



## LFP-LV MODULE PRODUCT MANUAL



This installation applies only to: 51.2V-100Ah LFP-LV Module  
48V-100Ah LFP-LV Module  
25.6V-200Ah LFP-LV Module

### COMPLIANCE:

Certifications: UL-1973, CE, IEC62619 & CB, KC BIS  
Shipping Class: UN3480, Class 9, UN38.3



# CONTENTS

<b>SECTION 1.</b>	<b>SAFETY INFORMATION</b>	<b>4</b>
1.1.	Warning	4
1.2.	Notice	4
1.3.	About This installation Manual	4
1.4.	Symbols Used in this Manual	5
1.5.	Warnings	6
1.6.	Before you Start	7
1.7.	Before Installation:	7
1.8.	System Compatibility	7
1.9.	Safety Check	8
1.10.	UL-1973 Certification	8
<b>SECTION 2.</b>	<b>BATTERY INFORMATION</b>	<b>9</b>
2.1.	Terminology	9
2.2.	Module Specifications: 51.2V-100Ah AND 48V-100AH	10
2.3.	Module Specifications: 48V-100Ah	11
2.4.	Product Diagram	12
<b>SECTION 3.</b>	<b>ENCLOSURE INFORMATION</b>	<b>13</b>
3.1.	Grounding Instructions	13
3.2.	Leveling Instructions	13
3.3.	Installation Instructions – General	13
<b>SECTION 4.</b>	<b>BATTERY INSTALLATION</b>	<b>14</b>
4.1.	Safety Check	14
4.2.	Module to Module Connections	15
4.3.	Sample Multi Stack Line Diagram	17
4.4.	Improper Connection Methods	18
<b>SECTION 5.</b>	<b>MODULE COMMUNICATION SETTINGS</b>	<b>19</b>
5.1.	6-BIT MODULE COMMUNICATION SETTINGS	19
5.2.	8-BIT MODULE COMMUNICATION SETTINGS	22
5.3.	RJ485 CONNECTOR DIAGRAM	22
5.4.	8Bit Toggle Switch Settings	23



<b>SECTION 6.</b>	<b>SYSTEM SETUP</b>	<b>25</b>
6. 1.	Best Practices	25
6. 2.	Sol-Ark	26
6. 3.	SMA Sunny Island 6048	26
6. 4.	Outback Radian 8048	27
<b>SECTION 7.</b>	<b>TROUBLESHOOTING</b>	<b>28</b>
7. 1.	LED light Indications	28
<b>SECTION 8.</b>	<b>MODULE PACKAGING</b>	<b>30</b>
<b>SECTION 9.</b>	<b>LFP-LV MODULE LIMITED WARRANTY</b>	<b>31</b>



## SECTION 1. SAFETY INFORMATION

### 1.1. WARNING

**WARNING: Read this entire document before installing the POWERSYNC Energy Storage Batteries. Failure to follow all instructions and warnings within this document could result in electric shock, serious injury, or death and may damage the battery module or ancillary components.**

The information contained in this manual is accurate at the time of publication. However, information contained herein is subject to change without notice.

For the latest information regarding POWERSYNC Energy Solutions products and installation guides, go to [www.powersyncenergy.com/document-library](http://www.powersyncenergy.com/document-library)

### 1.2. NOTICE

**THIS INSTALLATION GUIDE ONLY APPLIES TO THE FOLLOWING MODEL NUMBERS:**

**LFP3250-LV512100HP (51.2V-100Ah "High Power"Module)**

**LFP3250-LV512100SP (51.2V-100Ah "Standard Power"Module)**

**LFP3250-LV480100HP (48V-100Ah "High Power" Module)**

**LFP3250-LV256200HP (25.6V-200Ah Module)**

**DO NOT CONNECT 25.6V-200AH MODULES TO 51.2V-100AH MODULES**

**POWERSYNC BATTERIES ARE AVAILABLE IN 6-BIT OR 8-BIT TOGGLE SWITCH SETTINGS. DO NOT CONNECT A 6-BIT BATTERY TO AN 8-BIT BATTERY**

**DO NOT CONNECT ANY POWERSYNC MODULE TO ANY OTHER BRAND OF BATTERY**






**DO NOT CONNECT GEN 3 POWERSYNC MODULES WITH GEN 2 OR GEN 1 POWERSYNC MODULE**

### 1.3. ABOUT THIS INSTALLATION MANUAL

- This Installation Manual will guide you through the installation of your Lithium Iron Phosphate ("LiFePO4") Low Voltage – Energy Storage System ("ESS"). The 8-BIT POWERSYNC modular system is designed for parallel connections ONLY for up to 16 modules in a single stack. The 6-BIT modular system is designed for parallel connections for up to 62 modules. SEE "Section 5. Module Communication Settings" on page 19.
- This Installation Manual applies only to the POWERSYNC Energy Solutions LiFePO4 51.2V-100Ah and 25.6V-200Ah battery module.
- The is designed to be integrated with third party solar charge controllers, inverters, and rectifiers.
- Contact POWERSYNC Energy Solutions for a list of approved inverter and solar charge controller suppliers.
- For instruction regarding connection to inverters, solar charge controllers, and rectifiers consult the installation manuals for the respective products.



**1. 4.    SYMBOLS USED IN THIS MANUAL**

	WARNING
	Important safety information to follow.
	Recycle or dispose of Lithium batteries in accordance with local Laws/regulations.
	Do not dispose of battery in a fire!
	Do not dispose of battery in the trash!
NOTE:	Do not dispose of battery in the trash!





## 1. 5. WARNINGS

Please read and comply with the following conditions of installation and use of the battery, incorrect installation using the battery may cause personal injury or damage to the product. : Use ONLY POWERSYNC Energy Solutions LiFePO4 battery modules. **DO NOT CONNECT ANY OTHER BATTERY MODULES. DOING SO WILL VOID THE WARRANTY AND MAY DAMAGE THE POWERSYNC LiFePO4 BATTERY.**

**Over-voltages or wrong wiring can damage the battery pack and cause deflagration, which can be extremely dangerous.**

**DO NOT connect the battery modules in series. (Parallel connections only.)**

**DO NOT connect POWERSYNC 51.2V-100Ah modules with 25.6V-200 Ah or 12.8V-400Ah modules. Batteries must be connected with batteries of the same voltage and capacity.**

**DO NOT** open the battery case or disassemble the battery.

**DO NOT** throw the battery into water. Always store the batteries in a cool and dry environment when not in use.

**DO NOT** put the battery into a fire or heat the battery, so as to avoid explosion or other dangerous events.

**DO NOT** use unqualified chargers. When charging the battery, please choose specialized charging equipment, and follow the correct procedures.

**DO NOT** reverse positive and negative terminals.

**DO NOT** connect the battery directly to AC power.

Avoid battery short circuit.

**DO NOT** use batteries from different manufacturers or different kinds, types together ,and do not mixed use old batteries and new batteries.

**DO NOT** use the battery should it deform or leak.

**DO NOT** puncture the battery;

**DO NOT** throw, impact, or hit the battery.

**DO NOT** open or try to repair the battery when it is defective.

**DO NOT** expose the battery to high temperatures.

**IMPORTANT NOTICE:** The module is NOT weight bearing and is not designed to support the weight of other battery modules. Do not place battery modules on top of one another without using proper racking or cabinet solutions. For more information about appropriate enclosures, see the **Enclosure Information** section of this installation manual.



## 1.6. BEFORE YOU START



Read all the safety information provided in this document prior to installing and/or operating the equipment. Contact POWERSYNC Energy Solutions Customer Support at (877) 459-4591 immediately if you have any questions about the handling, operation and safe use of the battery.

Installations of the must be done by a licensed professional electrician, electrical contractor, or solar installer who has all of the following skills and experience:

- Knowledge of the functional principles and operation of on-grid and off-grid (backup) systems.
- Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
- Knowledge of the installation of electrical devices
- Knowledge of and adherence to this guide and all safety precautions and best practices.

## 1.7. BEFORE INSTALLATION:



- Remove any possible metallic items that may be at risk of an electrical short such as jewelry, watches, pens, metal bars, or frames.
- **All tools must be insulated**

The POWERSYNC LiFePO4 Battery modules are shipped between 10% and 50% Depth of Discharge (“DOD”). Prior to opening the battery module box(es), inspect all boxes to ensure that there is no damage during shipping. If a box is damaged document the damage with pictures. If the damage is significant do not open the box. Contact POWERSYNC at (877) 459-4591 to schedule a return of the module to POWERSYNC.

If long term battery storage is necessary, please charge and discharge the battery at least once every three months to ensure the best performance. The optimal state of charge for storage is between 50% and 60% DOD.

Please use the battery in the temperature range which defined in the manual.

## 1.8. SYSTEM COMPATIBILITY

POWERSYNC modules are compatible with a wide range of 3rd party inverters, solar charge controllers, and rectifiers. Always consult the installation manuals of ancillary products prior to installation.



1. 9. SAFETY CHECK

After removing the battery module from the box, inspect each battery module to ensure that there is no damage.

The POWERSYNC battery modules are supplied with a main power switch on the front of the battery.



Master Switch

Ensure that the Main Switch on the front of the battery module is in the off position. Remove the terminal caps. Using a multimeter, test the terminals. The voltage should read zero “0 V”.

Turn the Main Switch to the “ON” position. Using a multimeter, test the terminals. The voltage should read a voltage of greater than 10 V.

Turn the Main Switch to the “OFF” position. Using a multimeter, test the terminals to ensure that the voltage is once again reading zero “0 V”.



**PERFORM ALL INSTALLATION AND MAINTENANCE AND CABLE CONNECTIONS WITH THE MAIN SWITCH IN THE “OFF” POSITION.**

1. 10. UL-1973 CERTIFICATION

The Intertek ETL (UL-1973) certification sticker is located on the lateral side of the LFP-LV Module. The listing can be found on the [Intertek Directory of Listed Products](#) website.

**Lithium Iron Phosphate Battery Module**

**POWERSYNC**  
ENERGY SOLUTIONS

Date of Manufacture: MAR.19.2022

Model No.	LFP3250-LV512100
Anode Material	LiFePO4
Nominal Voltage	51.2V
Nominal Capacity	100Ah
Recommended Discharge Current	100A
Maximum Discharge Current	200A
Recommended Charge Voltage/Current	58.4V/50A
Charge Cut Off	58.4V
Dimension(W x D x H)	482x610x160mm
Water Dust Resistance	IP20
Short-Circuit Current	1288A

**CAUTION**

- \* For long term storage,the battery state of charge should be kept at +/-40%
- \* A regular charge and discharge cycle should be performed approximately once every 3 months
- \* Do not short-circuit, over-charge,or over discharge the battery
- \* Do not disassemble or modify the battery
- \* Do not expose the battery to heat,flame,water
- \* Do not reverse the polarity of the battery





## SECTION 2. BATTERY INFORMATION

### 2.1. TERMINOLOGY

Cell	Smallest subpart of an electrochemical LFP-LV Module that stores the chemical energy
Module	Aggregation of several cells or blocks
Stack	Aggregation of up to up to 16 modules
Battery system	Parallel connection of several packs or strings forming the battery
BMS	Battery Management System
C-Rate	The C-Rate is the rate of discharge relative to the capacity of the battery.

When multiple POWERSYNC battery modules are connected in parallel, the maximum C-Rate of the battery is 2C (200ADC) per module. There is a 400A rated internal busbar between the top and bottom terminals on the inside of the battery for both the positive and negative connections.

For best cycle life, the recommended normal operating C-Rate is 0.3C. For more information review the “Normal Performance Parameters” section of this manual.



1. Dual positive and negative terminals for fast and easy connectivity. No external bus bars are necessary.
2. 250A full stop breaker
3. SOC Meter
4. Run / Alarm Lights
5. Toggle Switches
6. Reset Button (To Reset BMS)
7. CAN 2.0B Active (29bit ID) Protocol (Battery to Inverter)
8. RS485 Connector (Module to Module Communications)
9. RV-C Communication Port
10. Module to Module connector (Supplied Separately)



## 2.2. MODULE SPECIFICATIONS: 51.2V-100AH AND 48V-100AH

Model Number	LFP3250-LV512100 High Power	LFP3250-LV512100SP Standard Power	LFP3250-LV480100 High Power	LFP3250-LV480100SP Standard Power
PERFORMANCE SPECIFICATIONS				
Nominal Voltage	51.2V		48V	
Nominal Capacity	100Ah		100Ah	
Energy (at 100% DOD)	5.12 kWh		4.8 kWh	
Chemistry	LiFePO4			
Cell	Prismatic			
Scalability (Max Parallel)	62	62	62	62
Internal Resistance	≤7mΩ			
Cycle Life*	6,000 at 70% Retained Capacity (80% DOD @ 0.5C)			
Self Discharge Rate	<1% per month			
Efficiency of Charge	100%			
Efficiency of Discharge	>98%			
DISCHARGE SPECIFICATIONS				
Max Continuous Current	2C = 200A (10.2kW)	1C = 100A (5.12kW)	2C = 200A (9.6kW)	1C = 100A (4.8kW)
Recommended Cut-off Voltage	48V		45V	
Under Voltage (Recovery)	45V (>48V)		42V (>45V)	
CHARGE SPECIFICATIONS				
Max Continuous Current	1C = 100A (5.12kW)	0.5C = 50A (2.5kW)	1C = 100A (4.8kW)	0.5C = 50A (2.4kW)
Rec. Charge (Bulk / Absorb / Float)	56.8V / 56.8V / 56V		53.25V / 53.25V / 52.5V	
Equalization (60 min every 7 days)	55V		51.6V	
Over Voltage (Recovery)	58.4V (<54V)		54.75V (<51V)	
MECHANICAL SPECIFICATIONS				
Case	19" 4U Stainless Steel			
Protection Rating	IP20			
Dimensions (W x D x H)	19 x 24 x 6.3 in. 482 x 610 x 160 mm	19 x 20 x 6.3 in. 482 x 525 x 160 mm	19 x 24 x 6.3 in. 482 x 610 x 160 mm	19 x 20 x 6.3 in. 482 x 525 x 160 mm
Weight	±116 lbs (52.6 kg)	±108 lbs (49 kg)	±116 lbs (52.6 kg)	±108 lbs (49 kg)
ENVIRONMENTAL SPECIFICATIONS				
Oper. Temp.	-10°C to 60°C (14°F to 140°F)			
Warranty	15 Year Limited			
Certifications	UL-1973, CE, IEC62619 & CB, KC BIS			
Shipping	UN3480, Class 9, UN38.3			

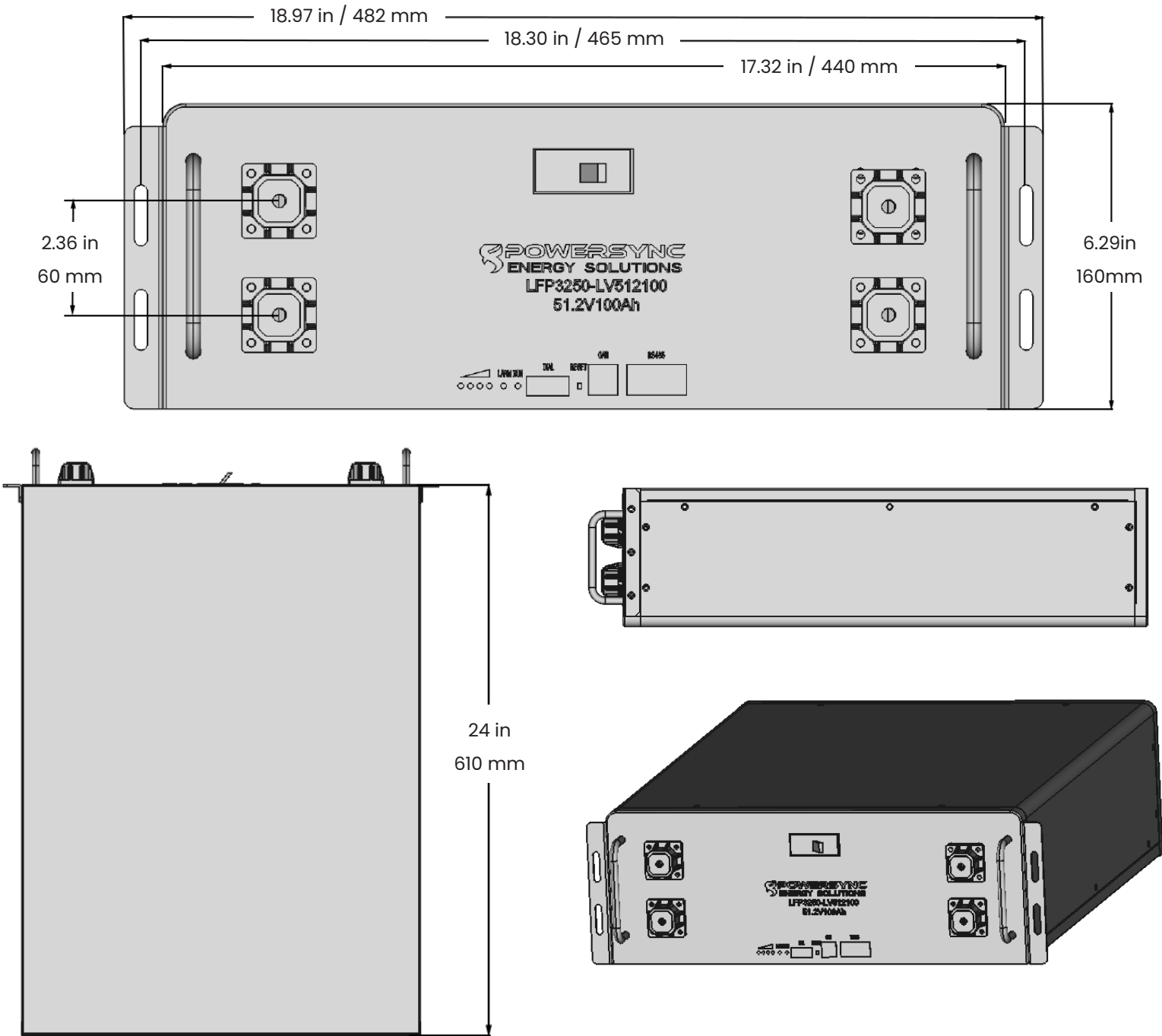


## 2.3. MODULE SPECIFICATIONS: 48V-100AH

Model Number	LFP3250-LV256200 High Power		LFP3250-LV256200SP Standard Power	LFP3250-LV128400
PERFORMANCE SPECIFICATIONS				
Nominal Voltage	25.6V			12.8V
Nominal Capacity	200Ah			400Ah
Energy (at 100% DOD)	5.12 kWh			
Chemistry	LiFePO4			
Cell	Prismatic			
Scalability (Max Parallel)	62	62	16	
Internal Resistance	≤7mΩ			
Cycle Life*	6,000 at 70% Retained Capacity (80% DOD @ 0.5C)			
Self Discharge Rate	<1% per month			
Efficiency of Charge	100%			
Efficiency of Discharge	>98%			
DISCHARGE SPECIFICATIONS				
Max Continuous Current	1C = 200A (5.12kW)	0.5C = 100A (2.56 kW)	0.5C = 200A (2.56 kW)	
Recommended Cut-off Voltage	24V			12V
Under Voltage (Recovery)	22.5V (>24V)			11.25V (>12V)
CHARGE SPECIFICATIONS				
Max Continuous Current	0.5C = 100A (2.56kW)	0.25C = 50A (1.28kW)	0.25C =100A (1.28 kW)	
Rec. Charge (Bulk / Absorb / Float)	28.4V / 28.4V / 28V			14.2V / 14.2V / 14V
Equalization (60 min every 7 days)	27.5V			13.75V
Over Voltage (Recovery)	29.2V (<27V)			14.6V (<13.5V)
MECHANICAL SPECIFICATIONS				
Case	19" 4U Stainless Steel			
Protection Rating	IP20			
Dimensions (W x D x H)	19 x 24 x 6.3 in. 482 x 610 x 160 mm	19 x 20 x 6.3 in. 482 x 525 x 160 mm	19 x 24 x 6.3 in. 482 x 610 x 160 mm	
Weight	±116 lbs (52.6 kg)	±108 lbs (49 kg)	±116 lbs (52.6 kg)	
ENVIRONMENTAL SPECIFICATIONS				
Oper. Temp.	-10°C to 60°C (14°F to 140°F)			
Warranty	15 Year Limited			
Certifications	UL-1973, CE, IEC62619 & CB, KC BIS			
Shipping	UN3480, Class 9, UN38.3			



2. 4. PRODUCT DIAGRAM





## SECTION 3. ENCLOSURE INFORMATION

POWERSYNC batteries are designed for easy installation into standard 19" racking systems or cabinets. POWERSYNC supplied indoor or outdoor NEMA-3 rated enclosures are available upon request.

**IMPORTANT NOTICE:** The module is NOT weight bearing and is not designed to support the weight of other battery modules. Do not place battery modules on top of one another without using proper racking or cabinet solutions.

Enclosures must be capable of supporting the weight of the entire pack of battery modules.

### 3.1. GROUNDING INSTRUCTIONS



Proper installation of an equipment grounding terminal must be made and the rack must be grounded in accordance with NFPA 70, "National Electrical Code," and the applicable sections of ANSI C2, "National Electrical Safety Code".

When using a racking enclosure, a ground can be applied to any part of the racking frame. If the frame is painted, remove the paint before attaching a grounding cable.

### 3.2. LEVELING INSTRUCTIONS

Prior to loading any equipment into the enclosure put the levelers down and make sure that the enclosure is level.



**Do not move rack with equipment installed**

### 3.3. INSTALLATION INSTRUCTIONS – GENERAL

1. Prior to loading any battery modules, ensure that the enclosure is capable of supporting the entire weight of all battery modules. The approximate weight of each battery modules is 108 lbs.
2. Provide the minimum spacing between the accessories/components and the housing that shall be maintained for safe operation of the equipment when installed in accordance with the National Electric Code, ANSI/NFPA 70.
3. As appropriate, all wiring and equipment should be installed in accordance with NFPA 70, "National Electrical Code," and the applicable sections of ANSI C2, "National Electrical Safety Code."
4. The equipment shall be installed by trained service personnel. All parts such as screws, bolts, wiring and similar parts that are required to complete the assembly shall be provided. Assembly instructions shall be provided in the Installation Instructions.
5. Prior to loading any equipment into the rack use levelers to level the enclosure.
6. When installing battery modules install from the lowest rack space first. Do not install from the top down.





## SECTION 4. BATTERY INSTALLATION

**IMPORTANT NOTICE:** The module is NOT weight bearing and is not designed to support the weight of other battery modules. Do not place battery modules on top of one another without using proper racking or cabinet solutions. For more information about appropriate enclosures, see the **Enclosure Information** section of this installation manual.

### 4.1. SAFETY CHECK

1. Prior to installing the battery module, conduct a safety check.
2. Ensure that the battery main switch is in the OFF position.

SWITCH RED = ON/HOT

SWITCH GREEN = OFF/NEUTRAL



**NOTE: DURING INSTALLATION OR MAINTENANCE, MAKE SURE THAT ALL MODULE BREAKERS ARE IN THE OFF POSITION.**

**WHEN MORE THAN ONE MODULES ARE CONNECTED USING THE TERMINAL TO TERMINAL CONNECTIONS AS DESCRIBED IN SECTION 4.3.2, CURRENT CAN FLOW FROM MODULE TO MODULE IF ONE OF THE MODULE BREAKERS IS IN THE ON POSITION**

3. Select the appropriate Personal Protective Equipment “PPE” according to your hazard analyses.
4. Select the appropriate tools according to the chosen hardware. **ALWAYS USE INSULATED TOOLS.**



4. 2. MODULE TO MODULE CONNECTIONS

Module Connection Torque: Max of 7.5 Nm (5.5 ft/lbs)

4. 2. 1. MODULE CONNECTION OVERVIEW

The battery modules are designed for parallel connections only.



DO NOT CONNECT A POSITIVE TERMINAL ON ONE BATTERY TO THE NEGATIVE TERMINAL ON THE ADJACENT BATTERY.

There are two positive and two negative terminal connectors on the module. A 400A busbar connects the positive and the negative terminals on the inside of each battery module.

BLACK TERMINAL = NEGATIVE

ORANGE / RED TERMINAL = POSITIVE

Review you inverter installation manual prior to connecting the battery modules to the inverter.

Do not turn on the master switch on any of the batteries until all connections have been completed and the battery toggle switches have been programmed according to section “Section 5. Module Communication Settings” on page 19.

4. 2. 2. MODULE TERMINAL CONNECTIONS

When installing the modules with POWERSYNC enclosures the appropriate module to module connectors will be provided. If your modules are being installed with a third party enclosure or battery racking, **we recommend using a 2/0 welding cable for the module to module connections.**

The module that is connected to the inverter is always the “HOST” module. It is recommended to connect the batteries as seen in Figure 2.

- 1. Connect the P1 terminal on the host module to the positive terminal on the inverter. The the N1 terminal of the HOST can be connected to the negative terminal on the inverter. Alternatively, the N2 terminal on the last module in the stack can be connected to the negative terminal on the inverter.
- 2. Starting with the Host battery, connect the P-2 terminal on the Host battery with the P-1 terminal on Sub Module 1. Connect the N2 terminal on the Host battery with the N-1 terminal on Sub Module 1.
- 3. REPEAT for each battery module up to the last module in the rack.



FIGURE 1. MULTI MODULE CONFIGURATION

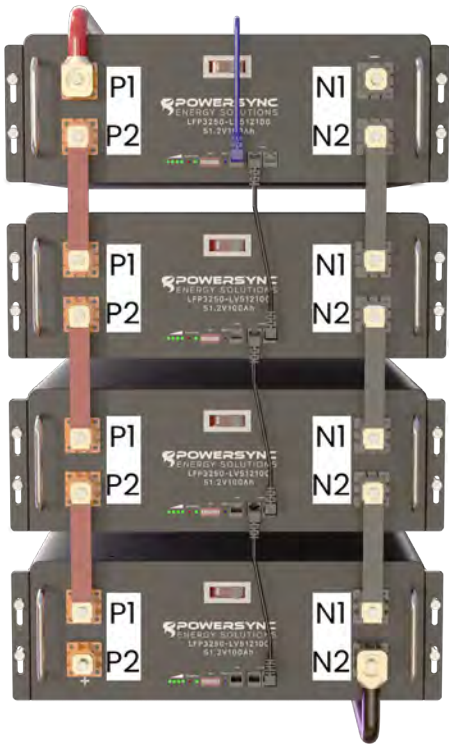


FIGURE 2. MODULE TERMINAL CONNECTIONS

#### 4.2.3. CAN BUS PORT CONNECTION

The can-bus port on the HOST battery shall be connected with the corresponding connection to the CAN bus on the PCS/inverter as seen with the **BLUE** drawing in Figure 3.

Once all connections have been completed program the module toggle switches according to section "Section 5. Module Communication Settings" on page 19.

#### 4.2.4. RS485 CONNECTIONS

There are two RS485 connectors on each module for module to module connections.

When connecting the communications cables they shall be connected as seen by the **black cables** drawing in Figure 3.

Continue down the string with alternating port connections.



**FIGURE 3. MODULE TERMINAL CONNECTIONS**



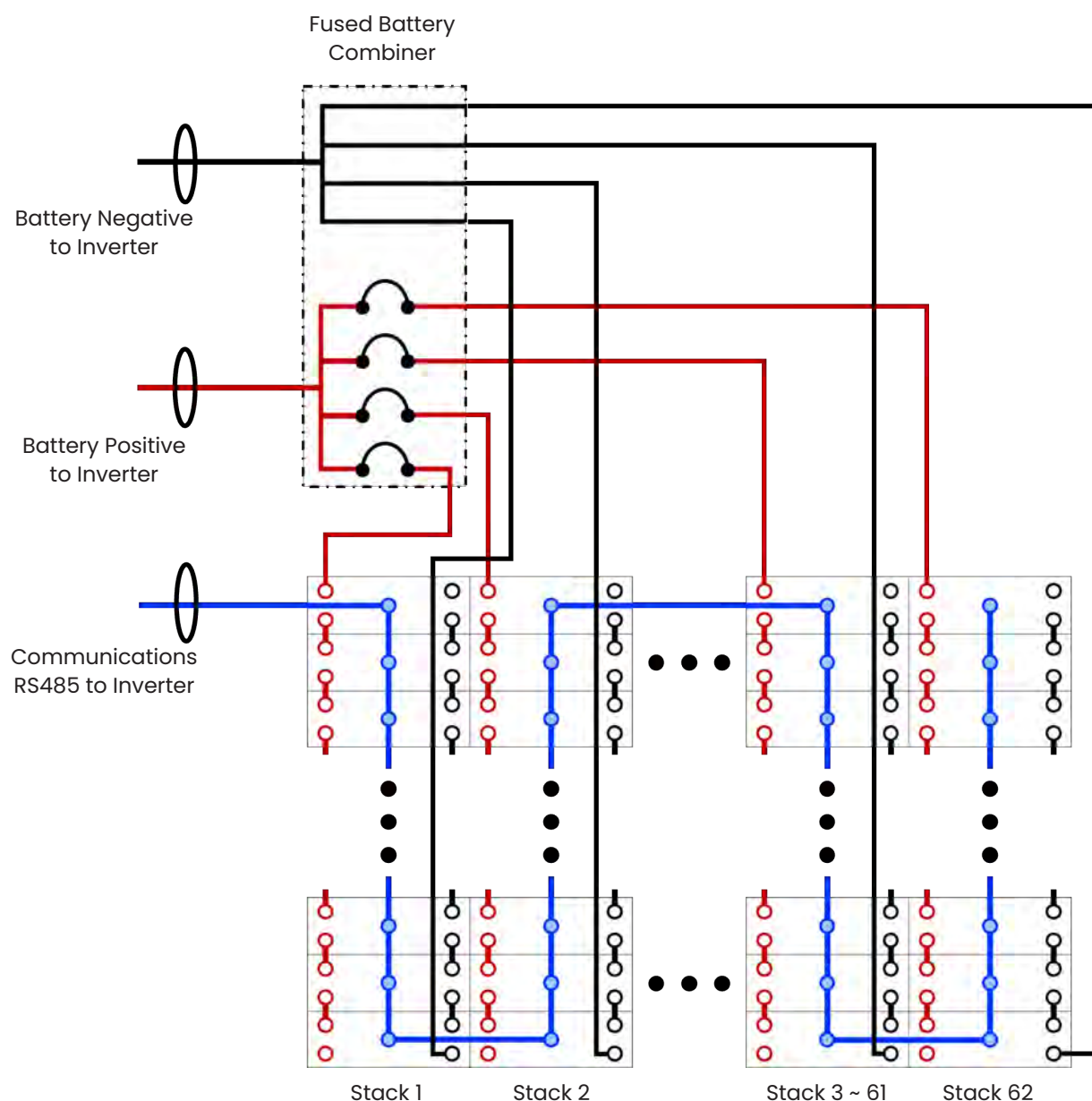
### 4.3. SAMPLE MULTI STACK LINE DIAGRAM

When using the 6-Bit battery modules, up to 62 modules can be connected in parallel. When using the 8-Bit modules, up to 16 batteries can be connected in parallel. It is recommended that each stack should have an equal number of batteries.

When connecting multiple stacks of batteries in parallel, it is recommended to connect each stack to a common DC bus or a fused combiner box as seen in Figure 4. Contact POWERSYNC for additional support

For RS485 communications all batteries will be connected as one string in a daisy chain format from the Host to the last module in the system.

**FIGURE 1. SAMPLE MULTI-STACK 62 MODULE DIAGRAM**







4. 4. IMPROPER CONNECTION METHODS

DO NOT REVERSE POLARITY BY CONNECTING POSITIVE TERMINALS TO NEGATIVE TERMINALS



DO NOT CONNECT MODULE TO MODULE USING A SINGLE TERMINAL CONNECTION







## SECTION 5. MODULE COMMUNICATION SETTINGS

**FOR MODULES THAT HAVE THE 6 TOGGLE SWITCHES (6-BIT), REFER TO THE TOGGLE SWITCH SETTINGS IN SECTION 5.1.**

**FOR MODULES THAT HAVE THE 8 TOGGLE SWITCHES (8-BIT), REFER TO THE TOGGLE SWITCH SETTINGS IN SECTION 5.2.**

**DO NOT ATTEMPT TO CONNECT 6-BIT MODULES WITH 8-BIT MODULES**

### 5.1. 6-BIT MODULE COMMUNICATION SETTINGS

When connecting modules in a multi-module stack, you will have one “Host” module that will connect via CAN port to the inverter of your choice. All module to module connections will be accomplished via the RS 485 ports.

It is recommended to set the toggle switches prior to starting the system. Press the reset button if a toggle switch is changed after the battery breaker has been turned on.

For systems being installed with Sol-Ark, Pylon, or Goodwe manufactured inverters use Host Option 1 in the table below. For systems being installed with Victron or SMA inverters, use Host Option 2.

#### STARTUP PROCEDURE

1. POWER DOWN ALL MODULES
2. CABLING INSTRUCTIONS:
  - 2.1. USE THE CABLE SUPPLIED BY YOUR INVERTER MANUFACTURER FOR CONNECTING THE INVERTER TO THE HOST MODULE. INSERT CABLING FROM HOST MODULE CAN PORT TO INVERTER
  - 2.2. USE THE CABLE LABELED “MASTER TO SLAVE” FOR CONNECTING THE HOST MODULE TO THE SECOND MODULE
  - 2.3. USE THE RS485 CABLES PROVIDED WITHIN THE POWERSYNC MODULE BOX FOR THE REMAINDER OF THE SUB-MODULES (2 ~ END) USING RS485 PORTS
3. VERIFY TOGGLE SWITCH SETTINGS ON EACH MODULE ACCORDING TO TABLE 2 AND TABLE 3.
4. POWER MODULES BACK ON

The LFP Modules with the 6-Bit toggle switch option is designed to have up to 62 modules connected in parallel.

#### 5.1.1. CAN COMMUNICATION INTERFACE DEFINITION

Communication cables for Host Module to Inverter communications are available upon request. If you are providing your own Host Module to Inverter communication cable, verify that the pin-out on your cable matches the following table.

TABLE 1. 6-BIT CAN CABLE PIN-OUT

Pin	Specifies
1, 3	RS485_B
7	RS485_A
8, 6	GND
4	CAN-H
5	CAN-L



## 5.1.2. 6-BIT TOGGLE SWITCH SETTINGS

**TABLE 2. HOST MODULE TOGGLE SWITCH SETTINGS**

	#1	#2	#3	#4	#5	#6	Inverter
Host Option 1	OFF	OFF	OFF	OFF	OFF	ON	Sol-Ark, Pylon, Goodwe
Host Option 2	OFF	OFF	OFF	OFF	ON	ON	Victron, SMA

**TABLE 3. SUB-MODULE TOGGLE SWITCH SETTINGS (1-29 MODULES)**

Module	#1	#2	#3	#4	#5	#6
1	ON	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF
5	ON	OFF	ON	OFF	OFF	OFF
6	OFF	ON	ON	OFF	OFF	OFF
7	ON	ON	ON	OFF	OFF	OFF
8	OFF	OFF	OFF	ON	OFF	OFF
9	ON	OFF	OFF	ON	OFF	OFF
10	OFF	ON	OFF	ON	OFF	OFF
11	ON	ON	OFF	ON	OFF	OFF
12	OFF	OFF	ON	ON	OFF	OFF
13	ON	OFF	ON	ON	OFF	OFF
14	OFF	ON	ON	ON	OFF	OFF
15	ON	ON	ON	ON	OFF	OFF
16	OFF	OFF	OFF	OFF	ON	OFF
17	ON	OFF	OFF	OFF	ON	OFF
18	OFF	ON	OFF	OFF	ON	OFF
19	ON	ON	OFF	OFF	ON	OFF
20	OFF	OFF	ON	OFF	ON	OFF
21	ON	OFF	ON	OFF	ON	OFF
22	OFF	ON	ON	OFF	ON	OFF
23	ON	ON	ON	OFF	ON	OFF
24	OFF	OFF	OFF	ON	ON	OFF
25	ON	OFF	OFF	ON	ON	OFF
26	OFF	ON	OFF	ON	ON	OFF
27	ON	ON	OFF	ON	ON	OFF
28	OFF	OFF	ON	ON	ON	OFF
29	ON	OFF	ON	ON	ON	OFF



TABLE 4. SUB-MODULE TOGGLE SWITCH SETTINGS (30-62 MODULES)

Module	#1	#2	#3	#4	#5	#6
30	OFF	ON	ON	ON	ON	OFF
31	ON	ON	ON	ON	ON	OFF
32	ON	OFF	OFF	OFF	OFF	ON
33	OFF	ON	OFF	OFF	OFF	ON
34	ON	ON	OFF	OFF	OFF	ON
35	OFF	OFF	ON	OFF	OFF	ON
36	ON	OFF	ON	OFF	OFF	ON
37	OFF	ON	ON	OFF	OFF	ON
38	ON	ON	ON	OFF	OFF	ON
39	OFF	OFF	OFF	ON	OFF	ON
40	ON	OFF	OFF	ON	OFF	ON
41	OFF	ON	OFF	ON	OFF	ON
42	ON	ON	OFF	ON	OFF	ON
43	OFF	OFF	ON	ON	OFF	ON
44	ON	OFF	ON	ON	OFF	ON
45	OFF	ON	ON	ON	OFF	ON
46	ON	ON	ON	ON	OFF	ON
47	ON	OFF	OFF	OFF	ON	ON
48	OFF	ON	OFF	OFF	ON	ON
49	ON	ON	OFF	OFF	ON	ON
50	OFF	OFF	ON	OFF	ON	ON
51	ON	OFF	ON	OFF	ON	ON
52	OFF	ON	ON	OFF	ON	ON
53	ON	ON	ON	OFF	ON	ON
54	OFF	OFF	OFF	ON	ON	ON
55	ON	OFF	OFF	ON	ON	ON
56	OFF	ON	OFF	ON	ON	ON
57	ON	ON	OFF	ON	ON	ON
58	OFF	OFF	ON	ON	ON	ON
59	ON	OFF	ON	ON	ON	ON
60	OFF	ON	ON	ON	ON	ON
61	ON	ON	ON	ON	ON	ON



### 5.2. 8-BIT MODULE COMMUNICATION SETTINGS

The LFP Modules with the 8-Bit toggle switch option is designed to have up to 16 modules connected in parallel.

**NOTE: WITH THE 8-BIT LFP MODULES, DO NOT CONNECT MORE THAN 16 MODULES IN PARALLEL. IF YOU ANTICIPATE NEEDING MORE THAN 16 MODULES IN PARALLEL, USE ONLY THE 6-BIT LFP-LV MODULES.**

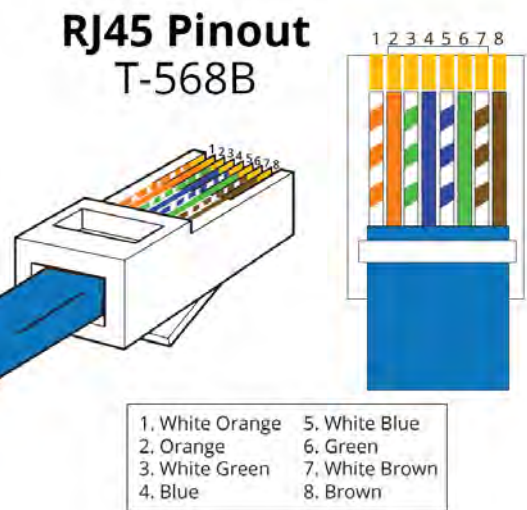
TABLE 5. CAN COMMUNICATION INTERFACE DEFINITION

Pin	Specifies
1, 2, 7, 8	NC
3, 6	Ground
4	CAN-H
5	CAN-L

TABLE 6. RS485 COMMUNICATION INTERFACE DEFINITION

POWERSYNC Pin	Specifies
1, 8	RS485 -B
2, 7	RS485 +A
3, 6	Ground
4, 5	NC

### 5.3. RJ485 CONNECTOR DIAGRAM





5. 4. 8BIT TOGGLE SWITCH SETTINGS



**NOTE: PRIOR TO THE INITIAL INSTALL, SET THE TOGGLE SWITCHES APPROPRIATELY BEFORE TURNING ON THE BREAKER.**

**WHEN ADDING MODULES TO AN EXISTING INSTALLATION, TURN OFF THE BREAKER, SET THE TOGGLE SWITCHES APPROPRIATELY, WAIT 20 SECONDS, TURN THE BREAKER ON.**

5. 4. 1. **TOGGLE SWITCH ID SETTINGS FOR MULTI MODULE INSTALLATIONS**

You may need to zoom in your PDF to clearly see the images in the following tables.

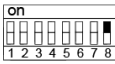
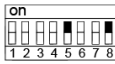
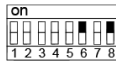

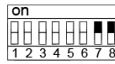
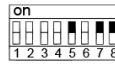
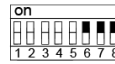

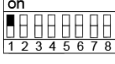
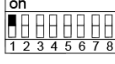
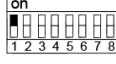
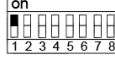
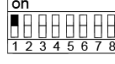
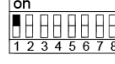
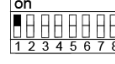

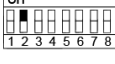

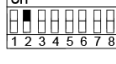
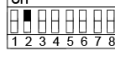
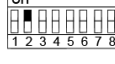



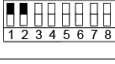
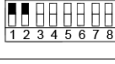
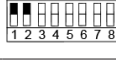
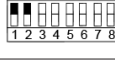
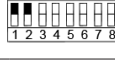











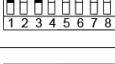
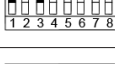
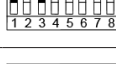
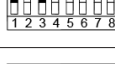


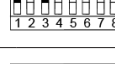

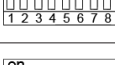
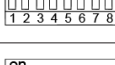
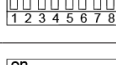
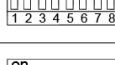
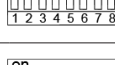
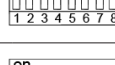
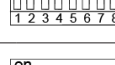
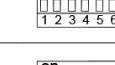
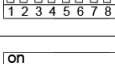
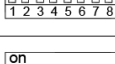
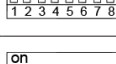
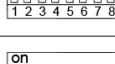
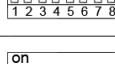
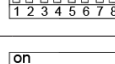
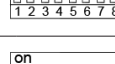
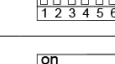
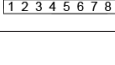
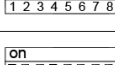
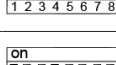
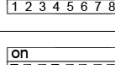
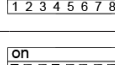
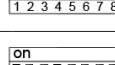
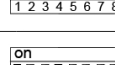
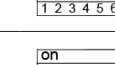
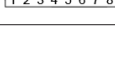
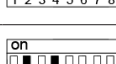
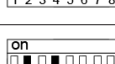
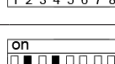
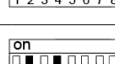
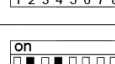
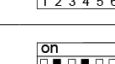





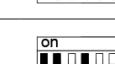

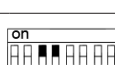
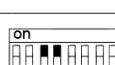





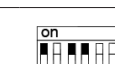






**TABLE 7. SINGLE MODULE THROUGH 8 MODULE INSTALLATIONS**

Modules In Parallel	Single Battery	2P	3P	4P	5P	6P	7P	8P
Host Module								
Module 2								
Module 3								
Module 4								
Module 5								
Module 6								
Module 7								
Module 8								





**TABLE 8. 9 THROUGH 16 MODULE INSTALLATIONS**

Modules In Parallel	9P	10P	11P	12P	13P	14P	15P	16P
Host Module								
Module 2								
Module 3								
Module 4								
Module 5								
Module 6								
Module 7								
Module 8								
Module 9								
Module 10								
Module 11								
Module 12								
Module 13								
Module 14								
Module 15								
Module 16								



## SECTION 6. SYSTEM SETUP

### 6.1. BEST PRACTICES

#### 6.1.1. PRE-COMMISSIONING CHARGING

It is required by law for lithium battery modules to be shipped at or below 50% state of charge. Therefore upon arrival, your battery may be at a low state of charge.

If more than one battery module will be connected in parallel in a stack, it is a good practice to individually charge all batteries to a full charge using a 48V charger that is capable of CC/CV (Constant Current / Constant Voltage).

**TABLE 1. CHARGE VOLTAGE AND CURRENT**

The Recommended Charge Voltage for the modules are as follows:

Module	Voltage	Max Current
51.2V-100Ah	54.4VDC	<100 ADC
25.6V-200Ah	27.2VDC	<100 ADC

Once all of the batteries for your system are at a full state, proceed to the installation phase.

#### 6.1.2. MULTI-MODULE EQUALIZATION RECOMMENDATION

In multi-module systems, the POWERSYNC batteries BMS will balance all modules without the need for installing external BMS components. During normal cycling where the batteries reach 100% SOC (full battery), the batteries will automatically auto-balance to keep the modules optimized and within the acceptable parameter range of one another.

In circumstances where the modules are not able to get to a full charge for a few days such as in solar when you may have more cloudiness than usual, the modules may become slightly unbalanced. While this perfectly safe and normal operation of the battery, over time the SOC of each module may drift even more from one another as the balancing process initializes at charge voltages greater than 55V.

Therefore, in order to mitigate these situations, we recommend setting the battery system to perform an equalization for 60 minutes at least once every 7 days. Depending upon which inverter you are using, the inverter may be preprogrammed to do this to occur on a regular basis. With some inverters, the equalization may have to be accomplished manually.

The recommended voltage for the 60 minute equalization are as follows:

Module	Equalization Voltage
51.2V-100Ah	55VDC
25.6V-200Ah	27.6VDC



6.2. SOL-ARK

**FOLLOW ALL INVERTER INSTALLATION INSTRUCTIONS FOR THE SOL-ARK INVERTER WHICH CAN BE FOUND AT [WWW.SOL-ARK.COM](http://WWW.SOL-ARK.COM).**

Closed loop communications have been successfully completed with the entire Sol-Ark line of 48V inverters.  
Communication Steps

- 1. Ensure that the LFP-LV Modules are installed according to the “Section 4. Battery Installation” on page 14.
- 2. Set the toggle switches on the battery according to the “5. 4. Toggle Switch Settings” on page 23.
- 3. Connect the Host module to the “CAN” port on the Sol-Ark “Battery CAN bus” port (or to the inverters “CAN” port for indoor only units) using a standard RJ 45 Ethernet cable.. (Not Supplied)
- 4. Turn on the module Master switches starting with the Host battery first.
- 5. Enable “BMS Lithium Batt” and set its value to “00”.

6.3. SMA SUNNY ISLAND 6048

**FOLLOW ALL INVERTER INSTALLATION INSTRUCTIONS FOR THE SMA 4048 or 6048 INVERTER WHICH CAN BE FOUND AT [SMA-America.com](http://SMA-America.com)**

TABLE 2. SMS SUNNY ISLAND PINOUT

POWERSYNC Pin	Specifies	SMA 6048 Pin
1 , 8	RS485 -B	6
2 , 7	RS485 +A	3
3 , 6	Ground	2
4 , 5	NC	1, 4, 5, 7, 8



## 6. 4. OUTBACK RADIAN 8048

TABLE 3. OUTBACK RADIAN SETTINGS

Inverter Settings	Radian 8048A Settings
Absorb Voltage	55.2 Vdc
Absorb Time	0.2 hr
Float Voltage	55.2 Vdc
Float Time	0.0 hr
Re-float Voltage	Default
Re-bulk Voltage	52.8 Vdc
Sell Voltage	54 Vdc
AC Charger Limit	30 Aac
Low Battery Cutout	48.0 Vdc
LBCO Delay	120 seconds
Low Battery Cut-in	49.2 Vdc
High Battery Cutout	60 Vdc
HBCO Delay	10 seconds
High Battery Cut-in	58 Vdc
Charge Controller Settings	
Absorb Voltage	55.6 Vdc
Absorb Time	0.2 hr
Float Voltage	55.6 Vdc
Re-bulk Voltage	50.0 Vdc
DC Current Limit	200A per module divided by # of controllers
Absorb End Amps	0 Adc

Communication Settings	
Battery Ah	100Ah per module
Charged Voltage	54.4 Vdc
Charged Time	30 min
Charged Return Amps	1A
Battery Charge Efficiency	96%
Relay Invert Logic	No *User adjustable
Relay Voltage	High = 53.8 V Low = 51.2 V *User adjustable
Relay Delay	High = 1, Low = 0 *User adjustable
MATE3s	
FN-DC Advanced	Low SOC Warning = 20%
FN-DC Advanced	Critical SOC Warning = 10%



## SECTION 7. TROUBLESHOOTING

### 7.1. LED LIGHT INDICATIONS

TABLE 1. SEQUENCE OF LED LIGHTS

SOC				ALARM	RUN
L1 ●	L2 ●	L3 ●	L4 ●	●	●

One running light, one warning light and four capacity indicators

TABLE 2. STATE OF CHARGE LIGHTS

Status	Charge				Discharge			
Capacity Indicator	L1 ●	L2 ●	L3 ●	L4 ●	L1 ●	L2 ●	L3 ●	L4 ●
0 ~ 25%	Flash	OFF	OFF	OFF	ON	OFF	OFF	OFF
25 ~ 50%	ON	Flash	OFF	OFF	ON	ON	OFF	OFF
50 ~ 75%	ON	ON	Flash	OFF	ON	ON	ON	OFF
≥75%	ON	ON	ON	Flash	ON	ON	ON	ON
Running Indicator ●	Always ON				Flash			

TABLE 3. FLASHING DEFINITIONS

FLASH MODE	ON	OFF
A	0.25s	3.75s
B	0.5s	0.5s
C	0.5s	1.5s



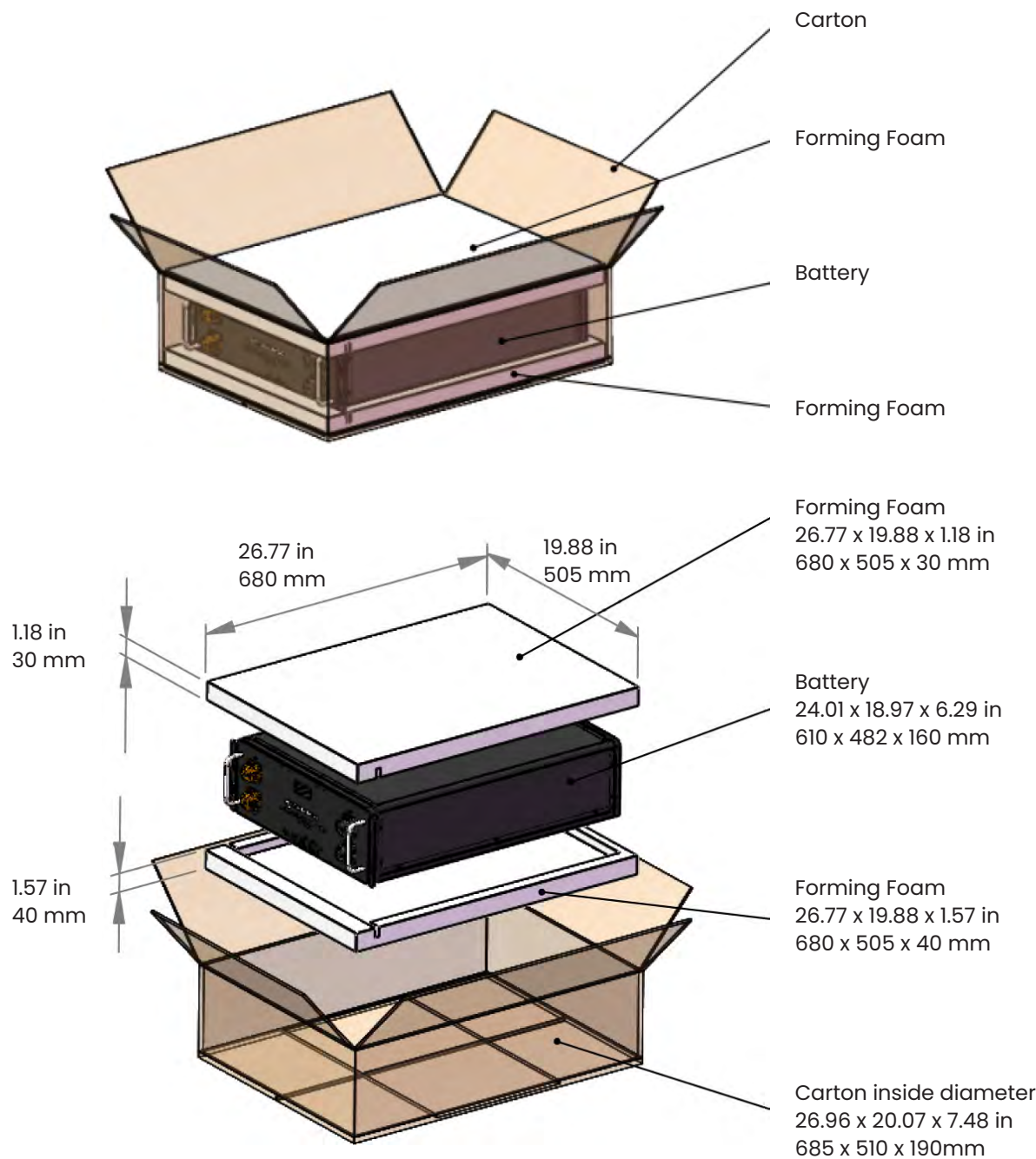


**TABLE 4. STATUS LIGH**

SYS STATUS	RUN STATUS	RUN	ALARM	SOC				REMARKS
		●	●	●	●	●	●	
Turn OFF	Sleep	OFF	OFF	OFF	OFF	OFF	OFF	ALL OFF
Standby	Normal	Always ON	OFF	According to SoC Indicator				Standby State
Charge	Normal	Always ON	OFF	According to SoC Indicator				Highest LED Flash Mode B
	Over Current Alarm	ON	Flash Mode B	According to SoC Indicator				Highest LED Flash Mode B
	Over Voltage Alarm	Flash Mode A	OFF	OFF	OFF	OFF	OFF	
	Temperature & Over Current Protection	Flash Mode A	OFF	OFF	OFF	OFF	OFF	
Discharge	Normal	Flash Mode C	OFF	According to SoC Indicator				According to SoC Indicator Always ON
	Alarm	Flash Mode C	Flash Mode C					
	Temperature over current, short circuit, etc	OFF	Always ON	OFF	OFF	OFF	OFF	Stop discharging, no action forced dormancy after 48h when the mains are off-line
	Low Volt. Protection	OFF	OFF	OFF	OFF	OFF	OFF	Stop Discharging
Charge or Discharge	Battery Below 20% SOC		Flash					Charge Battery



SECTION 8.      MODULE PACKAGING



<b>Weight</b>	
Module net weight:	113 lbs / 51.3kg
Carton + foam:	4.85 lbs / 2.2 kg
Module Gross weight:	117.9 lbs./ 53.5kg



**SECTION 9. LFP-LV MODULE LIMITED WARRANTY**

POWERSYNC Energy Solutions LLC (“POWERSYNC”) warrants, to the original purchaser (“User”), that its stationary lithium batteries (“Battery(ies)”) listed in the table below, if purchased from POWERSYNC or an authorized distributor, dealer or installer in the United States and Canada, and used in renewable energy storage or backup power applications will be free from defects in material and/or workmanship from the date of purchase and for the duration listed in the table below (“Warranty Period”).

MODEL	FULL REPAIR / RE- PLACEMENT PERIOD	PRORATED PERIOD	TOTAL WARRANTY PE- RIOD
LFP3250-LV512100			
LFP3250-LV512100SP			
LFP3250-LV480100	5 Year	10 Years	15 Years
LFP3250-LV256200			
LFP3250-LV256200SP			
LFP3250-LV128400			

**CONDITIONS**

- 1. 5 years from the date of purchase by the User (“Full Repair/Replacement Period”), Batteries are warranted against defects in material and/or workmanship and conform to POWERSYNC’s LFP-LV Product Manual, published design, mechanical, environmental, performance specifications and instructions. A Battery will not be considered defective unless it fails to retain seventy percent (70%) of the stated nominal capacity when tested in accordance with POWERSYNC’s approved testing procedures. Within the Full Repair/Replacement Period, POWERSYNC, at its discretion, will repair or replace a Battery at POWERSYNC’s expense, subject to the terms, conditions, exclusions and limitations herein.
- 2. Should a Battery fail to retain seventy percent (70%) of the stated nominal capacity after the Full Repair/Replacement Period but before 180 months from the date of purchase, (the “Prorated Period”) and tested in accordance with POWERSYNC’s approved testing procedures, POWERSYNC, at its discretion, will repair or replace

$$\text{Prorated Credit} = ((\text{Original Purchase Price}) \div (\text{Warranty Period in Months})) \times (\text{Months Used})$$
$$\text{Prorated Credit Example at 7 years, 6 Months: } (\$3,200 \div 180) \times 90 = \$1,600$$

Battery at POWERSYNC’s expense, or provide a credit towards the purchase of another POWERSYNC Battery of equal or greater capacity, for the amount received from the original purchase price of the Battery, divided by the Warranty Period (in months) and multiplied by the months used in the warranty.

- 3. Repair or replacement of the Battery under this warranty does not extend the Warranty Period.
- 4. Battery must be used, stored, charged, discharged, maintained and serviced in strict accordance with all instructions provided by POWERSYNC, including, but not limited to the POWERSYNC LFP-LV Product Manual, published design, mechanical, environmental and performance specifications.
- 5. This warranty will be void with respect to any Battery that has undergone or experienced unauthorized repair or modification or that POWERSYNC determines damage, neglect, abuse or becomes unserviceable due to fire, flood, lightning and any other act of God or is otherwise not used, maintained or serviced in conformity with the POWERSYNC LFP-LV Product Manual, published design, mechanical, environmental, performance specifications and instructions.



6. To initiate a warranty claim, within this limited warranty, contact your authorized distributor, dealer or installer in the United States and Canada. Proof of purchase will be required. If the Battery is in need of inspection, the Battery must be returned, at the User's expense, in accordance with the applicable federal and state department of transportation requirements. Receipt of the Battery does not indicate acceptance of the warranty claim.
7. WITHOUT THE INVOLVEMENT OF POWERSYNC IN SYSTEM DESIGN AND POWERSYNC'S EXPRESS WRITTEN AUTHORIZATION, BATTERIES ARE NOT INTENDED FOR USE AS A PRIMARY OR BACKUP POWER SOURCE FOR LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT, OR ANY USE WHERE PRODUCT FAILURE COULD LEAD TO INJURY TO PERSONS OR LOSS OF LIFE OR CATASTROPHIC PROPERTY DAMAGE. USE IN THIS MANNER IS AT PURCHASER'S OR END USER'S OWN RISK. TO THE EXTENT PERMITTED BY LAW, POWERSYNC DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF ANY SUCH USE. FURTHER, POWERSYNC RESERVES THE RIGHT TO REFUSE TO SERVICE ANY BATTERY USED FOR THESE PURPOSES AND DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF POWERSYNC'S REFUSAL TO SERVICE.
8. POWERSYNC SHALL NOT BE LIABLE FOR, AND USER SHALL INDEMNIFY AND SAVE POWERSYNC HARMLESS FROM, ANY CLAIMS AND LIABILITIES ARISING OUT OF THE USE, MAINTENANCE, TRANSPORTATION OR INSTALLATION OF ANY BATTERIES WARRANTED HEREUNDER. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE USER IS SOLELY RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE PRODUCTS FOR USER'S INTENDED PURPOSE AND IN USER'S SPECIFIC APPLICATION. IN NO EVENT SHALL POWERSYNC BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

## EXCLUSIONS AND LIMITATIONS

The following limitations and exclusions apply to this warranty:

- insufficient ventilation
- installation with other makes/models
- normal wear and tear
- excessive vibration
- accidents or abuse
- damage from shipping and/or transportation
- environmental exposure causing corrosion and/or discoloration
- water damage of any kind
- external Influences including but not limited to physical or electrical stress, power failure surges, inrush current, system harmonics etc.
- damage caused by other components including but not limited to inverters, chargers, charge controllers, breakers, switches, fuses, enclosures etc.
- manufacturing date codes, safety certification numbers or serial and tracking numbers are destroyed or altered