

Invicta Lithium Xero SNLX - User Manual



Safety

1.1 Statement: Please read this manual carefully before installation, operation, and maintenance, and pay attention to various warning signs and statements on the equipment. After reading this manual, please keep it safe for future reference.

1.2 Specification: This manual's contents using the following symbols should be paid special attention to during operation.

SYMBOL	STATEMENT
	Attention, caution, warning: Reminder of precautions during operation
	Danger, Reminder that there is a risk of electric shock during operation and protective measures need to be taken
	Explanation or reminder, Matters that require special explanation or reminder

1.3 Critical Safety Information: Before installing, operating, or maintaining the battery, read the following operating and maintenance instructions: Before installing:

It is crucial to read the user manual carefully before installing or using the battery. Failure to follow instructions or warnings in this document may result in electric shock, serious injury, or damage to the battery and the entire system.

Before connecting the battery pack to your device, check the voltage and ensure that they are within the limits of your device specifications. Failure to comply with these specifications will void your warranty.

During installation:

Personnel familiar with the electrical specifications of their country or region are required to install battery packs. For optimal safety, please follow the steps described in this manual.

Battery operation:

- Prohibit connecting batteries to different types of batteries.
- Do not use faulty or mismatched chargers to charge the battery.
- Follow the environmental conditions specified in the product specification.
- If the battery is found to be deformed, abnormally hot, or emitting an odour, immediately cut off the power and stop using it.

1.4 Battery Maintaining: A professional personnel should take care of the charging operation, ensuring good contact between the plug and socket during the charging process, regular operation of the charging equipment, and good contact at all connection points of the battery pack. If there is an abnormality, it needs to be repaired before charging.

If there is a large amount of dust, metal shavings, or other debris on the upper cover and pole of the battery pack, clean it with a vacuum cleaner promptly, and avoid using water or objects soaked in water for cleaning.

Try to avoid splashing water or other conductive objects onto the battery cover and pole during charging and discharging, such as when exposed to heavy rain for use.

Estimate the charging and discharging time of the battery or battery pack based on its actual usage status. Pay attention to observing whether there are any abnormalities in the battery or battery pack at the end of charging and discharging, such as voltage difference issues.

Check whether the conductive strip, voltage connection terminal, and other nodes are loose, detached, rusted, or deformed, ensuring the batteries used in series or parallel connection are fixed and reliable (once every three months).

1.5 Waste Disposal: Please handle packaging and components in accordance with the laws and regulations of the country or region where the battery pack is located. Do not mix batteries with general waste.



Installation

2.1 Tools and Equipment:

- Insulating gloves
- Safety shoes
- Correct tools

2.2 Battery Placement: Place the battery pack on the support surface. Do not lay it upside down; do not place any covers above the pack, do not cover the pressure release valve. The schematic diagram of battery pack placement is shown below.

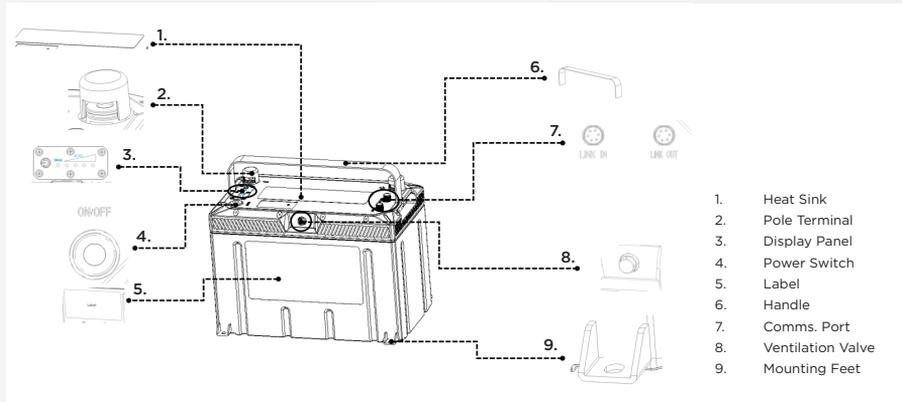


2.3 Box Contents: Material List

SN	Item	QTY	SPEC
1	Comms Cable	1	500mmL, M1 with 2 circular communications interfaces at each end
2	Battery	1	SNLX
3	Screw	2	M8

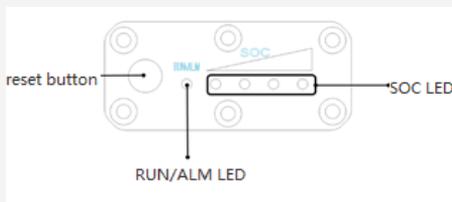
Introduction to Invicta Lithium XERO Batteries

3.1 Main Features: Invicta Xero is a LifePO4 chemistry which ensures exceptional safety and extended lifespan. It boasts high reliability, maintaining consistent performance across a broad temperature range. The battery's enhanced heat dissipation allows for prolonged high-current charging and discharging. Additionally, the communication function enables seamless interaction with external devices through CAN, optimizing battery management.



3.2 Product Appearance:

- 1. Heat sink:** The heat sink is a cooling component that benefits the battery life. At the same time, the heat sink is a hot decoration that cannot be touched by hand during battery use to avoid burns.
- 2. Pole terminal:** Each battery has a positive and negative terminal. During use, be sure to identify and avoid reversing the positive and negative poles. After connecting the power line to the pole terminal, cover it with a protective cover to prevent short circuits.
- 3. Display Panel:** The battery display panel has one fault/running light, 4 SOC indicator lights, and one button: the usage method is as follows: RUN/ALM: One red light, one yellow light, displayed in yellow when the battery is normal; when there is a battery failure alarm or protection, it will display in red.
- 4. Battery Power Switch:** The battery power switch is used to turn the battery on or off. When the battery is in the ON state, it indicates that the battery BMS is in a normal state and can



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be charged, discharged, and connected to Bluetooth; when the battery is in the OFF state, it indicates that the battery is in a shutdown state, and cannot be charged or discharged, and cannot connect to the battery Bluetooth; The battery enters a sleep state. Placing the switch in the OFF state can reduce BMS power consumption when the battery is not used for a long time.

The lithium battery is equipped with an intelligent BMS, which is designed to protect the battery cell. From the OFF state to the ON state, the BMS performs a self-check, and the self-check time does not exceed 10 seconds. Therefore; the startup time is normal within 10 seconds.

IMPORTANT!!! Reset button: The battery cannot be used normally until it is activated. Press and hold for 15 seconds (ref. Display Panel)

Explanation of indicator lights below

Indicator light		Always on during charging or discharging	Flashing during standby 1
Indicator light		Always on when there is a malfunction	

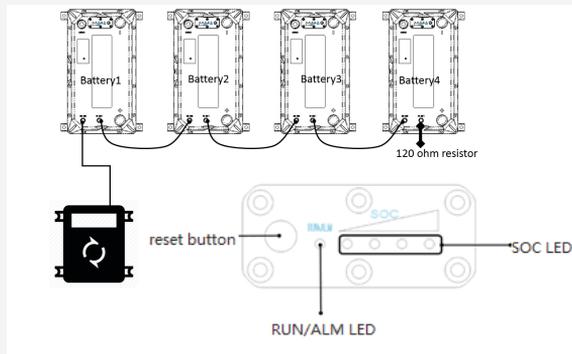
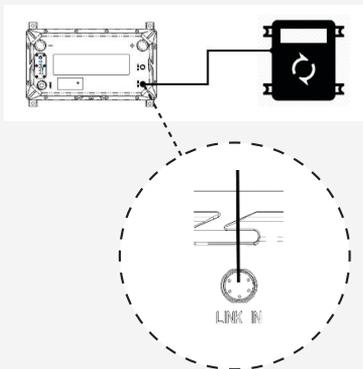
Blinking mode	Lighting time	Off time
Blink 1	0.25s	3.75s
Blink 2	0.5s	0.5s

Status	Charge				Discharge			
	L1	L2	L3	L4	L1	L2	L3	L4
SOC								
0-25%	off	off	off	Blink2	off	off	off	On
25-50%	off	off	Blink2	On	off	off	On	On
50-75%	off	Blink2	On	On	off	On	On	On
75%-100%	Blink2	On						

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Usage method:

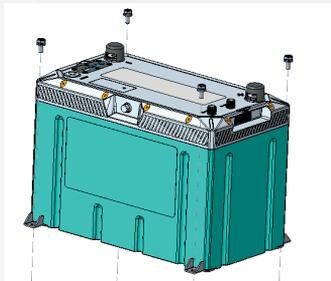
- When using the battery for the first time, place the battery power switch in the ON position.
 - Short press the reset button for 1s to indicate battery SOC. The LED will be on for 10s.
 - Long press and hold the reset button for 10s to activate the battery. After activation, the LED lights will indicate the battery SOC; RUN light flashing yellow. It is used to match the battery address for networking automatically. For detailed purposes, please refer to the networking function.
5. **Label:** During use, matching the corresponding charger and loading according to the label parameters is essential to avoid battery failure.
 6. **Handle:** The handle is used to bear the weight of the battery. When lifting the battery, observe the stability of the handle to avoid the battery falling off.
 7. **Communication Port:** There are two communication ports: one is Link in, and the other is Link out. Pay attention during use. A 120 ohm resistor will be required when comms port in use. See **4.5.2 Networking Method for more information**
 - When the battery communicates with external devices, a Link cable must be connected.
 - A: Schematic diagram of single battery usage
 - B: When multiple batteries are used in series or parallel, the external device communication line must be connected to the battery Link.
 - C: Press and hold host battery (battery 1) reset button for 15 seconds to match address



8. **Pressure relief valve:** The waterproof grade is IP67 because the battery is heating during charging and discharging, which leads to thermal expansion. Adding a pressure relief valve can prevent the air pressure inside the battery box from rising, resulting in dangerous accidents. Make sure that there is no other object around the pressure relief valve.
9. **Installation bracket:** Install the bracket to facilitate battery installation in vehicles. It is recommended to use M6 stainless steel screws to secure the battery.

3.3 Functional Characteristics

3.3.1 First Use: Observe that there are no signs of the battery being disassembled. When the battery leaves the factory, the power switch will be turned off and in the OFF state. Before using the battery, turn the switch to the ON state, and the LED display light will be on.



Scan to see the full specifications of the SNLX Range.

3.3.2 Communication Port: 2 x Communication ports with CAN communication; You can upgrade the battery firmware through the communication port. It can communicate with other devices through the communication port.

3.3.3 Power Switch: When the battery is in transportation or long-term storage, it can be turned off, which is of extremely low self-consumption, ensuring that the battery can be stored for a long time without being discharged. At the same time, it improves the battery's safety.

Series and Parallel Connection of Batteries

4.1 Introduction: The Xero battery allows multiple batteries to be connected in series or parallel and simultaneously in series and parallel. This allows for the assembly of different voltage systems and the expansion of battery system capacity. For example, four 12.8V200Ah batteries can be connected in series and parallel to form a 25.6V400Ah battery system.

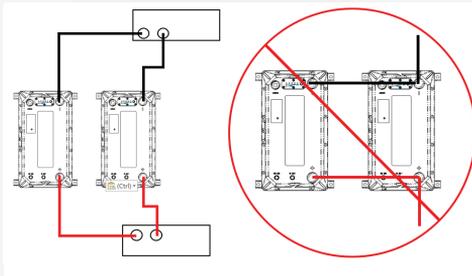
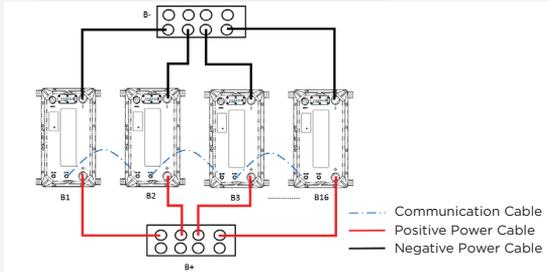
When multiple sets of batteries are connected in series or parallel at the same time, in addition to external power lines, communication lines can be connected between the batteries, and internal communication between the batteries can better obtain battery information. One battery can be set as the host battery, and the other batteries can be set as the slave battery. The host collects all information about other slave batteries and can communicate with external devices such as inverters, display screens, MPPTs, etc.

Before connecting batteries in series or parallel, pay attention to: a). The batteries must be of the same model. When there are different models, different capacities, and different voltage platforms, series and parallel connections are not allowed; b). Ensure that all parallel wires are of identical length; c). 0.5C charging is recommended, that is, charging current = rated capacity of the battery * 0.5C; d). Before connecting the batteries in series and parallel, the voltage of each group of batteries must remain highly consistent.

It is recommended that the voltage difference between battery packs be:

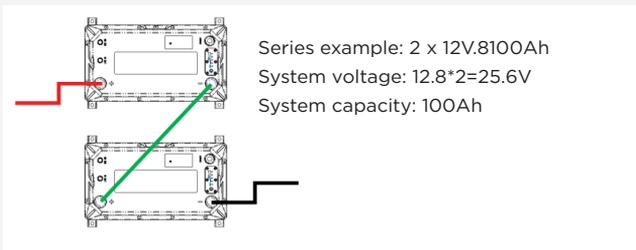
- Voltage difference < 2000mV (@ 0%-95% SOC)
- Voltage difference < 1500mV (@ 96%-100% SOC)
- When battery batteries are connected in series and parallel, they will be charged and discharged as a whole system.

4.2 Parallel Usage: A maximum of 16 batteries can be used in parallel. Before connecting batteries in parallel, use a multimeter to test the voltage between the positive and negative terminals of the battery. You can also check the battery voltage through the Bluetooth app to ensure that the voltage between the batteries does not exceed 2V, which can be connected in parallel. If the voltage between the batteries exceeds 2V, each battery must be fully charged separately, left for 1 hour and then used in parallel. (see picture next page)



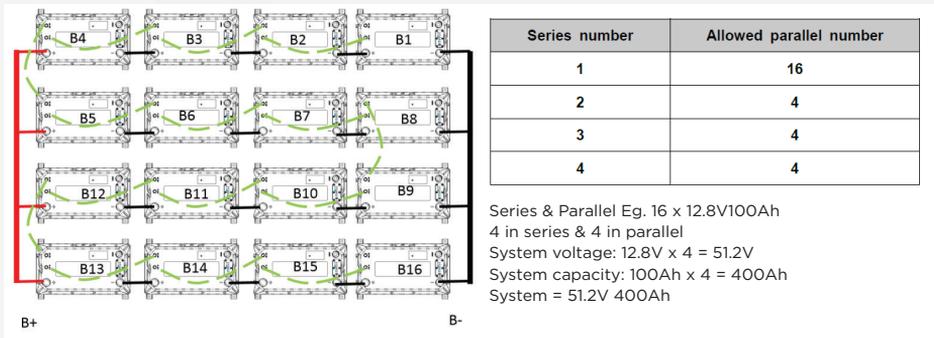
Parallel example: 2 x 12.8V100Ah
 System voltage: 12.8V
 System capacity: 100Ah + 100Ah = 200Ah

4.3 Series Usage: A maximum of 4 batteries can be used in series. Before connecting the batteries in series, use a multimeter to test the voltage between the positive and negative terminals of the battery. You can also check the battery voltage through the Bluetooth app to ensure the voltage between the batteries does not exceed 2V. If the voltage between the batteries exceeds 2V, each battery must be fully charged separately, left for 1 hour, and then used in series. Series connection method: Connect the battery's positive pole to the negative pole of the next battery, and so on. For example, two 12.8V100Ah batteries are connected in series.



Series example: 2 x 12V.8100Ah
 System voltage: 12.8*2=25.6V
 System capacity: 100Ah

4.4 Simultaneous Series and Parallel: To series batteries allow simultaneous use of batteries in series and parallel, with a maximum support of 4 series and 4 parallel applications. The connection method is: first in series, then in parallel, which means that the batteries are connected in series to form a high voltage and then in parallel to form a high capacity.

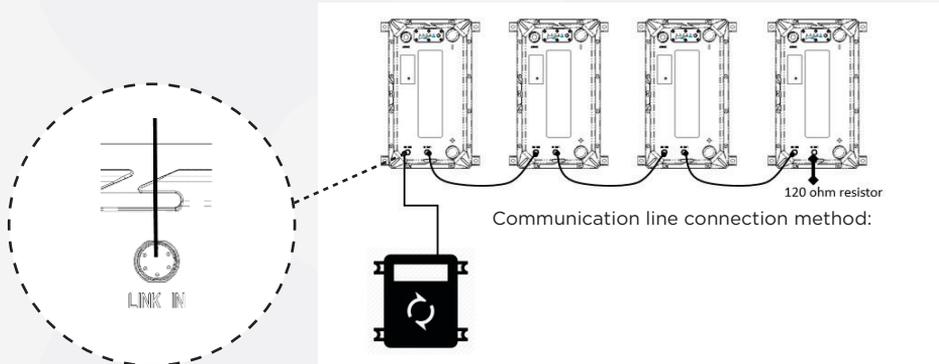


4.5 Battery Communication

4.5.1 Communication Terminal Connection: The series of Xero batteries have the function of communication networking between batteries. When communication with external devices is needed, the networking function can be used to enable the battery to summarise information. The battery can be used alone or used for communication networking, which is more prominent in some intelligent devices. When using this function, it is essential to understand its purpose and carefully read the following instructions for correct operation.

The battery includes a Controller Area Network (CAN) bus communication interface. Two circular M8 DIN connectors are located at the top of the battery to connect one battery (Link in) to another battery (Link out) using a CAN bus cable in a simple daisy link wire method.

Users can use an external communicated cable (optional) to connect to batteries and other devices via the CAN bus. This allows for communication between the battery and the load or charger, making it more efficient to use the battery. This is also beneficial for understanding battery faults. If you have more questions about the CAN bus, please get in touch with Invicta Lithium for technical support.



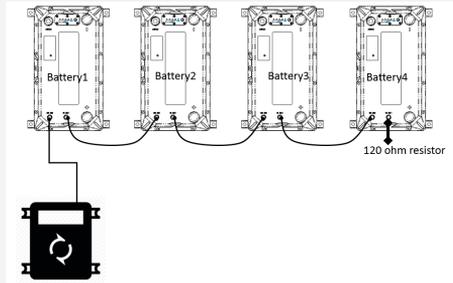
For normal battery operation, the CAN bus function is not mandatory. The battery can automatically operate and protect itself; it does not require any CAN bus communication or external devices (such as external controllers) or other CAN bus connected batteries to operate. Retain the two black covers installed on the two M12 connectors to protect them from environmental influences when not in use.

4.5.2 Networking Method: After connecting the battery through the communication cable, it is necessary to use the Bluetooth connection method through the smart APP to network the battery.

- **Equipment Operation:** Wiring: When all batteries are turned off, use the power line to connect the batteries in series and parallel (first in series and then in parallel); Please refer to this chapter <4.2 Parallel Use>. <4.3 Series Use>. <4.4 Simultaneous Series & Parallel Use>
- The battery connected to external devices serves as the first battery (Battery1), and we define this battery as the host, while other batteries are the slaves; The LINK OUT of host battery1 is connected to the LINK IN of slave battery2, Connect the LINK OUT of slave battery2 to the LINK IN of slave battery3; and so on. Turn on the battery power switch: switch from OFF to ON.

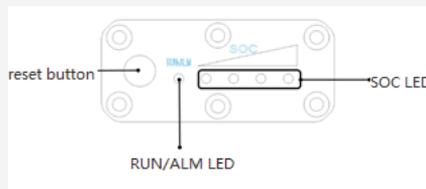
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- **Matching Address:** After pressing the host (battery 1) reset button for 15 seconds, the indicator light will start running. After all the indicator lights are off, it means that the internal address allocation of the battery is completed;
- Attention: The battery must be connected to the power line in a series first and then in parallel mode. The communication line should first connect the first cluster of series connected batteries, and then connect the second cluster of series connected batteries; cannot mix;
- The matching address must select battery 1 as the host, and long press and hold its reset button for 15s. Do not select and press the reset button of other slave batteries. This step is particularly important as improper operation may result in battery networking failure.



! Attention: The battery must be connected to the power line in a series first and then in parallel mode; The communication line should first connect the first cluster of series connected batteries, and then connect the second cluster of series connected batteries, cannot mix; The matching address must be selected battery1 as the host, and long press and hold its reset button for 10s. Cannot select and press the reset button of other slave batteries. This step is particularly important as improper operation may result in battery networking failure.

Press reset button on battery 1 once battery is wired up: The battery cannot be used normally until it is activated. Press and hold for 15 seconds (ref. Display Panel)



Charging Requirements

We recommend using a charging source with specific lithium charging settings to meet the following charging requirements and achieve the optimal performance and lifespan of INVICTA LITHIUM XERO series batteries.

5.1 AC-DC Charger: Check if the AC-DC battery charger you plan to use has a dedicated lithium charging setting that meets the above charging requirements. Many battery chargers are designed only for lead-acid batteries and may not have appropriate lithium charging settings.

Model	Recommended Charge Voltage	Recommended float voltage	Cut-off Voltage	Max. Charge Current	Recommended Charge Current	Operation Temperature
48V	57.6V	54.4V	44.8V	1C	0.3C	Charge: 0 ~45°C Discharge: -20~65°C
36V	43.2V	40.8V	33.6V			
24V	28.8V	27.2V	22.4V			
12V	14.4V	13.6V	11.2V			

We recommend using a charging source with specific lithium charging settings to meet the following charging requirements and achieve the optimal performance and lifespan of INVICTA LITHIUM XERO series batteries.

5.1 AC-DC Charger: Check if the AC-DC battery charger you plan to use has a dedicated lithium charging setting that meets the above charging requirements. Many battery chargers are designed only for lead-acid batteries and may not have appropriate lithium charging settings.

5.2 Photovoltaic Charging: Check if the solar regulator you plan to use has a dedicated lithium charging setting meeting the above requirements. INVICTA LITHIUM Xero series batteries can be charged using a solar regulator without lithium charging settings, but it must be set to charge no more than 58.4V (4 batteries in series, with a maximum charging voltage of no more than 14.6V for a single battery). After the battery is fully charged, please switch to the recommended floating voltage.

5.3 Charging with an AC Generator through a DC-DC Charger: Check if the DC-DC charger you plan to use has a dedicated lithium charging setting meeting the above requirements. You can use a DC-DC charger without lithium charging settings to charge INVICTA LITHIUM XERO series batteries. However, it must be set to charge no more than 58.4V (4 batteries in series, with a maximum charging voltage of no more than 14.6V for a single battery), and then it must be turned off after the INVICTA LITHIUM XERO series battery is fully charged. After the battery is fully charged, please switch to the recommended floating voltage.

5.4 Recommended Charging Voltage: We strongly recommend a dedicated lithium charger to charge the battery fully and safely and achieve optimum Xero battery performance.

5.5 Passive Balance Function: When the battery is charged close to SOC 100%, due to the chemical characteristics of lithium batteries, the voltage difference between the cells will gradually expand. To ensure that each cell has the same capacity, slightly higher-capacity cells will be consumed, allowing the remaining cells to catch up.

Battery Recycling

Invicta Lithium® Xero lithium-ion batteries are recyclable and should not be treated as household waste or landfill waste. If you need assistance in recycling batteries, please get in touch with your dealer or Invicta Lithium.

Transportation and Storage

- During transportation, there should be no severe vibration, impact, or compression, and it should be protected from sunlight and rain.
- Handle with care during loading and unloading, and strictly prevent falling, rolling, and heavy pressure.
- The battery should be stored in a dry, clean, dark, and well-ventilated indoor environment for a long time. The recommended storage temperature range is 15-35 °C.
- The storage area should be free of harmful gases, flammable and explosive materials, and corrosive chemicals.

Warnings and Reminders

Please carefully read the battery specifications or instructions before use. Improper use may cause the battery to heat up, catch fire, rupture, damage, or decrease capacity. Sealed Performance Batteries Pty Ltd. shall not be responsible for any accidents caused by not following our operating instructions.

Warning!

- The battery must be kept away from heat sources, high voltage, and direct sunlight.
- Do not throw the battery into water or fire.
- Do not invert the two terminals when using the battery.
- Do not connect the positive and negative poles of the battery to the conductors.
- Do not strike, throw, or step on the battery.
- Do not disassemble the battery without the manufacturer's permission and guidance.
- Do not mix batteries of different capacities and brands.

Reminder:

- It is recommended to fully charge the battery every month to correct the battery SOC.
- When the battery is over-discharged, please charge the battery in a timely manner (≤ 2 days).
- Please use a dedicated lithium battery charger to charge the battery.
- Please stop using the battery if it emits odour, heat, deformation, or any abnormalities occur.
- Please place the battery away from children or pets.
- If the battery pack electrolyte leaks, please avoid contact with liquids or leaked gases. If the battery pack electrolyte leaks, please take the following steps immediately:
 - Inhalation of gas: Evacuate personnel from the contaminated area and seek medical attention as soon as possible.
 - Eye contact: Rinse eyes with water for 15 minutes and seek medical attention as soon as possible.
 - Skin contact: Thoroughly rinse the exposed area with soap and water to ensure no chemicals or soap residues are on it, and seek medical assistance as soon as possible.
 - Swallowing: Try to induce vomiting and seek medical attention as soon as possible.
 - Fire: Please use carbon dioxide fire extinguishers instead of liquid fire extinguishers to extinguish the fire.

Warranty

Invicta has a 7-year full replacement warranty when installed in an approved application and when instructions in this manual have been followed. Please refer to your warranty card or invictalithium.com.au and register your battery to ensure your battery is in an approved application. A copy of the warranty statement can be found at www.invictalithium.com.au/warranty-statement/.

Contact Details

A range of resources can be found at invictalithium.com.au. This includes specifications, product registration and our warranty statement. If you require further assistance with your Invicta battery, please contact the team at Sealed Performance Batteries (SPB) on 1300 001 772 or info@spb.net.au.

Invicta Lithium is a brand and registered trademark of Sealed Performance Batteries (SPB), a company that has over 25 years experience in energy storage and are located in Brisbane, Sydney and Melbourne. For more information on SPB please visit spb.net.au

