terminal of the orange wire to the negative (black) terminal of the rightmost battery using the fasteners supplied with the batteries
  - i. 1. Slide a terminal cap unto the wire, with the ring terminal protruding
  - ii. 2. Apply the same battery terminal protectant to the fasteners before installation
  - iii. 3. Torque fastener to 7 Nm
  - iv. 4. Slide terminal cap over ring terminal to completely cover conductive parts
5. Fasten the ring terminal of the blue wire to the positive (red) terminal of the leftmost battery following Steps 4a-d.
6. Attach 3 battery connector cables to the batteries to put them in series
  - i. Use the diagram above as reference.
  - ii. Slide two terminal caps (one from each end) onto the battery connector cables
  - iii. One end of each connector cable attaches to a negative terminal of one battery and the positive terminal of an adjacent battery in the same substring
  - iv. Repeat for the remaining connector cables until every terminal has a connection to a different battery or the integrated wiring
7. The first tier is now 50% complete. Nest the second battery holding tray into the framing in front of the completed substring.
8. The frontmost substring of batteries will be wired opposite/mirrored to the rearmost substring.
9. The factory wiring on the front of the right side panel will attach to the positive (red) battery terminal
10. The factory wiring on the front of the left side panel will attach to the negative (black) battery terminal

## 5: Install second tier of batteries

1. Install the four (4) joists for the second tier using 8 each of the ¼"-20 x 0.625" SHC screws and lock washers provided
  - i. Install the frontmost joist first
  - ii. Align the joist clearance holes with the frontmost pair of holes on the shelf

- supports
  - iii. Thread the fasteners into the captive nuts of the shelf supports, but do not tighten
  - iv. Measure the overall distance between the side panels at the back of the unit
  - v. Using the measurement obtained above, hold the side panels at the front of the unit to this measurement and tighten the fasteners to torque
  - vi. Install remaining joists and torque
2. Repeat Step 4, 1 through 7
  3. Install the front substring of the second tier, remembering that the wiring will mirror that of the back substring with one exception:
  4. Install battery temperature sensor
    - i. Included in the pre-wiring is a specialized battery connector cable fitted with a temperature sensor
    - ii. This sensor has been designed for installation between the two leftmost batteries of the second tier's front substring, with the larger end attaching to the middlemost battery's negative terminal
  5. The second tier is now complete

## 6: Install third tier of batteries

1. Repeat Step 5.1
2. Repeat Step 4.1 through 4.8

## 8: Install front cover and wiring tray

1. Using 10 of the M4 x 10 screws removed in Step 1.7, reinstall the front bulkhead panel
  - i. Make sure all screws are started before tightening to 2.3 N-m (23 in-lbs.)
2. Install wiring tray
  - i. Remove one of the provided knockouts in the wiring tray for later use. Note that this wiring will be connecting to a Pika Islanding Inverter.
  - ii. Pull all touch safe string connect wires out of the box and fix them (with tape or other) so they exit the top of the unit in the wiring channels front and back
  - iii. Holding the wiring tray by its front and back flanges, slowly lower the wiring tray into the unit with the large front and back flanges outside of the unit
  - iv. As it approaches the bottom, align the six threaded studs of the front and back bulkheads with the clearance holes in the bottom of the tray

- v. Align the clearance holes in the large front flange with the captive nuts in the side panels and start 4 of the M4 x 10 screws removed in Step 1.7
- vi. Repeat for the rear flange, then tighten all fasteners to 2.3 N-m (23 in-lbs)

## 9: Install ground and field wiring

- 1. Run DC wiring to the knockout in the unit
  - i. 10 ga wiring should extend 15 inches (380mm) into the unit
- 2. Strip wire ends and wire to terminal blocks provided as shown in “Wiring tray wiring diagram” on page 12.

## 10: Connect substrings



**WARNING:** Be very careful, the high voltage battery stack will be connected in the next step. Only use insulated tools from this point forward to aid safety. Do not touch any of the terminals or disconnect the fuses after this point in the assembly process.

- 1. Connect the 3 pairs of color-coded wiring on the left side of the unit
  - i. Yellow to yellow, blue to blue, green to green
- 2. Connect the 2 pairs of color-coded wiring on the right side
  - i. Orange to orange, purple to purple
- 3. Connect the Red battery positive cable to the mating red wire in the wiring tray
- 4. Connect the black battery negative cable to the mating black wire in the wiring tray
- 5. Connect the quick connect to the blackstart battery positive red terminal
  - i. This ships from the factory unplugged to prevent battery discharge
  - ii. There may be a fuse to insert instead

## 11: Check voltages



**WARNING:** Be VERY CAREFUL not to short the two terminals together. Shorting the terminals together can cause bodily harm or death.

1. Carefully check the string voltage of the battery stack by probing the two battery fuse terminals with a multimeter.
  - i. Ensure that the battery wiring voltage polarity is correct with reference to "Wiring tray wiring diagram" on page 12.
  - ii. The battery voltage should read between 240Vdc-320Vdc.
2. Ensure REbus wiring polarity is correct. Reference "Wiring tray wiring diagram" on page 12.

## 12: Install top cover

1. Install the rear cover panel first
  - i. Insert 4 of the M4 x 10 screws, removed in Step 1.1, but do not tighten
2. Install the front cover panel
  - i. Tilt the cover to 60° and slide toward the rear cover to engage the interlocking features of the covers
  - ii. Once engaged, lower the front cover to horizontal
  - iii. Insert 6 of the M4 x 10 screws, removed in Step 1.1
3. Make final adjustments to the covers and tighten all fasteners to 2.3 N-m (23 in-lbs)

## **Section 5: Commissioning**

Before commissioning the SB14A ensure that all wiring is correct and that lid has been secured to the top of the SB14A.

**To commission the SB14A follow these steps:**

1. Turn on the AC breaker to the Pika Islanding Inverter
2. Turn on the DC breaker corresponding to the SB14A located inside the Pika Islanding Inverter
3. Enable the Pika Islanding Inverter
4. Turn the disconnect switch on front panel of the SB14A to the "ON" position
5. Verify self-discovery of SB14A on inverter display
6. Enable SB14A on inverter display
7. Select desired System Operating Mode (refer to Pika Islanding Inverter Operations Manual for system operating mode types and configurations settings)

### Front panel LED key

The SB14A features a front panel LED. The front panel LED state descriptions are described in the table below.

**LED Color key:**

LED Color	State Description	Solid/Blinking
Green	Charging	Solid
Yellow	Disabled	Solid
Orange	Discharging	Solid
Red	Error State	Blinking

## **Section 6: Operating Modes**

For full operating instructions consult the Operation Manual of the Pika Islanding Inverter.

## **Section 7: Warranty**

See Pika Energy website for standard limited warranty terms.

## **Section 8: Troubleshooting**

### **Smart Battery Not recognized by inverter:**

1. Check that inverter is enabled and REbus is operating.
  - i. The inverter cannot communicate with the battery unless the differential bus voltage is at least 300V.
2. Check that inverter DC breaker is on
  - i. The DC breaker must be on and not tripped for the battery to communicate

### **Smart battery does not source or sink power to bus:**

Check that battery main fuses are good. Fuse check must be performed by a properly trained electrician. To check the fuses, follow these steps:

1. Disable smart battery from inverter console
2. Shut off DC breaker to battery
3. Turn disconnect switch on front of battery to off position
4. Remove top cover of Smart Battery (front portion only)
5. Verify voltage at input and output terminals of fuse block. If voltage is different, one or more fuses has blown.
6. Replace fuses if necessary. Information on replacement fuses may be found in section "Section 11: Technical Reference" on page 23.

## **Section 9: Maintenance**

### **Annual maintenance:**

Once per year, the owner/operator should inspect the unit and its surroundings. Do not allow leaves, dust, snow, or other debris to accumulate near or under the SB14A. Ensure that the bottom, back, and front exhaust vents are clear at all times. Wipe down the enclosure with a damp cloth.

Do not stack anything on top of the unit, store anything under it or beside/behind it in a way that violates the clearances defined in “Location and clearances” on page 13 of this manual.

### **Five-year maintenance:**

Every five years, a qualified technician should inspect the unit internally and check the batteries for visible corrosion.

## **Section 10: End of Life**

The SB14A is designed to be recycled at end of life. DO NOT DISCARD IN A LANDFILL. The frame and enclosure are made from metal, which can be recycled at a local scrap yard. Lead-based batteries are recyclable and may have considerable value.

Wherever possible, repower the unit with new batteries. If this is not feasible, follow the following procedure to recycle the unit:

1. Discharge the battery by operating in an islanded mode until the battery reports full discharge.
2. Turn the disconnect switch on the SB14A front panel to ‘Off’.
3. Disconnect from the REbus DC microgrid by opening the breaker in the inverter.
  - i. Remove the top cover (front portion only)
  - ii. Disconnect all MC4 battery connectors and open and remove all fuses
  - iii. Dismantle the SB14A by reversing the assembly instructions above.
  - iv. Recycle the components
4. Sell the batteries to a local battery recycler
5. Sell the metal frame and shell components to a local scrap yard
6. Recycle the wiring as scrap copper
  - i. Recycle the contents of the electronics tray as e-waste



## **Section 11: Technical Reference**

Replaceable fuses are as follows:

<b>Fuse</b>	<b>Manufacturer/Part number</b>	<b>Ratings</b>
Main battery fuses	Ferraz A60Q40-2	40A, 600V
String protect fuse	Ferraz A60Q40-2	40A, 600V
Black Start battery Fuse	TBD	TDB

### **Technical Support Information**

Support department hours: 9AM to 5PM Eastern Standard Time Zone, Monday – Friday  
(excluding holidays)

Phone: (207) 887-9105

Email: [support@pika-energy.com](mailto:support@pika-energy.com)

## **Section 12: Product Specifications**

Specification	SB14A	Unit
Max Power	±8000	W
Max REbus™ Current	±24	A
Power Converter Efficiency (max)	99%	-
Max Battery Voltage	±180	V
Range of Battery Voltage	±100 to ±180	V
Max Continuous Battery Current	±30	A
Short Circuit Battery Current	40	A
Max REbus™ Voltage	±210	VDC
Standby Power Consumption (max)	3	W
Sleep Power Consumption	<1	W
Communications	REbus (Power Line Carrier)	-
Remote Monitoring	Via REview™ Internet Dashboard	-
Protection Features	Over/under voltage, overtemp, over-current, battery temp	-
Weight (unloaded, loaded)	130, 1200	lb
Dimensions (H x W x D)	42 x 28.9 x 22.4	in
Operating Temp. Range (min/max)	-5 to 40	°C
Pika Equipment Limited Warranty	10	years

### **Battery Pack Specification**

Compatible Battery Type and Voltage	24 @ Deep cycle AGM, sealed, 12V, Group 22, 50-55Ah	-
Battery String Voltage (nominal)	288	VDC
Maximum String Current	±30	A

## **Section 13: Notes**

Use the following pages to record notes about your system or to document phone calls with our service department, available M-F 9AM-5PM ET at 207-887-9105.

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[www.pika-energy.com](http://www.pika-energy.com)

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