

# AES RACKMOUNT

Energy Storage System

## AES RACKMOUNT Quick Stack Rack Manual

READ AND SAVE THESE INSTRUCTIONS

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Quick Stack Rack 950-0050

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# INTRODUCTION

The AES RACKMOUNT Quick Stack Rack is designed for indoor use with AES RACKMOUNT Battery Modules and with the AES RACKMOUNT Battery Module Combiner to create an open stacking system containing up to six Battery Modules and one Battery Module Combiner.

## 1. AUDIENCE, WARNINGS, MESSAGES, GENERAL SAFETY, PERSONAL PROTECTIVE EQUIPMENT

### 1.1 Audience

Configuration, installation, service, and operating tasks should only be performed by qualified personnel in consultation with local authorities having jurisdiction and authorized dealers. Qualified personnel should have training, knowledge, and experience in the:

- Installation of electrical equipment
- Application of electrical codes, safety and installation standards
- Analysis and reduction of hazards involved in performing electrical work
- Installation and configuration of batteries

### 1.2 Warning, Caution, Notice, and Note Messages

Messages in this manual are formatted according to this structure.



Additional information concerning important procedures and features of the Quick Stack Rack. Read all the instructions before installation, operation, and maintenance.



Important information regarding hazardous conditions.

#### **WARNING**

Important information regarding hazardous conditions that may result in personal injury or death.

#### **CAUTION**

Important information regarding hazardous conditions that may result in personal injury.

#### **NOTICE**

Important information regarding conditions that may damage the equipment but not result in personal injury.

## NOTE

Ad hoc information concerning important procedures and features unrelated to personal injury or equipment damage.

### 1.3 Safe Handling Procedures

Before using the AES RACKMOUNT Quick Stack Rack with AES RACKMOUNT Battery Modules and AES RACKMOUNT Battery Combiner Modules, read all instructions and cautionary markings on the units and all appropriate sections of this manual.

- Use personal protective equipment when working with the Quick Stack Rack and Battery Modules.
- Dispose of or recycle a Quick Stack Rack following local regulations.
- Do not modify, re-manufacture, or attempt to insert foreign objects into the Quick Stack Rack, immerse or expose the Quick Stack Rack to water or other liquids, fire, explosion, or other hazards.
- Use the Quick Stack Rack only with the AES RACKMOUNT Battery Combiner, Battery Modules, or with batteries that Discover Energy Systems specifies as compatible.
- Do not lift or carry while in operation.
- Take precautions when handling electrical cables.
- Do not submerge the Battery Modules or Battery Module Combiner.
- Do not install the Battery Module or Battery Module Combiner with the faceplate down.
- Do not use the Battery Module Combiner with Battery Modules or a Power Conversion system that exceeds the specifications of the Battery Module Combiner. Using Battery Modules or a Power Conversion system that exceeds breaker, cable, and fuse specifications may present a fire risk or other hazards.
- Do not short-circuit a Battery Module or Battery Module Combiner or allow metallic conductive objects to contact cable ends and terminals.
- Do not drop the Battery Module or the Battery Module Combiner.
- If the Battery Module or Battery Module Combiner is damaged, take it to a service center for inspection.
- If a bracket on the Quick Stack Rack is damaged, replace it. Do not use the Quick Stack Rack with damaged components.

### 1.4 Personal Protective Equipment

When handling or working near a battery:

- Use Personal Protective Equipment, including clothing, glasses, insulated gloves, and boots.
- Do not wear metal rings, watches, bracelets, or necklaces.

## 2. ITEMS SHIPPED IN THE BOX

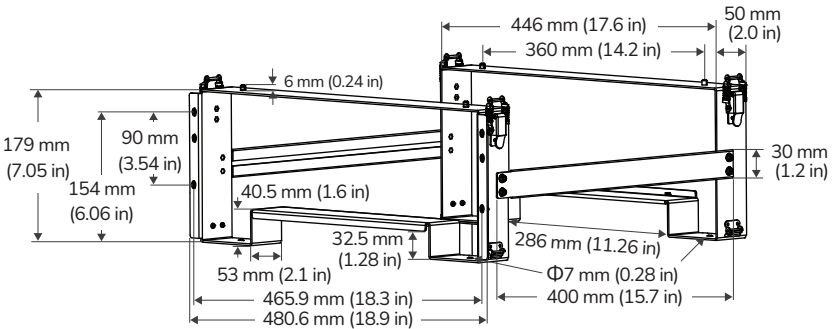
The Quick Stack Rack is designed for use with the AES RACKMOUNT Battery Module and Battery Module Combiner. Use the Quick Stack Rack to stack a maximum of six Battery Modules plus one battery combiner.

**Table 2.1, AES RACKMOUNT Quick Stack Rack contents**

ITEMS	DESCRIPTION
1	Front End bracket
1	Back End bracket
2	Side Arm
8	Side Arm Nut (M4)
4	Mounting Screw (M6)
1 set	Spares: Mounting Screw (2), Side Arm Nut (2)

## 3. SPECIFICATIONS

### 3.1 Mechanical Specifications



**Figure 1. Quick Stack Rack Dimensions**

**Table 3-1, Quick Stack Rack Dimensions**

Mechanical Specifications	AES RACKMOUNT Quick Stack Rack (3U) 950-00050
<b>Fully Assembled Quick Stack Rack with Battery Module Combiner and Six Battery Modules</b>	
Height	1.25 meters (4.11 ft)
Width	482.6 mm (19 inch)
Depth	497.3 mm (19.6 inch)

<b>Mechanical Specifications</b>	<b>AES RACKMOUNT Quick Stack Rack (3U) 950-00050</b>
<b>One Assembled Quick Stack Rack without Battery Module Combiner or Battery Module</b>	
Height	179.0 mm (7.05 inch)
Width	480.6 mm (18.9 inch)
Depth	462.4 mm (18.2 inch)
<b>Front End Bracket</b>	
Height	179.0 mm (7.05 inch)
Width	480.6 mm (18.9 inch)
Depth	53.0 mm (2.1 inch)
<b>Holding pins</b>	
Height	6.0 mm (0.24 inch)
Diameter	6.0 mm (0.24 inch)
<b>Back End Bracket</b>	
Height	179.0 mm (7.05 inch)
Width	446.0 mm (17.6 inch)
Depth	50.0 mm (2.0 inch)
<b>Holding pins</b>	
Height	6.0 mm (0.24 inch)
Diameter	6.0 mm (0.24 inch)
<b>Side Arm</b>	
Height	30.0 mm (1.2 inch)
Length	400.0 mm (15.7 inch)

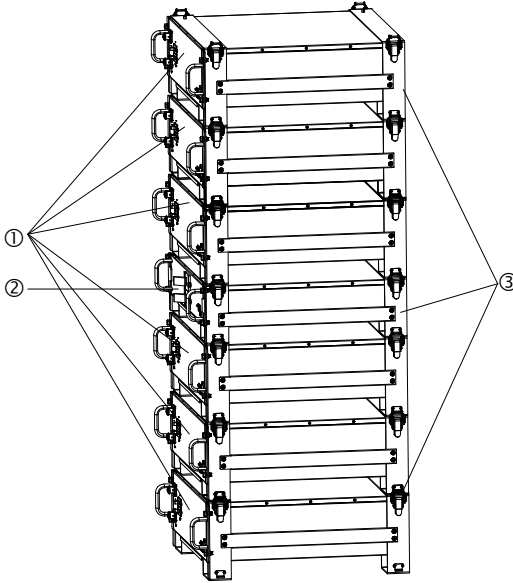
### 3.2 Environment

Use the Quick Stack Rack indoors in a dry location.

<b>NOTICE</b>
<ul style="list-style-type: none"> <li>• Do not install outdoors.</li> <li>• Do not install in wet locations.</li> </ul>

## 4. SYSTEM OVERVIEW AND CONFIGURATION

The Quick Stack Rack can hold up to six AES RACKMOUNT Battery Modules and an AES RACKMOUNT Battery Module Combiner.



**Figure 2. Quick Stack Racks with 6 Battery Modules and 1 Battery Module Combiner**

Item	Description
1	Up to 6 Battery Modules (not included)
2	Battery Module Combiner (not included)
3	7 sets of Quick Stack Racks

## 4.1 Minimum Specifications for AES RACKMOUNT Battery Energy Storage Systems

To increase system capacity, install AES RACKMOUNT Battery Modules in a parallel battery bank configuration. Overall battery energy storage system capacity must be correctly sized to meet the requirements of the load and account for the following:

- Total Continuous Charge Current
- Total Peak Current
- Total Continuous Discharge Current

The total charging capacity of all charging sources in the system should not exceed the Continuous Charge Current operating limit of all the Battery Modules in the system or the limits on the Battery Module Combiner. Exceeding one of these limits will cause either the BMS in the Battery Modules to trigger over-current protection and disconnect or trip the breaker on the Battery Module Combiner. The charging system's maximum Continuous Charge Current must either be below the operating limit of installed Battery Modules or curtailed.

The sum of all the Peak Current values for the attached loads must be less than the Peak Current value of the BESS, including inrush current values for any motors and surge values for any inverters.

The sum of all the Continuous Discharge Current values for the attached loads must be less than that of the BESS.

For Battery Modules installed in parallel in a battery bank configuration, the sum of all Battery Module capacities provides the overall capacity value for the BESS. Table 4-1 provides DC capacity values for sample systems using AES RACKMOUNT Battery Modules.

### NOTICE

- Exceeding the Peak Current, Continuous Discharge, or Continuous Charge values of the Battery Modules in the system will trip the Battery Module Combiner Breaker, the Battery Module Breaker, or trigger the Battery Module BMS over-current protection, resulting in the disconnection of all Battery Modules in the system.
- Disconnection could result in a voltage spike (Load Dump), which may damage any component electrically attached to the battery energy storage system.



**Table 4-1, 48-48-5120 / 48-48-5120-H DC Capacity Values for a Sample Battery Energy Storage System**

Specifications @ 25 °C (77 °F)

Part Number	Parallel System	Peak Current (3 seconds)	Max Continuous Discharge (1 hour) <sup>(1)</sup>	Max Continuous Discharge (1)(2)	Max Continuous Charge (1 hour) <sup>(1)</sup>	Max Continuous Charge (1)(2)	Usable Capacity
950-0050_1	1 Battery Module	218 A	95 A	70 A	95 A	70 A	5 kWh
950-0050_2	2 Battery Modules	436 A	190 A	140 A	190 A	140 A	10 kWh
950-0050_3	3 Battery Modules	654 A	285 A	210 A	285 A	210 A	15 kWh
950-0050_4	4 Battery Modules	872 A	380 A	280 A	380 A	280 A	20 kWh
950-0050_5	5 Battery Modules	1090 A	475 A	350 A	475 A	350 A	25 kWh
950-0050_6	6 Battery Modules	1308 A	500 A <sup>(3)</sup>	420 A	500 A <sup>(3)</sup>	420 A	30 kWh

<sup>(1)</sup> Divide loads evenly across the two 1-pole 250 A breakers.

<sup>(2)</sup> The maximum continuous charge and discharge values are based on two complete charge and discharge cycles.

<sup>(3)</sup> The Battery Module Combiner is rated for 500 A (250 A per pole). Do not exceed when charging or discharging the Battery Modules.

## 5. QUICK STACK RACK ASSEMBLY

### CAUTION

#### RISK OF INJURY

- Use Personal Protective Equipment, including gloves and boots, when assembling the Quick Stack Rack.
- Without protection, the metal edges of the Quick Stack Rack can nick your hands and fingers.

**Failure to follow these instructions may result in injury.**

### 5.1 Tools

- Settable torque driver with bits matched to nut and screw heads in use.

## 5.2 Attaching the Brackets and Side Arms onto the Battery Module

Assemble a single Quick Stack Rack and lower the AES RACKMOUNT battery module into the front opening.

1. Line up the holes of the Side Arms with the screw thread ends protruding from the Front End Bracket and Back End Bracket.

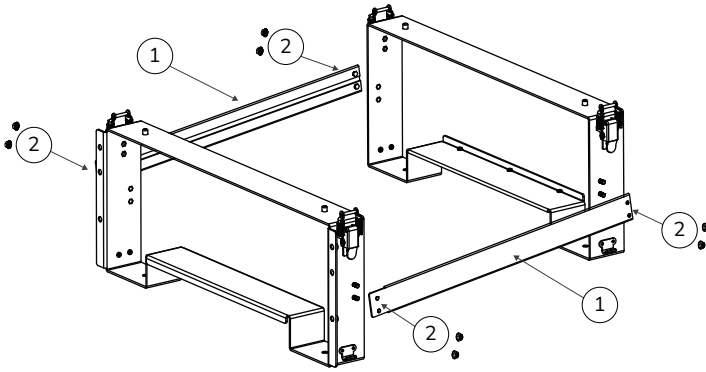


Figure 3. Quick Stack Rack Assembly

2. Screw on the M4 nuts (torque 2.5 to 3 Nm [1.85 to 2.2 ft-lbs]) to secure the Side Arms to the Front End Bracket and Back End Bracket.

Once the single Quick Stack Rack is constructed, flip it vertically so the Back End Bracket is on the ground.

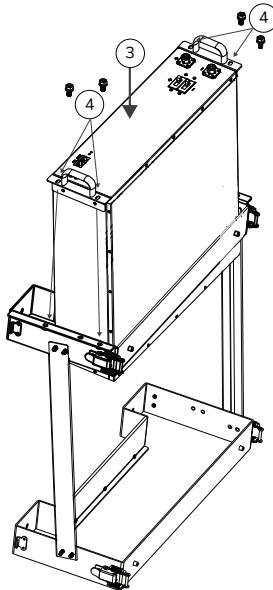


Figure 4. Quick Stack Rack Installation

- Using a two-person lift, slowly lower the Battery Module through the Front End Bracket and then through the Back End Bracket.
- Secure the side flanges of the AES RACKMOUNT Battery Module to the Front End Bracket using the mounting screws that came with the Battery Module (torque of 8 to 10 Nm [5.9 to 7.4 ft-lbs]).
- Repeat as necessary for all the AES RACKMOUNT Battery Modules.

## NOTICE

### EQUIPMENT DAMAGE

When lowering the AES RACKMOUNT battery module through the Quick Stack Bracket, do it slowly to minimize scratches to the finish and to the safety and specification decals.

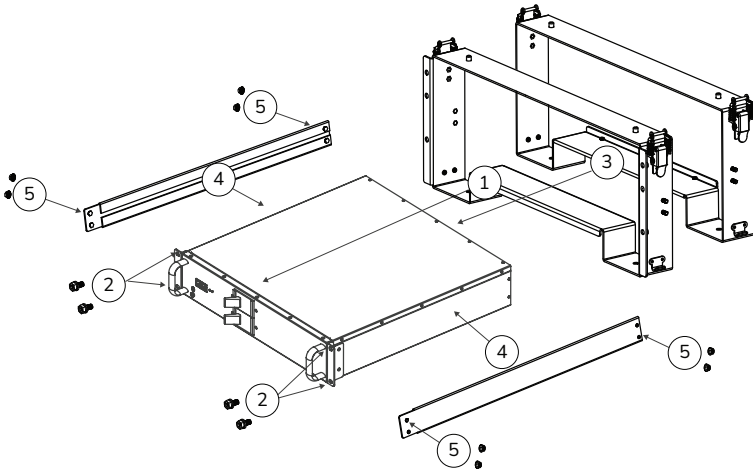
**Failure to follow these instructions may result in equipment damage.**

## NOTE

This assembly method is not suited for the Battery Module Combiner due to the interference caused by the pre-installed battery cables.

### 5.3 Attaching the Brackets and Side Arms onto the Battery Module Combiner

- Slide the Front End Bracket from the back of the Battery Module Combiner all the way to the front.



**Figure 5. Battery Module Combiner Quick Stack Rack Assembly**

- Secure the side flanges of the AES RACKMOUNT Battery Module Combiner to the Front End Bracket using the mounting screws that came with the Battery Module Combiner (torque of 8 to 10 Nm [5.9 to 7.4 ft-lbs]).

- Slide the Back End Bracket onto the Battery Module Combiner.

Note the screw thread ends protruding from the sides of the Front End and Back End Brackets.

- Attach the Side Arms so the holes line up with the screw thread ends.
- Screw on the M4 nuts to secure the Side Arms with a torque of 2.5 to 3 Nm (1.85 to 2.2 ft-lbs).

## NOTE

This assembly method can also be used to attach the Quick Stack Rack to battery modules.

## 6. INSTALLATION

When using the Quick Stack Rack, the Battery Module Combiner should be placed in the middle of the stack so the battery cables can reach the terminals of all the Battery Modules.

### 6.1 Location

The Quick Stack Rack must be installed and used indoors in a dry location on a flat surface with at least 1U (44.45 mm, 1.75 inch) clearance space above and on both sides of the Battery Modules and Battery Module Combiner. Provide enough space at the back of the modules to accommodate DC cables. For more installation details, refer to the (805-0043) AES RACKMOUNT Installation and Operation Manual and the (805-0055) AES RACKMOUNT Battery Module Combiner User Manual.

### 6.2 Stacking Battery Modules with the Battery Module Combiner

#### CAUTION

##### TIPPING HAZARD

- Do not stack more than six Battery Modules and one Battery Module Combiner.
- Install the Battery Module Combiner in the middle of the stack.
- Secure stacked Battery Modules to a wall or nearby frame. An anchoring mechanism is not provided with the Quick Stack Rack. Please use off-the-shelf seismic wall or concrete anchors.

**Failure to follow these instructions may result in injury.**

#### CAUTION

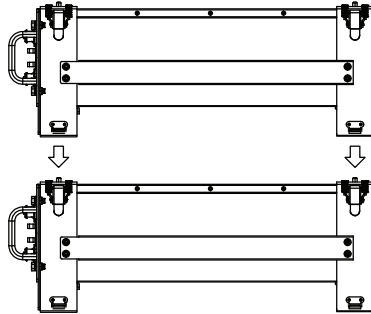
##### HEAVY OBJECT

- Two-person lift is recommended for Battery Modules and the Battery Module Combiner.
- Do not try to move or drag a fully assembled Quick Stack Rack. Always unstack then restack the Quick Stack Rack in the new location.

**Failure to follow these instructions may result in injury.**

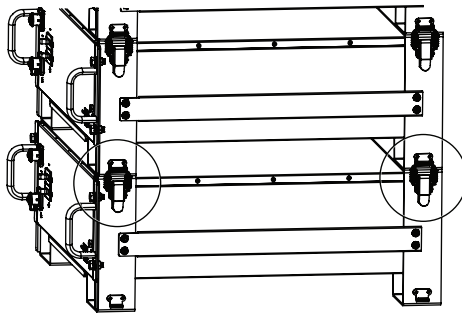
Before stacking Battery Modules, the Front End and Back End brackets and the side arms must be attached to all Battery Modules and the Battery Module Combiner.

1. As a base, place a Battery Module, with brackets attached, in the final installation location.
2. Stack a second Battery Module on top of the first Battery Module.



**Figure 6. Align pins on the lower unit's brackets with holes in the upper unit's brackets**

3. Mate the holes in the bottom of the upper unit's brackets with the holding pins on the top of the lower unit's brackets to correctly position the Battery Module.
4. Secure the lower brackets to the upper brackets using the snap lock clasps.



**Figure 7. Secure Stacked Modules with Snap Lock Clasps**

5. Repeat until all the Battery Modules and Battery Module Combiner are stacked and secured.
6. Attach the Battery Module Combiner in the middle of the stack.

## 7. COMMISSIONING

1. Review the Commissioning checklist before turning on the system (see Appendix 1).
2. Turn on one Battery Module and wait 30 seconds. Confirm it stays on without any errors.
3. Turn on the next Battery Module, and wait 30 seconds. Confirm it stays on without any errors.
4. Continue turning on all the Battery Modules until all the Battery Modules are on.

### NOTICE

If a Battery Module faults during the above sequence:

- Check the polarity of the battery cable connections on the busbars and the Battery Module.
- The SOC of the Battery Module may be different compared to the other Battery Modules. Try turning on the Battery Module again after waiting a few minutes.

## 8. ROUTINE INSPECTION

### CAUTION

#### ELECTRIC SHOCK HAZARD

- Configuration, installation, service, and routine inspections should only be performed by qualified personnel.
- Do not touch the energized surfaces of any electrical component in the stack system.
- Follow all procedures to fully de-energize the stack system.
- Follow the Safe Handling Procedures prescribed in all relevant manuals when working with a stacked system.

**Failure to follow these instructions may result in injury.**

Inspect the stacked system and each Quick Stack Rack every 6 months.

### 8.1 De-energize the Energy Storage System

1. Isolate the batteries from external power sources by opening all the disconnects of externally connected equipment, such as inverters, battery chargers, and charge controllers.
2. Open the breakers on the Battery Module Combiner.
3. Turn off all the batteries and open all battery breakers.
4. Use a voltmeter to confirm there is no voltage across the positive and negative terminals of the Battery Modules and Battery Module Combiner.

## 8.2 Quick Stack Rack Inspection

1. Ensure the Quick Stack Rack is stable and all feet sit firmly on the mounting surface.
2. Ensure the stacked structure is secured to the ground, nearby wall, or frame.
3. Inspect the anchoring mechanism for signs of damage or rust.
4. Ensure all fasteners are tight.
5. Inspect all the components of the Quick Stack Rack, latches, and connections for any bending, damage, or rust.
6. Replace any damaged or rusted components.
7. Clean dust and debris on and around the Quick Stack Rack, Battery Modules, and Battery Module Combiner.

### NOTE

An anchoring mechanism is not provided with the Quick Stack Rack. Please use off-the-shelf seismic wall or concrete anchors.

## 8.3 Energy Storage Inspection

1. Ensure that all DC cables and connections are secure and torqued to their specification.
2. Ensure all networking cables and connectors are secure and tight.
3. Ensure that the installation location is clean and free from debris.
4. Inspect the casing of the Battery Module Combiner and all Battery Modules for cracks or damage.
5. Replace the Battery Module Combiner if cracked or damaged.
6. Replace any cracked or damaged Battery Modules.
7. Replace any frayed, cut, or damaged cables.

## 9. RELATED INFORMATION

Find information about Discover Energy Systems at [discoverenergysys.com](https://discoverenergysys.com).

# APPENDIX

## A1. AES RACKMOUNT BESS Commissioning Checklist

Use this checklist to confirm the correct installation and function of the AES RACKMOUNT BESS during the commissioning of a complete energy storage system. This checklist is only for the installation and operation of the AES RACKMOUNT BESS. Further system-level functionality checks and tests must be performed once the full system is interconnected with the battery energy storage system to complete commissioning.

### Battery Installation

PROCEDURE	CHECK
1. Ensure that ALL Battery Modules and the Battery Module Combiner are securely mounted to the Quick Stack Racks. Verify that:	
<ul style="list-style-type: none"> <li>All FOUR screws are tight on each flange of the Battery Modules and Battery Module Combiner.</li> </ul>	
2. Ensure that the bottom of all four feet is making solid contact with the mounting surface.	
3. Ensure that the Quick Stack Rack is suitably anchored to the wall or ground.	
4. Confirm the wiring from the Battery Module Combiner to Battery Modules.	
<ul style="list-style-type: none"> <li>All the positive battery cables (RED) from the Battery Module Combiner are correctly attached to positive battery terminals.</li> </ul>	
<ul style="list-style-type: none"> <li>All the negative cables (BLACK) from the Battery Module Combiner are correctly attached to the negative battery terminals.</li> </ul>	
<ul style="list-style-type: none"> <li>All the cables are connected and there are no unattached cables.</li> </ul>	
5. Ensure each battery terminal connector is secure and of correct polarity. Verify that:	
<ul style="list-style-type: none"> <li>The positive connector (RED) of each battery is correctly installed on the positive battery terminal (RED and marked with a "+")</li> </ul>	
<ul style="list-style-type: none"> <li>The negative connector (BLACK) of each battery is correctly installed on the negative battery terminal (Black and marked with a "-")</li> </ul>	
<ul style="list-style-type: none"> <li>Each battery terminal connector is latched in place.</li> </ul> <p>Note: Push in the terminals until the latching mechanisms click in place. If correctly installed, the terminals should not come off without pressing the release button on the lead side connector.</p>	
6. Equipment is grounded as required per the local installation code. Verify that:	
<ul style="list-style-type: none"> <li>A ground wire is secured from each Battery Module's grounding terminal to a suitable ground.</li> </ul>	



## Battery Operation Verification

The safety functions inside the Enclosure to protect the batteries are solely provided by each UL 1973 certified AES RACKMOUNT battery module and its integral BMS (Battery Management System). No communication with any equipment external to the AES RACKMOUNT BESS is needed to operate the battery module's integral protection functions.

Verify the items below to confirm that the protection functions of the battery modules are working correctly.

PROCEDURE	CHECK
1. Confirm that each battery breaker is OPEN, and turn on each Battery Module through the push button. Verify that:	
<ul style="list-style-type: none"> <li>• The battery status LED turns ON and pulses AMBER.</li> </ul> NOTE: <ul style="list-style-type: none"> <li>• If the LED does not turn ON, there is an issue with the battery module. Contact Technical Support.</li> <li>• If the LED turns GREEN, check if the battery breaker is OPEN. If it is open, contact Technical Support.</li> <li>• If the LED turns RED, there is a fault present. Use LYNK Access software to find details about the fault.</li> </ul>	
2. CLOSE each battery breaker, one by one. After each battery breaker is closed, verify that:	
<ul style="list-style-type: none"> <li>• The battery status LED changes from pulsing AMBER to solid GREEN.</li> </ul> NOTE: If the LED displays any other color, the Battery Module has an issue. Contact Technical Support. <ul style="list-style-type: none"> <li>• Check that all previously ON Battery Modules still display a solid GREEN LED and that their breakers remain closed.</li> </ul>	
3. On the Battery Module Combiner, confirm the LED is solid green, which indicates that one or more Battery Modules are switched ON.	

## A2. Decommissioning Checklist

This checklist should be used to ensure the correct installation and function of the AES RACKMOUNT BESS during the decommissioning of a complete battery energy storage system. This checklist is only for the battery energy storage system; further system-level decommissioning procedures on the full system may be required.

### Disassemble, Recycle, and Dispose

PROCEDURE	CHECK
1. Open disconnect devices to ensure there is no electrical connection to any externally connected Power Conversion Equipment.	
2. Open the disconnect on the Battery Module Combiner.	
3. Turn off each Battery Module one by one using the battery ON/OFF push buttons.	
4. Disconnect cables on each Battery Module and disconnect any cables connected to a homerun.	
5. Use a multimeter to verify there is no voltage on the terminals of the Battery Modules and the Battery Module Combiner.	
6. Release the anchor holding the AES RACKMOUNT Quick Stack Rack in place.	
7. Starting with the top unit and working your way down:	
a. Unlock the snaps of the Front End and Back End brackets.	
b. Using a two-person lift, lift the top unit and place it on the ground.	
c. Unscrew the screws from the flanges securing the unit to the Quick Stack Rack.	
d. Unscrew the screws from the Side Bars holding the Front End and Back End brackets together.	
e. Repeat until all the units have been lifted off the Quick Stack Rack and until the brackets have been removed.	
8. Recycle or dispose of components.	
a. Recycle all recyclable components.	
b. Dispose of unrecyclable components following local waste disposal guidelines.	