User Manual

Slimline LiFePO$_4$ Battery

PLI12-100BT-SLIM

PLI12-200BT-SLIM

V1.0

Introduction

The Predator Lithium slimline series are high performance 12V deep cycle Lithium Iron Phosphate (LiFePO$_4$) batteries. There are two sizes available; a compact 100Ah version and a larger 200Ah version which are both only 70mm deep. These batteries have been designed to fit in locations where space is limited, such as behind seats in utility and commercial vehicles.

The integrated Battery Management System (BMS) includes Bluetooth communication which allows the battery to be remotely monitored using the Predator Lithium App, available for both Android and iOS devices. The slimline series also include communication ports which enables CANBus communication with Victron inverters.

The LiFePO$_4$ cells are thermally stable and considered non-combustible, which ensures safe and reliable operation.

It is important that you read this User Manual before attempting to install the battery to ensure you understand the installation and operation of this battery. Failure to do so may void your warranty.

Warnings & Safety

- Read this manual carefully before installing or using the product
- Keep the manual in a safe place so it can be referred to as required
- Any damage or injury as a result of misuse is the responsibility of the user
- The information in this manual is subject to change without notice
- Do not short circuit the battery
- Do not disassemble the battery
- Do not drop the battery
- Do not store or use battery near a heat source
- Do not connect battery to high voltage
- Do not connect more than 4 batteries in series
- Do not expose battery to water or fire
- Do not install in an external location – internal installation only (IP30)
- Always check polarity before connecting battery
- Do not use excessive force when attaching wires to battery terminals
- Do not expose the battery to impact or crushing force
- Do not allow the battery to remain discharged
- The battery must be positively retained when installed to prevent damage or short circuit
- Ensure the correct battery charger is used for charging
- If battery emits an odour, or the case becomes hot or distorted, stop using the battery
- If eyes or skin are exposed to liquid leaking from battery, wash with water immediately and seek medical advice

Battery Operation

The Predator Lithium batteries will enter sleep mode to conserve energy if there is no charge or discharge activity for 24 hours. Any charging or discharging activity will re-activate the battery.

If the battery is over-discharged, the battery will enter sleep mode after 5 minutes to protect the battery. The battery will re-activate when the battery begins charging.

Connections

The main battery power output terminals are located on the side panel of the battery as well as two BMS communication ports and a main output circuit breaker (figure 1). The circuit breaker can also be used to isolate the battery outputs when it is not in use.

Circuit Breaker   **Communication Ports**   **Power Outputs**

Fig. 1 – Connections on side panel

Battery Status Panel

The front of the battery features a small panel which contains a power button as well as a number of LED indicators which are used to show the current status of the battery (see figure 2).

POWER: To switch the battery ON or OFF, press and hold the power button for 6 seconds.

State of Charge (SoC): There are four LED's which indicate the SoC of the battery (25%, 50%, 75% & 100%).
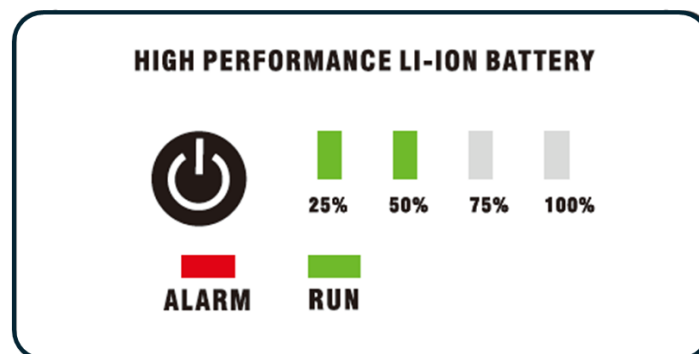

Fig. 2 - Battery Status Panel

Battery Status

The six LED's in the Status Panel (figure 2) are used to indicate the current battery status. The table below explains how each status is displayed:

Battery Status	BMS Status	RUN	ALARM	SoC LED's	Action
Shutdown		OFF	OFF	All OFF	
Standby	Normal	Flash 1	OFF	Display SoC	
	Low voltage	Flash 1	Flash 2	Display SoC	Charge battery
Charge	Normal	ON	OFF	Display SoC	
	Warning	ON	Flash 2	Display SoC	
	Over Charge Protection	ON	OFF	All ON	Disconnect charger
	Temperature or over current protect	OFF	OFF	All OFF	
Discharge	Normal	ON	OFF	Display SoC	
	Warning	ON	Flash 2	Display SoC	
	Low voltage protect	OFF	OFF	All OFF	Disconnect all loads
	Temperature, over current or short circuit protect	OFF	ON	All OFF	

Note: **Flash 1:** ON 0.25s, OFF 3.75s   **Flash 2:** ON 0.5s, OFF 1.5s

Bluetooth App

The slimline series are fitted with Bluetooth communication. The Predator Bluetooth App is available for both Android (Play Store) and iOS (App Store).

To conserve power, the Bluetooth circuit will sleep after a period of inactivity. The circuit will be re-activated when the battery is charged or discharged.

Communication

The Predator slimline BMS is capable of communicating with Victron inverters via CANBus. If more than one battery is connected in parallel, they can be linked to enable the inverter to see all batteries.

Each BMS has a default CAN Address of 0 from the factory. To enable communication with a Victron inverter, the BMS Address for each battery must be set up. The required components are included in the box with each battery.

Fig. 2 - (L to R): Communication cable, Coding Terminator (grey), CAN Terminator (blue)

To set up the BMS CAN Address to enable communication:

1. Ensure the battery (or batteries) are powered off and the circuit breakers are in the OFF position. If the batteries are powered on, press and hold the power button for 6 seconds. The LED's should not be illuminated, even when the power button is pressed momentarily.
2. If connecting multiple batteries in parallel, connect the power cables between the batteries (refer to Parallel Connection section below). Use the supplied fasteners, and ensure the connections are torqued correctly (9-10Nm max.) - do not overtighten as this may damage the terminal.
3. If you are only using one battery, insert the CAN Terminator in the DOWN socket of the battery (refer figure 3). If you are connecting multiple batteries in parallel, insert the CAN Terminator (blue colour) in the DOWN port of the last battery in the string.
4. For multiple batteries connected in parallel, insert the end of the communication cable labelled 'battery' to the UP port of the last battery (figure 3), and connect the 'inverter' end of the communication cable to the DOWN port of the next battery. Repeat this until all batteries are connected. You should have an empty UP port in the first battery.
5. Power on the batteries by pressing and holding the power button for 6 seconds. The SoC LED's will illuminate.
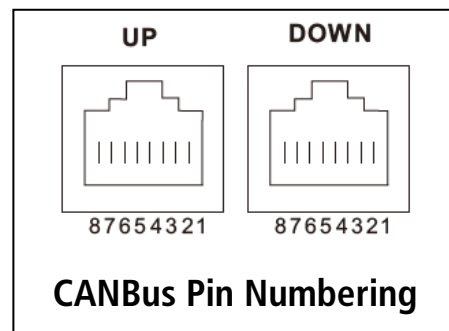

Fig. 3 - CAN Terminator in DOWN port

6. Insert the Coding Terminator (grey) in the empty UP port of the first battery. The RUN & ALARM LED's should begin flashing together, which indicates that the Address coding is in progress. When the LED's resume normal operation, the coding is complete.
7. Remove the Coding Terminator and connect the first battery to the inverter using the UP port.

Communication Pin Allocation

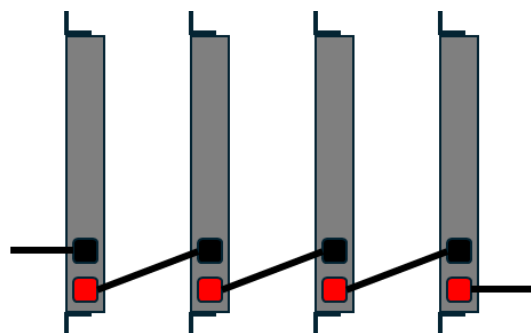| UP			DOWN			
Pin	**Description**		**Pin**	**Description**		
1	LED -		1	/		
2	O/F/LED +		2	SWB		
3	O/F		3	SWA		
4	CAN H		4	CAN H		
5	CAN L		5	CAN L		
6	COMG		6	COMG		
7	RS485-A		7	RS485-A		
8	RS485-B		8	RS485-B		

CANBus Pin Numbering

Series Connection

Up to a maximum of 4 batteries can be connected in series to achieve a higher operating voltage. Connecting more than 4 batteries is not supported as it will damage the BMS.

You must ensure the wire is large enough to flow the rated current of the batteries being connected. Undersized wire will result in poor performance and may damage the battery. Best practise is to use wire which is one size larger than required. A fuse should be installed to protect the wiring.

Up to 4 batteries in series (4S1P)

When connecting batteries in series, the batteries **must** be the same size and specification, and **must** also be at the same SoC. Failure to do this will reduce performance and may result in unreliable operation.
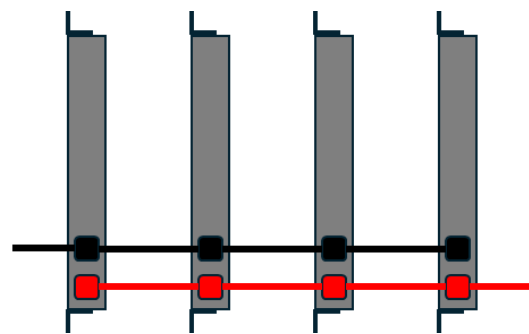
Parallel Connection

Up to 4 batteries can be connected in parallel to achieve an increase in battery capacity.

You must ensure the cable used is large enough to flow the total expected current of the battery group. Using undersize wire will result in poor performance and may damage the battery. Best practise is to use wire which is one size larger than required. A fuse should be installed to protect the wiring.

Up to 4 batteries in parallel (1S4P)

When connecting batteries in parallel, the batteries **must** be the same size and specification. The open circuit voltage of all batteries **must** be within 100mV (0.1V) to avoid high pulse current or sparking. Failure to ensure this may result in damage to the BMS.

Installation

There are 4 attachment points (8 threaded holes) which are integrated in the battery case. All 8 holes must be used to retain the battery to ensure the battery is securely mounted.

It is recommended that the 4 mounting brackets included in the box be used to install the battery. If an alternative mounting strategy is used, all 8 holes in the battery case must be used to ensure the battery is securely mounted.

Battery Temperature and Charge Current

Lithium Iron Phosphate cells must not be charged if their temperature is outside the operating temperature range shown in the Product Specifications. Charging $LiFePO_4$ cells at lower temperatures will risk damage and permanent loss of capacity. The cell temperature can be monitored using the Bluetooth App.

The table below shows the relationship between temperature and charging current.

Battery Temperature	Maximum Charge Current	
	PLI12-100BT-SLIM	PLI12-200BT-SLIM
Below 0°C	DO NOT CHARGE	
0°C	10A (0.1C)	20A (0.1C)
10°C	≤ 50A	≤ 100A
20°C	80A	150A
35°C	≤ 50A	≤ 100A
45°C	20A (0.2C)	40A (0.2C)
Above 55°C	DO NOT CHARGE	

Storage

For extended storage, the battery should be stored in an environment where the temperature is between -20ºC and 55ºC with a relative humidity (RH) of 10% to 90%.

For extended storage at 25ºC, the battery should be charged every 6 months.

For extended storage at 40ºC, the battery should be charged every 3 months.

Product Specifications

Refer to the specific Product Data Sheet for detailed specifications of each battery.

	PLI12-100BT-SLIM	PLI12-200BT-SLIM
Nominal Capacity	100Ah	200Ah
Nominal Energy	1280Wh	2560Wh
Nominal Voltage	12.8V	
Charging Voltage	14.4V ±0.2V	
Float Charge	13.6V	
Maximum Charge Current	80A	150A
Recommended Charge Current	≤ 50A	≤ 100A
Maximum Discharge Current	80A	150A
Discharge cut-off voltage	11.2V	
Dimensions (LxWxH)	560 x 250 x 70mm	600 x 500 x 70mm
Nominal Weight	14kg	25kg
Bluetooth Connectivity	Yes, via App (search Predator Bluetooth)	
Operating Temperature — Charge	0ºC to 50ºC, 0-95% RH	
Operating Temperature — Discharge	-20ºC to 55ºC, 0-95% RH	

Included in the box:

1 x slimline lithium battery
1 x communication cable
1 x RS485 diagnostic cable
1 x CAN terminator
1 x Coding terminator
2 x terminal screws
4 x mounting brackets & screws
4 x expansion anchor bolts (for securing to concrete or brick)