EN

INSTALLATION GUIDE

AND USER MANUAL

L3 SERIES LIMITLESS LITHIUM™

L3 HV-40kWh | L3 HV-60kWh

READ THE INSTRUCTIONS COMPLETELY BEFORE OPERATING THE EQUIPMENT

While a best effort is made to ensure all specifications and descriptions contained in this document are accurate at the time of publication, Sol-Ark reserves the right to make product modifications at any time without advance notice.

For the latest Sol-Ark product and installation documents, visit: www.sol-ark.com

For errors, omissions, or suggestions, contact support@sol-ark.com

For complete product specifications and information on relevant product listings and certifications, refer to the Product Datasheet available at www.sol-ark.com

DISCLAIMER

UNLESS SPECIFICALLY AGREED TO IN WRITING:

Sol-Ark assumes no responsibility or liability for any damages, property loss, personal injury, or any adverse consequences resulting from improper use and installation of the product or the failure to adhere to the guidelines provided in this document. Users are expressly advised to follow the instructions and guidelines outlined in the documentation accompanying the product. Sol-Ark shall not be liable for any damages or losses incurred due to deviations from recommended usage, installation, or maintenance procedures. By using the product, users acknowledge their understanding of these disclaimers and agree to use the product at their own risk. Sol-Ark reserves the right to update or modify product information, specifications, and guidelines without prior notice.

Sol-Ark retains the right to final interpretation of this document and all related materials pertaining to this product. This document is subject to modifications, updates, revisions, or termination without prior notice. For the latest product information, please visit Sol-Ark's official website. www.sol-ark.com

This manual is only for the **L3 Series Limitless Lithium™ Indoor Battery Energy Storage System**.

For support, contact:

(USA) +1 (972) 575-8875 ext. (2)

support@sol-ark.com

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IMPORTANT INSTRUCTIONS

This manual provides crucial information for the installation and operation of the L3 Series Limitless Lithium™ Battery Energy Storage System. Qualified and authorized personnel are required to conduct the installation and maintenance procedures adhering to all safety standards and system requirements outlined in this document.

This manual is applicable to countries that comply with the certification requirements. Standards and legal requirements of other countries might differ from the specifications outlined in this manual.

To secure the full product warranty, the L3 system must be registered by completing the warranty verification process and sending the information to Sol-Ark.

SYMBOLS THAT APPEAR IN THIS DOCUMENT

WARNING: This symbol indicates information that, if ignored, could cause serious injury, equipment damage, or death.

CAUTION: This symbol indicates information that, if ignored, could result in minor injury or equipment damage.

NOTE: This symbol indicates relevant information that is not related to hazardous situations.

SYMBOLS THAT APPEAR ON THE EQUIPMENT

CAUTION: Indicates risk of injury or equipment damage.

RISK OF ELECTRIC SHOCK: Indicates components that present risk of electrical shock.

DO NOT INCINERATE: Do not dispose of product by incineration.

RISK OF EXPLOSION: Physical damage, fire, or over charging may cause Li-ion batteries to ignite and/or explode.

RECYCABLE: Product is recyclable. Proper disposal is required.

REFER TO INSTRUCTIONS: User must refer to operating and installation instructions before proceeding.

cSGSus: SGS marking indicates NRTL product testing and certification for compliance with standards for North America and Canada.

DO NOT THROW AWAY: Proper disposal of inverters and/or batteries is required

NOTICES

ATTENTION: Read all instructions and cautionary markings in this document and on the equipment before installing the L3 HV. Failure to do so may result in equipment damage, electric shock, serious injury, or loss of life. Failing to follow any of these instructions may also void the warranty.

All installations must conform to the laws, regulations, codes and standards applicable in the jurisdiction of installation. Before starting an installation, consult a local building or electrical inspector for current requirements. Local codes may vary but are adopted and enforced to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.

When installed in the US electrical installations are required to follow the National Electrical Code (ANSI/NFPA 70) adopted by their local AHJ (Authority Having Jurisdiction) including any local amendments.

General

WARNING: Risk of electric shock. Risk of fire. Only qualified electrical personnel should install, troubleshoot, service, or replace the equipment.

WARNING: Risk of electric shock. Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices during installation and service. Turn off all power supplying this equipment before working on or inside equipment. Always use a properly rated voltage sensing device to confirm power is off. Replace all devices, covers, and doors before turning on power to the equipment.

WARNING: Inspect the equipment for damage before installing. Do not install the equipment if it has been damaged in any way.

WARNING: Do not insert foreign objects into any part of the equipment.

WARNING: Do not expose the equipment or any of its components to direct flame.

WARNING: Do not attempt to open, disassemble, repair, tamper with, or modify the equipment other than what is permitted in this manual. The equipment contains no user-serviceable parts. Contact the installer who installed the equipment for any repairs.

WARNING: Do not connect life-support systems, other medical equipment, or any other use where product failure could lead to injury to persons or loss of life.

CAUTION: Do not use solvents to clean the equipment or expose the equipment to flammable or harsh chemicals or vapors. Do not allow petroleum-based paints, solvents, or sprays to contact nonmetallic parts of the equipment.

CAUTION: Do not use parts or accessories other than those specified for use with the equipment.

Installation and Use

WARNING: Risk of electric shock. Risk of fire. Only use electrical system components approved for dry locations.

WARNING: Risk of electric shock. Risk of fire. Ensure that all wiring is correct and that none of the wires are pinched or damaged.

WARNING: Risk of electric shock. Risk of fire. Before making any connections verify that the DC disconnect(s) are in the off position. Double check all wiring before applying power.

WARNING: Risk of electric shock. Improper servicing of the equipment or its components may result in a risk of shock or fire. To reduce these risks, disconnect all wiring before attempting any maintenance or cleaning.

WARNING: Risk of electric shock. Always de-energize the equipment before servicing.

WARNING: Risk of electric shock. Do not use equipment in a manner not specified by the manufacturer. Doing so may cause injury or loss of life, or damage to equipment.

NOTE: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Environmental Conditions

WARNING: This equipment is intended for operation in an environment having a minimum temperature of 4°C (40°F) and a maximum temperature of 43°C (110°F).

WARNING: Install the equipment in a location that prevents damage from flooding. Ensure that no water sources are above or near the equipment, including downspouts, sprinklers, or faucets.

NOTICES: Transportation and Handling

WARNING: To protect the equipment and its components from damage when transporting, handle with care. To help prevent damage, leave all equipment in its shipping packaging until it is ready to be installed.

WARNING: Risk of physical injury or death. The battery rack is not designed for transportation with modules installed. Do not attempt to lift a fully installed rack using any lifting device.

WARNING: Risk of physical injury or death. Vehicles used to transport Lithium-ion batteries must comply with all DOT transportation regulations surrounding Class 9 hazardous freight.

WARNING: Risk of physical injury or death. Use caution when using lifting equipment to move battery modules and components.

WARNING: Risk of physical injury or death. Boxed battery modules stacks should not exceed 8 units.

WARNING: Risk of physical injury or death. Each battery module weighs 44 kg (97lbs). Use appropriate transport and lifting equipment for safe handling and transport.

WARNING: Risk of physical injury or death.

Product Recycling

Due to the considerable size, the L3 HV series battery storage system requires special handling to be recycled properly. For more information on locating recycling resources in your area, please visit our website at sol-ark.com/recycling.

Proper recycling is crucial for lithium storage batteries. It keeps hazardous waste out of landfills and allows reusable materials like lithium and other metals to be recovered and repurposed. As the owner of the system, you are responsible for ensuring proper end-of-life recycling takes place through a certified lithium battery recycling program.

You must not attempt disposal via normal waste collection or abandon the battery at a public facility. Please reference our website or call us for more details as soon as you know your energy storage system has reached its end of usable life.

Requirements for Installation Personnel

All work MUST comply with local code, regulations, and industry standards. The installation of the L3 system can only be completed by qualified persons with appropriate qualifications as determined by the local AHJ.

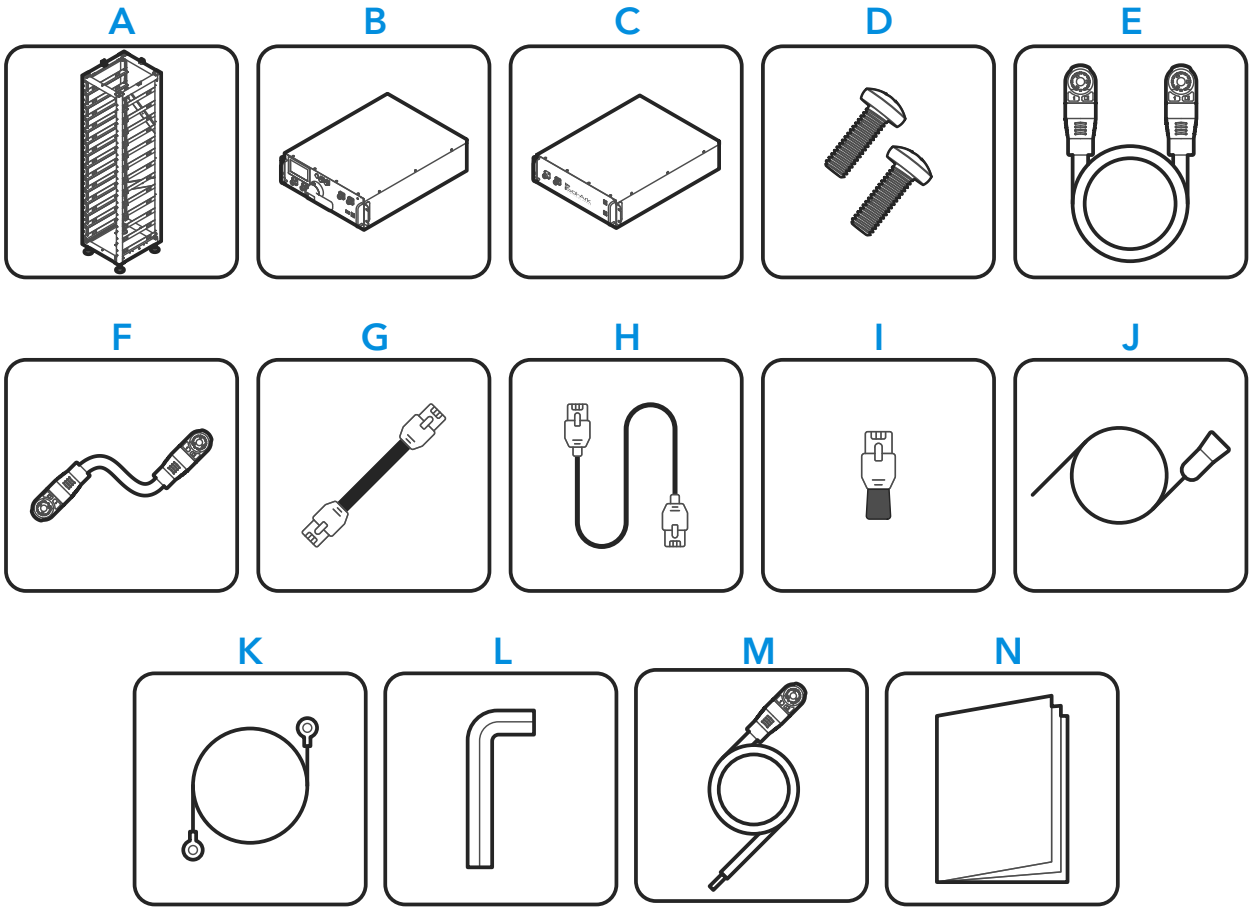
1. L3 Series: At a First Glance

INSPECT SHIPMENT

The box should include all items shown in the component guide. If there are damaged or missing parts, immediately call Sol-Ark customers support at +1 (972) 575-8875 Ext. 2.

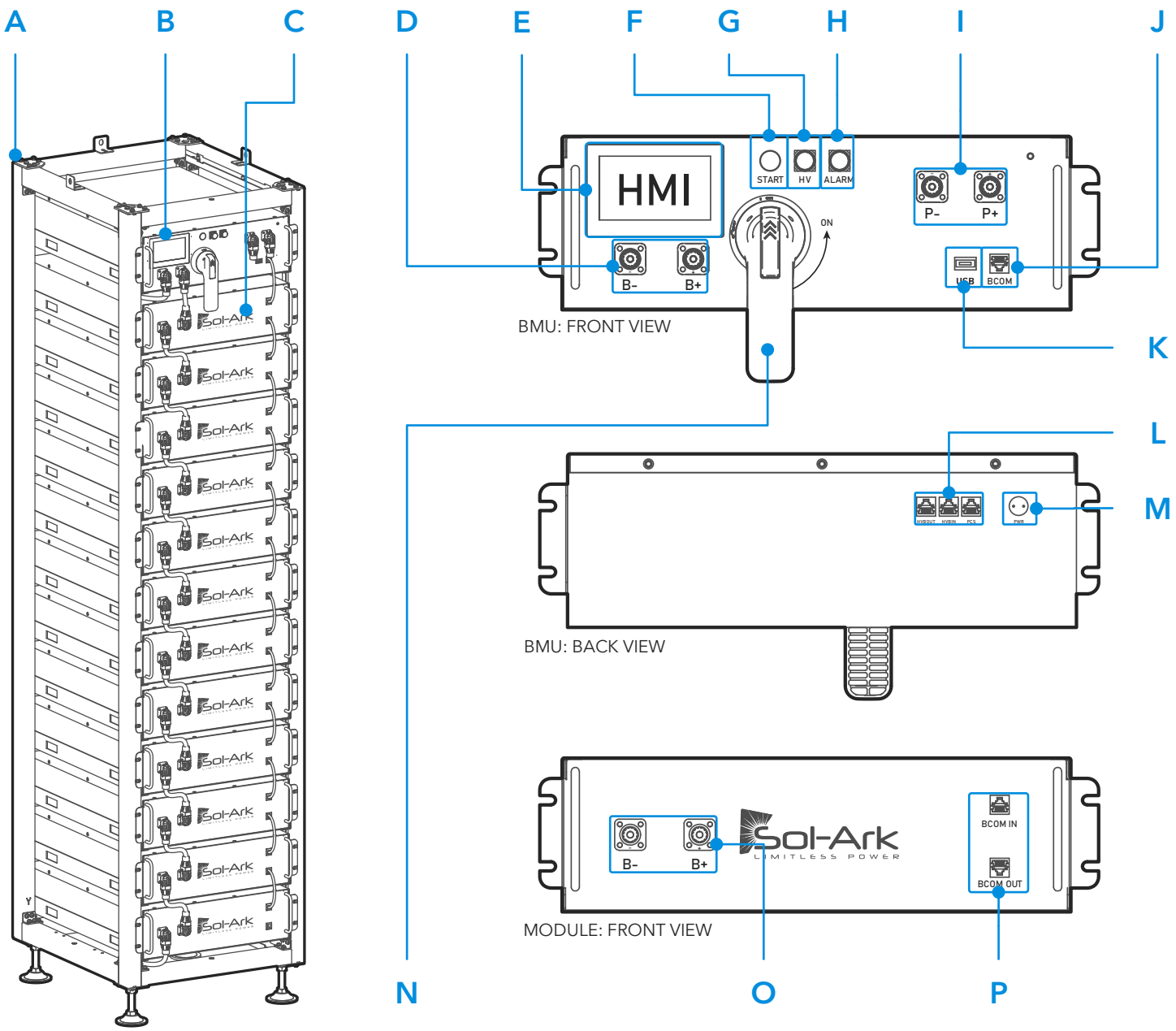
COMPONENT GUIDE

The L3 battery energy storage system includes the following components:



Component	Description	Quantity	
		L3 HV-40kWh	L3 HV-60kWh
A	Unassembled battery rack and components	See section 2.1	
B	L3 HV BMS 750V Battery Management Unit (BMU)	1	
C	L3 HV 5.1kWh Battery Module	8	12
D	Rack Mount Screws (M4x20)	90	100
E	Negative Link - Amphenol Battery Cable	1	
F	Series Link - Amphenol Battery Cable	8	12
G	Battery module communication cable	8	12
H	Inverter communication cable	1	
I	120Ω terminating resistor	1	
J	External 12V power supply cord	1	
K	Battery rack ground wire	1	
L	Hex key (4 mm)	1	
M	Amphenol PCS Cable	2	
N	Documentation Page	1	

1.1 General Description

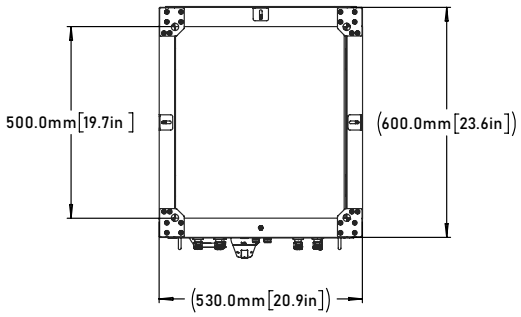


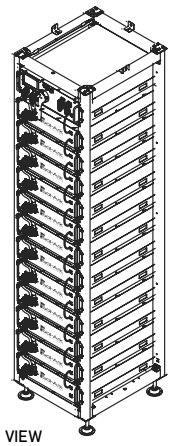
Component	Name	Component	Name
A	Battery rack	I	Inverter (+, -) connections
B	Battery management unit (BMU)	J	BMU communication port
C	Battery modules	K	BMS upgrade interface and storage expansion
D	BMU battery (+, -) connections	L	Parallel communication ports for adjacent L3 battery
E	LCD touchscreen	M	External $12V_{DC}$ power supply connection
F	BMU start button	N	BMU DC disconnect switch
G	High voltage hazard light indicator	O	Battery module (+, -) connections
H	Alarm light indicator	P	Battery module communication ports

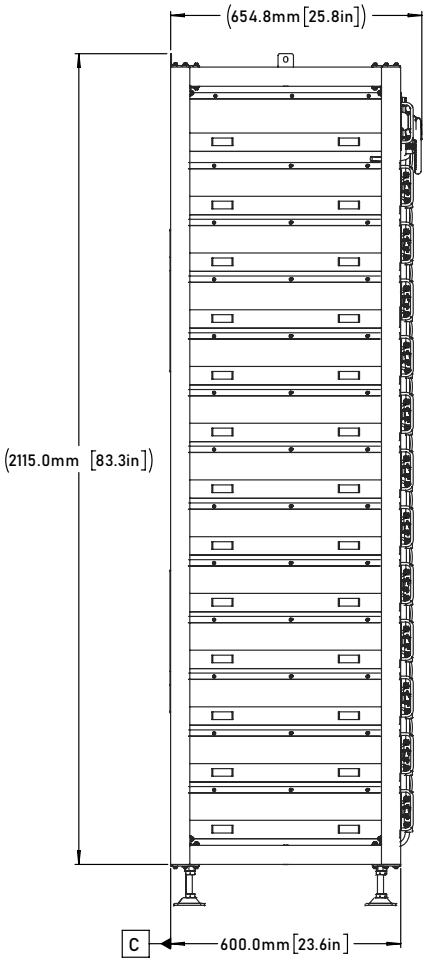
1.2 Specifications

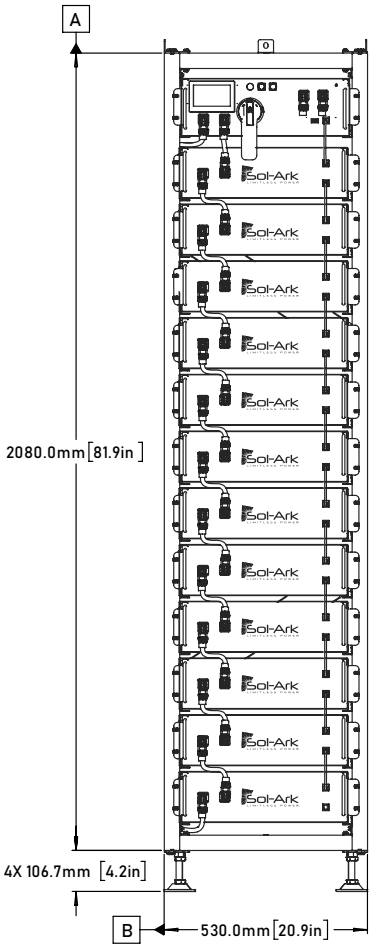
L3 HV-60kWh Dimensions

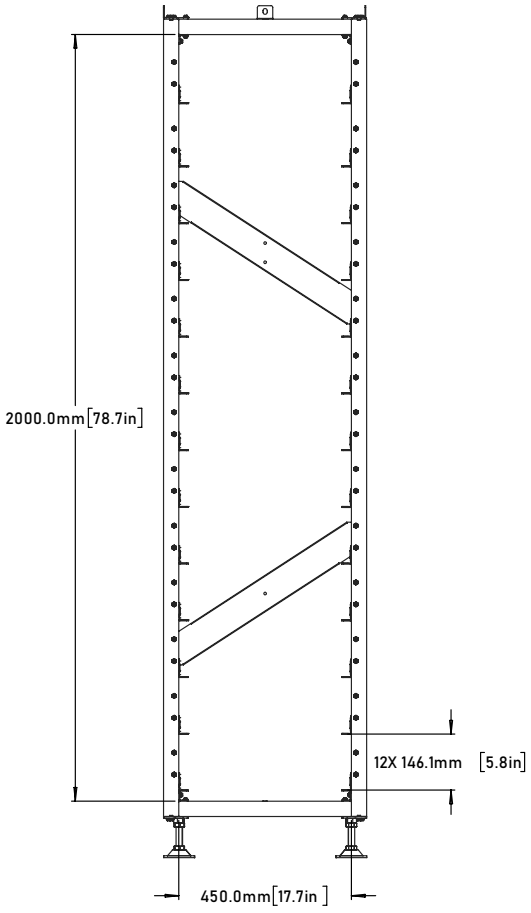
*Note that size and dimensions of the following drawing of the L3 energy storage systems corresponds to the **L3 HV-60kWh** model.*





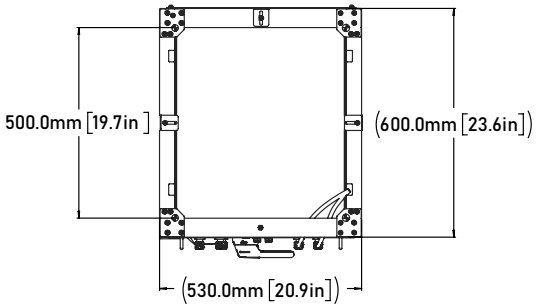


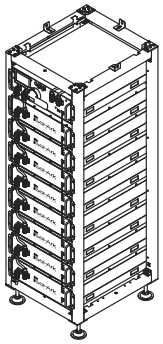




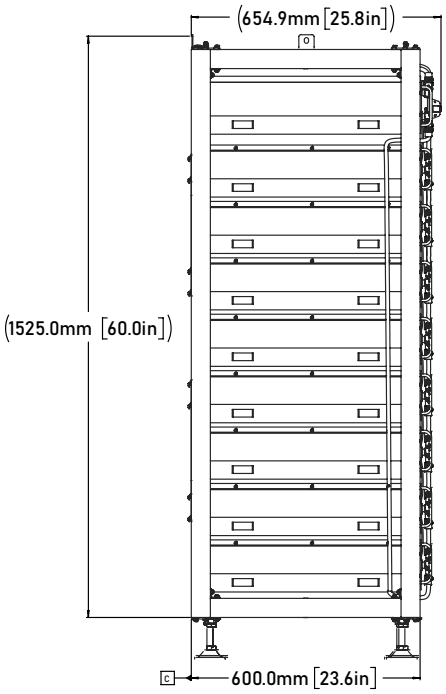
L3 HV-40kWh Dimensions

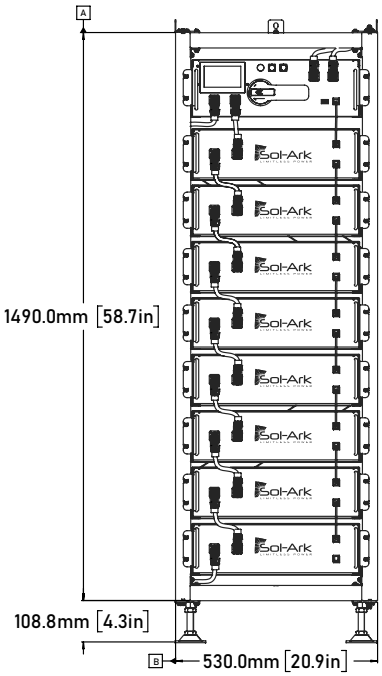
*Note that size and dimensions of the following drawing of the L3 energy storage systems corresponds to the **L3 HV-40kWh** model.*

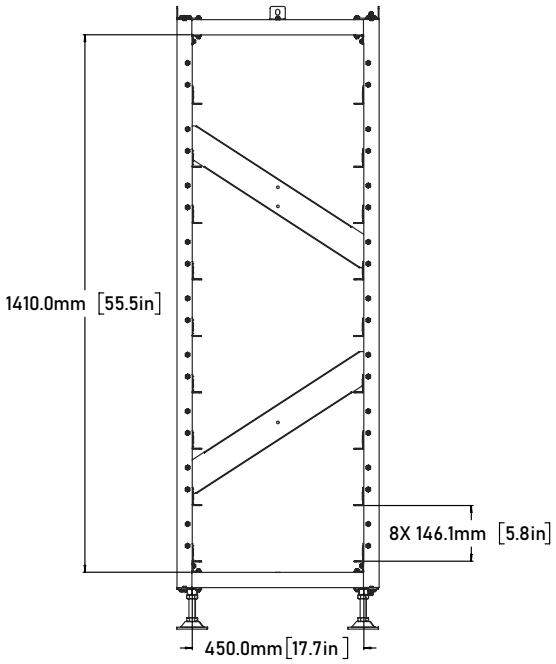




ISOMETRIC VIEW
REFERENCE ONLY







LIMITLESS LITHIUM™ L3 TORQUE APPLICATION NOTE

Do not use impact drivers to tighten any fasteners on the Sol-Ark

Connection	Torque [in-lb]	Torque [Nm]
BMU/Rack Grounding Screw	40 in-lb	4.5 Nm
BMU Mounting Screws	10.6 in-lb	1.2 Nm
Battery Module Mounting Screws	10.6 in-lb	1.2 Nm

DATASHEET

L3 SERIES LIMITLESS LITHIUM™

Battery Energy Storage System

Battery Model:	L3 HV-60	L3 HV-40
SKU:	L3-HV-60KWH	L3 HV-40KWH
System Data		
Compatible Inverter	Sol-Ark 60K-3P-480V-N	Sol-Ark 30K-3P-208V-N
Environmental Rating	Indoor	
Cell Chemistry	Lithium Iron Phosphate	
Battery Cabinet Capacity	61.44 kWh	40.96 kWh
System Usable Energy [1]	55.30 kWh	36.86 kWh
Built-In DC Disconnect Rating	200A	
Internal Fuse Rating	160A	
Real Power (backup) Per Inverter	60	30 kWac
Max DC-Coupled Solar Per Inverter	78	39 kWac
Max AC-Coupled Solar Per Inverter	125	54 kWac
Max Battery Cabinets Per Inverter	16	
Maximum Inverters Per System	12	
Recommend Depth of Discharge	90%	
System Nominal Voltage	614.4V	410V
System Operating Voltage	588V – 672V	392V – 448V
Charge/Discharge Current [2]		
• Recommend	50A	
• Nominal/Continuous	100A	
• Peak Discharge (2 min @ 25°C)	125A	
System Roundtrip Efficiency	90% (25C, 0.5C)	
Product Dimensions (WxDxH)	58x58x162 cm (23x23x64 in)	58x58x162 cm (23x23x64 in)
Net Weight	773 kg (1,705lbs)	628 kg (1,384 lbs)
Mounting Type	Freestanding Rack Mount	
Operating Temperature [3]	4°C – 43°C (40°F – 110°F)	
Humidity	5%–85% RH	
Operating Altitude [4]	3000m (9,843 ft)	
Storage Conditions [5]	-4°F – 95°F Up to 85% RH (non-condensing) State of Charge (SOC) 30%	
Ingress Rating	IP20 (NEMA 1)	
Noise Level @ 1m	< 40 dBA at 30°C (86°F)	
Seismic Zone	4	
Communication Ports	CAN2.0/RS485	
Battery Module Specifications		
Battery Module Configuration	12s1p	8s1p
Battery Module Energy	5.12kWh	
Battery Module Nominal Voltage	51.2V	
Battery Module Nominal Capacity	100Ah	
Warranty and Certification		
Performance Warranty [6]	10 years or 130MWh Throughput	
Product Warranty	10 Years	
Certifications	UL1973, UL9540*, UL9540a, UN38.3, FCC, Prop 65	

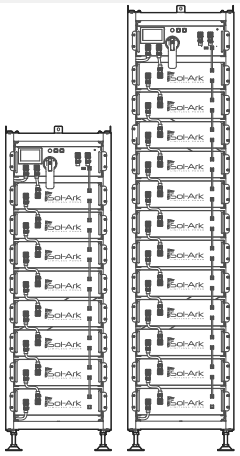
1. DC usable energy, test conditions: 90% DOD, 0.3C charge and discharge at 25°C. Usable system energy may vary due to system configuration parameters.
2. Output current is affected by battery temperature and SOC.
3. Temperature is based on the average cell temperature as measured by the BMS. Battery charging is disabled below 0°C (32°F). Derating occurs above 45°C (113°F). For HVR model, operating temperature range only applies if using included climate controls. See Sol-Ark technical sales for planning outdoor sites.
4. Battery will operate at a maximum of 1C charge/discharge up to 2000m, above 2000m maximum output is derated to 0.8C, contact Sol-Ark for details.
5. Storage temperature of the battery with no charge or discharge.
6. Operating Conditions 77°F±7°F 0.5C/0.5C, EOL (End of Life) 70% retained capacity.
7. *. Pending

2. Installation

System Description

The L3 Series Limitless Lithium™ is a high voltage lithium-ion battery designed for expandable energy storage and reliable backup power. The modular configuration of the L3 allows for expansion through the addition of battery modules, each capable of 5.12 kWh storage capacity. The capacity of the L3 system can be expanded up to 40.96kW and 61.44kWh, for the L3 HV-40kWh and L3 HV-60kWh models respectively.

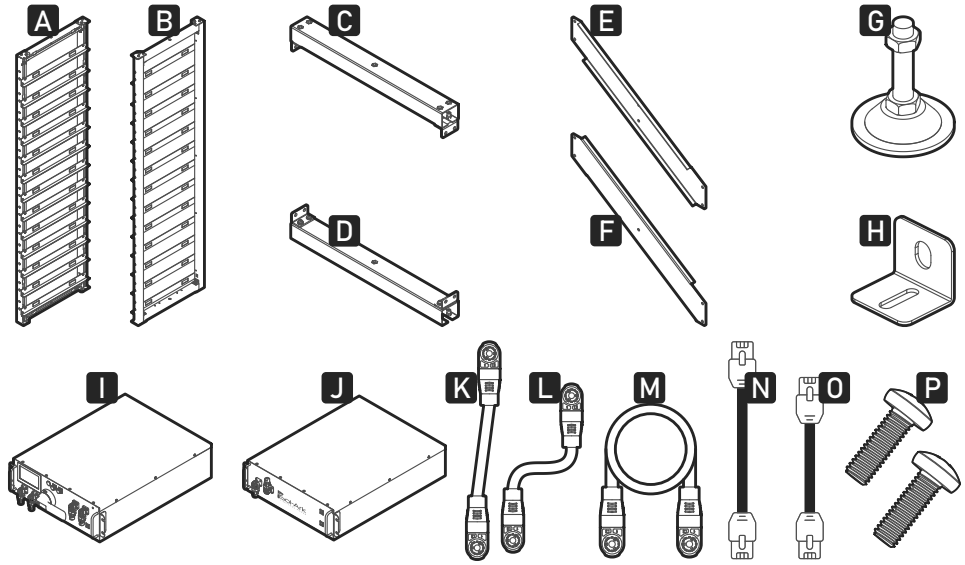
The number of battery modules and the maximum capacity of the system will vary depending on the model. The table below displays the L3 models along with their respective maximum capacities, modules, and parts:



Model	Modules	Total Energy Capacity	Parts
L3 HV-40kWh	8	40.96 kWh	8x L3 HV-5.1kWh + L3 HV BMS-750V
L3 HV-60kWh	12	61.44 kWh	12x L3 HV-5.1kWh + L3 HV BMS-750V

2.1 Part List

The list below outlines the parts and assembly steps specific to the L3 HV-60kWH model. This model is used as reference for system assembly and installation. While the quantity of parts may differ for the L3 HV-40kWH, the assembly steps remain highly comparable, if not identical.

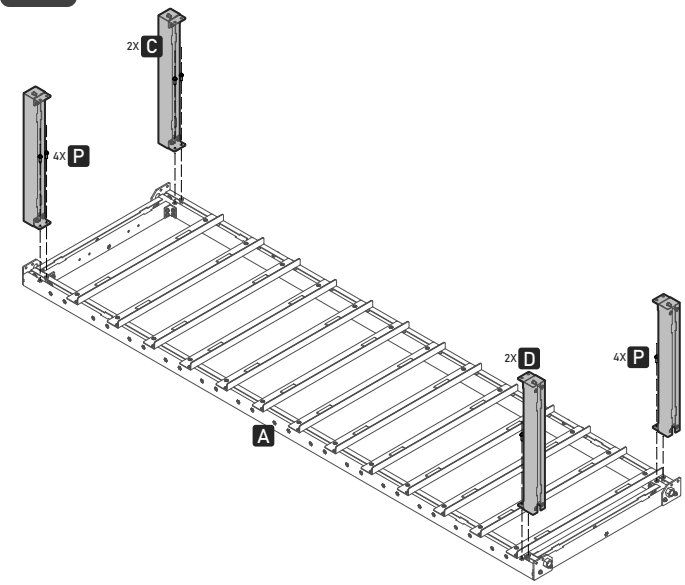


Component	Description	Quantity	
A	Pre-assembled left rack	1	
B	Pre-assembled right rack	1	
C	Top crossbeam	2	
D	Bottom crossbeam	2	
E	Left diagonal brace	1	
F	Right diagonal brace	1	
G	Mounting Feet	4	
H	Rack-to-Rack and Rack-to-Wall Angle Bracket	3	
I	Battery Management Unit (BMU)	1	
J	L3 HV Battery Module	12	
K	Positive Link - Amphenol Battery Cable	1	
L	Series Link - Amphenol Battery Cable	1	
M	Negative Link - Amphenol Battery Cable	11	
N	RJ45 Inter-battery Communication Cables (140mm)	1	
O	RJ45 BMU to Battery Communication Cable (110mm)	7	11
P	Rack Screws (M4x20)	90	100

2.2 Assembly

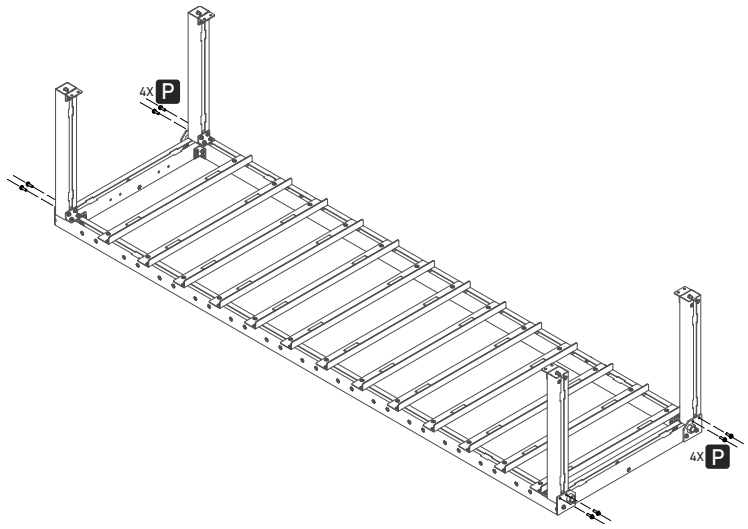
The next steps outline in detail the assembly of the battery rack, the installation of BMU, battery modules and the wiring of the L3 system. Carefully each and every step and verify proper assembly:

1



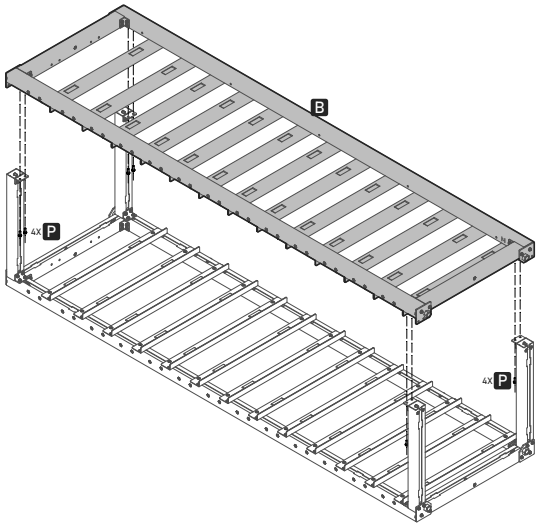
Place the left rack **(A)** on the floor to facilitate assembly. Affix the 2x top crossbeams **(C)** in position and pre-tighten using 4x screws **(P)**. Install the two 2x bottom crossbeams **(D)** and pre-tighten using 4x screws **(P)**. To easily identify the bottom of the rack, locate the 2x square base plates containing welded nuts..

2



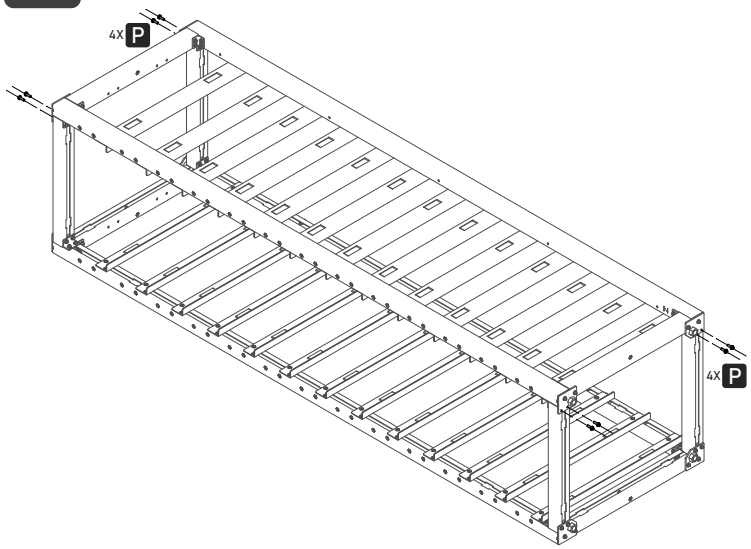
Use 8x additional screws **(P)** to fully secure the crossbeams to the top and the bottom of the rack. Pre-tighten all screws before moving to the next step.

3



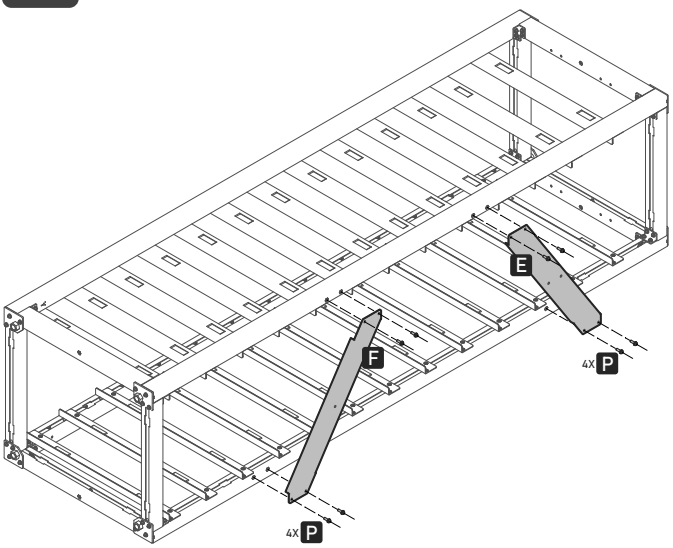
Gently lay the right rack **(B)** onto the previously assembled top and bottom crossbeams, ensuring correct orientation. Align each hole and secure in place with 8x screws **(P)**.

4



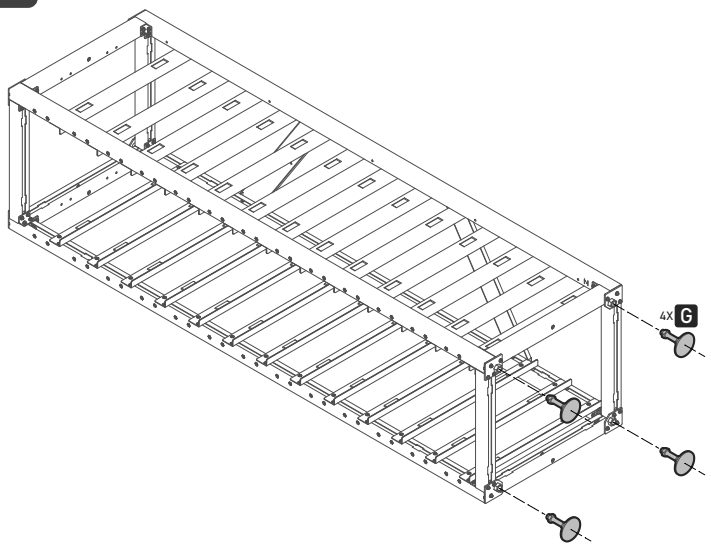
Use 8x additional screws **(P)** to fully secure the right rack to the rest of the assembly. Tighten all screws before moving to the next step

5



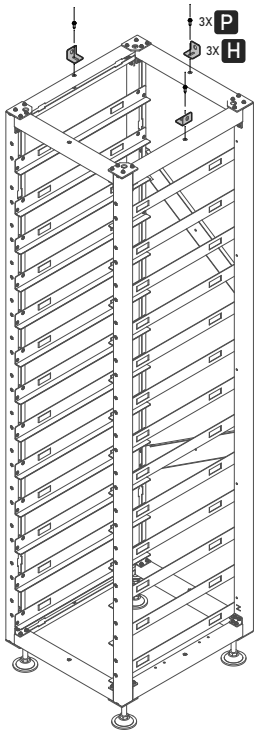
Proceed to the rear of the assembly. Install the left brace **(E)** and right brace **(F)** in their respective holes using 8x screws **(P)**. Once installed, please note that the brace flanges will point inwards, towards the rack.

6



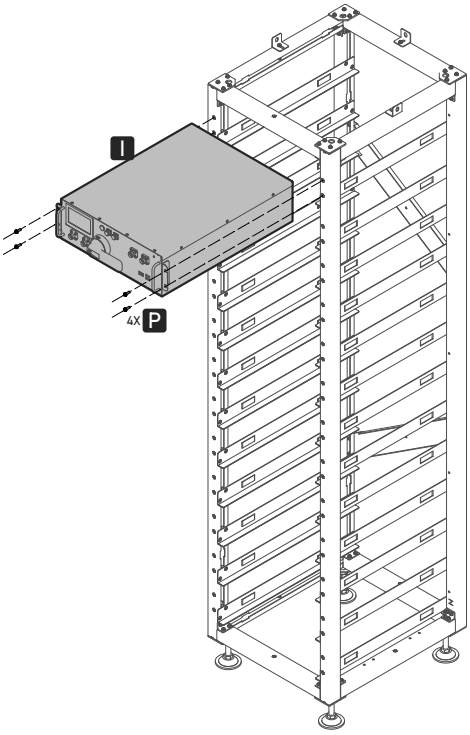
Attach the 4x mounting feet **(G)** to the underside of the rack assembly. Secure the feet by screwing them into the welded nuts of the bottom square base plates.

7



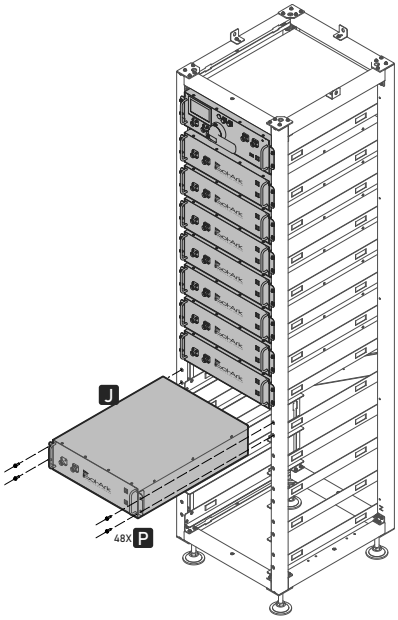
Gently raise the rack into an upright position. Fasten the 3x angle brackets **(H)** using 3x screws **(P)**.

8



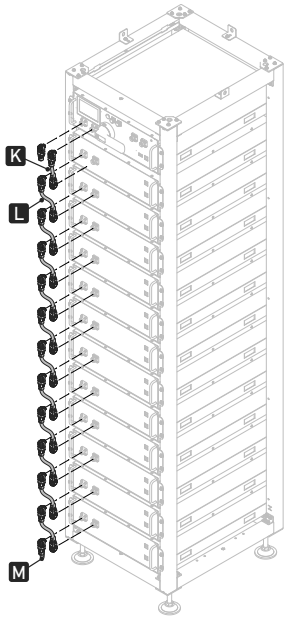
Carefully slide the BMU **(I)** into the top slot of the rack and secure in place using 4x screws **(P).**

9



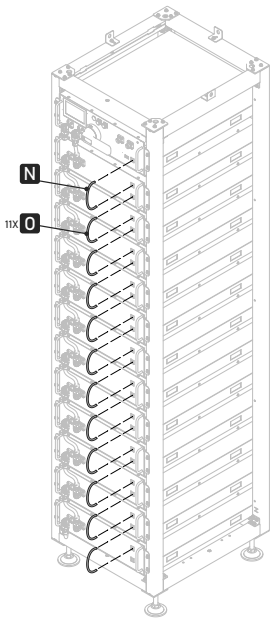
Gradually insert the battery modules **(J)** one by one into the remaining slots. Ensure proper installation by securing each module with 4x screws **(P).**

10

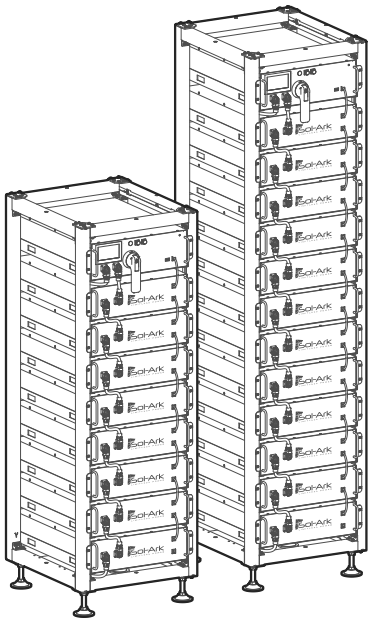


Install the battery conductors **(K)**, **(L)** and **(M)** and wire the battery modules appropriately. See section 2.5 for detailed wiring instructions.

11



Connect the battery communication cables **(M)** from module to module as described in section 2.5.



⚠ Damage can occur to the building due to static overload of the structure. Consult with a licensed professional structural engineer when installing batteries above ground level.

2.3 Equipment Clearance Guidelines

Proper clearance around the L3 system is required for safety, optimal performance, ventilation, and ease of access during maintenance. Please adhere to the following clearance guidelines when siting and installing the system:

1. Sides/Rear

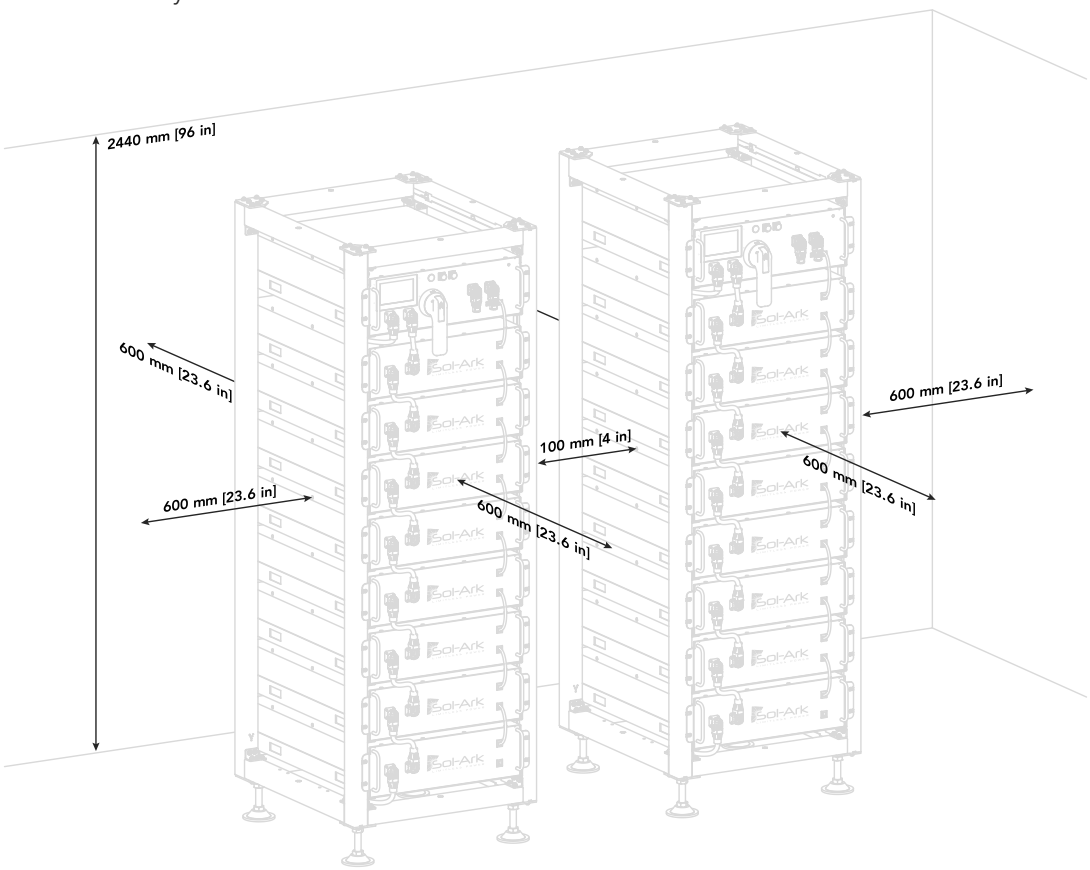
- Maintain at least **60 cm [23.6 in]** of clearance between the battery sides and any walls or other barriers.
- Maintain at least **10 cm [4 in]** of clearance between adjoining battery racks.
- The rear requires **60 cm [23.6 in]** of clearance between the battery and any walls, barriers, or another battery

2. Front

- **60 cm [23.6 in]** clearance is required in front of the battery racks to be able to open the door or install battery modules.
- Clearance may need to be increased if two batteries have their doors facing each other

3. Ceiling Height

- Install battery racks with a minimum ceiling height of **244 cm [96 in]** measured from the floor. This allows sufficient operator height.
- Ceiling access is not required for this system.



The clearance dimensions listed above are the minimum requirements. Additional clearance may be required by local fire codes or the Authority Having Jurisdiction (AHJ).

2.4 Seismic Installation Guidelines

When installing the L3 system, it is important to follow all bracing requirements to ensure structural integrity during a seismic event. Specific installation methods will depend on the requirements of your local AHJ, but the following general guidelines apply:

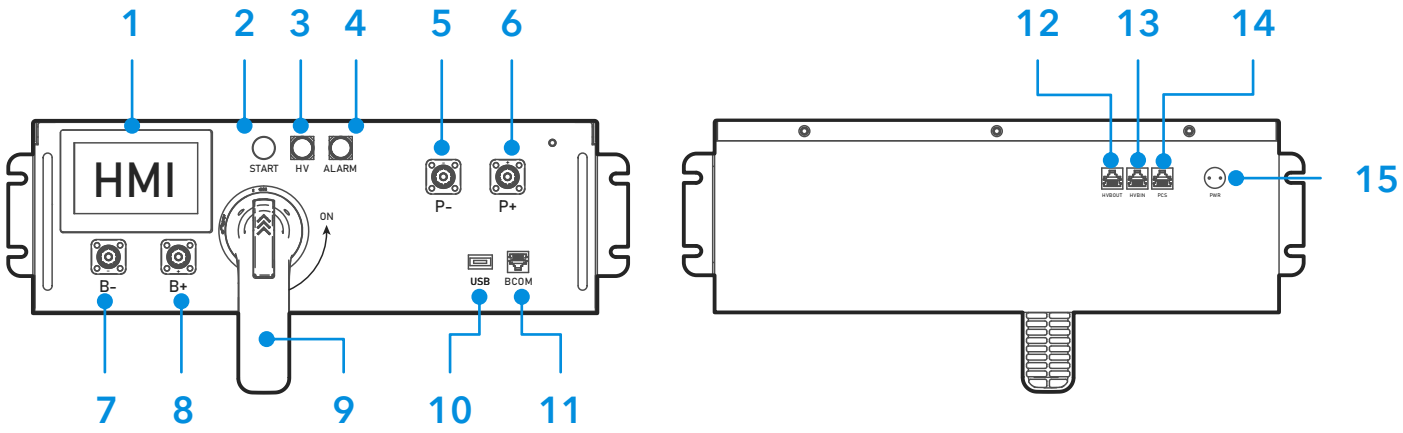
- Do not fasten the battery directly to drywall or using expanding anchors. The Sol-Ark supplied mounting brackets must be secured to wall studs or other structural building elements.
- If installing on a raised floor, consult a licensed structural engineer to ensure the raised floor is rated for the weight and forces of the battery system for your seismic zone.

After completing the L3 assembly, the total weight of the battery energy storage system is 628 kg (1,384 lb) or 773 kg (1,705 lb) for the L3 HV-40kWh and L3 HV-60kWh models respectively. Ensure that the installation site has sufficient bearing capacity to support the weight of however many batteries are installed.

For detailed information on structural mounting requirements and pre-engineered designs in seismic Zones 4 and above, please reach out to Sol-Ark at: support@sol-ark.com or +1 (972) 575-8875, Ex. 2.

2.5 Battery Overview

1. BMU



No.	Name	Description
1	HMI / LCD touchscreen	Displays battery diagnostics and local monitoring
2	START	Turns on 12V power supply to startup BMU
3	HV light indicator	High voltage hazard indicator (yellow)
4	ALRM light indicator	Battery system fault alarm indicator (red)
5	PCS-	Negative (-) Amphenol connector for inverter output conductors.
6	PCS+	Positive (+) Amphenol connector for inverter output conductors.
7	Grounding Terminal	Ground point to bond the battery rack and module case.
8	B-	Negative (-) Amphenol battery connector.
9	B+	Positive (+) Amphenol battery connector.
10	DC Disconnect	DC disconnect switch for the entire battery system.
11	USB	BMS upgrade and date logging interface.
12	BCOM	Battery communication port for the first battery module.
13	HVBOUT	Communication output port to next L3 stack BMU.
14	HVBIN	Communication input port for previous L3 stack BMU.
15	PCS	RJ45 port for battery to inverter closed-loop communication.
16	PWR	Connector for external 12V power supply. Used for over-discharge recovery.

2. Battery Module

No.	Name	Description
1	B-	Negative (-) Amphenol battery module connector.
2	B+	Positive (-) Amphenol battery module connector.
3	BCOM IN	Communication port for previous battery module
4	BCOM OUT	Communication port to next battery module

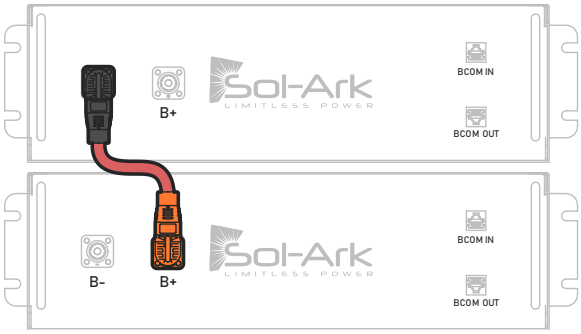
⚠ *Power Over Ethernet (POE) through BCOM IN and BCOM OUT.* ***DO NOT*** *connect PCS communications to either of these ports. Damage will occur.*

2.5 Wiring

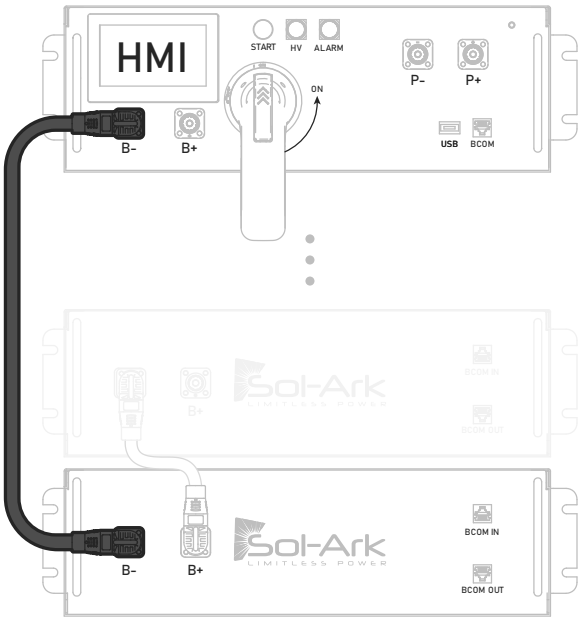
1. High-Voltage DC Wiring

> ⚠ *Before wiring the system, ensure the DC disconnect switch of the BMU is turned **OFF**.*

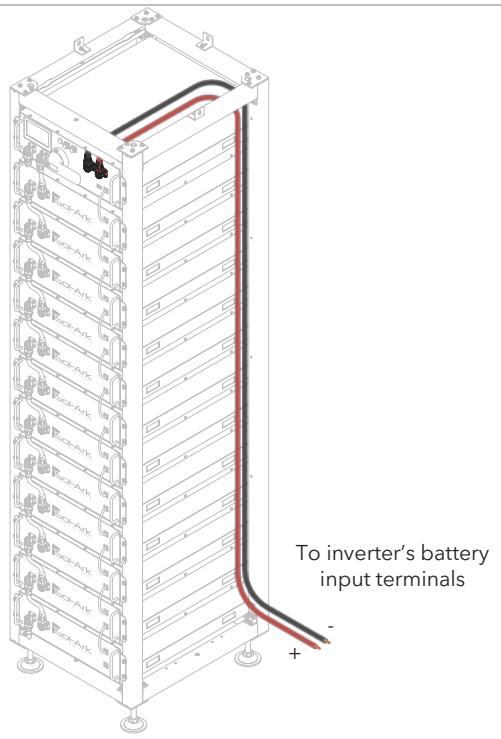
- Verify a secure installation of the BMU and battery modules onto the rack by following steps 9 and 11 of the assembly instructions. Refer to section 2.2 for more comprehensive details on how to assemble the battery rack.
- Install the 220 mm battery conductor from the positive Amphenol battery connector **(B+)** of the BMU to the positive Amphenol battery connector **(B+)** of the first battery module.
- Install the 200 mm battery conductors from module to module. Ensure connection in series from the negative Amphenol battery connector **(B-)** of the first battery module to positive Amphenol battery connector **(B+)** of the subsequent battery module.



- Connect the remaining battery conductors in the manner.
- Install a long battery conductor from the last battery module to the BMU. This is done by linking the negative Amphenol battery connector **(B-)** of the last module to the remaining unconnected negative Amphenol battery connector **(B-)** of the BMU.

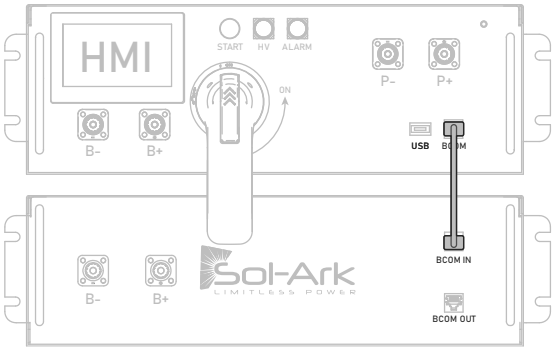


- Connect the grounding wire from the BMU to any available hole in the top crossbeam of the battery rack. Safely fasten it in position using M4 and M6 screws, respectively.
- Connect a grounding wire from any hole in the bottom crossbeam of the battery rack to the customer's common ground.
- To interconnect an inverter, create a custom length conductor using the included Amphenol connectors. Run the wires from the positive and negative Amphenol connector **(P+)** and **(P-)** to the inverter's battery input terminals.



2. Communications Wiring

- After all battery modules are installed, locate the included 140mm (5.5in) BMU communication cable. Connect one end to the **BCOM** communication port of the BMU. Subsequently, connect the other end to the **BCOM IN** communication port of the first module.



- Locate 7 pieces (or 11 pieces) of the 110mm (4.3in) inter-battery communication cables that connect the battery modules together.
- Connect one end to the **BCOM OUT** communication port of the first battery module. Connect the other end to the **BCOM IN** communication port of the subsequent battery module.
- Connect all remaining 110mm (4.3in) communication cables for the rest of the battery modules.

The BCOM OUT port of the last battery module should not be to any other battery module . Instead, this port should be sealed with the included 120Ω terminating resistor.

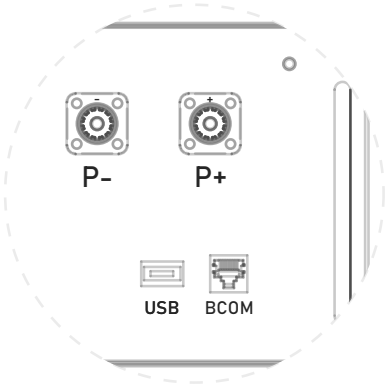
2.6 Battery Communications

The L3 Series Limitless Lithium™ energy storage system employs a CAN (Controller Area Network) communication system to communicate among battery modules and daisy-chained BMUs of paralleled L3 stacks, up to 16 units. For PCS (Power Control System) devices like Sol-Ark hybrid inverters the battery can communicate via either CAN or RS485 MODBUS.

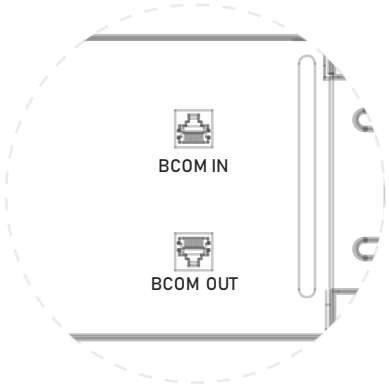
> *Currently only Sol-Ark 30K-3P-208V and 60K-3P-480V inverters are supported by the L3 Limitless Lithium™ series. In addition, only CAN based battery to inverter communication is supported at this time.*

Battery communications is essential for correct operation and optimal performance. The following figures and tables provide a detailed overview of the pin configuration of the different communication ports within the L3 system.

BMU (FRONT)



BATT MODULE (FRONT)



Pin	BMU
--	BCOM
1	BMU_CANL
2	BMU_CANH
3	DO+
4	DO-
5	GND
6	GND
7	12V
8	12V

Battery Module	
BCOM IN	BCOM OUT
BMU_CANL	BMU_CANL
BMU_CANH	BMU_CANH
DI+	DO+
DI-	DO-
GND	GND
GND	GND
12V	12V
12V	12V

BMU (BACK)

Pin	HV OUT
1	BMS_CANL
2	BMS_CANH
3	DI+
4	DI-
5	--
6	--
7	--
8	--

HV IN
BMS_CANL
BMS_CANH
DI+
DI-
--
--
--
--

PCS
485B-
485A+
--
PCANH
PCANL
--
485A+
485B-

2.7 Powering-up the Sol-Ark L3 System

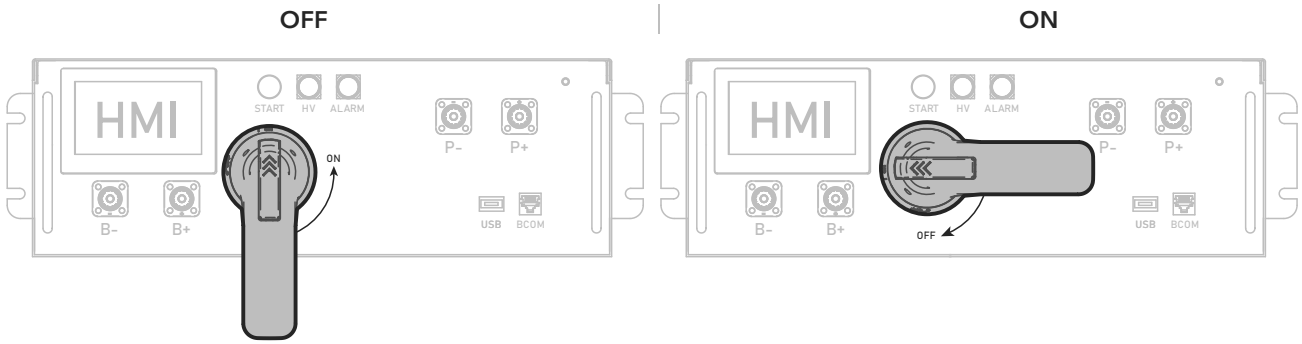
⚠ *Follow proper safety measures when powering-up and testing the system*

1. Verify voltage of battery modules

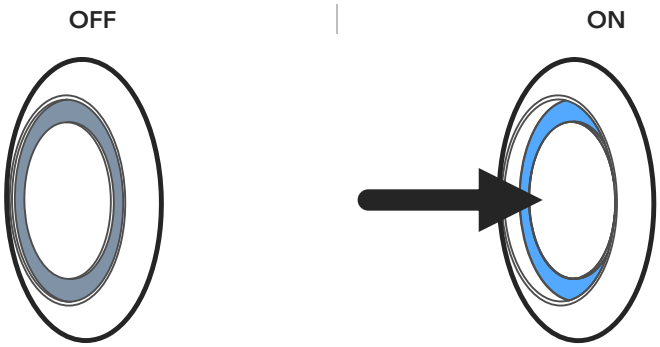
A. ℹ The nominal voltage of battery module is 51.2V.
B. Measure and verify proper DC voltage between the B+ and B- connectors of the first battery module.
C. Repeat the measurement across **ALL** battery modules to confirm consistent voltage levels.
D. ⚠ Once all battery modules have been verified, measure and verify proper **high voltage** level between the B- connector of the first battery module and B- connector of the last battery module.
E. Reattach the connectors and ensure all conductors are properly installed.

2. Power ON the L3 system

A. Twist the handle clockwise to the **ON** position, the DC disconnect switch will click and latch in place.
B. NOTE: The DC disconnect features a built-in locking tab that can be used to lock out the disconnect in the **OFF** position for service and maintenance.



C. **PRESS** the START button of the BMU to the **ON** position. The Sol-Ark boot-up screen will appear.



D. ⚠ The **high voltage "HV"** indicator will light up.
E. Wait a few seconds, then tap the screen once to access the home screen.

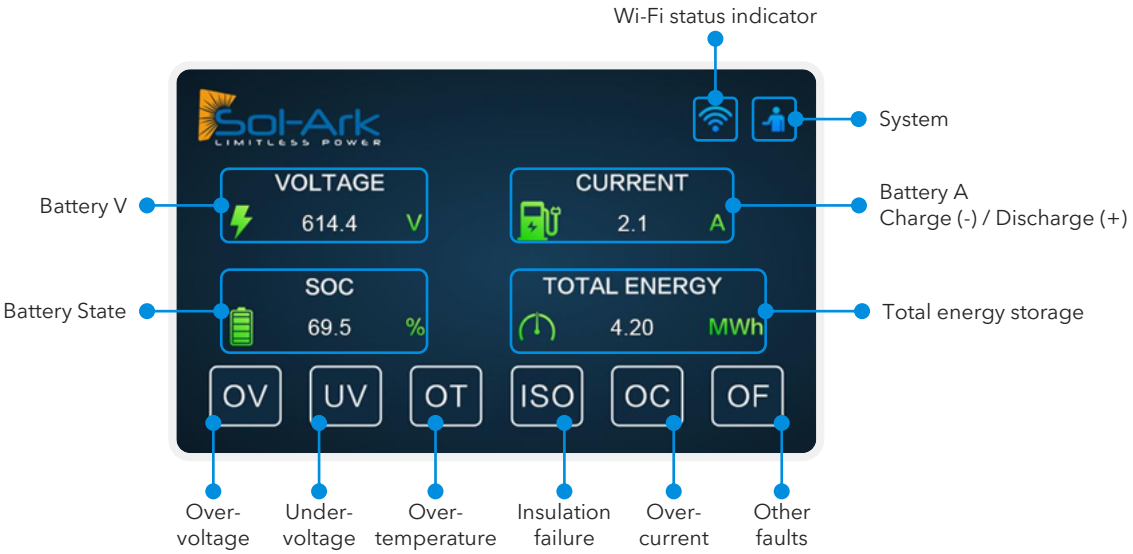
2.8 Power Cycle Sequence

1. **PRESS** the START button, making sure it is in the OFF position.
2. **TURN OFF** the DC disconnect switch. The LCD screen will turn off if not using an external 12V supply for the BMU.
3. Wait a moment (~1 min) to ensure the inverter is completely de-energized.
4. Ensure the "HV" light indicator is **OFF**.
5. Ensure proper connectivity among **ALL** battery modules, BMU, and integrated inverter within the L3 system.
6. Follow the sequence in Section 2 to turn **ON** the L3 system.

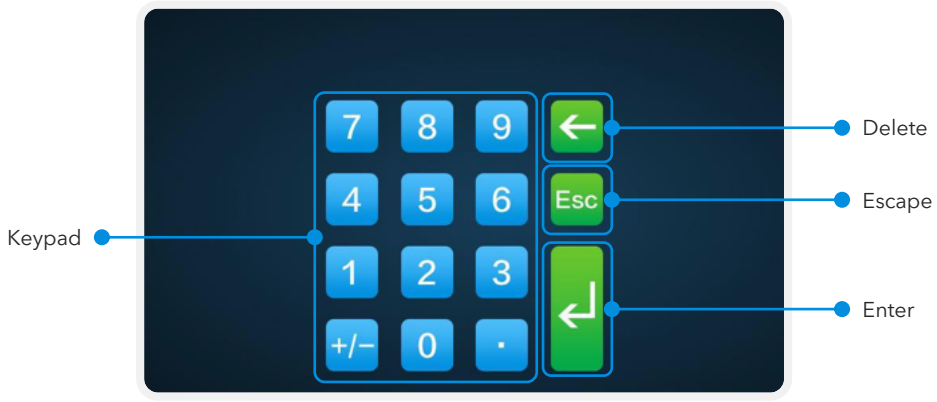
3. User Interface

3.1 GUI Screens

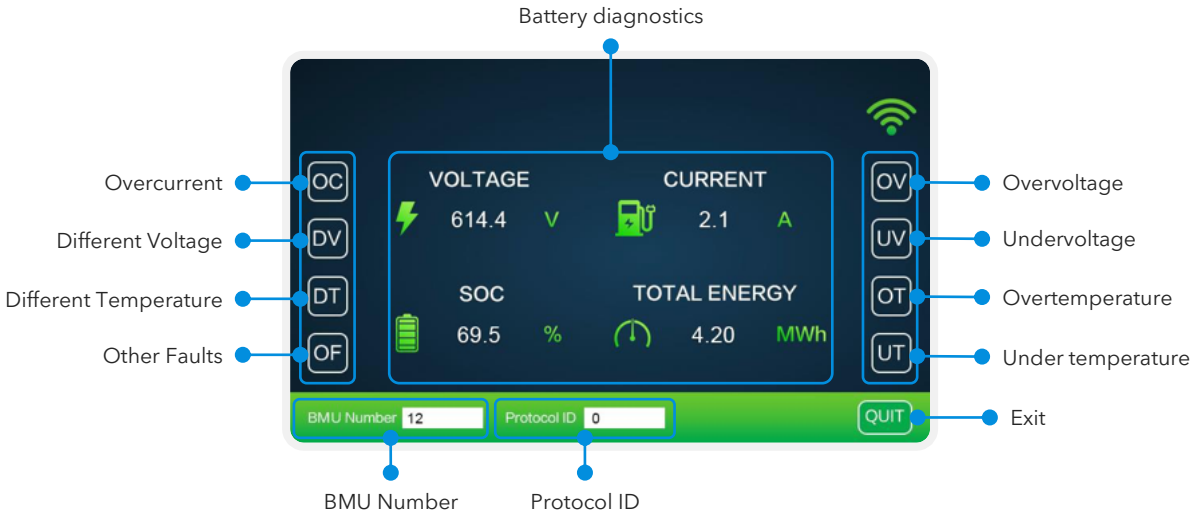
3. Home Screen



4. Login Screen



5. System Maintenance Screen

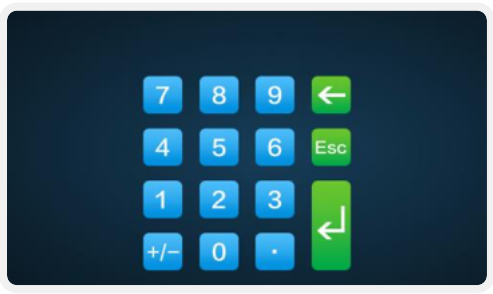


3.2 System Setup

Battery communication of the L3 Series Limitless Lithium™ system will automatically setup the system and identify the number of battery modules detected on the CAN bus. To enter the system maintenance and configuration screen to confirm these values or to access more detailed descriptions about the faults, perform the following steps.

1. Tap the center of the screen to access the home screen menu.

2. At the top-right corener of the screen, tap the icon to access the system maintenance menu. A security screen will appear and request a passcode.



3. Enter the code 1 2 3 by taping the numbers on the screen. Press the button to enter the code and proceed to the system setup menu.

4. The "BMU Number," located at the bottom-left of the screen, serves to identify the quantity of battery modules within the L3 system. This number is automatically displayed when there is proper communication between the battery modules and the BMU.
5. The "Protocol ID" defines the CANBus communication protocol utilized by the L3 system.
6. You can tap on each Fault icon positioned on the right and left sides of the screen to access additional information about faults, including detailed descriptions and common causes.

In the event of a fault, the "Alarm" indicator on the BMU will illuminate, and the corresponding fault will be highlighted in red on both the "Home Screen" and the "System Maintenance Screen". You can access the "Maintenance Screen" and tap on the respective fault for more info.

4. Operation and Maintenance

4.1 Maintenance of the L3 system

> ⚠ Before any disassembly or maintenance, ensure that L3 system is powered off and appropriate lock-out-tag-out procedures have been followed. Failure to do so could result in injury or death.

For safe operation, it is essential to thoroughly inspect all components of the L3 system, including but not limited to system conductors, connectors, wiring between modules, BMU and ground. The following annual maintenance tasks and inspections should be carried out by a qualified professional:

1. Perform a basic visual inspection of the system.
2. Verify the tightness of all electrical connections, including any torque values described in section 1.2.
3. Keep the unit clean and free of any dust and debris.

> ℹ To clean the battery rack, BMU, or modules, use a damp cloth to wipe down any surfaces, no harsh solvents or cleaning products should be used. Ensure that the battery connections remain free from any moisture.

4.2 Fire Supression System

Each L3 HV 5.1kWh battery module contains one thermally activated aerosol-based fire suppression canister designed to automatically deploy in response to high heat or fire within the module.

The suppression canisters have an estimated 10-year service life under normal conditions. However, it is important to avoid subjecting the battery module to external impacts or severe corrosive or wet environments which could damage the activation mechanism.

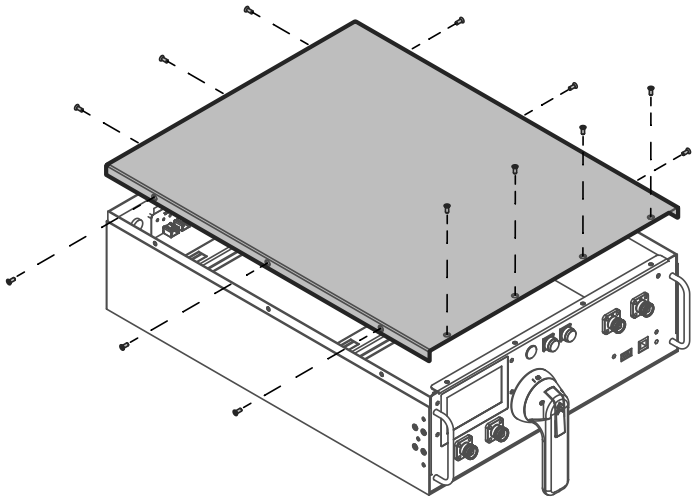
4.3 Over-Discharge Recovery

The Battery Management Unit (BMU) is designed to receive power directly from the battery stack. If the battery is left without a charging source for an extended amount of time, the BMU and other system devices standby power consumption could lead to an over-discharge of the batteries below the required input voltage for BMU operation.

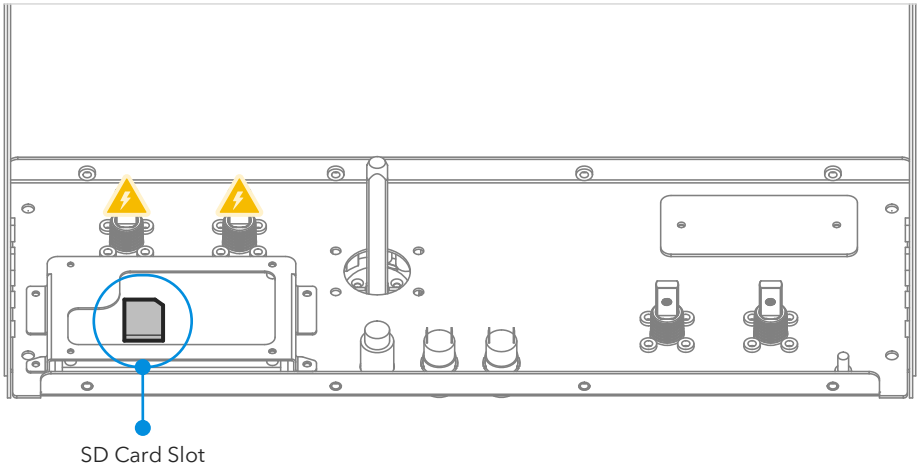
In such instances, it may become necessary to restore power to the BMU by utilizing the provided external 12V power supply cord. This process involves using the input connector located on the back of the BMU. Connecting a 12V supply to the **"PWR"** input of the BMU using the included two-wire connector. Doing so will enable the BMU to power and close the contactors, allowing the batteries to be recharged.

4.4 HMI Firmware Update Process

1. ⚠ Ensure the DC disconnect is turned **OFF** before doing any maintenance.
2. ⚠ Unplug the **ALL** four B+, B-, P+ and P- conductors from the BMU and wait at least **5 minutes** before opening unit.
3. Remove the top metal cover of the BMU by unscrewing all x13 M4 screws as shown below.

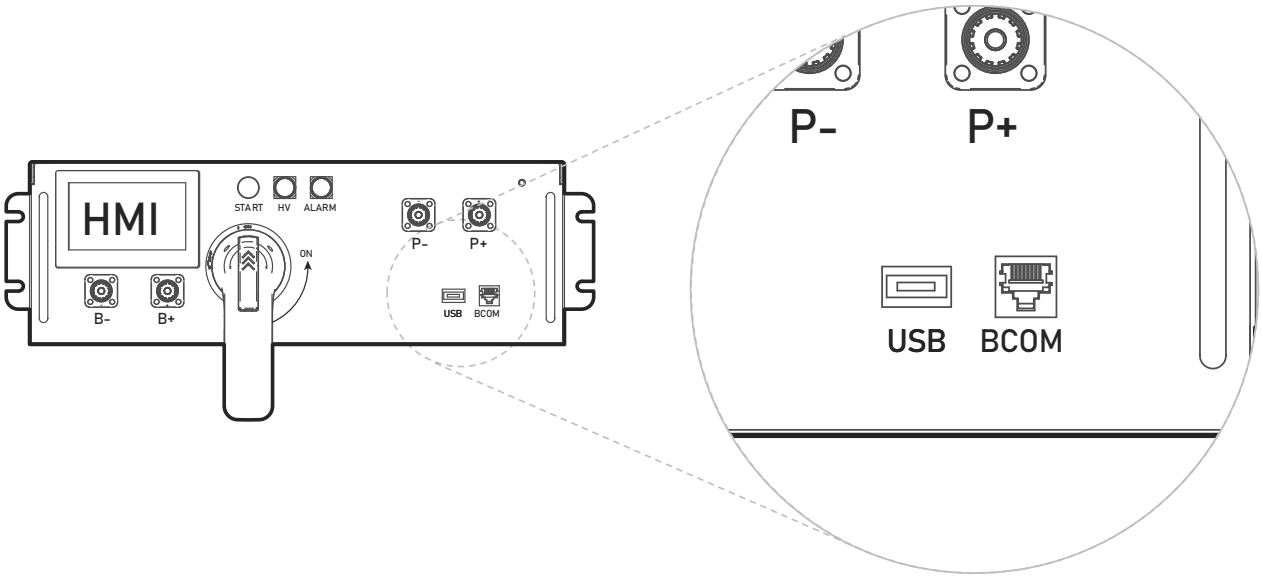


4. Locate the SD card slot.



4.5 BMS Firmware Update Process

1. The USB port of L3 system allows for the upgrading firmware and logging battery data.
2. To update the firmware first format a USB 2.0 drive as FAT32, no larger than 8GB in size.
3. Place the upgrade file provided by Sol-Ark in the root directory of the USB drive.
4. Turn on the battery and insert the USB flash disk after the blue indicator is on.
5. After the blue light indicator flashes and turns off, pull out the USB drive to complete the upgrade. Do not turn off the battery during the process.
6. After the blue light indicator of the battery lights up again, check the version number through the screen or app and verify the upgrade result.



4.5 Long Term Battery Storage

When storing the assembled battery system for periods longer than 1 week it is recommended that the following steps be performed.

- To maximize battery lifespan, maintain storage temperature between 13°C – 30°C (55°F – 86°F).
- Power on and cycle the battery at least once every 6 months to maintain the SOC within 30-50%.
- Minimize BMU self-discharge by disconnecting the negative Amphenol battery connector **(B-)** during this period. This interrupts the power supply to the BMU, preventing battery discharge.

4.7 Wiring Diagrams

The following diagrams illustrate wiring configurations for power conductors and communication cables for a Sol-Ark 30K-3P-208V hybrid inverter. Note that the wiring for battery input terminals and communication ports may vary based on the specific PCS in use.

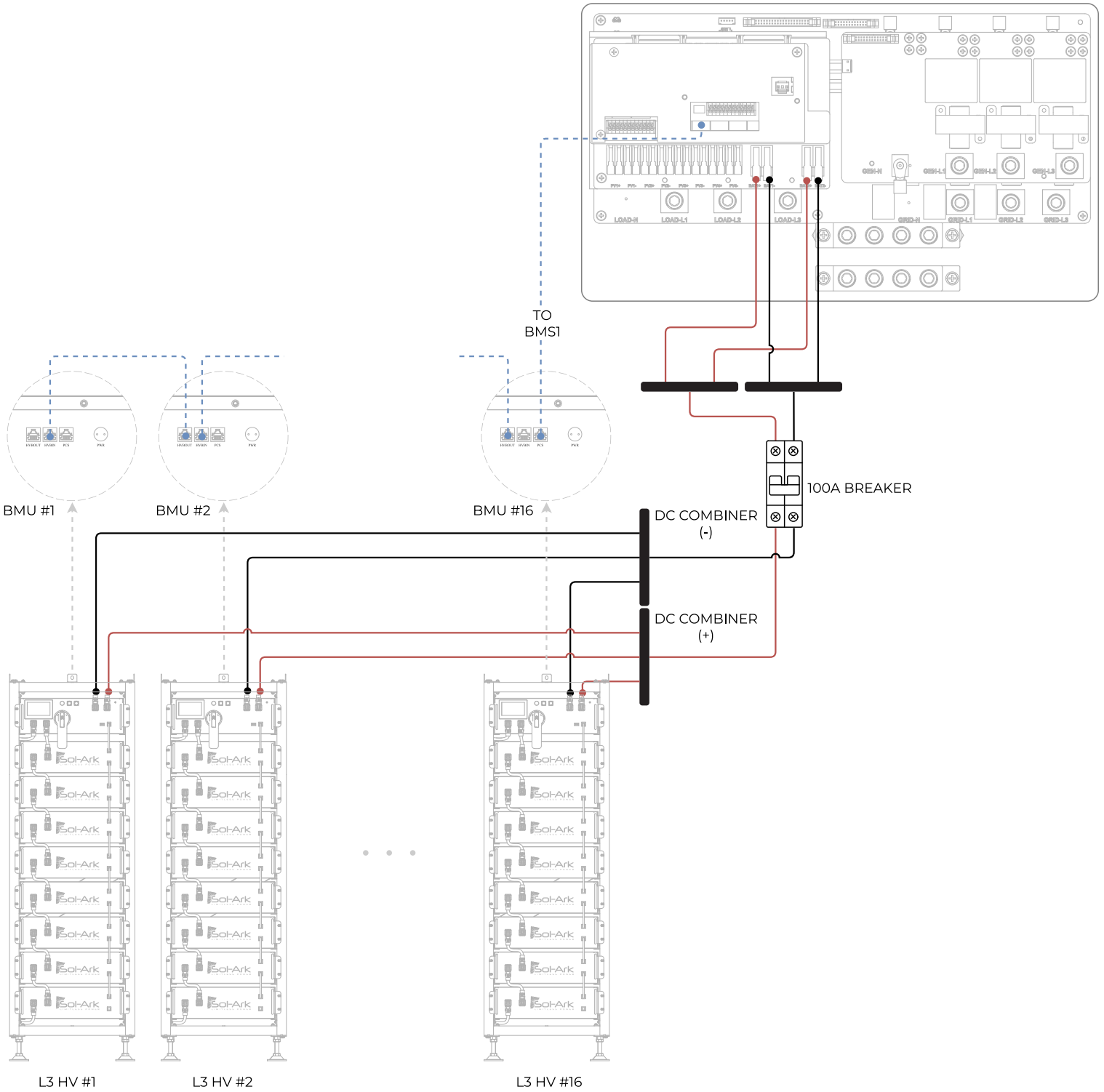


Diagram 01

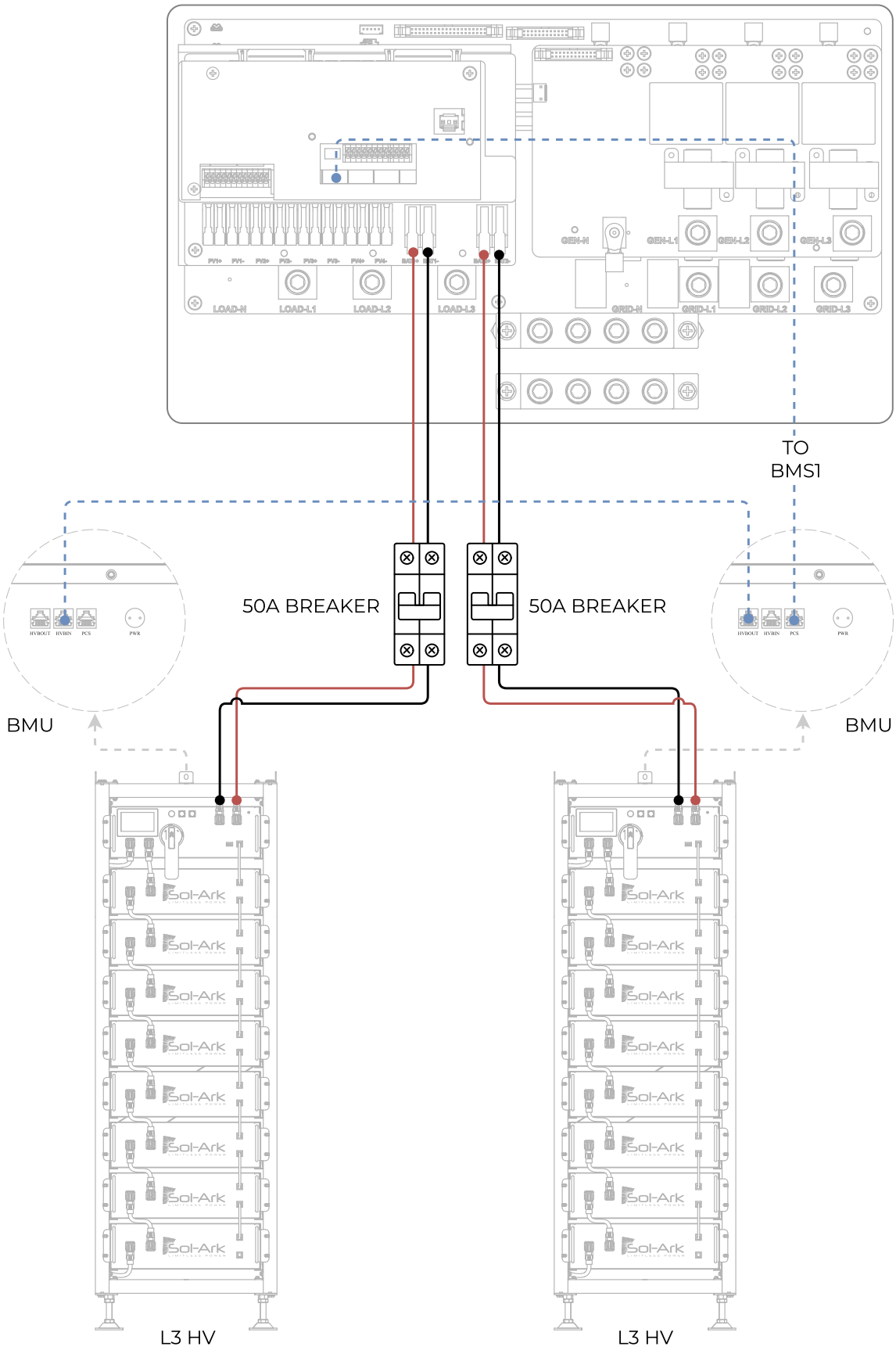


Diagram 02

5. Error Codes

5.1 Description of System Faults

FAULT	Potential Fault Cause
OT (Over Temperature)	BMS southward connector overtemperature
	BMS northward connector overtemperature
	Pre-charge resistor overtemperature level-2 alarm
	Heating film overtemperature level-2 alarm
	Charge overtemperature level-2 alarm
	Discharge overtemperature level-2 alarm
UT (Under Temperature)	Charge under temperature level-2 alarm
	Discharge under temperature level-2 alarm
OC (Over Current)	Charge overcurrent level-2 alarm
	Discharge overcurrent level-2 alarm
DV (Differential Voltage)	Excessive differential voltage level-2 alarm
DT (Differential Temperature)	Excessive differential temperature level-2 alarm
OV (Over Voltage)	Total charge voltage too high
	Cell overvoltage level 2 alarm
UV (Under Voltage)	Charge voltage too low
	Total discharge voltage too low
	Cell undervoltage level-2 alarm
OF (Other Fault)	Abnormal numbers of BMU
	BMU lost
	RTC clock fault
	Current module fault
	SCHG total voltage acquisition fault
	Abnormal RS485 communication
	RS485 communication failure
	PCS-CAN BUS communication failure
	Repeated BMS address fault
	Repeated BMU address fault
	Abnormal power supply voltage
	Heating relay adhesion
	SOC too low
	SOC too high
	Fuse Blown
	Charge Relay Welded
	Discharge Relay Welded
	Master Positive Relay Welded
	Temperature Acquisition Failure
	Cell voltage acquisition fault
	Inter battery communication failure
	Pre-charge failure
	Insulation level 2 alarm
	External total voltage acquisition fault
	Internal total voltage acquisition fault
	Current acquisition fault
	Limit protection
	EEPROM failure
ISO	Insulation level 2

5.2 Common Causes

FAULT TYPE	COMMON CAUSE
Charge over-current alarm	More than 105A for 2s; more than 125A for 5s; or more than 140A for 2s;
Charge over-current protection	If the battery is operating below 5°C (41°F) then:
Discharge over-current alarm	52.5A for 2s; more than 62.5A for 5s; or more than 70A for 2s;
Discharge over-current protection	
Charge overtemperature alarm	Exceeding the parameter set value and set time (>45°C , 2s)
Charge overtemperature protection	Exceeding the parameter set value and set time (>50°C, 2s)
Discharge overtemperature alarm	Exceeding the parameter set value and set time (>50°C , 2s)
Discharge overtemperature protection	Exceeding the parameter set value and set time (>55°C , 2s)
Charge under temperature alarm	Exceeding the parameter set value and set time (<5°C , 2s)
Charge under temperature protection	Exceeding the parameter set value and set time (<0°C , 2s)
Discharge under temperature alarm	Exceeding the parameter set value and set time (<-10°C , 2s)
Discharge under temperature protection	Exceeding the parameter set value and set time (<-20°C, 2s)
Excessive differential voltage alarm	Exceeding the parameter set value and set time (>500mv, 2s)
Excessive differential voltage protection	Exceeding the parameter set value and set time (>800mv, 2s)
Excessive differential temperature alarm	Exceeding the parameter set value and set time (>10°C, 2s)
Excessive differential temperature protection	Exceeding the parameter set value and set time (>15°C, 2s)
Cell overvoltage alarm	To maintain consistency, cut off the charging immediately when the full charge calibration rated voltage of 3.6V is reached. When the voltage drops to 3.35V, restart it with the turned-off red light indicator. All protective red light indicators are always on!
Cell overvoltage protection	
Cell undervoltage alarm	
Cell undervoltage protection	
Pre-charge resistor overtemperature alarm	Exceeding the parameter set value and set time (>55°C, 2s)
Pre-charge resistor overtemperature protection	Exceeding the parameter set value and set time (>65°C, 2s)
Insulation level 1	Exceeding the parameter set value and set time
Insulation level 2	Exceeding the parameter set value and set time
Heating film overtemperature alarm	Exceeding the parameter set value and set time (>75°C, 2s)
Heating film overtemperature protection	Exceeding the parameter set value and set time (>80°C, 2s)
BMS connector overtemperature alarm	Exceeding the parameter set value and set time
BMS connector overtemperature protection	Exceeding the parameter set value and set time
BMU connector overtemperature alarm	Exceeding the parameter set value and set time
BMU connector overtemperature protection	Exceeding the parameter set value and set time
Power loop overtemperature alarm	Exceeding the parameter set value and set time
Power loop overtemperature protection	Exceeding the parameter set value and set time
SOC too low	Exceeding the parameter set value and set time
Total voltage too high alarm	Exceeding the parameter set value and set time
Total voltage too high protection	Exceeding the parameter set value and set time
Total voltage too low alarm	Exceeding the parameter set value and set time
Total voltage too low protection	Exceeding the parameter set value and set time
Discharge relay adhesion	Relay feedback information state adhesion
Charge Relay Welded	Relay feedback information state adhesion
Heating Relay Welded	High voltage is detected after disconnecting the heating relay
Limit protection	Exceeding the parameter set value and set time
Abnormal power supply voltage	Exceeding the parameter set value and set time
Master positive Relay Welded	Relay feedback information state adhesion
Fuse Blown	No high voltage is detected after the relay is closed
Repeated BMU address fault	BMU with the same number
INTER-CAN BUS communication failure	Loss of communication between BMS
PCS-CAN BUS communication failure	The heartbeat message of the inverter has been not received for a long time
RS485 communication failure	Inverter RS485 access is not received for a long time
Abnormal RS485 communication	C
External total voltage acquisition fault	/
Internal total voltage acquisition fault	The difference between the acquired internal total voltage and the accumulated internal total voltage exceeding the set value
SCHG total voltage acquisition fault	/
Cell voltage acquisition fault	The cell voltage acquired is 0
Temperature acquisition failure	The temperature acquired is -40℃
Current acquisition fault	/
Current module fault	Abnormal Hall current/reference voltage
EEPROM storage failure	EEPROM write failure during self-test
RTC clock fault	The external RTC failed to enable the charging function
Pre-charge failure	Pre-charge timeout
Charging voltage too low	The minimum cell voltage is lower than the set value
BMU lost	BMU message not received for a long time
Abnormal number of BMU	The number of BMU addresses is different from the number of set parameters

For more information, please contact us at: support@sol-ark.com or support phone: +1 (972) 575-8875, Ex. 2

Limited Warranty

Products Subject to this Limited Warranty
L3 HV-40kWh
L3 HV-60kWh

YOU ARE URGED TO CAREFULLY READ THIS LIMITED WARRANTY. IT LIMITS THE RIGHTS AND REMEDIES YOU MAY HAVE FOR PRODUCTS PURCHASED FROM SOL-ARK AND APPLIES SOLELY AND EXCLUSIVELY TO THE BATTERY PRODUCTS REFERENCED IN THE TABLE SET FORTH BELOW AND MAY DIFFER FROM WARRANTY TERMS APPLICABLE TO OTHER PRODUCTS SOLD BY SOL-ARK.

Effective Date: January 1st, 2024

1. **Limited Warranty**. This Limited Warranty is effective for Sol-Ark Products (as defined) that are activated and operational on or after the Effective Date referred to above unless a revised or updated Limited Warranty has been posted or made available by Sol-Ark that indicates it supersedes this Limited Warranty or that it otherwise applies to your Sol-Ark Product (see www.sol-ark.com/limitedwarranty). Subject to the terms, qualifications and other limitations of this Limited Warranty, Portable Solar LLC, doing business as Sol-Ark (including any successor to Sol-Ark, "Sol-Ark") warrants to the Owner (as defined) that the Sol-Ark Product(s) specified in the Sol-Ark Product Table below (each a "Sol-Ark Product"), and installed for use at, and not removed from, the original end user location (the "Original Location"), will be free from material defects in workmanship and materials under normal application, installation, use and service conditions for the applicable Warranty Period (as defined) set forth below (each, a "Warranty Period"; the applicable Standard Warranty Period for a Sol-Ark Product may be extended by the Owner upon, and subject to, the terms of any extended warranty coverage offered by Sol-Ark, which Sol-Ark, in its sole discretion, may or may not determine to offer, and purchased by Owner, for the designated Sol-Ark Product, in which event the term "Warranty Period" shall refer to the Extended Warranty Period as reflected in the Warranty Coverage Table below). The Warranty Period starts on the date Owner purchases the Sol-Ark Product. This Limited Warranty is valid, and enforceable by the Owner against Sol-Ark, if and only if the (x) the applicable Sol-Ark Products are (i) sold to the Owner by Sol-Ark or by an authorized distributor, reseller, integrator, installer, or similar person specifically designated by Sol-Ark and (ii) registered with Sol-Ark as described below, and (y) Original Location is located within a jurisdiction set forth in the Specified Territories Warranty Coverage Table below, subject to any other limitations or exclusions that may be applicable under the laws of the Specified Territories. In connection with the foregoing limitations, Owner hereby expressly agrees and covenants not to assert against Sol-Ark any remedies, or to initiate or prosecute any action, suit or proceeding, that conflicts with or would breach or otherwise violate the limitations and conditions set forth in this Limited Warranty.

Sol-Ark Product Table to which this Limited Warranty is Applicable and Warranty Period[1]

Sol-Ark Product/Model Number/SKU	Standard Warranty Period	Extended Warranty Period (if applicable, subject to purchase by Owner as and if offered by Sol-Ark)
L3 HV-40 **L3-HV-40KWH**	10 years from date of purchase	Not Offered
L3 HV-60 **L3-HV-60KWH**	10 years from date of purchase	Not Offered

Specified System Component Coverages: For purposes of this Limited Warranty, the following specified System Components are also entitled to coverage for the applicable Warranty Period, subject to the further Operating Condition limitations and qualifications noted in the Table below:

System Component	Standard Warranty Period	Operating Conditions (operation outside of these parameters is not covered by this Limited Warranty)
Battery Management System (BMS/BMU)	10 years from date of purchase	-40˚C — 60˚C (-40˚F — 140˚F)
Fire Suppression System	10 years from date of purchase	-40˚C — 122˚C (-40˚F — 140˚F)

Specified Territories Warranty Coverage Table Based on Original Location[2]
United States and Territories, including Puerto Rico
Canada
Mexico

To ensure that Sol-Ark can properly manage and service Sol-Ark Products, this Limited Warranty will not apply, and the Owner will not receive the benefits of this Limited Warranty, unless the Owner registers the Sol-Ark Product within thirty (30) days from delivery of the Sol-Ark Product to the Owner (the "Registration") by either (1) registering on-line at www.sol-ark.com/warranty or (2)completing and returning the registration card (found at the end of this Limited Warranty) to the address set forth below ; *provided, however*, that if the Owner is a resident of any State or other jurisdiction that prohibits the return of a registration card or other form registration to obtain the benefits of any type of limited warranty, then, in any such event (and only in those States and other

[1] If your Sol-Ark Product is not identified in the Sol-Ark Product Table, it is not covered by this Limited Warranty, may not be entitled to any form of warranty from Sol-Ark or may be subject to other warranty terms set forth in a different agreement or terms of sale. Notwithstanding anything to the contrary, the Standard Warranty Period for LCD screens and fans used within Sol-Ark Products are five (5) years.
[2] If your Sol-Ark Product is not installed in one of the jurisdictions identified in the Specified Territories Warranty Coverage Table, it is not covered by this Limited Warranty.

jurisdictions), registration of the Sol-Ark Product will not be a condition to the application of, or a condition to receiving the benefits from, this Limited Warranty.

2. **Transfer of Warranty; Location Limitations**. A transferee of the Sol-Ark Product through a change in ownership of the Original Location is entitled to receive the benefits of this Limited Warranty if, and only if, (1) the Sol-Ark Product has not been removed from the Original Location, (2) the transferee notifies Sol-Ark, in writing, of the Change of Ownership, and (3) neither the original Owner nor transferee has failed to comply with any other terms and conditions of this Limited Warranty. This Limited Warranty cannot be transferred more than one time; any subsequent transferees will not be entitled to receive the benefits of this Limited Warranty.

   This Limited Warranty does not apply to, and "Sol-Ark Products" referred to herein, do not include, any third-party products, whether hardware, software or services, that may be installed, or used in connection, with any Sol-Ark Products at the Original Location. Sol-Ark is not responsible for, and this Limited Warranty does not cover, installation or configuration errors, defects (whether design or otherwise), or other components or services provided by installers or service providers.

3. **Performance Ratings.** This Limited Warranty also includes performance ratings for the Sol-Ark Products covered hereby. Subject to the limitations, exclusions and other qualifications set forth in this Limited Warranty, the Sol-Ark Products covered by this Limited Warranty are intended:

   a. under normal operating conditions when purchased, to have the rated energy capacity described in the Table set forth in this Section 3 below under the column "**Initial Energy Capacity"** (to obtain the benefits of the performance ratings set forth in this Section 3, you must conduct the "Initial Energy Capacity" testing of the applicable Sol-Product strictly in accordance with the methodologies and procedures set forth in Exhibit A hereto; if you do not conduct the testing strictly in accordance with Exhibit A, you will not be entitled to the coverage of this Section 3); *and*

   b. when installed according to information provided in the applicable Sol-Ark User Manual, data sheet, or product guidelines and operated within the **"Battery Operating Temperature"**[3] and the **Max Charge/Discharge Rate** set forth in the Table below in this Section 3, to retain not less than 70% of the Initial Energy Capacity upon the earlier of the (x) expiration of the standard Warranty Period referred to in Section 1 above or (y) date on which the "**Aggregate Energy Throughput"** [4] has first been reached.

Sol-Ark Product/Model Number/SKU	Initial Energy Capacity	Capacity Retention at End of Life (EOL)	Aggregate Energy Throughput (MWh)	Max Charge/ Discharge Rate (0.5C)
L3 HV-40 L3-HV-40KWH	40kWh	70%	130.7	50A
L3 HV-60 L3-HV-60KWH	60kWh	70%	196.2	50A

[3] "**Battery Operating Temperature"** means that the Sol-Ark Product must be operated in a range between 4˚C — 43˚C (40˚F — 110˚F).
[4] "**Aggregate Throughput"** means the total charge/discharge energy that has been processed by the battery, as recorded by the Battery Management Unit of the battery or another Sol-Ark approved external system that is able properly, and without error, to track and calculate the foregoing value.

4. **Return Material Authorization Policy**. To obtain warranty service for any Sol-Ark Product, the Owner must comply with Sol-Ark's Return Merchandise Authorization (RMA) Procedure, which is available at www.sol-ark.com/rma. Unless Sol-Ark instructs the Owner otherwise, the Owner is required to return the defective Sol-Ark Product in the original (or equivalent form) of packaging, with all corresponding hardware, parts and documentation. If a Sol-Ark Product is returned without an RMA from Sol-Ark, Sol Ark may refuse to accept delivery of the Sol-Ark Product to which the RMA relates. All returns are subject to a thirty five percent (35%) restocking fee. If a Sol-Ark Product is returned without an RMA from Sol-Ark, Sol-Ark may refuse to accept delivery of the Sol-Ark Product to which the RMA relates. By returning a Sol-Ark Product, Owner hereby acknowledges that ownership of the Sol-Ark Product is transferred to Sol-Ark upon Sol-Ark's receipt of the Sol-Ark Product. If the claim is justified based on this Limited Warranty, Sol-Ark will bear the cost of shipping the repaired or replacement Sol-Ark Product to Owner (or to the installer authorized by Owner to replace the Sol-Ark Product) at the Original Location. Any Sol-Ark Product returned to Sol-Ark that Sol-Ark determines is not covered under this Limited Warranty, or that is returned to Sol-Ark without a valid RMA, may be rejected, and returned at the Owner's cost (subject to prepayment), or kept for 30 days for pick-up by the Owner, and then disposed of in Sol-Ark's sole discretion without further liability or obligation to Owner. Once a returned Sol-Ark Product is received and inspected, Sol-Ark will notify the Owner (or the installer authorized by the Owner to replace the Sol-Ark Product) that Sol-Ark has received the returned Sol-Ark Product.

5. **Remedies**. During the applicable Warranty Period, if Sol-Ark confirms the existence of a defect that is covered by this Limited Warranty, Sol-Ark will, at Sol-Ark's option, either (1) repair or replace the Sol-Ark Product without charge, except as specified in Section 6 below to the extent applicable, or (2) refund the Owner the actual purchase price for the Sol-Ark Product less the depreciated value of the purchase price of the applicable Sol-Ark Product during the term of the Performance Warranty in a manner consistent with the calculations set forth under in Exhibit B hereto as determined by Sol-Ark. Sol-Ark will not elect to issue a refund unless (i) Sol-Ark is unable to provide a replacement and repair is not commercially practicable or cannot be timely made, and (ii) Owner is willing to accept a refund. In the event of any defect, to the extent permitted by law, the remedies referred to in this Section 5 are the Owner's sole and exclusive remedies, and Owner hereby expressly agrees and covenants not to seek or assert any other remedies, equitable or otherwise, against Sol-Ark. If Sol-Ark repairs or replaces the Sol-Ark Product pursuant to this Limited Warranty, (1) Sol-Ark will, at its option, use new or reconditioned parts or products, and (2) this Limited Warranty will continue to apply to the repaired or replacement Sol-Ark Product until the later of (x) the remainder of the original Warranty Period or (y) ninety (90) days from the date Owner receives the repaired or replacement Sol-Ark Product.

6. **Warranty Limitations and Exclusions**. This Limited Warranty does not include any costs, including for labor, related to (1) uninstalling or removing (whether temporary or otherwise) any Sol-Ark Product; (2) reinstalling a repaired or replacement Sol-Ark Product, or (3) the removal, installation, evaluation, testing, replacement or upgrade of Owner's electrical or any related or associated energy storage systems or hardware, products, components, systems, software or services not provided by Sol-Ark. This Limited Warranty does not cover, and Sol-Ark is not responsible for, delays, losses or damages, of any nature or kind, caused by any freight or common carrier. Furthermore, this Limited Warranty does not cover, and Sol-Ark is not responsible for, consumable parts, or those parts that sustain normal wear and tear in the ordinary course of use. Consumable parts include, but are not limited to, air filters, aerosol fire suppression devices, battery cables, fuses and parts of a similar nature.

   In addition to the foregoing, this Limited Warranty does not apply to, and Sol-Ark is not responsible for, any defect in or damage to any Sol-Ark Product: (1) that has been misused, neglected, tampered with, altered, or otherwise damaged, either internally or externally, by any third party, including

installers and service providers or anyone not specifically authorized by Sol-Ark, and any modifications or alterations of software provided by Sol-Ark or defects, loss or damage caused by the combination of third party software products with Sol-Ark Products without express prior authorization from Sol-Ark; (2) that has not been properly installed (for example, using wrong voltage batteries, connecting batteries improperly, damaging wires, or similar indications of improper installation, connection or implementation), operated, handled or used, including use (i) under conditions for which the Sol-Ark Product was not designed or intended, (ii) in an unsuitable environment, or (iii) in a manner inconsistent with information provided in the applicable Sol-Ark User Manual, data sheet, product guidelines or applicable laws or regulations; (3) that has been subjected to fire, water, generalized corrosion, biological infestations, acts of nature, lightning (other than Sol-Ark Products that specifically provide Electro Magnetic Pulse protection) or other operating conditions beyond the limits set forth in the applicable Sol-Ark Product User Manual, data sheet or product guidelines; (4) that has been subjected to loss or damage caused by third party hardware, products, components, systems, software or services; (5) that results from interruptions of telecommunications networks or the internet; or (6) if the original identification markings (including trademark or serial number) of the Sol-Ark Product has been defaced, altered or removed (other than through normal wear and tear). This Limited Warranty does not cover cosmetic, technical or other defects that do not materially affect form, fit or function or any defects or parts requiring replacement as a result of ordinary wear and tear, corrosion, rust, scratches, dents or similar matters related to the look of any Sol-Ark Product. The recovery of software programs installed in any Sol-Ark Product is not covered under this Limited Warranty, nor is the loss or corruption of data transmitted through any application made available by Sol-Ark. No representation is made, or warranty provided, that the operation of any Sol-Ark Product will be uninterrupted or error-free. No Sol-Ark employee, contractor, distributor, reseller or other person is authorized to make any modification, amendment, supplement, extension or additions to this Limited Warranty. If any term of this Limited Warranty is held to be illegal or unenforceable, the legality or enforceability of the remaining terms shall not be affected or impaired.

THE SOL-ARK PRODUCTS SUBJECT TO THIS LIMITED WARRANTY ARE NOT INTENDED FOR USE AS A PRIMARY OR BACKUP POWER SOURCE FOR LIFE-SUPPORT SYSTEMS, MEDICAL EQUIPMENT, OR ANY OTHER USE WHERE PRODUCT FAILURE COULD LEAD TO INJURY TO PERSONS OR LOSS OF LIFE OR CATASTROPHIC PROPERTY OR ENVIRONMENTAL DAMAGE (THE FOREGOING BEING REFERRED TO AS “CRITICAL APPLICATIONS”). OWNER MAKES FINAL DESIGN AND USE DECISIONS AND IS SOLELY RESPONSIBLE FOR COMPLIANCE WITH ALL LEGAL, REGULATORY, SAFETY, AND SECURITY RELATED REQUIREMENTS RELATED TO CRTICAL APPLICATIONS, REGARDLESS OF ANY INFORMATION OR SUPPORT THAT MAY BE PROVIDED BY SOL-ARK OR ITS AFFILIATES. OWNER ASSUMES ALL RISK RELATED TO THE USE OF PRODUCTS, INCLUDING SOFTWARE, FOR CRITICAL APPLICATIONS AND SOL-ARK AND ITS AFFILIATES SHALL NOT BE LIABLE FOR ANY USE OF SOL-ARK PRODUCTS IN CRITICAL APPLICATIONS BY OWNER. SOL-ARK EXPRESSLY DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF THE USE OF SOL-ARK PRODUCTS, INCLUDING SOFTWARE, IN CRITICAL APPLICATIONS. FURTHER, SOL-ARK RESERVES THE RIGHT TO REFUSE TO SERVICE SOL-ARK PROUDCTS USED FOR ANY CRITICAL APPLICATIONS AND EXPRESSLY DISCLAIMS ANY AND ALL LIABILITY ARISING FROM ANY REFUSAL TO SERVICE ANY SOL-ARK PRODUCTS USED IN CRITICAL APPLICATIONS.

7. **Out-of-Warranty Support.** In the event of the failure of a Sol-Ark Product subject to this Limited Warranty after the expiration of the applicable Warranty Period, Sol-Ark may, in its sole discretion, determine to offer, or not offer, after-sales service to Owner on terms and conditions determined solely by Sol-Ark. Those terms and conditions may include, among other limitations, qualifications, terms or conditions established by Sol-Ark, requirements that the Owner pay for parts as selected by Sol-Ark, pay for labor, and pay for travel and lodging costs related to servicing. To request after-sales

service, Owner must provide any and all information requested or necessary to enable Sol-Ark, or its authorized representatives, to evaluate alleged defects or performance issues.

8. **Assignment**. Sol-Ark expressly reserves the right to assign any or all of its rights and obligations under this Limited Warranty to any affiliate or third party without the consent of Owner.

9. **DISCLAIMER OF WARRANTIES.**THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY GIVEN BY SOL-ARK AND, EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, ALL OTHER WARRANTIES AND CONDITIONS, WHETHER EXPRESS OR IMPLIED, STATUTORY, OR OTHERWISE, ARISING BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE USAGE OF TRADE, OR OTHERWISE (INCLUDING WARRANTIES AND CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, OR WARRANTIES AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN MANUALS OR OTHER DOCUMENTATION) SHALL BE LIMITED IN SCOPE AND DURATION TO THE SCOPE AND DURATION SET FORTH IN THIS LIMITED WARRANTY. THE BENEFITS OF THIS LIMITED WARRANTY ARE FULLY CONDITIONED UPON, AND SUBJECT TO, THE TERMS AND CONDITIONS SET FORTH HEREIN. IF THE LAWS OF A JURISDICTION DO NOT PERMIT EXCLUSIONS ON THE DURATION OF A WARRANTY OR FOR EXCLUSIONS OR LIMITATIONS ON LEGAL WARRANTIES OF THE NATURE AND TYPE SET FORTH HERERIN, THEN, AND ONLY THEN, CERTAIN EXCLUSIONS OR LIMITATIONS MAY NOT APPLY TO THE OWNER IF, AND ONLY IF, THE LAWS OF THE SPECIFIC JURISDICTION EXPRESSLY AND UNCONDITIONALLY CONFLICT WITH THIS LIMITED WARRANTY AND REQUIRE THE EXCLUSION OR MODIFICATION OF SPECIFIED TERMS OR CONDITIONS OF THIS LIMITED WARRANTY, AND, IN THOSE CASES, THE OWNER MAY HAVE ADDITIONAL RIGHTS UNDER APPLICABLE LAW.

10. **LIMITATION OF LIABILITY.** EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, IN NO EVENT WILL SOL-ARK BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, LOSSES, COSTS OR EXPENSES HOWEVER ARISING, WHETHER IN CONTRACT OR TORT, INCLUDING WITHOUT LIMITATION ANY ECONOMIC LOSSES OF ANY KIND, ANY LOSS OR DAMAGE TO PROPERTY, OR ANY PERSONAL INJURY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF SPECIAL, INDIRECT, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO THE OWNER AND THE OWNER MAY HAVE ADDITIONAL RIGHTS UNDER APPLICABLE LAWS.

11. **Governing Law**. This Limited Warranty shall be governed by the laws of the State of Texas, USA, without giving effect to any conflict of laws principles that may require the application of the law of another jurisdiction. If, in any event or in any circumstance, the arbitration provisions set forth in Section 12 do not apply, are not enforceable or are otherwise unavailable with respect to any specific matter, then, in such event or circumstance, and only in such event or circumstance, (a) each of Owner and Sol-Ark agree that any litigation, action or proceeding related the foregoing specific matter (and only such matter) shall be commenced exclusively in, and subject to the exclusive jurisdiction of, a state court sitting in the city of Dallas, Texas (or, if appropriate, a federal court located within the city of Dallas in the Northern District of Texas), and each party, in any such event or circumstance, hereby consents to the personal jurisdiction of those courts and (b) EACH PARTY HEREBY IRREVOCABLY WAIVES ALL RIGHT TO TRIAL BY JURY (WHETHER BASED ON CONTRACT, TORT OR OTHERWISE) IN CONNECTION WITH ANY MATTERS REFERRED TO IN CLAUSE 11(A), INCLUDING ANY COUNTERCLAIMS RELATED THERETO.

12. **Arbitration**. PLEASE READ THIS SECTION 12 CAREFULLY BECAUSE IT AFFECTS THE RIGHTS OF ANY OWNER. BY AGREEING TO BINDING ARBITRATION, OWNER WAIVES THE RIGHT TO LITIGATE DISPUTES THROUGH A COURT AND TO HAVE A JUDGE OR JURY DECIDE A CASE. THE LAWS OF SOME JURISDICTIONS DO NOT ALLOW MANDATORY ARBITRATION PROVISIONS OR CLASS ACTION WAIVERS, SO SOME OR ALL OF THIS SECTION 10 MAY NOT APPLY, IN WHICH EVENT PROVISIONS OF SECTION 11 ABOVE WILL CONTROL AND APPLY.

    a. *Disputes*. In order to expedite and control the cost of disputes, Sol-Ark and Owner agree that any legal or equitable claim, dispute, action, or proceeding arising from or related to the access or use of Sol-Ark Products, or to any aspect of Owner's relationship with Sol-Ark, will be resolved by binding arbitration, rather than in court (the "Dispute"). This applies to all Disputes, whether based in contract, tort, statute, fraud, misrepresentation, or any other legal theory, even if the Dispute arises after the expiration of this Limited Warranty. OWNER UNDERSTANDS AND AGREES THAT OWNER AND SOL-ARK ARE EACH HEREBY WAIVING THE RIGHT TO A TRIAL BY JURY AND THE RIGHT TO JOIN AND PARTICIPATE IN A CLASS ACTION, TO THE FULLEST EXTENT PERMITTED UNDER THE LAW.
    b. *Opt-Out of Arbitration Agreement*. If Owner is an individual consumer, Owner can opt out of arbitration within 30 days of the date on which Owner first becomes subject to this Limited Warranty. If Owner is an individual consumer and has previously agreed to arbitration, then Owner may opt out of any future revisions to the arbitration provision within 30 days of receiving notice of the updated arbitration provision, in which case the prior version of the arbitration provision will apply. To opt out of arbitration (or revisions to this arbitration provision), Owner must send Owner's name, residence address, username, email or phone number Owner has used to purchase Sol-Ark Products or uses to obtain Sol-Ark services related to the applicable Sol-Ark Products, and a clear, unambiguous statement that Owner has affirmatively determined to opt out of this arbitration agreement (or of the revisions to it), and Owner must the written notice to this email address: support@sol-ark.com.
    c. *Notice of Dispute*. In the event of a Dispute, Owner or Sol-Ark must give the other a written statement that sets forth the name, address, and contact information of the party giving it, the facts giving rise to the Dispute, and a proposed solution (a "Notice of Dispute"). Owner must send any Notice of Dispute by first class U.S. Mail to Sol-Ark at 805 Central Expressway South Allen, Texas 75013, attn: Warranty Claims, and also via email to support@sol-ark.com. Sol-Ark will send any Notice of Dispute to Owner by first class U.S. Mail to Owner's address if Sol-Ark has it, or otherwise to Owner's email address. Owner and Sol-Ark will attempt to resolve any Dispute through informal negotiation within 45 days from the date the Notice of Dispute is sent. After 45 days, Owner or Sol-Ark may commence arbitration. An arbitrator will decide any disputes over whether this subsection has been violated, and has the power to enjoin the filing or prosecution of arbitrations. Unless prohibited by applicable law, the arbitrator will not administer any arbitration unless the requirements of this subsection have been met.
    d. *Mediation and Binding Arbitration*. Owner and Sol-Ark will endeavor to settle any Dispute by mediation under the Mediation Rules of Judicial Arbitration and Mediation Services, Inc. ("JAMS"). The place of mediation will be Dallas, Texas. Any Dispute which has not been resolved by mediation as provided herein within 30 days after appointment of a mediator or such time period as Owner or Sol-Ark may otherwise agree, will be finally resolved by binding arbitration as described in this Section 12. Owner is giving up the right to litigate (or participate in as a party or class member) all Disputes in court before a judge or jury. Instead, all Disputes will be resolved before a neutral arbitrator, whose decision will be final except for a limited right of appeal under the Federal Arbitration Act. The arbitrator will decide all issues pertaining to arbitrability, including his or her own jurisdictional validity and enforceability of the Agreement (e.g., unconscionability). For the avoidance of doubt, this is not meant to reduce any powers granted to the arbitrator under the applicable JAMS rules. The place of arbitration will be Dallas, Texas. Any court with jurisdiction over the parties may enforce the arbitrator's award.

e. *Class Action Waiver*. TO THE FULLEST EXTENT PERMISSIBLE UNDER APPLICABLE LAW, OWNER AND SOL-ARK EACH AGREE THAT ANY PROCEEDINGS TO RESOLVE OR LITIGATE ANY DISPUTE IN ANY FORUM WILL BE CONDUCTED SOLELY ON AN INDIVIDUAL BASIS, AND NEITHER OWNER NOR SOL-ARK WILL SEEK TO HAVE ANY DISPUTE HEARD AS A CLASS ACTION OR IN ANY OTHER PROCEEDING IN WHICH EITHER PARTY ACTS OR PROPOSES TO ACT IN A REPRESENTATIVE CAPACITY. No arbitration or proceeding will be combined with another without the prior written consent of all parties to all affected arbitrations or proceedings. CLASS ACTIONS AND CLASS ARBITRATIONS ARE NOT PERMITTED; for example, Owner may bring a claim only on Owner's own behalf and cannot seek relief that would affect other users of Sol-Ark products or services. Nor may an arbitrator consolidate arbitrations unless all parties agree. If there is a final judicial determination that the limitations of this paragraph are unenforceable as to a particular claim or a particular request for relief (such as a request for injunctive relief), then the parties agree that such a claim or request for relief will be decided by a court after all other claims and requests for relief are arbitrated.

f. *Mass Arbitrations*. If ten (10) or more claimants submit similar Notices of Dispute or file similar arbitrations and are represented by the same or coordinated counsel, all of the cases must be resolved in arbitration in stages using staged bellwether proceedings. Owner agrees to do this even though the resolution of some claims might be delayed. In the first stage, the parties will select up to five (5) cases to be filed in arbitration and resolved by separate arbitrators. In the meantime, no other cases may be filed in arbitration. Nor may the arbitration provider accept, administer or demand payment for fees for other arbitrations. If the remaining cases are not settled after the first stage is done, the parties will repeat the process. These staged bellwether proceedings will continue until all cases are resolved. If this subsection applies to a Notice of Dispute, any statute of limitations applicable to the listed claims will be tolled from the time the first cases are selected for bellwether proceedings until the claimant's Notice of Dispute is selected for a bellwether proceeding or otherwise resolved. A court will have the authority to enforce this subsection, including the power to enjoin the filing or prosecution of arbitrations or assessment of related fees.

g. *Arbitration Procedures*. Any arbitration will be conducted by JAMS under the JAMS Comprehensive Arbitration Rules and Procedures ("JAMS Rules") in effect at the time the Dispute is filed. Owner may request a telephonic or in-person hearing by following the JAMS Rules. In a dispute involving $10,000 or less, any hearing will be telephonic unless the arbitrator finds good cause to hold an in-person hearing instead. To the extent the forum provided by JAMS is unavailable, Sol-Ark and Owner each agree to select a mutually agreeable alternative dispute resolution service and that such alternative dispute resolution service will apply the JAMS Rules. Subject to the limitations of liability contained herein, the arbitrator may award the same damages to Owner individually as a court could. The arbitrator may award declaratory or injunctive relief only to the Owner individually, and only to the extent required to satisfy an Owner's individual claim.

h. *Arbitration Fees*. Whoever files the arbitration will pay the initial filing fee. If Sol-Ark files, then Sol-Ark will pay; if Owner files, then Owner will pay unless Owner gets a fee waiver under the applicable arbitration rules. Each party will bear the expense of that party's attorneys, experts, and witnesses, and other expenses, regardless of which party prevails, but a party may recover any or all expenses (including attorney's fees) from another party if the arbitrator, applying applicable law, so determines.

i. *Filing Period*. TO THE FULLEST EXTENT PERMISSIBLE UNDER APPLICABLE LAW, ANY DISPUTE UNDER THESE TERMS MUST BE FILED WITHIN ONE (1) YEAR IN AN ARBITRATION PROCEEDING. The one-year period begins on the earliest date when any of the events giving rise to the Dispute first occur. If a Dispute is not submitted within one year, the Dispute (including claims, actions or proceedings underlying or related to that Dispute) is permanently barred and Owner hereby expressly agrees and covenants no to assert against Sol-Ark any matter related to a Dispute (including claims, actions or proceedings underlying or related to that Dispute) that is

permanently barred by this provision.. This period can only be extended by the written consent of both parties. No statutes or provisions of law that would toll or otherwise affect the time in which a party may bring a Dispute (including claims, actions or proceedings and underlying or related to that Dispute) will operate to extend the period limited in this Section 10, and any such statutes and provisions are hereby waived, to the fullest extent permissible under applicable law.

j. *Enforceability*. If the waiver of class actions above is found unenforceable, or this entire Section 12 is found unenforceable, then this entire Section 12 will be null and void. If that happens, Owner and Sol-Ark agree that Section 11 on Exclusive Jurisdiction and Governing Law will govern and control any Dispute.

k. ALL SOL-ARK PARTIES ARE INTENDED THIRD-PARTY BENEFICIARIES OF THE ARBITRATION CLAUSES IN THIS SECTION 12.

Exhibit A:

Battery Capacity Testing Method

The following test method is to be used when the battery is new and is first commissioned to determine the actual Initial Energy Capacity in kWh of the battery, as compared to the Initial Energy Capacity stated in Section 3a of this Limited Warranty.

Test Equipment Needed:

Battery cycler or DC electronic load and lithium-ion battery charger suitable for the voltage and current levels outlined in Table 1, capable of CC-CV charging and constant current discharging.
Calibrated Volt-Meter and DC Amp-Meter
Thermocouple connected to a measurement device to measure battery temperature on the outside of the battery module casing.
Data logging tool or software able to sample the following data at a rate of 5 Hz: Battery Voltage, Battery Current, Battery Temperature, and Timestamp for the duration of the test.

Equipment Measurement Accuracy:

Voltage Accuracy:
- ±0.5% accuracy or better
- Use a digital multimeter (DMM) with 6.5 digits of resolution or battery cycler/analyzer with equivalent accuracy

Current Accuracy:
- ±0.5% full scale accuracy or better
- Use programmable DC electronic load or battery cycler/analyzer

Temperature Accuracy:
- ±2˚C accuracy on temperature chamber/enclosure
- ±1˚C accuracy or better on thermocouple contacting the battery

Test Instructions:

An ambient temperature of 25˚C ±3C must be maintained throughout the duration of this test:

1. Discharge the battery under a Constant Current (as specified) rate until the battery reaches End of Discharge Voltage ("EODV") in Table 1.
2. Wait for 30 minutes after the End of Discharge as specified in Item 1.

Begin Charge Test Section:

3. To begin the charging capacity test, charge the battery using a Constant Current "CC" (as specified) until the battery voltage, as measured at the battery output terminals, reaches the Constant Voltage value (as specified).
4. Once the battery has reached the Constant Voltage value, the battery cycling equipment should transition to a Constant Voltage "CV" charging stage until the output current of the battery cycling equipment reaches 5% or less of the Battery Nominal Amp-hour rating.
5. The battery Charged Useable Energy in kWh equals: (X) the integral of the Charge Current multiplied by (Y) the Battery Voltage over the duration of the test.
6. After completing the steps in Item 5, wait for 30 minutes.

Begin Discharge Test Section:

7. To begin the discharge capacity test, discharge the battery with Constant Current until the earlier of the following (1) it reaches EODV (as specified) or (2) the Battery Management Unit opens the contactors of the battery, as indicated by a lack of voltage on the battery terminals.
8. The battery Discharged Useable Energy in kWh equals: (X) the integral of the Discharge Current multiplied by (Y) the Battery Voltage over the duration of the test.
9. Repeat the above Steps 1 through 8 a minimum of two more times and average the resulting values for Charged Useable Energy and Discharged Useable Energy to arrive at the measured battery Useable Energy Capacity.

Table 1 – Battery Capacity Testing

Sol-Ark Product/Model Number/SKU	End of Discharge Voltage (Vdc)	Constant Voltage (Vdc)	Constant Current (Adc)	Battery Nominal Amp-hour Rating (Ah)
L3 HV-40 L3-HV-40KWH	332.8V	456V	20A	100
L3 HV-60 L3-HV-60KWH	499.2V	684V	20A	100

Exhibit B:

Battery Performance Refund Calculation

The following calculations describe how a refund amount would be calculated for batteries that fail to meet minimum Aggregate Energy Throughput, as defined in Section 3, at any point within the Limited Warranty period as defined in Section 1 of the Limited Warranty.

Option 1:

Calculate the refund amount based on difference between the Measured Energy Throughput from the Battery Management Unit vs the Warranted Energy Throughput (as defined in the Performance Ratings Table) in Megawatt-hours as shown below:

$$Refund\ Amount = \frac{Purchase\ Price \times (Warranted_{EnergyThroughput} - BMS_{EnergyThroughput})}{Warranted_{EnergyThroughput}}$$

Example calculation, using Option 1:

$$\$2,076.92 = \frac{\$27,000 \times (130MWh - 120MWh)}{130MWh}$$

Option 2:

If Sol-Ark determines that the Product is completely inoperable and not subject to repair, Sol-Ark will calculate the refund amount as follows:

Calculate the refund amount based on difference between the Remaining Warranty Months vs the Total Warranty period of 120 months (10 years), as shown below:

$$Refund\ Amount = \frac{\$\ Purchase\ Price \times (120 - Months\ Since\ Purchase\ Date)}{120}$$

Example calculation, using Option 2:

$$\$4,500 = \frac{\$27,000 \times (120 - 100)}{120}$$