



ADVANCED ENERGY

Lithium Ion Battery

LYNK Edge Card SMA Sunny Island User Manual

PN: 950-0016-SMA

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1. Safety

1.1 Warnings, Cautions and Notes

▲ WARNING

Death or Injury

▲ CAUTION

Equipment Damage

▲ NOTE

Additional Information

1.2 General Warnings

▲ WARNING

HAZARD OF ELECTRICAL SHOCK AND FIRE

- Connect only to Safety Extra Low Voltage (SELV) circuits and power sources.
- All wiring must be completed by qualified personnel to ensure compliance with applicable installation codes and regulations.

Failure to follow these instructions can result in death or serious injury.

▲ CAUTION

HAZARD OF EQUIPMENT DAMAGE

- Do not install LYNK outdoors.
- Do not connect any port of the LYNK to a network with power over Ethernet (POE) or to a public telecommunication network.
- Do not run CAT5 cables or other cables connected to LYNK through conduit that could be exposed to lightning strikes.

Failure to follow these instructions can damage equipment.

2. Documentation

This User Manual provides information about the integration of Discover AES Lithium batteries with SMA Sunny Island in a Closed Loop configuration using the AES LYNK Communication Gateway with installed AES LYNK Edge Card for SMA.

AES battery can be used in Grid backup and Off-grid applications. These instructions apply to an Off-grid application.

Note that in a Sunny Island networked system the charging variables will be managed automatically by the AES battery BMS and Sunny Island inverter Charger.

SMA Reference Documents:

- Operating Manual Sunny Island 4548-US / 6048-US (en-21)
- Operating Manual Sunny Island 4.4M / 6.0H / 8.0H (en-13)

Depending on product age, it may also be helpful to refer to older manuals for legacy SMA products

- Installation Manual Sunny Island 3.0M / 4.4M / 6.0H / 8.0H (en-33)

Discover Reference Documents:

- Discover Energy 808-0004 42-48-6650 Data Sheet
- Discover Energy 805-0015 AES LiFePO₄ Battery 44-24-2800 42-48-6650 Manual
- Discover Energy 805-0017 AES LYNK Communication Gateway User Manual

Visit discoverbattery.com for the most recent version of published documents.

Certain configuration, installations, service, and operating tasks should only be performed by qualified personnel in consultation with local utilities and/or authorized dealers. Qualified personnel should have training, knowledge, and experience in:

- Installing electrical equipment
- Applying applicable installation codes
- Analyzing and reducing hazards involved in performing electrical work
- Installing and configuring batteries

No responsibility is assumed by Discover for any consequences arising out of the use of this material.

Read AES Battery Manual and Safety instructions before installing the battery.

Read SMA manuals for guidance on product features, functions, parameters and how to use the product safely.

3. Overview

3.1 System Overview

The AES LYNK Communication Gateway unlocks the full potential of a Discover AES LiFePO₄ Battery by enabling the internal Battery Management System (BMS) to optimize the charge and discharge configurations of the world's best inverter chargers and solar charge controller systems in a closed loop configuration.

AES LiFePO₄ batteries must be set up to work with Power Conversion and Monitoring devices in either an Open Loop or Closed Loop configuration.

AES LiFePO₄ battery charge and discharge settings in a Open Loop configuration are set up manually through the controller for the Power Conversion device at the time of installation. This is commonly referred to as a 'lead acid drop-in replacement' configuration.

In a Closed Loop configuration the battery charge and discharge rates and settings are dynamically controlled by the BMS of the AES LiFePO₄ Battery over a connection with the power conversion devices in the network.

To connect with the communication network of a specific brand of inverter charger or solar charge controller, the LYNK Communication Gateway requires an AES LYNK Edge Card with the appropriate communication port.

3.2 Minimum Battery Capacity

Battery charge and discharge rates are managed automatically by the AES LiFePO₄ Battery and Sunny Island. Using very large solar arrays with battery banks that are too small can exceed the operating limits of the battery to charge and possibly lead to the BMS triggering over-current protection. Battery capacity must be sized to accept the maximum charge current of the system, or the charging devices must be curtailed to charge below the operating limit of the installed batteries. This value is derived by adding together the charge capacities of all inverter/chargers and solar charge controllers in the system. Additionally, battery peak capacity must be sized to support the surge requirements demanded by the load attached to the inverter. Match the sum of all inverter peak power values with the sum of all battery peak battery current values.

Model	Inverter Peak	Discharge Current	Max Charge Current	Single Phase Minimum 42-48-6650	Three Phase Minimum 42-48-6650
SI 4548-US	300 A	190 A (1min)	110 A	2	5
SI 6048-US	300 A	190 A (1min)	140 A	2	5
SI 3.0M*	160 A	105 A (5min)	51 A	1	3
SI 4.4M	160 A	132 A (5min)	75 A	1	3
SI 6.0H	300 A	195 A (5min)	110 A	2	5
SI 8.0H	300 A	260 A (5min)	140 A	2	6

*Discontinued Model

3.3 Off-grid System Components

SMA Sunny Island systems are often AC coupled with Sunny Boy PV inverters for off-grid applications.

▲ NOTE

- In the case of Off-Grid operation, where Sunny Island is a grid-forming device (not synchronized to the grid or generator) the charging set-point received from the external BMS is automatically reduced by – 1 V. This is a protective measure implemented in Sunny Island to prevent unintended overcharging under high dynamic conditions (sudden changes in PV and load).

▲ NOTE

- SMA brand Sunny Charge Controllers are not approved for use with Lithium-ion batteries and therefore must not be used with AES LiFePO₄ batteries.

3.4 Battery Protection - Off-grid

The overall operation of the Sunny Island system and protection of the battery is based on the SOC of the battery. During off-grid operation the Battery Protection mode prevents the battery from being deeply discharged when the energy supply is low, thus preventing a total system failure as well as damage to the battery. If the state of charge (SOC) of the battery falls below the threshold settings (Setting: #223) (Web: Battery > Protection mode), Battery Protection mode is activated and the Sunny Island switches to standby mode or switches itself off. The AES LiFePO₄ battery BMS reports SOC to the Sunny Island via LYNK, but does not override the threshold settings. Please see the relevant Sunny Island Manual for the correct use and set up of Battery Protection.

3.5 Battery Protection - Self-Consumption

The options for increased self-consumption depend to a large extent on battery SOC and on the availability of PV energy. In order to use the battery optimally, adjust the depth of discharge of the battery based on location and the season (Setting: #262) (Web: Battery > Areas of application > Season operation active). The AES LiFePO₄ battery BMS reports SOC to the Sunny Island via LYNK, but does not override the threshold settings. Please see the relevant Sunny Island Manual for the correct set up and use of threshold settings. Self-consumption adjustments are not available for the 4548-US and 6048-US models.

▲ NOTE

- Self-consumption Battery Protection adjustments are not available for Sunny Island 4548-US and 6048-US models.

4. Installing LYNK and Connecting LYNK to the SMA Network

4.1 Installing the LYNK Edge Card

The LYNK Edge Card for SMA is a Slot 0 Type which only inserts into the left side slot on the bottom of the LYNK Communication Gateway.



Slot 0 Type

▲ NOTE

- The LYNK Edge Card type to be used is determined by the brand of power conversion equipment.
- If LYNK Edge Card is in the wrong slot, it will not function.
- If LYNK Edge Card is not firmly seated, it will not function.

4.2 Connecting LYNK to the AES Battery

Connect the AES LYNK Communication Gateway to the AES LiFePO₄ Battery and power up as described in the LYNK Communication Gateway Users Manual.

▲ CAUTION

HAZARD OF EQUIPMENT DAMAGE

- Do not plug the AEBus RJ-45 cable terminator into the 10/100 Ethernet port of the LYNK.
- Do not connect a CAT5 cable from the 10/100 Ethernet port of the LYNK to the WAN or MODEM port of a network router.
- Turn OFF all devices before connecting cables or inserting an Edge Card.

Failure to follow these instructions can damage equipment.

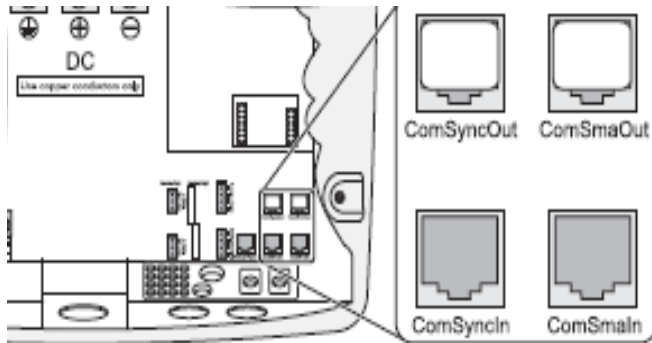
▲ NOTE

- Power electronics are not AEBus devices and should not be connected to AEBus.

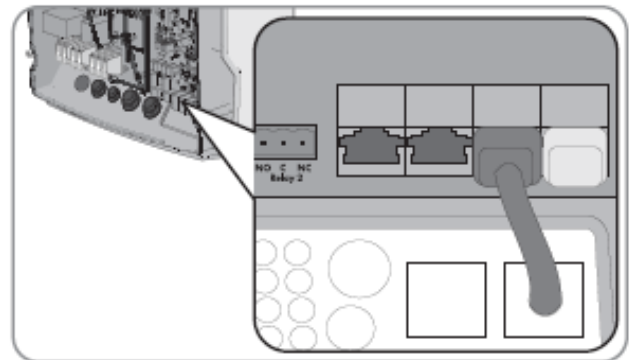
4.3 Connecting LYNK to the SMA Network

Insert one end of a CAT5 communication cable with RJ45 plugs into the LYNK Edge Card port and the other end into the port labeled ComSyncln on the Sunny Island. Ensure that the ComSyn communication bus is terminated at both ends. The LYNK Communication Gateway unit is internally terminated.

SMA supplies a termination plug with the Sunny Island which should be placed at the other end of the communication bus. In the case of a single Sunny Island the other end of the communication bus will be the ComSynOut port on the Sunny Island. In the case of a Sunny Island cluster the other end of the communication bus will be the ComSynOut port on the last Sunny Island in the cluster.



4548-US 6048-US



4.4M 6.0H 8.0H

RJ45 Pin configuration is as follows:

1. Sync1 - reserved
2. CAN_GND
3. SYNC_H
4. CAN_H
5. CAN_L
6. SYNC_L
7. Sync7 - reserved
8. Sync8 - reserved

ComSyn termination:

100 Ohm resistor between CAN_H and CAN_L and another 100 Ohm resistor between SYNC_H and SYNC_L.

4.4 Sunny Island Battery Temperature Sensor

For AES LiFePO₄ batteries, the internal BMS transfers the battery temperature to the Sunny Island and there is no need to use an external battery temperature sensor.

5 Configuring Sunny Island

5.1 Set Up of Sunny Island 4548-US and 6048-US

Before connecting LYNK to the Sunny Island network ensure that the firmware for the Sunny Island 4548-US and 6048-US is v7.3 or higher.

This section presumes familiarity with SMA Sunny Island operation and assumes a system with a single Sunny Island in an off-grid application. To install a system with multiple Sunny Island inverters refer to the Sunny Island Manual for set up instructions.

After installing the batteries as described in the AES LiFePO₄ Battery Manual use the Quick Configuration Guide (QCG) to set up the Sunny Island for use with AES LiFePO₄ Batteries.

- Switch the DC circuit breaker of the Sunny Island to from OFF to ON.

The Sunny Island initiates the start-up phase and several notifications are displayed. The 'To init system' notification is the last notification displayed.

- Press and hold down <ENTER> until the Sunny Island beeps three times.

The QCG set up is started.

- Select 'New Battery' for an existing SI system when AES LiFePO₄ Batteries are replacing other batteries.

When a 'New System' is being commissioned, wait until prompted to enter battery parameters.

The following parameters must be set for AES LiFePO₄ Batteries:

- Battery Type: Lilon_Ext-BMS
- Nominal capacity of the battery: installed number of batteries x 130 Ah



▲ NOTE

- Nominal voltage for the battery will automatically be set to 48V
- Not all parameters are available to set in the QCG, only the mandatory values for the basic operation of the Sunny Island system.

After entering all parameters, the 'INIT MASTER OK START?' Notification appears

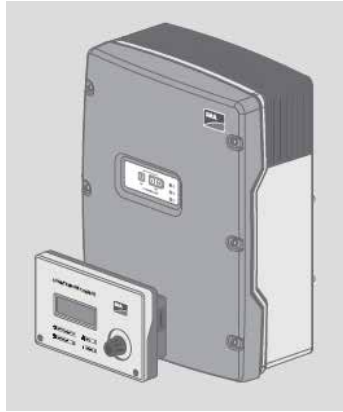
- Press <ENTER> to confirm, the following notification appears
- Press <ENTER> and hold until you hear an acoustic signal.

The Sunny Island will now start operation.

5.2 Set Up of Sunny Island 3.0M, 4.4M, 6.0H and 8.0H with Legacy Sunny Remote Control

This section presumes familiarity with SMA Sunny Island operation and assumes a system with a single Sunny Island in an off-grid application. To install a system with multiple Sunny Island inverters refer to the Sunny Island Manual for set up instructions. After installing the batteries as described in the AES LiFePO₄ Battery Manual use the Sunny Remote Control to start the Quick Configuration Guide (QCG) to set up the Sunny Island for use with AES LiFePO₄ Batteries.

During the initial start-up of the Sunny Island the Quick Configuration Guide (QCG) starts automatically. On the display of the Sunny Remote Control – SRC-20 the user is guided through a menu structure which allows quick and easy commissioning of the system.



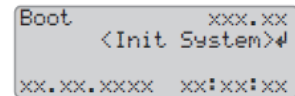
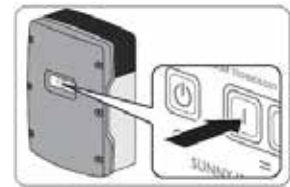
Sunny Island with Sunny Remote Control

- Press the activation button on the Sunny Island.
- When the Sunny Island Remote Control displays <Init System>, press and hold the button on the Sunny Remote Control. An acoustic signal sounds three times and Sunny Remote Control displays the QCG.
- When AES LiFePO₄ Batteries are replacing other batteries in an existing system, turn the button on the Sunny Remote Control to the right and select 'New Battery'. Press the button. This confirms your selection of 'New Battery'.

When a 'New System' is being commissioned, wait until prompted to enter battery parameters.

The following parameters must be set for AES LiFePO₄ Batteries:

- Set the Battery Type: Lilon_Ext-BMS
- Set the nominal capacity of the battery: installed number of batteries x 130 Ah



▲ NOTE

- Nominal voltage for the battery will automatically be set to 48V
- Not all parameters are available to set in the QCG, only the mandatory values for the basic operation of the Sunny Island system.

- Confirm the settings to finish the process.

5.3 Set Up of Sunny Island 4.4M, 6.0H and 8.0H with Integrated Web Interface

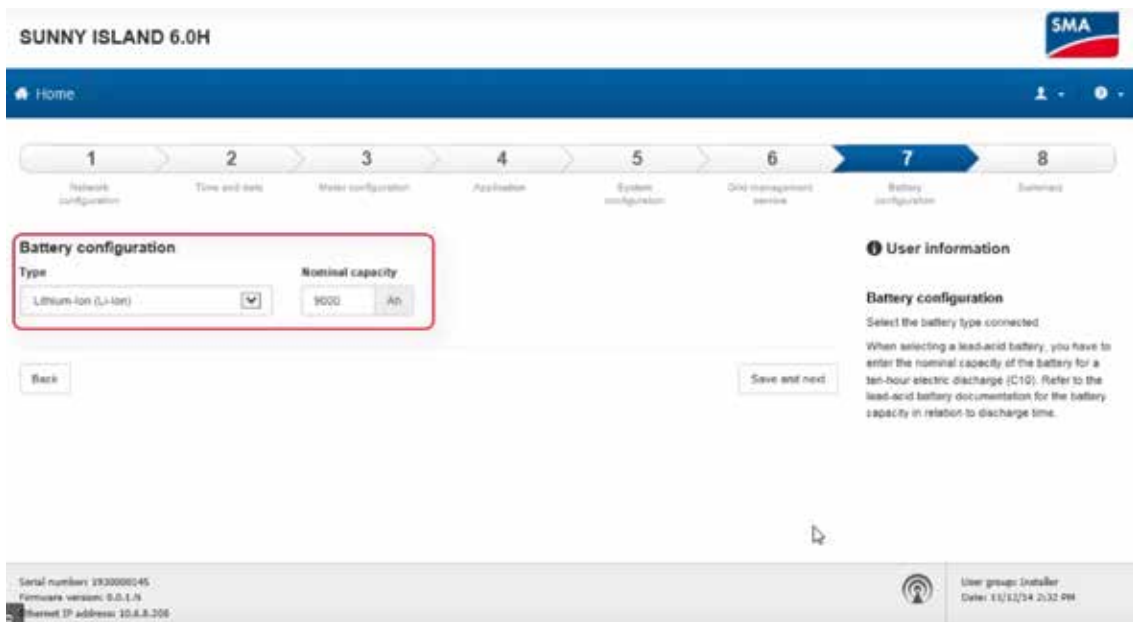
This section presumes familiarity with the SMA Sunny Island -12 generation (or higher) and assumes a system with a single Sunny Island in an off-grid application. To install a system with multiple Sunny Island inverters refer to the Sunny Island Manual for set up instructions. Follow the commissioning instructions in the Sunny Island 4.4M / 6.0H / 8.0H Operating Manual which uses a web based interface.

After installing the batteries as described in the AES LiFePO₄ Battery Manual establish a direct connection (WLAN or Ethernet) to the Sunny Island and log into the user interface as an installer.

- When AES LiFePO₄ Batteries are replacing other batteries in an existing system, go to the > Battery Configuration tab.
- When commissioning a system for the first time the installation assistant will guide you through the process.

The following parameters must be set for AES LiFePO₄ Batteries:

- Set the Battery Type: Lithium-ion (Li-Ion)
- Set the nominal capacity of the battery: installed number of batteries x 130 Ah



▲ NOTE

- Nominal voltage for the battery will automatically be set to 48V
- Not all parameters are available to set in the Battery Configuration Tab, only the mandatory values for the basic operation of the Sunny Island system.