



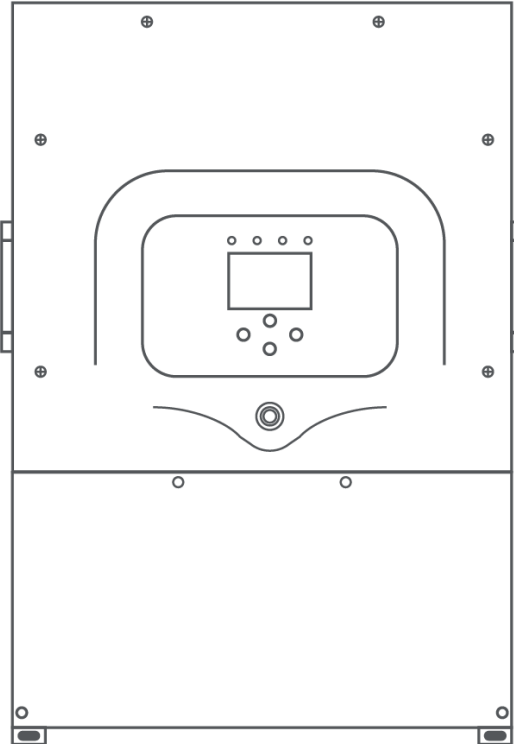
# **LYNK II Sol-Ark User Manual**

Revision F - 4

# Table of Contents

1	INTRODUCTION.....	5
2	AUDIENCE, SAFETY, MESSAGES, AND WARNINGS .....	7
2.1	Audience.....	7
2.2	Warning, Caution, Notice, and Note Messages.....	7
2.3	General Warnings.....	8
2.4	Safe Handling Procedures .....	9
2.5	Personal Protective Equipment .....	9
3	OVERVIEW.....	11
3.1	System Overview .....	11
3.2	Minimum Battery System Capacity .....	12
4	LYNK II CAN HARDWARE TERMINATION AND CAN OUT PIN CONFIGURATION .....	14
4.1	LYNK II CAN Termination .....	14
4.2	LYNK II CAN Out - RJ45 PIN Assignments for Sol-Ark Inverters .....	14
4.2.1	Sol-Ark Outdoor Inverter-Charger Pin Assignments.....	15
4.2.2	Sol-Ark Indoor (Legacy) Inverter-Charger Pin Assignments.....	16
5	INSTALLING AND CONNECTING LYNK II TO THE SOL-ARK NETWORK.....	18
5.1	Networking Discover Lithium Batteries with LYNK II .....	18
5.2	Connecting LYNK II to the Sol-Ark Network.....	20
6	ENABLING LYNK II TO COMMUNICATE WITH SOL-ARK DEVICES.....	24
6.1	Setting Up Sol-Ark Open-Loop Configuration.....	25
6.1.1	Open-Loop - Batt Setup > Batt.....	26
6.1.2	Open-Loop - Batt Setup > Charge .....	28
6.1.3	Open-Loop - Batt Setup > Discharge .....	30
6.2	Setting the LYNK II Communication Protocol for Sol-Ark.....	32
6.2.1	The Protocol Configuration Procedure .....	32
6.3	Setting Up Sol-Ark Closed-Loop Configuration.....	33
6.3.1	Closed-Loop - Batt Setup > Batt.....	35
6.3.2	Closed-Loop - Batt Setup > Charge.....	37

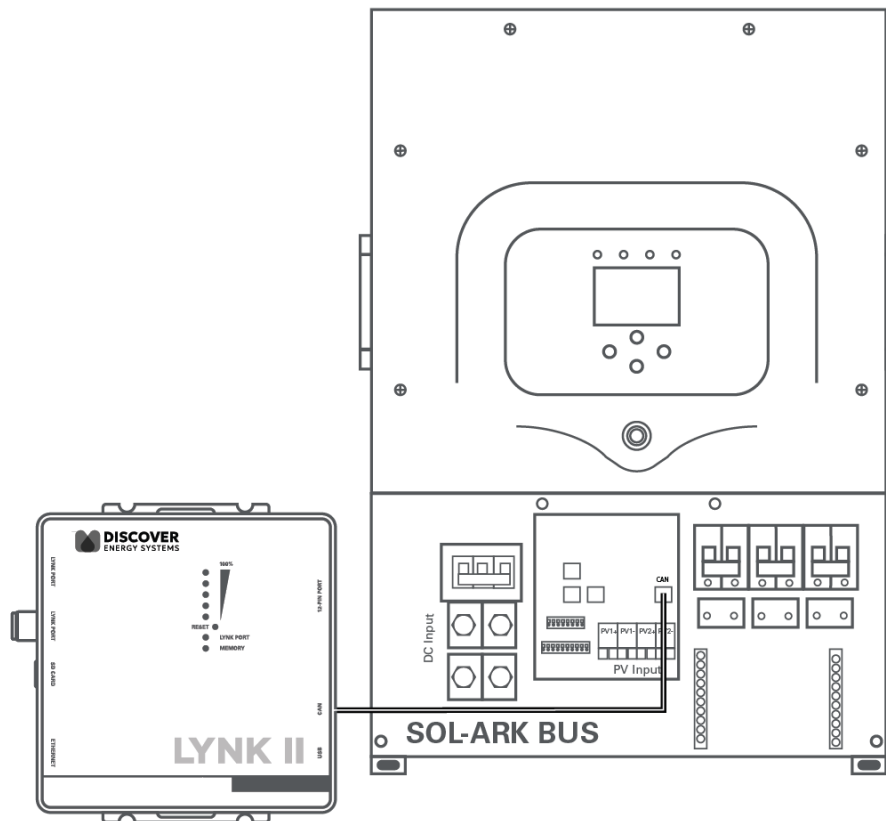
6.3.3	Closed-Loop - Batt Setup > Discharge.....	39
6.3.4	Batt Setup > Smart Load .....	40



**Document:** 805-0038  
**Revision:** F-4

# 1 INTRODUCTION

This Application Note provides information about integrating LYNK network-enabled Discover Lithium Batteries using the LYNK II Communication Gateway with Sol-Ark inverter-chargers.



Before installation and configuration, consult the relevant product documentation, including Manuals, Application Notes, and Installation and Configuration Guides.

## Sol-Ark Documentation

- 15K-2P-N Installation Guide and User Manual
- 12K-2P-N Installation Guide and User Manual
- 12K Indoor Installation Guide and User Manual (Legacy Model)

Visit <https://sol-ark.com> for the most recent version of published documents.

## Discover Battery Documentation

- [AES RACKMOUNT Installation and Operation Manual](#) (805-0043)
- [AES RACKMOUNT datasheet](#) (808-0039)
- [HELIOS ESS Installation and Operation Manual](#) (805-0090)

- [LYNK II Installation and Operation Manual \(805-0033\)](#)

Visit <https://discoverenergysys.com> for the most recent version of published documents.

---

The LYNK II Communication Gateway is compatible with the following.

#### **Discover Lithium Batteries**

- AES RACKMOUNT: 48-48-5120, 48-48-5120-H
- HELIOS ESS: 46-24-1560, 46-48-1540

#### **Sol-Ark Outdoor Inverters**

- Sol-Ark 5K-P
- Sol-Ark 8K-P
- Sol-Ark 12K-P
- Sol-Ark 15K-P

#### **Sol-Ark Indoor Inverters (Legacy)**

- Sol-Ark 8K Hybrid
- Sol-Ark 12K Hybrid

## 2 AUDIENCE, SAFETY, MESSAGES, AND WARNINGS

### 2.1 Audience

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

- Installation and commissioning of electrical equipment.
- Application of electrical codes, safety, and installation standards.
- Analysis and reduction of hazards involved in performing electrical work.
- Installation, configuration, and maintenance of batteries and energy storage systems.
- Installation and configuration of communication systems, such as CAN and Ethernet.
- Installation and configuration of systems activated by relays.

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

Messages in this manual are formatted according to this structure.



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



Important information regarding hazardous conditions.



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



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

**NOTICE**

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

**NOTE**

Ad hoc information concerning important procedures and features of the battery not related to personal injury or equipment damage.

## 2.3 General Warnings

 **WARNING**
**ELECTRIC SHOCK AND FIRE HAZARD**

- This equipment must only be installed as specified.
- Do not disassemble or modify the battery.
- If the battery case has been damaged, do not touch exposed contents.
- There are no user-serviceable parts inside.

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

 **WARNING**
**ELECTRIC SHOCK AND FIRE HAZARD**

Do not lay tools or other metal parts on top of the battery or across the terminals.

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



### **ELECTRIC SHOCK**

- Do not touch the energized surfaces of any electrical component in the battery system.
- Before servicing the battery, follow all procedures to fully de-energize the battery system.
- Follow the “Safe Handling Procedures” below when working with the battery.

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

## 2.4 Safe Handling Procedures

Before using the battery and any power electronics, read all instructions and cautionary markings on all components and appropriate sections of their manuals.

- Use personal protective equipment when working with batteries.
- Do not dispose of the battery in fire.
- Promptly dispose or recycle used batteries following local regulations.
- Do not disassemble, open, crush, bend, deform, puncture or shred.
- Do not modify, re-manufacture, attempt to insert foreign objects into the battery, immerse or expose to water or other liquids, or expose to fire explosion or other hazards. If the user suspects damage to the battery due to water, heat, or other reason, take it to a service center for inspection.
- Only use the battery for the system for which it is specified.
- Do not lift or carry the battery while in operation.
- When lifting a heavy battery, follow the appropriate standards.
- Only lift, move, or mount following local regulations.
- Take care when handling battery terminals and cabling.
- Only use the battery with a charging system that has been qualified for the system. The use of an unqualified battery or charger may present a risk of fire, explosion, leakage, or other hazards.
- Do not short circuit a battery or allow metallic conductive objects to contact battery terminals.
- Replace the battery only with another battery that has been qualified for the system. Using an unqualified battery may present a risk of fire, explosion, leakage, or other hazards.
- Avoid dropping the device or battery. If the device or battery is dropped, especially on a hard surface, and the user suspects damage, take it to a service center for inspection.

## 2.5 Personal Protective Equipment

When handling or working near a battery:

- Use Personal Protective Equipment, including clothing, glasses, insulated gloves, and boots.

- Do not wear rings, watches, bracelets, or necklaces.

## 3 OVERVIEW

This manual provides general settings and is not a comprehensive guide to the programming and configuration of a specific installation. An installation may have unique conditions or use cases that require modification or adaptation of values. Installers must be capable of reviewing and adapting to the specifics of an installation and its specific use case, and optimizing settings where needed.

The key steps required to install and configure the LYNK II Communication Gateway with compatible Discover Lithium batteries and power conversion equipment are as follows:

- Review and confirm equipment compatibility and correct sizing.
- Configure the LYNK II CAN out pins to match the CAN in pins of the power conversion equipment.
- Mount the LYNK II, connect the Discover battery communication network to the LYNK Port and then connect the LYNK II's CAN Out Port to the power conversion equipment's communication network.
- Terminate all networks correctly.
- Using LYNK ACCESS software, set the LYNK II to the correct protocol to enable closed-loop communication between the Discover batteries and the power conversion equipment.
- Set up the closed-loop configuration parameters on the power conversion equipment.
- Set up user preferences and enable the use case using the power conversion control system.

### 3.1 System Overview

The LYNK II Communication Gateway unlocks the full potential of a Discover Lithium battery by enabling the internal Battery Management System (BMS) to provide real-time data in a closed-loop configuration to other devices. In solar applications, this allows the world's best hybrid inverter-chargers and solar charge controller systems to optimize their control over the charging process.

LYNK II also enables the remote monitoring of Discover Lithium battery SOC and data logging of multiple sites using the data monitoring services offered by inverter systems.

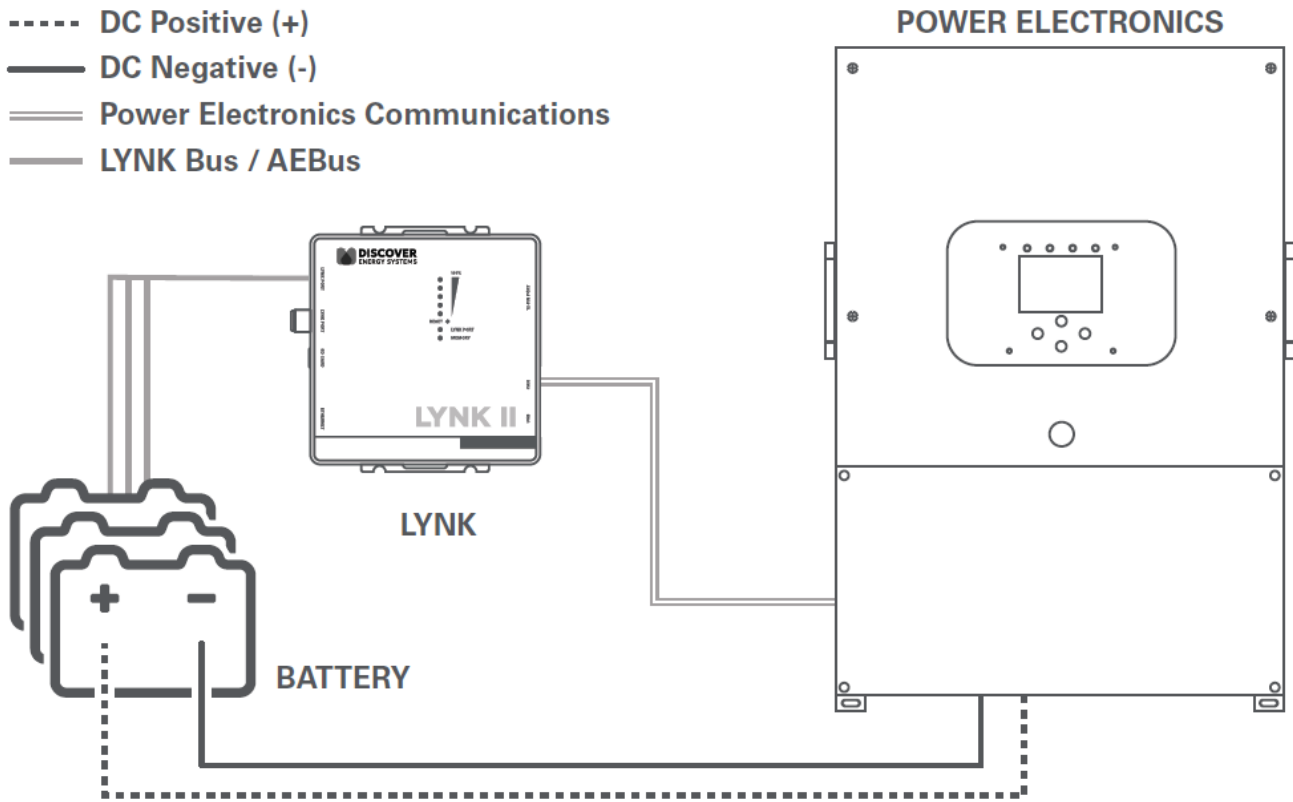
Additionally, LYNK II enables remote monitoring through Discover's LYNK CLOUD web application, allowing access to the battery's state of charge, configuration, and remote troubleshooting over the Internet.

Discover Lithium batteries must be set up to work with power conversion and monitoring devices in either an open-loop or closed-loop configuration. In an open-loop configuration, Discover Lithium battery charge and discharge settings are set up manually through the controller for the power conversion device at the time of installation. Refer to the Appendix's "Sol-Ark Open-Loop Configuration" section.

In a closed-loop configuration, the Discover Lithium battery's BMS sends the battery status over a network data connection with the power conversion device. Power conversion devices use the

Discover Lithium battery BMS data to fine-tune the output of their charger and deliver other functional controls based on battery voltage, temperature, and percent State-of-Charge.

If communication between the BMS and the Sol-Ark power conversion device is interrupted for more than ten seconds, the inverter will safely stop operation, so long as the BMS Lithium Batt and the BMS\_Err\_Stop parameters are both enabled on the Sol-Ark inverter. The inverter will display an F58 BMS Communication Fault when communication is lost.



System Overview

### 3.2 Minimum Battery System Capacity

The Discover Lithium Battery and Sol-Ark device automatically manages battery charge and discharge rates. Using large solar arrays with battery banks that are too small can exceed the battery's operating limits to charge, possibly leading to the BMS triggering over-current protection. Battery capacity must accept the maximum charge current of the system, or charging must be curtailed below the operating limit of the installed batteries. This value is derived by adding the charge capacities of all inverter-chargers and solar charge controllers in the system. Additionally, battery peak capacity must support the surge requirements of the load attached to the inverter. Match all inverter peak power values with the sum of all battery peak battery current values.

$$\text{Inverter Peak} = (\text{Inverter Surge Value}) / (\text{Inverter Efficiency}) / (48\text{V: Low Battery Cut-Off})$$

Model	Inverter Peak	Charger Continuous Max <sup>(3)</sup>	AES RACKMOUNT 48-48-5120, 48-48-5120-H Recommended per inverter <sup>(4)</sup>	HELIOS ESS 52-48-16000 Recommended per inverter <sup>(5)</sup>
Sol-Ark 5K-P	345 A DC <sup>(1)</sup>	120 A DC	2	1 or 2 <sup>(6)</sup>
Sol-Ark 8K-P	345 A DC <sup>(1)</sup>	185 A DC	2	1 or 2 <sup>(6)</sup>
Sol-Ark 12K-P	345 A DC <sup>(1)</sup>	185 A DC	2	1 or 2 <sup>(6)</sup>
Sol-Ark 15K-P	518 A DC <sup>(2)</sup>	275 A DC	3	2

<sup>(1)</sup> Calculated based on Surge Power 16,000 VA (10 s) and Efficiency 96.5% CEC, as published in Sol-Ark User Manuals (2022-05).

<sup>(2)</sup> Calculated based on Surge Power 24,000 VA (10 s) and Efficiency 96.5% CEC, as published in Sol-Ark User Manuals (2022-05).

<sup>(3)</sup> As published in Sol-Ark User Manuals (2022-05).

<sup>(4)</sup> Discover AES RACKMOUNT Battery Module, Peak Power: 218 A DC (3 seconds), 95 A DC Continuous Charge/Discharge (1 hour), as published in Discover AES RACKMOUNT Installation and Operation Manual (805-0043, Rev J).

<sup>(5)</sup> Discover HELIOS 52-48-16000 Battery, Peak Power: 300 A RMS (15 seconds), 200 A DC Continuous Charge/Discharge, as published in Discover HELIOS ESS Installation and Operation Manual (805-0090, Rev D).

<sup>(6)</sup> HELIOS ESS supports the maximum continuous charge and discharge currents from this inverter. To use one battery, limit the heavy loads that are active at any time on the system. If the peak current of loads on the circuit will push the inverter and batteries to their maximum limits, consider increasing the number of batteries.

## 4 LYNK II CAN HARDWARE TERMINATION AND CAN OUT PIN CONFIGURATION

### 4.1 LYNK II CAN Termination

#### NOTICE

##### **DISCONNECT POWER**

Disconnect power and all connections to LYNK II before attempting to configure header jumpers.

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

Jumpers are used to configure termination for the AEBus and LYNK Networks, and the CAN Out PIN assignments. Follow the instructions in the [LYNK II Installation and Operation Manual \(805-0033\)](#) to access the configuration header board and jumpers.

Detailed pin configurations are included in the LYNK II User Manual but are repeated here for convenience.

#### NOTE

LYNK II terminates the AEBus and LYNK Network by default. Do not remove the termination jumper inside LYNK II unless instructed to do so by Discover Energy Systems.

### 4.2 LYNK II CAN Out - RJ45 PIN Assignments for Sol-Ark Inverters

CAN signals (CAN H, CAN L, CAN GND) can be assigned to any PIN of the RJ-45 connector by adjusting the jumpers on the header board.

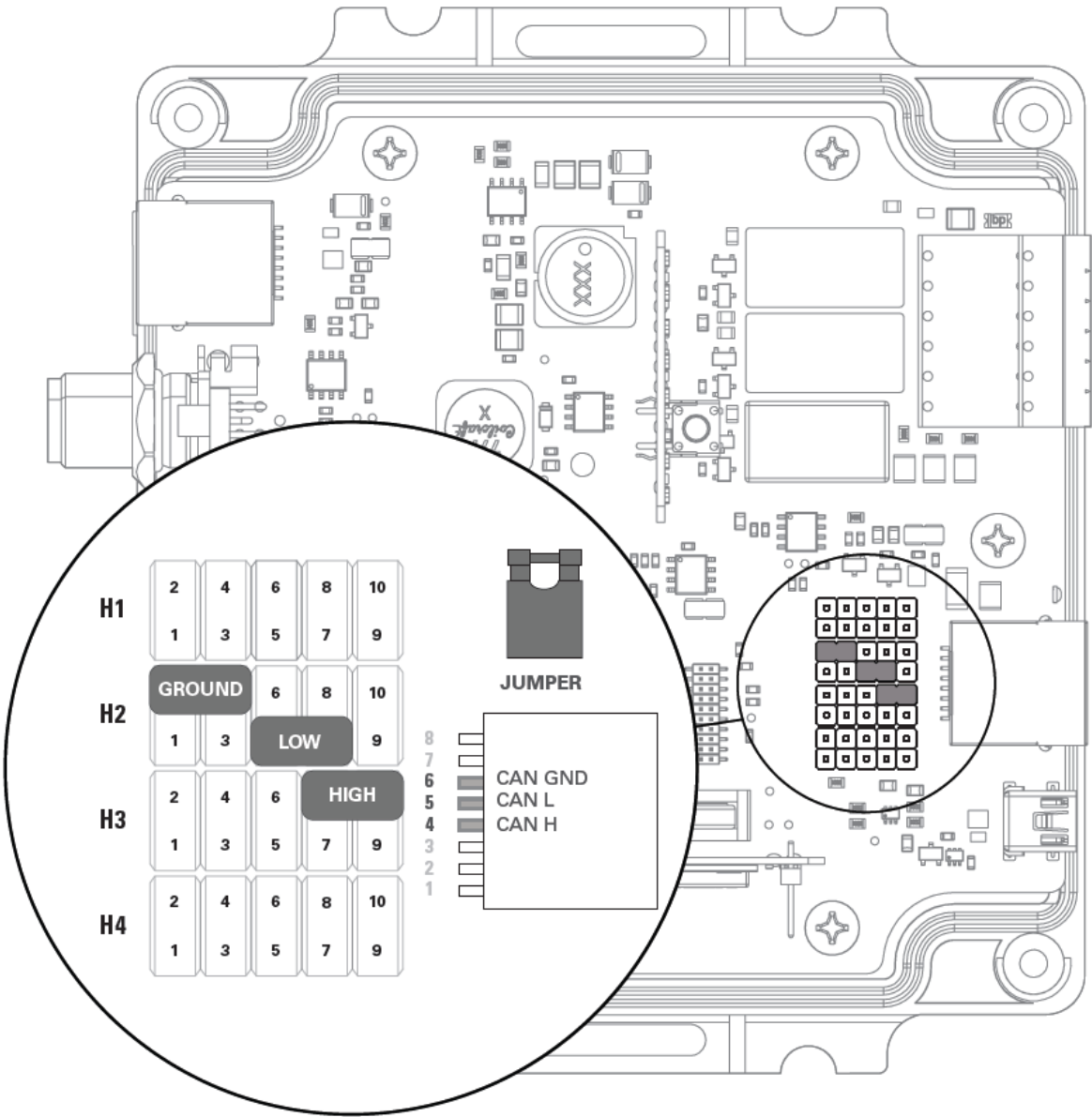
**NOTE**

There are different ground pin (CAN GND) assignments for the Sol-Ark indoor (Legacy) and outdoor inverter-chargers.

#### 4.2.1 Sol-Ark Outdoor Inverter-Charger Pin Assignments

- 5K-P
- 8K-P
- 12K-P
- 15K-P

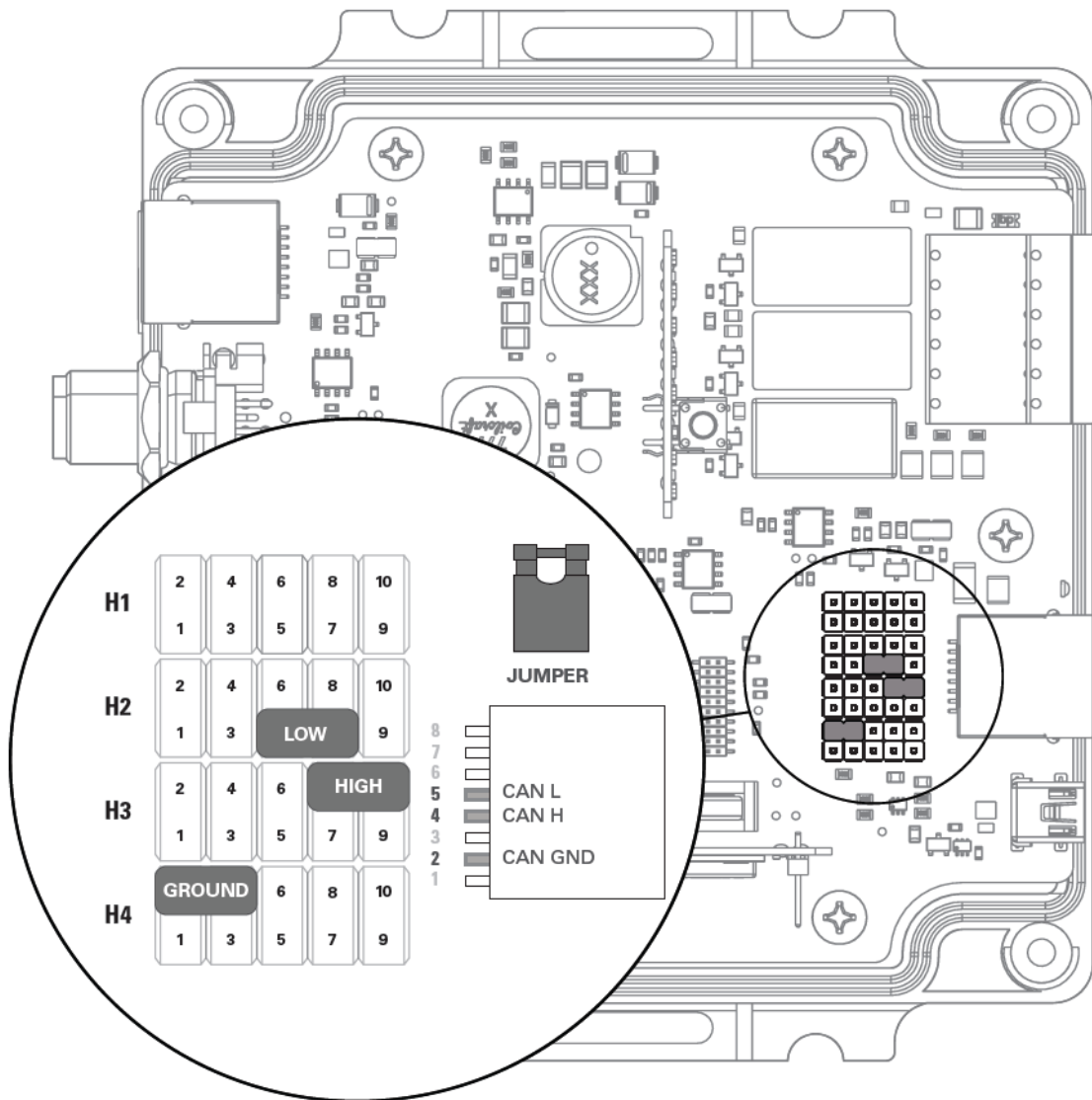
CAN Out	Header Jumper	RJ45 PIN
CAN L	H2 - 5-7	5
CAN H	H3 - 8-10	4
CAN GND	H2 - 2-4	6



Sol-Ark Outdoor CAN Pin Assignment

### 4.2.2 Sol-Ark Indoor (Legacy) Inverter-Charger Pin Assignments

- 8K Hybrid
- 12K Hybrid



Sol-Ark Indoor (Legacy) CAN Pin Assignment

CAN Out	Header Jumper	RJ45 PIN
CAN L	H2 - 5-7	5
CAN H	H3 - 8-10	4
CAN GND	H4 - 2-4	2

## 5 INSTALLING AND CONNECTING LYNK II TO THE SOL-ARK NETWORK

### 5.1 Networking Discover Lithium Batteries with LYNK II

#### NOTE

- Turn OFF all devices before connecting cables.
- Do not plug a LYNK RJ45 network cable or terminator into the 10/100 Ethernet port of the LYNK II.
- Do not connect a CAT5 cable from the LYNK or Ethernet ports of the LYNK II to a WAN or MODEM port of a network router.
- Mixing the LYNK Network with other networks may result in equipment malfunction and damage.

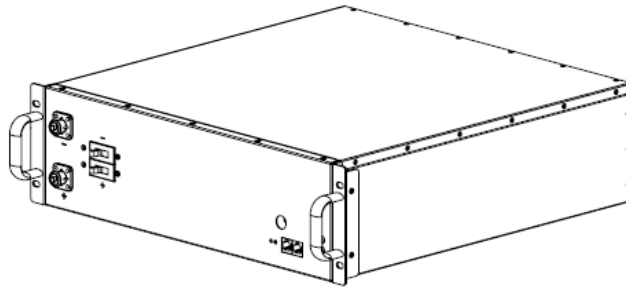
#### NOTE

Unless specified by Discover Energy Systems, power electronics must not be connected directly to the LYNK network.

Refer to the [LYNK II Installation and Operation Manual \(805-0033\)](#) for detailed instructions on network layouts, connections, and terminations for compatible Discover Lithium battery models. Some key reminders are repeated here for convenience.

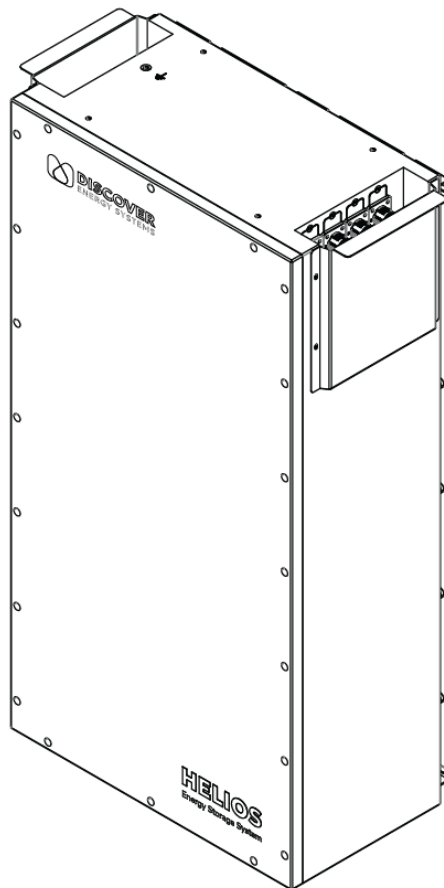
- At least one battery must be connected to the LYNK Port on LYNK II.
- A network of batteries will communicate as one battery.
- No more than one network of batteries may be connected to LYNK II.
- Network termination is required for the system's proper functioning - note some batteries and devices may auto-terminate.
- LYNK II requires power from three possible sources (13-90 VDC power supply, LYNK Port enabled Discover Lithium battery, or a USB device).
- Discover Lithium batteries must be set to ON to supply power and communicate data with LYNK II.

## AES RACKMOUNT



Both LYNK II and AES RACKMOUNT Battery Modules are internally terminated. No extra termination is required.

## HELIOS ESS



Both LYNK II and HELIOS ESS batteries are internally terminated. No extra termination is required.

**NOTICE****TERMINATION REQUIREMENT**

HELIOS ESS Batteries prior to serial number DLPHD48B251080001 are supplied with a termination resistor. When setting up closed-loop communication with these HELIOS ESS Batteries, plug the termination resistor into the COM3/COM4 port on the last battery in the LYNK network.

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

**NOTE**

The HELIOS ESS supports closed-loop communication with the inverter-charger without using the LYNK II Communication Gateway. Connect a CAT 6 or higher straight cable from the HELIOS ESS COM2 port to the inverter-charger's battery CAN port.

## 5.2 Connecting LYNK II to the Sol-Ark Network

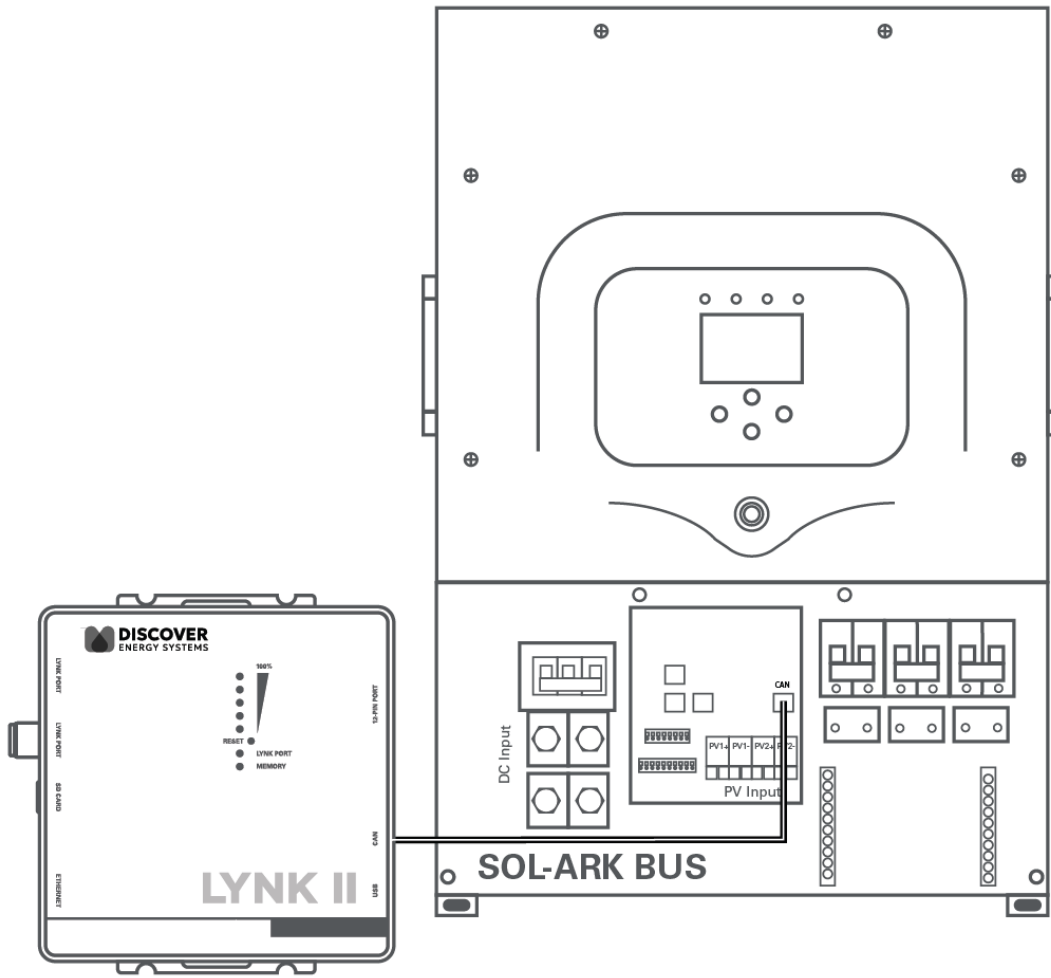
Before connecting LYNK II to the Sol-Ark network, ensure that all Sol-Ark devices use COMM firmware version 1.4.3.0 or later. Also, ensure that the CAN out pins for LYNK II are configured correctly. Refer to [LYNK II CAN Hardware Termination and CAN Out Pin Configuration](#).

Insert one end of a CAT5e or higher communication cable into the LYNK II CAN out port and the other end into the correct CAN port of the Sol-Ark inverter-charger.

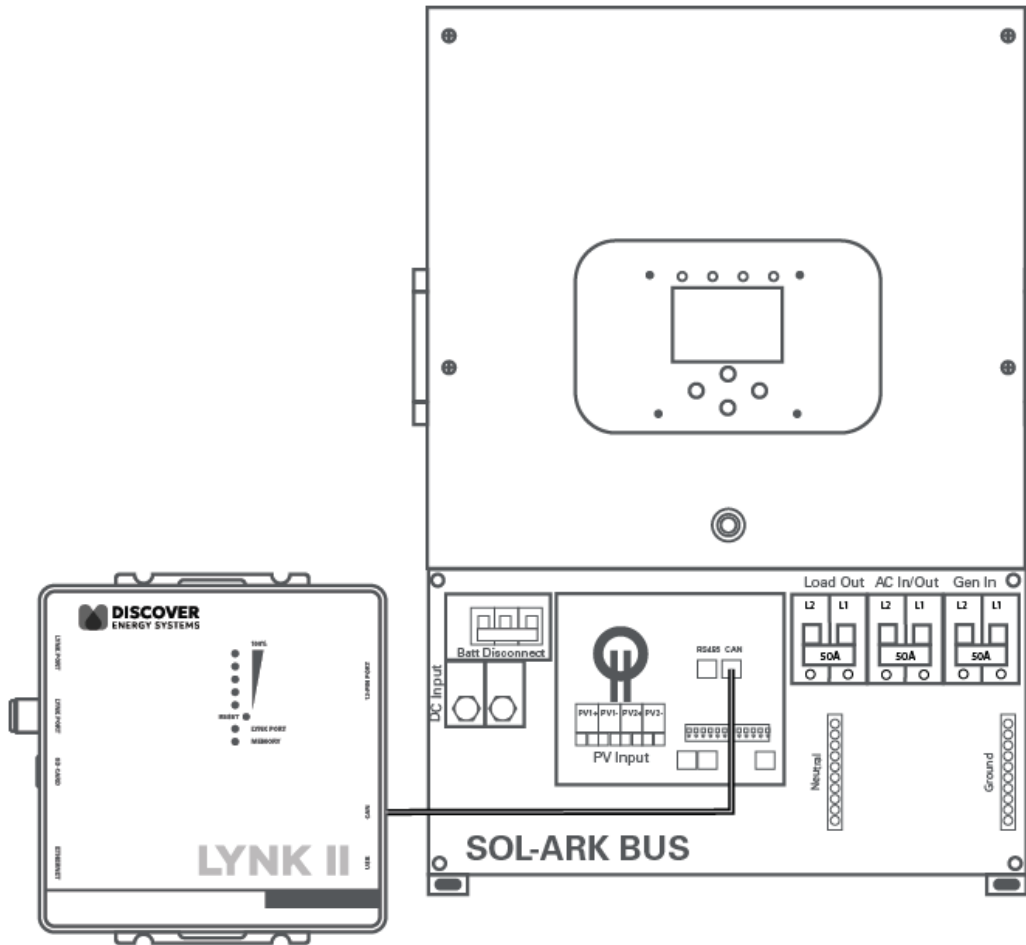
**NOTE**

Ensure that all Sol-Ark inverters are using COMM firmware version 1.4.3.0 or higher.

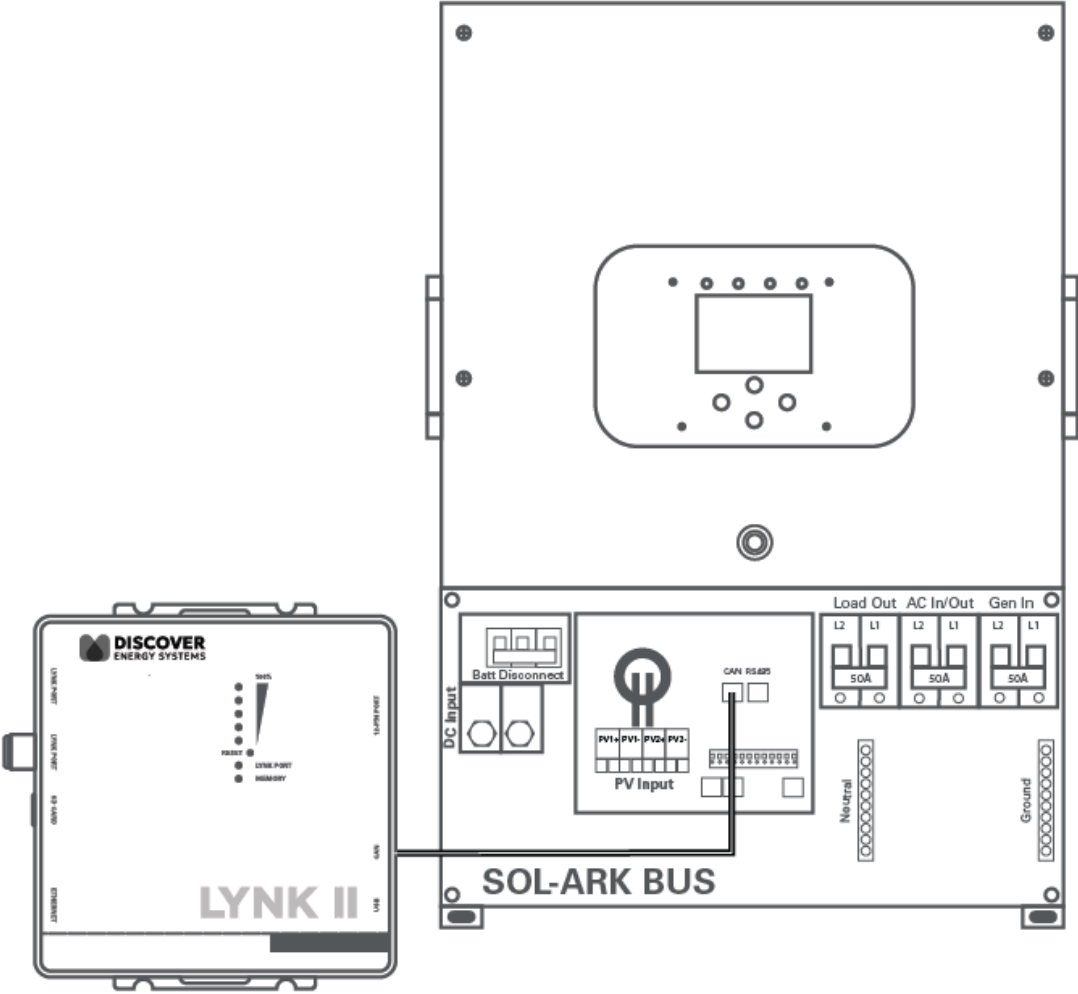
The CAN port locations differ across the Sol-Ark indoor (legacy) and outdoor models. Refer to the following diagrams for the CAN port location of your Sol-Ark inverter.



Sol-Ark 5K-P / 8K-P / 12K-P / 15K-P Hybrid Inverter (Outdoor)



Sol-Ark 8K Hybrid Inverter (Indoor, Legacy)



Sol-Ark 12K Hybrid Inverter (Indoor, Legacy)

## 6 ENABLING LYNK II TO COMMUNICATE WITH SOL-ARK DEVICES

When properly connected to a closed-loop network and set to use the Sol-Ark protocol, LYNK II will transmit real-time parameters from the Discover Lithium battery, including voltage, current, temperature, state of charge, and fault conditions, to a Sol-Ark inverter. LYNK II will also transmit charge voltage and current requests from the Discover Lithium battery to a Sol-Ark inverter.

LYNK ACCESS software for 64-bit Windows 10 / 11 is required to configure LYNK II settings for closed-loop CAN communication with Sol-Ark inverters.

Users and installers should be aware that if communication between the LYNK II and the inverter is lost for more than ten seconds, the inverter will safely stop operation, so long as the BMS Lithium Batt and the BMS\_Err\_Stop parameters are both enabled on the Sol-Ark inverter. The inverter displays the F58 BMS Communication Fault when communication is lost.

The Sol-Ark inverter will check every five minutes and resume closed-loop operation if communication is reestablished. However, if communication cannot be re-established, the Sol-Ark inverter will need to be manually converted to an open-loop configuration to resume operation. So, as a precautionary measure, it is recommended that the Sol-Ark inverter be programmed with the correct voltage-based open-loop parameters before setting up the system to operate in a closed-loop configuration.

If the BMS Lithium Batt parameter is disabled and the Use Batt V Charged parameter is enabled, the Sol-Ark inverter will operate in an open-loop configuration using voltage-based parameters.

### NOTE

- In a closed-loop configuration with the BMS Lithium Batt function enabled, the BMS\_Err\_Stop parameter must be enabled. If the BMS\_Err\_Stop parameter function is not enabled, the Sol-Ark inverter will continue to operate based on the last communicated battery values. Depending on the mode of operation at the time of communication fault and given enough time, the Sol-Ark inverter-charger will eventually put the attached battery into an overcharged or fully discharged state. When that occurs, either situation will trigger the Discover Lithium Battery BMS to self-protect and disconnect the battery from the system.
- Neither Discover Lithium batteries nor LYNK II directly control Sol-Ark relay functions, generator starting or other grid-interactive features. These functions are controlled through the programming of the Sol-Ark inverter.

## 6.1 Setting Up Sol-Ark Open-Loop Configuration

As a precautionary measure, it is recommended to program the Sol-Ark inverter with the correct voltage-based open-loop parameters before setting up closed-loop parameters.

If necessary, first configure Sol-Ark inverters to operate in parallel by establishing the inverter master/slave relationships and phase designations before setting the parameters for battery operation. Configuring the master inverter will cascade parameters and settings to the slave inverters.

### The Open-loop Configuration Procedure

Refer to the latest Discover Energy Systems documentation for battery values and the latest Sol-Ark documentation for details on menu navigation and the setup procedure.

1. Set the Discover Lithium batteries to ON and set the inverter to ON.
2. Using the touch screen and keypad on the inverter, navigate from the SYSTEM SETUP menu to the BATT SETUP menu screen.
3. Enable and disable parameters according to the instructions in the tables below.
4. Set each variable parameter according to the instructions in the tables below.
5. Touch the OK button to save all onscreen values - Ignore data displayed in GREY boxes.

#### NOTE

Touch the Sol-Ark screen to:

- Navigate the Sol-Ark onscreen menus.
- Enable parameters.
- Activate the adjustment of values.
- Save all onscreen settings.

Values are adjusted using the keypad.

**NOTE**

Enable parameters with a CHECKMARK, and disable parameters by leaving them unchecked. Touch a WHITE box onscreen to activate the adjustment of that value. Selecting parameters that have been enabled and disabled alters values that are available to be adjusted.

- A WHITE BOX indicates values that can be adjusted.
- A GREY BOX indicates values that cannot be adjusted, and any data displayed should be ignored.

**NOTE**

If necessary, configure Sol-Ark inverters to operate in parallel before setting the parameters for battery operation.

### 6.1.1 Open-Loop - Batt Setup > Batt

Touch the BATT tab onscreen to start the programming sequence (see image below).

- Touch the OK button to save all onscreen values – ignore data displayed in GREY boxes.

Batt Setup				
Batt	Charge	Discharge	Smart Load	
Batt Capacity	200 Ah		<input checked="" type="checkbox"/>	Use Batt V Charged
Max A Charge	185 A		<input type="checkbox"/>	Use Batt % Charged
Max A Discharge	185 A		<input type="checkbox"/>	No Battery
TEMPCO	-0mV/C/Cell		<input type="checkbox"/>	BMS Lithium Batt <span style="border: 1px solid grey; padding: 2px;">00</span>
			<input checked="" type="checkbox"/>	Activate Battery
<input type="button" value="CANCEL"/>		<input type="button" value="OK"/>		

Open-Loop Battery Setup > Batt Menu (Two 100 Ah AES RACKMOUNT Batteries with 12K-P)

<b>Batt Setup &gt; Batt</b>	
Batt Capacity	Set to the number of Discover Lithium batteries x Ah capacity of each. For example, set to 200 Ah (2 x 100 Ah) for two AES RACKMOUNT 48-48-5120 batteries.
Max A Charge	<p>For a single inverter: set to the lesser of the inverter's max charge capacity, or the quantity of attached batteries, multiplied by the battery model's specific max charge rating. For example, a 12K-P inverter would be set to the lesser of the inverter's max charge rate of 185 A, or 190 A for two AES RACKMOUNT 48-48-5120 batteries rated at 95 A max charge each.<sup>(1)</sup></p> <p>For a three-phase system: set to the lesser of the max charge value for the master inverter, or the quantity of attached batteries, multiplied by the battery model's max charge rating, divided by the number of inverters. For example, the master 12K-P would be set to the lesser of the inverter's max charge rate of 185 A, or 126 A, for four AES RACKMOUNT 48-48-5120 batteries rated at 95 A max charge each (380 A divided by three inverters).</p>
Max A Discharge	<p>For a single inverter: set to the lesser of the inverter's max discharge capacity, or the quantity of attached batteries, multiplied by the battery model's specific max discharge rating. For example, a 12K-P inverter would be set to the lesser of the inverter's max discharge rate of 185 A, or 190 A for two AES RACKMOUNT 48-48-5120 batteries rated at 95 A max charge each.<sup>(1)</sup></p> <p>For a three-phase system: set to the lesser of the max discharge value for the master inverter, or the quantity of attached batteries multiplied by the battery model's max discharge rating, divided by the number of inverters. For example, the master 12K-P would be set to the lesser of the inverter's max discharge rate of 185 A, or 126 A, for a battery bank of four AES RACKMOUNT 48-48-5120 batteries rated at 95 A max discharge each (380 A divided by three inverters).</p>
TEMPCO	Set to 0 mv/C/Cell. <sup>(2)</sup>
Use Batt V Charged	Enable

<b>Batt Setup &gt; Batt</b>	
Use Batt % Charged	Disable
No Battery	Disable
BMS Lithium Batt	Disable (Displays 00 value) <sup>(3)</sup>
Activate Battery	Enable
<p>(1) The recommended value for Max A Charge is 75% of the rated maximum charge current for the battery.</p> <p>(2) Discover Lithium batteries do not require temperature compensation. Setting TEMPCCP to 0 mv/C/Cell will disable inverter-charger controlled temperature compensation.</p> <p>(3) Setting the BMS Lithium Batt parameter to Disable confirms open-loop operation. Setting the parameter to Enable confirms closed-loop operation.</p> <p>The values and parameters used are for an assumed operating temperature of 25 °C (77 °F).</p>	

### 6.1.2 Open-Loop - Batt Setup > Charge

Touch the CHARGE tab onscreen to start the programming sequence (see image below).

- Touch the OK button to save all onscreen values - Ignore data displayed in GREY boxes.

**Batt Setup**

Batt	Charge	Discharge	Smart Load
StartV	48.0V	48.0V	Float V
Start%	10%	10%	Absorbtion V
A	185 A	185 A	Equalization V
<input checked="" type="checkbox"/> Gen Charge	<input checked="" type="checkbox"/> Grid Charge	30 Days	0.0 hours
Generator Exercise Cycle Day & Time>>		Mon 08	:00 20min
<input type="checkbox"/> Gen Force	CANCEL	OK	

Open-Loop Battery Setup > Charge (Two 100 Ah AES RACKMOUNT Batteries with 12K-P)

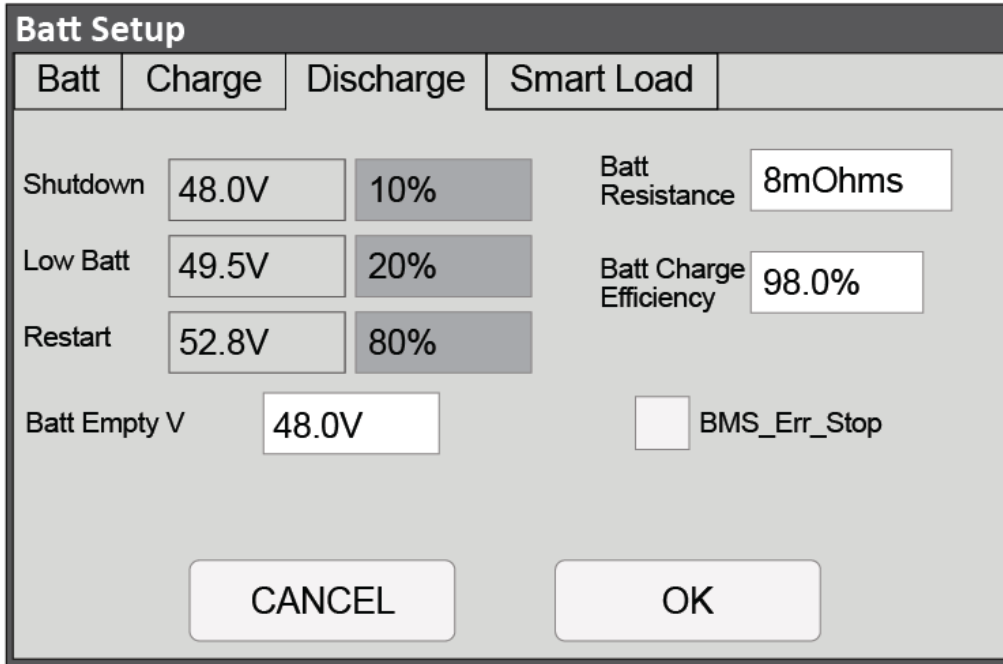
Batt Setup > Charge	
Gen Charge	Enable if charging from a generator is desired. <sup>(1)</sup> Note: The Gen Input Breaker must be connected to the output of an AC generator for this work.
Grid Charge	Enable if charging from the grid is desired. <sup>(2)</sup> Note: The Grid Input Breaker must be connected to input from the grid for this to work.
StartV	Set the value to the desired battery voltage that will trigger battery charging. The absolute minimum is 48 V.
Start%	Unavailable (Grey) in an open-loop configuration.
A	Set to the same Amp value that was used for Max A Charge. <sup>(3)</sup>

<b>Batt Setup &gt; Charge</b>	
Float V	Set to 53.6 V
Absorption V	Set to 55.2 V <sup>(4)</sup>
Equalization V	55.2 V <sup>(5)</sup> 30 days 0.0 hours <sup>(5)</sup>
Gen Exercise Cycle Day & Cycle	Refer to Solar-Ark documentation.
Gen Force	Refer to Solar-Ark documentation.
<p>(1) Left column options are for Gen Charge AutoStart values (Reference Sol-Ark documentation for more details on the generator AutoStart function).</p> <p>(2) Right Column options are for Grid Charge values.</p> <p>(3) If need be, this value is used to curtail the maximum current output of the charger.</p> <p>(4) Absorption will stop at 2% of the set capacity of the battery bank and move to the float value.</p> <p>(5) Lithium batteries MUST not be equalized. Using a value of 55.2 for Equalization V and zero for Hours ensures that the batteries will not be equalized.</p> <p>The values and parameters used are for an operating temperature of 25 °C (77 °F).</p>	

### 6.1.3 Open-Loop - Batt Setup > Discharge

Touch the DISCHARGE tab onscreen to start the programming sequence (see image below).

- Touch the OK button to save all onscreen values - Ignore data displayed in GREY boxes.



Open-Loop Battery Setup > Discharge (Two 100Ah AES RACKMOUNT Batteries with 12K-P)

Batt Setup > Discharge	
BMS_Err_Stop	Disable
Shutdown	48.0 V <sup>(1)</sup>
Low Batt	49.5 V <sup>(1)</sup>
Restart	52.8 V <sup>(1)</sup>
Batt Empty V	48.0 V
Batt Resistance	Set to: Ten mOhm divided by the number of batteries, plus the mOhm value of resistance for interconnection and homerun cabling. <sup>(2)</sup>

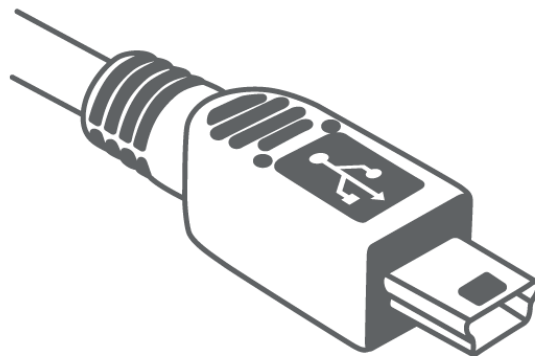
<b>Batt Setup &gt; Discharge</b>	
Batt Charge Efficiency	98.0 %
<p>(1) Discharge state-of-charge percentage values are unavailable in an open-loop (voltage-based) configuration.</p> <p>(2) This value should include cable and connection resistance. The formula is provided to assist with the calculation of a general value.</p> <p>The values and parameters used are for an operating temperature of 25 °C (77 °F).</p>	

## 6.2 Setting the LYNK II Communication Protocol for Sol-Ark

After establishing the open-loop configuration, the LYNK II Communication Protocol is set, followed by the Sol-Ark closed-loop configuration.

### 6.2.1 The Protocol Configuration Procedure

1. Download the current version of LYNK ACCESS software from the Discover Battery website to obtain the most up-to-date suite of available protocol configurations.



USB Type-B mini plug

2. Using a USB cable with a Type-B mini-plug, connect the 64-bit Windows 10 / 11 device running LYNK ACCESS software to the USB port on LYNK II. Ensure LYNK II is powered and connected to the correct Sol-Ark COM port.
3. Open LYNK ACCESS. Options for configuration and settings are found by selecting the LYNK tab.

4. Connect the LYNK II and open LYNK ACCESS. Ensure that only one LYNK device is connected to the computer.
5. Open LYNK ACCESS and select the LYNK tab. Select the blue gear icon in the upper right area of the CAN Settings tile.
6. Select the pre-configured Sol-Ark protocol to complete the closed-loop configuration for LYNK II. Click SAVE to confirm the configuration.

**NOTE**

Saving configuration changes using LYNK ACCESS will automatically cause LYNK II to shut down and restart.

### 6.3 Setting Up Sol-Ark Closed-Loop Configuration

**NOTICE****OVERCHARGE / OVERDISCHARGE HAZARD**

In a closed-loop configuration with the BMS Lithium Batt function enabled, the BMS\_Err\_Stop parameter must be enabled. If the BMS\_Err\_Stop parameter function is not enabled, the Sol-Ark inverter will continue to operate based on the last communicated battery values. Depending on the mode of operation at the time of communication fault and given enough time, the Sol-Ark inverter-charger will eventually put the attached battery into an overcharged or fully discharged state. When that occurs, either situation will trigger the Discover Lithium Battery BMS to self-protect and disconnect the battery from the system.

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

**NOTE**

It is recommended that the Sol-Ark inverter be programmed with the appropriate open-loop settings before enabling closed-loop communication.

Complete the Closed-loop configuration after establishing both the Sol-Ark open-loop configuration and the LYNK II Sol-Ark communication protocol. Ensure the Discover Lithium Batteries are networked with LYNK II and that the LYNK II is connected to the Sol-Ark network port.

If necessary, first configure Sol-Ark inverters to operate in parallel by establishing the inverter master/slave relationships and phase designations before setting the parameters for battery operation. Configuring the master inverter will cascade parameters and settings to the other inverters.

### Closed-loop Configuration Procedure

Refer to the latest Discover Energy Systems documentation for battery values and the latest Sol-Ark documentation for menu navigation and details on the setup procedure.

1. Set the Discover Lithium batteries to ON and set the inverter to ON.
2. Using the touch screen and keypad on the inverter, navigate from the SYSTEM SETUP menu to the BATT SETUP menu screen.
3. Enable and disable parameters according to the instructions in the tables below.
4. Set each adjustable value according to the instructions in the tables below
5. Touch the OK button to save all onscreen values - Ignore data displayed in GREY boxes.

#### NOTE

Touch the Sol-Ark screen to:

- Navigate the Sol-Ark onscreen menus.
- Enable parameters.
- Activate the adjustment of values.
- Save all onscreen settings.

Values are adjusted using the keypad.

#### NOTE

Enable parameters with a CHECKMARK, and disable parameters by clearing the check box. Touch a WHITE box onscreen to activate the adjustment of that value. Selecting parameters either enabled or disabled alters which values are available to be adjusted.

- A WHITE BOX indicates values that can be adjusted.
- A GREY BOX indicates values that cannot be adjusted, and any displayed value should be ignored.

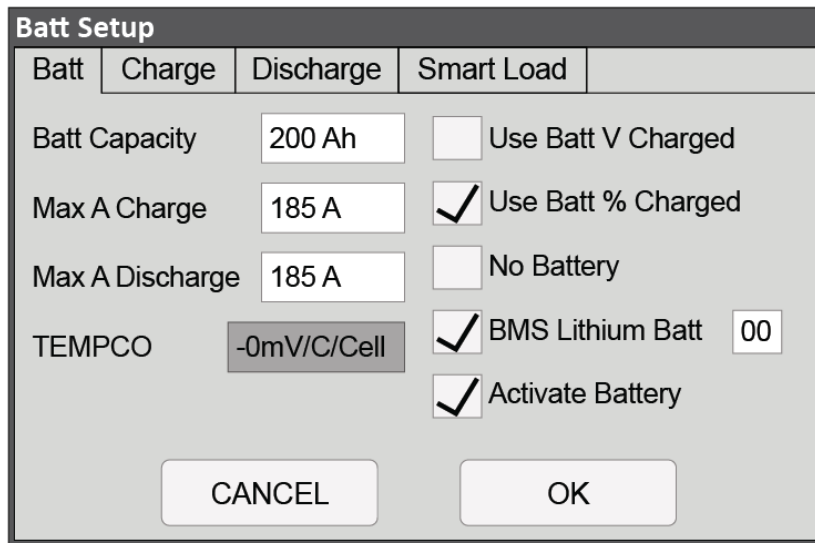
**NOTE**

If necessary, configure Sol-Ark inverters to operate in parallel before setting the parameters for battery operation.

**6.3.1 Closed-Loop - Batt Setup > Batt**

Touch the BATT tab onscreen to start the programming sequence (see image below).

- Touch the OK button to save all onscreen values - Ignore data displayed in GREY boxes.



Closed-Loop Battery Setup > Battery (Two 130Ah AES Batteries with 12K-P)

Batt Setup > Batt	
Batt Capacity	Set to the number of Discover Lithium batteries x Ah capacity of each. (For example, set to 200 Ah for two AES RACKMOUNT batteries, each rated at 100 Ah capacity).

<b>Batt Setup &gt; Batt</b>	
Max A Charge	<p>For a single inverter: set to the lesser of the inverter's max charge capacity, or the quantity of attached batteries, multiplied by the battery model's specific max charge rating. For example, a 12K-P inverter would be set to the lesser of the inverter's max charge rate of 185 A, or 190 A for two AES RACKMOUNT 48-48-5120 batteries rated at 95 A max charge each. <sup>(2)</sup></p> <p>For a three-phase system: set to the lesser of the max charge value for the master inverter, or the quantity of attached batteries multiplied by the battery model's max charge rating, divided by the number of inverters. For example, the master 12K-P would be set to the lesser of the inverter's max charge rate of 185A, or 126 A, for a battery bank of four AES RACKMOUNT 48-48-5120 batteries rated at 95 A max charge each (380 A divided by three inverters).</p>
Max A Discharge	<p>For a single inverter: set to the lesser of the inverter's max discharge capacity, or the quantity of attached batteries, multiplied by the battery model's specific max discharge rating. For example, a 12K-P inverter would be set to the lesser of the inverter's max discharge rate of 185 A, or 190 A for two AES RACKMOUNT 48-48-5120 batteries rated at 95 A max discharge each. <sup>(1)</sup></p> <p>For a three-phase system: set to the lesser of the max discharge value for the master inverter, or the quantity of attached batteries multiplied by the battery model's max discharge rating, divided by the number of inverters. For example, the master 12K-P would be set to the lesser of the inverter's max discharge rate of 185 A, or 126 A, for a battery bank of four AES RACKMOUNT 48-48-5120 batteries rated at 95 A max discharge each (380 A divided by three inverters).</p>
TEMPCO	This value is disabled (grey) when BMS Lithium Batt is enabled.
Use Batt V Charged	Disable
Use Batt % Charged	Enable

<b>Batt Setup &gt; Batt</b>	
No Battery	Disable
BMS Lithium Batt	Enable and set to 00 <sup>(2)</sup>
Activate Battery	Enable

(1) The recommended value for Max A Charge is 75% of the rated maximum charge current for the battery.

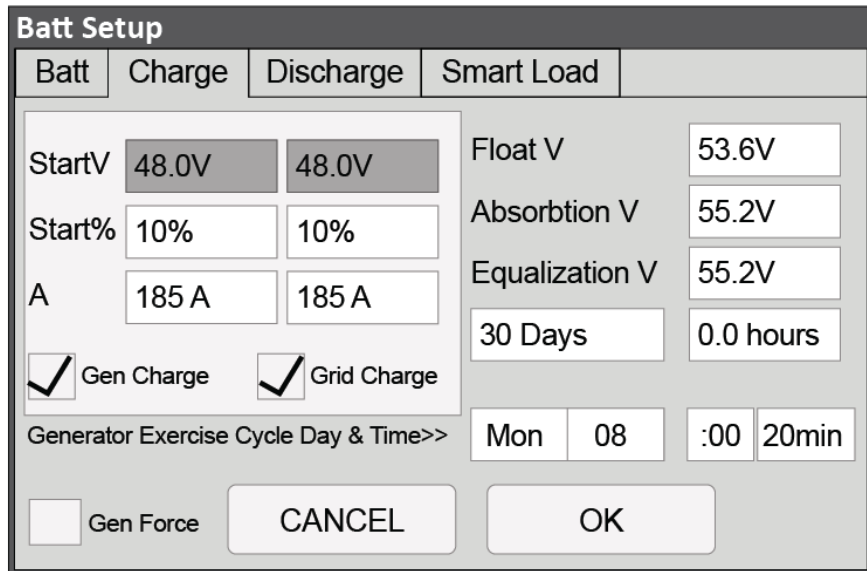
(2) Setting the BMS Lithium Batt parameter to Enable confirms closed-loop operation. Ensure that a checkmark and 00 (CANBus Battery mode) is displayed.

The values and parameters used are for an operating temperature of 25 °C (77 °F).

### 6.3.2 Closed-Loop - Batt Setup > Charge

Touch the CHARGE tab onscreen to start the programming sequence (see image below).

- Touch the OK button to save all onscreen values - Ignore data displayed in GREY boxes.



Closed-Loop Battery Setup > Charge (Two 100 Ah AES RACKMOUNT Batteries with 12K-P)

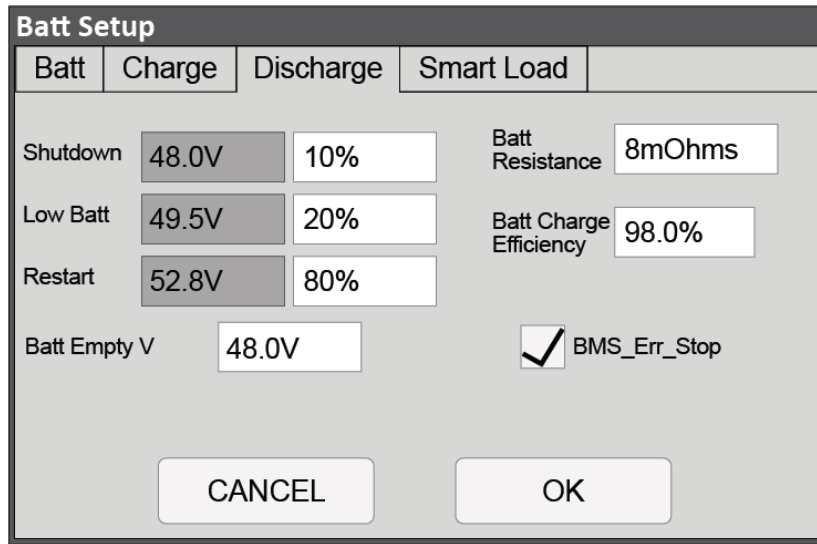
<b>Batt Setup &gt; Charge</b>	
Gen Charge	Enable if charging from a generator is desired. <sup>(1)</sup> Note: The Gen Input Breaker must be connected to the output of an AC generator for this work.
Grid Charge	Enable if charging from the grid is desired. <sup>(2)</sup> Note: The Grid Input Breaker must be connected to input from the grid for this to work.
StartV	Unavailable (Grey) in a closed-loop configuration.
Start%	Set to user preference based on battery State-of-charge as a percentage. The recommended minimum is 10%.
A	Set to the same Amp value that was set for Max A Charge. <sup>(3)</sup>
Float V	Value is communicated by BMS in a closed-loop configuration. Ignore the displayed value.
Absorption V	Value is communicated by BMS in a closed-loop configuration. Ignore the displayed value.
Equalization V	The function is disabled in a closed-loop configuration. Ignore the displayed value.
Gen Exercise Cycle Day & Cycle	Refer to Solar-Ark documentation.
Gen Force	Refer to Solar-Ark documentation.

<b>Batt Setup &gt; Charge</b>	
<p>(1) Left column options are for Gen Charge AutoStart values (Reference Sol-Ark documentation for more details on the generator AutoStart function).</p> <p>(2) Right Column options are for Grid Charge values.</p> <p>(3) If need be, this value is used to curtail the maximum current output of the charger.</p> <p>The values and parameters used are for an operating temperature of 25 °C (77 °F).</p>	

### 6.3.3 Closed-Loop - Batt Setup > Discharge

Touch the DISCHARGE tab onscreen to start the programming sequence (see Figure X.x).

- Touch the OK button to save all onscreen values - Ignore data displayed in GREY boxes.



Closed-Loop Battery Setup > Discharge (Two 100 Ah AES RACKMOUNT Batteries with 12K-P)

<b>Batt Setup &gt; Discharge</b>	
Shutdown	Set to user preference based on battery State-of-charge as a percentage. The recommended minimum is 10%. <sup>(1)</sup>

<b>Batt Setup &gt; Discharge</b>	
Low Batt	Set to user preference based on battery State-of-charge as a percentage. The recommended minimum is 20%. <sup>(1)</sup>
Restart	Set to user preference based on battery State-of-charge as a percentage. <sup>(1)</sup>
Batt Empty V	48 V
Batt Resistance	Set to: Ten mOhm divided by the number of batteries (plus mOhm value for cable resistance, if known). <sup>(2)</sup>
Batt Charge Efficiency	98.0 %
BMS_Err_Stop	Enable <sup>(3)</sup>
<p><sup>(1)</sup> A closed-loop configuration uses % state-of-charge. Discharge voltage values are not available.</p> <p><sup>(2)</sup> This value should include cable and connection resistance. The formula provided is to assist with the calculation of a general value.</p> <p><sup>(3)</sup> BMS_Err_Stop MUST be enabled to cause the inverter to stop operating if there is a communication error. If BMS_Err_Stop is disabled, the inverter will continue to operate using the last communicated battery values.</p> <p>The values and parameters used are for an assumed operating temperature of 25 °C (77 °F).</p>	

### 6.3.4 Batt Setup > Smart Load

Optional functionality. See Sol-Ark documentation for details on use and setup.