

APPLICATION NOTE:

Using the Pylontech Lithium-Ion Batteries With Axpert and InfiniSolar Inverters



1) INTRODUCTION:

Lithium-Ion is regularly chosen for new installations or as a suitable replacement for lead-acid batteries which have reached the end of their life in a solar PV storage system. Reasons for Lithium-Ion being selected include:

- Lighter weight.
- Higher efficiency.
- Greater depth of discharge.
- Higher cycle life.
- Better maintained voltage during the discharge cycle.
- Lower lifetime costs.
- Lower impact on the environment.
- Longer warranty available.

The [Pylontech US2000B Plus](#) is a highly suitable option for both new systems and for ones that need their lead acid batteries to be replaced. The US2000B is a battery system, developed with their own Lithium Iron phosphate cell to ensure the highest safety value and most promising life cycle. A self-designed BMS protects the cell from abnormal temperature, current, voltage, SoC and SoH.



Advantages of the Pylontech Lithium-Ion battery include:

- More than 6000 cycles with 80% DOD.
- Compact and fashionable design.
- Delivers up to 5kW for 15 seconds with single module (2.4kWh).
- Modular design gives the end customers the power of choice of capacity.
- [Compatible](#) with the Axpert and Infinisolar inverters.
- Simple buckle fixing minimizes the installation time and cost.
- Safety Cert. TÜV CE UN38.3.
- Up to 10-year [warranty](#) available, if registered on the Pylontech portal.

In most cases, it is expected that the lifetime cost of a Lithium-Ion battery would be less than half that of a lead-acid battery bank of equivalent capacity. The example below compares a 400Ah lead acid battery bank to a 250Ah Lithium bank, using pricing and specifications of products currently available:

- For lead acid: 2200 cycles @ 50% DOD (C10 rating); unit pricing = R4,500.
- For Lithium: 6000 cycles @ 80% DOD; unit pricing = R12,000.

LEAD ACID PRICE PER kWh					PYLONTECH LITHIUM-ION PRICE PER kWh				
Lead Acid Bank (48V)	Cycles @ 50% DOD	kWh Storage	Initial cost	Price per kWh	Pylon Bank	Cycles @ 80% DOD	kWh Storage	Initial cost	Price per kWh
8x200Ah (400Ah)	2200	9.6kWh	R36,000	R1.72	5 x US2000B Plus (250Ah)	6000	9.5kWh	R60,000	R1.04

From this example, it can be concluded that while the initial cost of lead acid batteries may be lower at around 60% the cost of Pylontech, over the life cycle the price per kWh of lead acid is up to 70% more expensive.

2) BATTERY SIZING:

When considering the size of the of the required Lithium battery bank there are two key factors:

1. The usable storage capacity
2. The power required

Both aspects should be considered and the number of PylonTech Lithium-Ion batteries specified should meet at least the minimum required based on both criteria.

a. Storage Capacity:

The PylonTech Lithium-Ion battery has a DOD of 80% when used with the Axpert or Infinisolar inverters which compares to 50% for typical lead-acid batteries. In order to provide the same storage capacity the minimum suggested replacement options, whereby Pylontech is used to replace the most commonly used 48V lead acid battery banks, are shown in the table below:

PYLONTECH LITHIUM-ION LEAD ACID REPLACEMENT PACKAGES			
Current Solution		Minimum Recommended Replacement	
Lead Acid Bank(48V)	kWh Useable (50% DoD)	PylonTech Lithium-Ion Bank	kWh Useable (80%DoD)
4 x 150Ah (150Ah)	3.6kWh	2 x US2000B Plus (100Ah)	3.8kWh
4 x 200Ah (200Ah)	4.8kWh	3 x US2000B Plus (150Ah)	5.7kWh
8 x 150Ah (300Ah)	7.2kWh	4 x US2000B Plus (200Ah)	7.6kWh
8 x 200Ah (400Ah)	9.6kWh	5 x US2000B Plus (250Ah)	9.5kWh
12 x 150Ah (450Ah)	10.8kWh	6 x US2000B Plus (300Ah)	11.4kWh
12 x 200Ah (600Ah)	14.4kWh	8 x US2000B Plus (400Ah)	15.2kWh

So for example, a 150Ah 48V lead acid battery bank comprising 4 x 150Ah batteries and giving an effective 3.6kWh of storage at 50% DoD could realistically be replaced with 2 x Pylontech US2000B Plus Lithium-Ion batteries which provide 3.8kWh storage at 80% DoD.

In many cases the original lead-acid battery bank being replaced may have been too small to fully meet the client's requirements and therefore consideration should be given to replacing it with a Lithium-Ion battery bank with a larger capacity.

b. Power Rating:

When used with Axpert or Infinisolar inverter, a Pylontech Lithium-Ion battery will deliver 1.5kWh usable energy when discharged at 1.2kW, and at 600W power draw 1.9kWh usable energy can be utilised.

Therefore, to take into account the expected current draw of the inverter, SegenSolar recommends that the minimum number of Pylontech Lithium-Ion batteries be linked to the site-specific base load as follows:

Recommended Base Load	Max Nominal Load	No. of PylonTech Lithium-Ion 2.4kWh Batteries
1.2kW	2.4kW	2
1.8kW	3.6kW	3
2.4kW	4.8kW	4
3.0kW	6.0kW	5
3.6kW	7.2kW	6
4.2kW	8.4kW	7
4.8kW	9.6kW	8
6.0kW	12.0kW	10

3) OTHER CONSIDERATIONS:

Pylontech have provided a detailed [set-up document](#) to follow when using their batteries. This needs to be followed closely, and the [warranty validation form](#) needs to be returned, in order for the battery warranty to be valid.

Safe handling of Pylontech batteries is of key importance. When handled properly and in accordance with the parameters specified by the manufacturer, Lithium batteries are safe during use. Improper handling or conditions leading to improper operation can cause leakage of battery substances and products of decomposition and reactions associated with these, which can cause personal injury and environmental damage. Since a wide variety of chemical substances are used, always follow the manufacturer's directions for immediate measures and first-aid measures in the event of an accident. Safety is described in detail in the [safe handling document](#).

The Pylontech [installation manual](#) provides clear steps to ensure the correct set-up and installation of the batteries in a system. Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode. Also remember:

- Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device.
- It is prohibited to connect the battery and AC power directly.
- The embedded BMS in the battery is designed for 48VDC, please **DO NOT** connect the battery in series.
- The battery system must be well grounded and the resistance must be less than 1 ohm.
- Please ensure the electrical parameters of battery system are compatible to related equipment.
- Keep the battery away from water and fire.

When comparing replacement options, it is important to consider all items including [cables](#), [cabinets](#), cost of maintenance and lifetime costs. SegenSolar provides a range of cabinets custom-made for Pylontech Lithium-Ion batteries, including floor-mounted units capable of holding between 2 and 5 batteries, and [wall-mounted units](#) capable of holding 2 batteries.

4) SEGENSOLAR PORTAL SERVICES:

The SegenSolar portal has a [System Designer](#) tool which allows you to create your own battery packages.

Please speak to your account manager or technical support representative if you require training on how to use the System Design tool. The design tool will allow you to create a quote quickly and easily with all the necessary components.

5) FURTHER NOTES:

About Pylontech:

Pylon Technologies, Co. Ltd, founded in October 2009, is a pioneer for LFP (Lithium-Ion Phosphate) batteries deployed in energy storage systems and electric vehicles. Pylontech is among a handful of companies who have vertically integrated the entire Lithium battery industrial chain. Recently, the company has invested the equivalent of over USD 400 million to set up Huangshi Pylon Technologies Co. Ltd in Huangshi city, Hubei Province, with this factory growing annual battery production capacity to 2 GWH.

Further info: <http://www.pylontech.com>

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