

Century

LITHIUM PRO



USER MANUAL

C12-100XLi

General Information

Century Lithium Pro batteries are designed to provide long lasting power in recreational deep cycle applications.

To ensure proper safe use, optimum performance, durability, and reliability of your Century Lithium Pro battery, please read through this user manual carefully and completely before use.

A technical data sheet and a material safety data sheet (SDS) are also available as additional information on the Century Batteries website.

Australia: centurybatteries.com.au/lithium

New Zealand: centurybatteries.co.nz/lithium

If you have any questions concerning safety precautions, installing, or using the battery please contact Century Yuasa Batteries. AU 1300 361 161 or NZ 0800 93 93 93

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Table of Contents

1. Introduction	4
1.1 Product Description	4
1.2 Terminology.....	5
2. Safety	6
3. Handling and Installation	7
4. Operating Use	8
4.1 Operating conditions.....	8
4.2 Bluetooth connection	9
4.3 Charging.....	14
4.4 Discharging	15
5. Troubleshooting	16
6. Care & Maintenance	17
7. Storage	17
8. Transportation	18
9. Disposal & Recycling	18



1. Introduction

1.1 Product Description

The Century Lithium Pro C12-100XLi is 12.8V lithium-ion battery incorporating Lithium Iron Phosphate (LFP or LiFePO4) technology and is designed for recreational cyclic applications. It contains 4 cells connected in series, equipped with an internal battery management system (BMS) to monitor each single prismatic cell for correct operation of the battery, as well as the loads and charge source that are connected to the battery.

This LFP battery is suitable for replacement of deep cycle lead acid batteries, used in RV, camper trailer, caravan, 4WD (AUX/boot), marine, and mobility applications. This LFP battery should not be used in any applications other than those described in this user manual. It is important to read and follow the information provided before installation, operation, and maintenance of this battery.

MODEL	Voltage (V)	CAPACITY (Ah)	STANDARD CHARGE CURRENT (A)	MAX CHARGE CURRENT (A)	MAX DISCHARGE CURRENT (A)	PULSE CURRENT (A) (<3S)	DIMENSIONS L * W * H (MM)	TERMINAL	WEIGHT (Kg)
C12-100XLi	12	100	50	100	100	350	307 * 172 * 217	M8	13.5



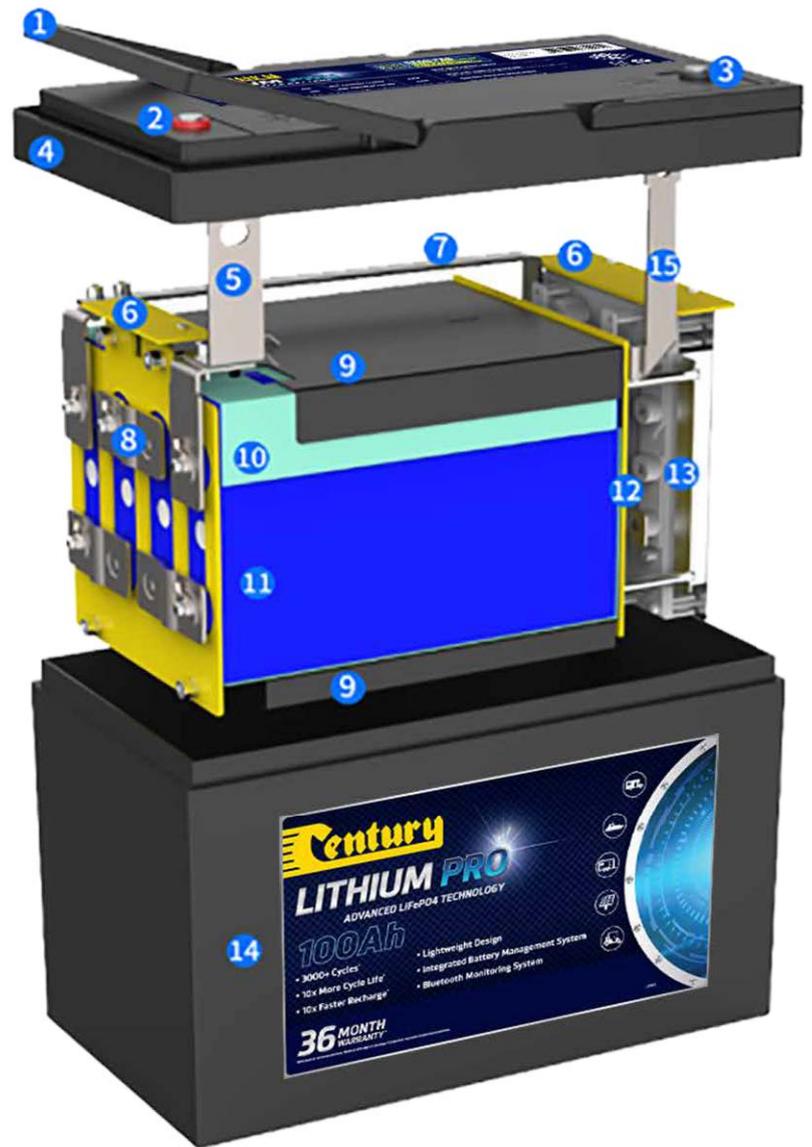
Bluetooth QR Scan & BMS Code

Manufacturing Code



Components & Construction

1. Handle
2. Positive terminal, M8 nut insert
3. Negative terminal, M8 nut insert
4. Top cover: Flame Retardant ABS/PC
5. Positive connecting copper bar
6. Epoxy board Insulator
7. Negative connecting copper bar - Module to BMS
8. Connecting aluminium bars - Prismatic cells
9. Battery module hold-down bracket
10. Electrical insulating sheet
11. Prismatic cells
12. Epoxy board insulator
13. BMS
14. Battery case: Flame Retardant ABS/PC
15. Negative connecting copper bar



1.2 Terminology

- BMS** Battery Management System
- DOD** Depth of Discharge
- OCV** Open Circuit Voltage
- SOC** State of Charge (%)
- °C** Degree Celsius in temperature
- V** Volt
- A** Ampere
- Ah** Capacity in Ampere-hour
- M8** 8mm nut insert terminal

Series Connection Batteries connected to increase voltage by connecting positive terminal of one battery to negative terminal of the next battery

Parallel Connection Batteries connected to increase overall capacity by connecting positive terminal of one battery to positive terminal of the next battery



LITHIUM PRO
ADVANCED LiFePO4 TECHNOLOGY

2. Safety



Warning! Risk of fire, explosion, or burn.

Failure to install or use according to the instructions in this manual may result in early battery failure or cause risk of electrical or fire damage to the battery and surrounding property and may cause personal injuries.

The Century Lithium Pro LFP battery is designed with an integrated BMS to prevent internal damage to the battery under various conditions. When this occurs in connected equipment, power can be abruptly interrupted to the system which may cause undesirable consequence. The system installer must understand the automatic safety shutdown functions of the BMS and shall assume all responsibility and liability for any damages if these functions are not properly applied.

Do's

- The battery must be kept in the original packaging until use.
- Wear personal protective equipment (eye protection and gloves) before handling.
- Keep sparks and open flames away from the battery.
- Use insulated tools when working on or with the battery.
- Secure connections with correct torque setting.
- Only connect the charger in line with recommended settings. Always disconnect the charger when working on batteries.
- Charge the battery before installing.
- Remove charger immediately and contact the dealer if any abnormal smell or noise while on charge or when a discharge is detected.

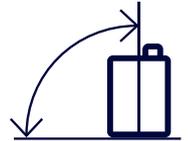
Don't s

- Do not drop, impact, or puncture the battery. The battery must be protected from mechanical impacts.
- Do not store the battery below 30% SOC.
- Do not use for cranking/starting applications.
- Do not install under the bonnet or engine compartment.
- Do not use the battery outside the specified temperature range.
- Do not expose to direct sunlight for extended period. During storage, the battery must be protected from direct sunlight.
- Do not submerge in water or expose to rain for any extended periods. The battery should be stored in a cool and dry environment.
- Do not install near heat source or flammable materials.
- Do not disassemble or modify the outer casing of the battery.
- Do not dispose of in fire, household waste or landfill
- Do not connect LFP batteries from different manufacturers, different brands, capacity, size, or type in series or parallel.
- Over-voltage charging, incorrect wiring, reverse polarity connection or short circuits of the terminals may damage the battery.



3. Handling and Installation

- Before connecting the battery, check that the battery voltage is $\geq 13.3V$. Recharge as required.
- Ensure that the cable connecting the battery terminals is correctly sized and in length.
- Ensure that the bolts on the terminals are firmly fastened to the recommended torque of 10~12Nm to avoid loosening during operation.
- Ensure the maximum output voltage of any charging device connected to the battery does not exceed 14.6V before connecting. Recommended charging voltage is 14.4V
- Side mounting with terminals on the upper side is acceptable but not recommended. Where feasible, always install upright to optimise the performance under a dynamic condition such as vibration.
- Fully charge each battery before use and if connecting them in series or parallel.
- When connecting in series or in parallel, ensure the capacity and voltage between each battery is consistent. Any variance should be below 100mV. ***Do not connect different batches, types, old or new batteries in series or parallel.***
- To optimise batteries with balanced cells, it is advisable not to mix batteries from a different batch for series or parallel connection. Each battery is labelled with a sequential production code i.e., number N-1 (such as 1-1, 1-2, 1-3, 1-4,) which shows the selected cells they are grouped with during the manufacturing process. The first number is the batch number, and the second number is the sequence within the batch.
- The battery can be connected in series up to 4 batteries, or in parallel up to 2 batteries. For example, four 12V100Ah batteries connected in series can create a 48V100Ah battery bank; and 2 batteries connected in parallel can create a 12V200Ah battery bank (note: maximum discharge current remains 100A).
- Parallel batteries can only increase the capacity of the battery system and increase the working time of the connected electrical devices. However, the maximum or peak discharge current can only be in accordance with a single battery (100A).
- The total maximum configuration in a string of series and parallel (i.e., 4S2P) is 8 batteries.
- Due to small variations in new LFP battery capacity, LFP batteries may be slightly unbalanced when unpacked for multiple connection in series or parallel. BMS interruption of charging is likely to occur during the initial charging which is considered normal. If the charger trips out, reset the charger until charging continues normally. For best result, each battery should be charged individually before being connected in series or parallel. Contact Century Yuasa Batteries for any further assistance.



4. Operation Use



Caution: Improper use will cause irreversible damage to the battery and could cause battery swelling and smoke in extreme cases.

4.1 Operating Conditions

The Century LFP battery is in sleep mode when not in use to reduce self-discharge. It will go into sleep mode after 24 hours when the charge or discharge current is below 1A.

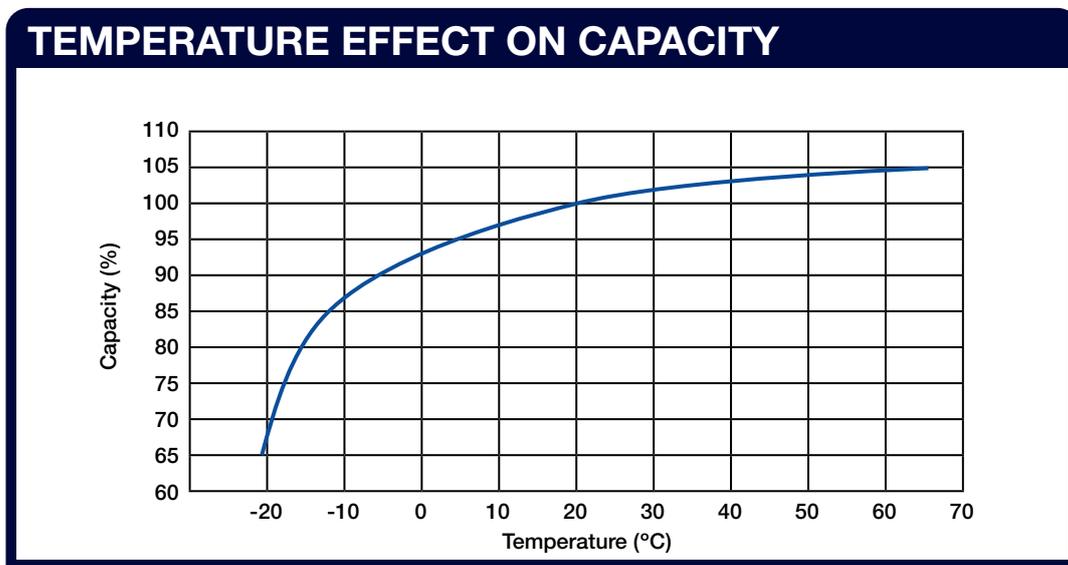
A charge or discharge will activate the battery from this sleep mode:

- Charge activation – Connect a charger with 1.2V above the battery voltage
- Discharge activation – Connect a load (<math><5k\Omega</math>)

The following operating ambient temperatures and humidity must be followed:

- Charging at between 0°C ~ 45°C
- Discharging at between -20°C ~ 55°C
- Ambient humidity: $\leq 85\%$

Reduce current when charging battery at temperatures $<10^{\circ}\text{C}$ and $>35^{\circ}\text{C}$



4.2 Bluetooth Connection

The Century C12-100XLi battery has an integrated wireless Bluetooth monitoring function.

The Century Lithium Pro Bluetooth App is available for iOS and Android portable smart devices and can be downloaded from Apple App Store or Google Play Store



Through the Century Lithium Pro Bluetooth monitoring system, the following information can be read or monitored:

- Battery Capacity
- Battery Voltage
- Individual Cell Voltage
- Battery State of Health
- Battery Cycle
- Battery Event Information
- Battery State of Charge (SOC)
- Battery Current
- Battery Status
- Battery Temperature
- Battery Alarm

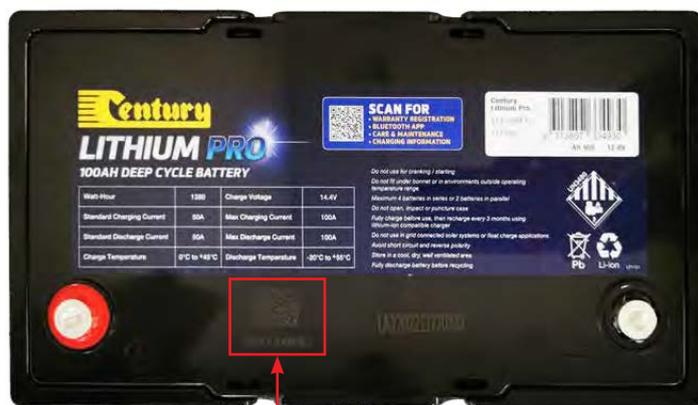
4.2.1 Installation and Pairing App on iOS or Android.

Download the App 'Century Lithium Pro'.



Ensure Bluetooth is enabled on the smart device before pairing. Ensure the battery is in 'WAKE-UP' mode before pairing. Activate the Bluetooth connection by charging or discharging the battery.

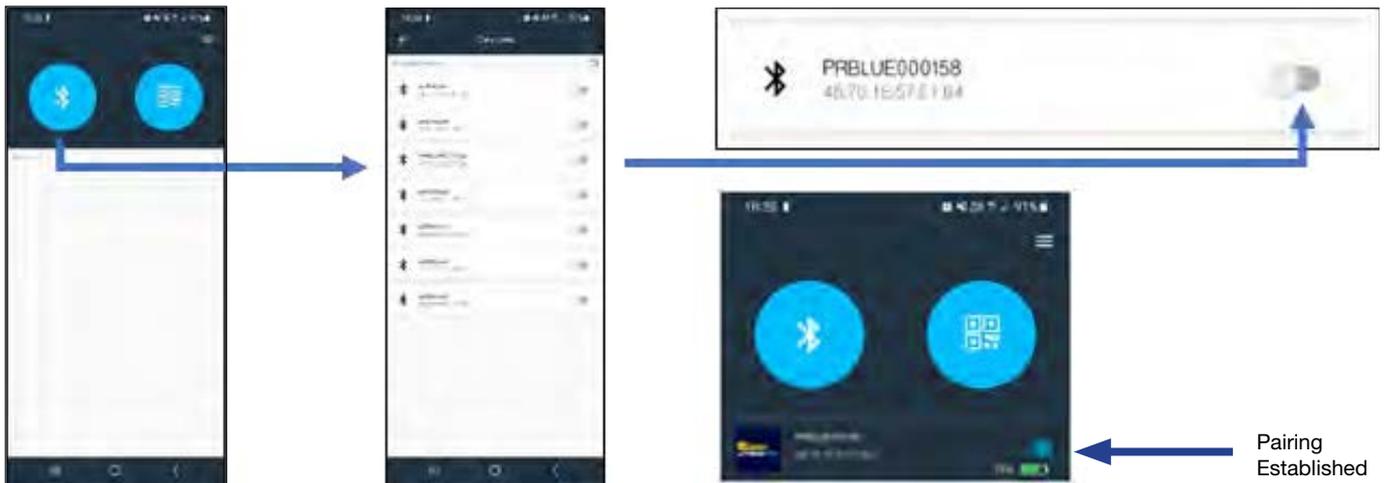
There are two options for pairing or connecting, by scanning the Bluetooth QR code and by the unique ID both of which are located on the top of each battery.



Bluetooth QR Scan & BMS Code



a. Search the battery from the listed battery Bluetooth ID(s) on the smart device, then toggle it ON:



b. Scan the QR code on the battery and the battery Bluetooth ID will appear:



The Bluetooth Monitoring System provides point to point connection. Only one battery can be connected to one device at a time. If more than one battery is configured in series or in parallel, each battery can be checked in turn, one by one, on the same smart device. Simply follow the pairing/connection process for each individual battery.

After being connected, the battery can be renamed from its ID code by the user on the smart device. All connected batteries will appear on the first screen when accessing the App next time.

4.2.2 Using the App.

a. After connecting, touch the paired battery name and it will bring up the **'Basic Info'** screen. This screen shows the SOC in percentage; battery voltage; battery capacity; battery status (standby, charge, or discharge); and battery state of health (good, or service – if below 80% initial capacity)



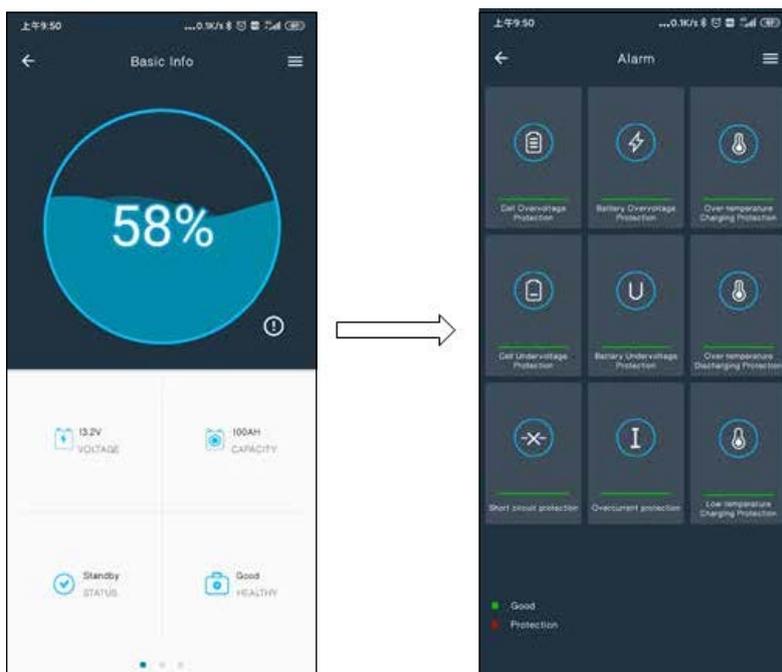
b. Swiping across from the Basic Info screen will show the **'Details Info'** screen. This screen shows battery voltage, battery current, estimated run time, individual cell voltage, battery temperature and battery cycle count.



Cycle count is accumulative of ONE full discharge

c. Touching “  ” icon on the ‘Basic Info’ screen will bring up the ‘Alarm’ screen.

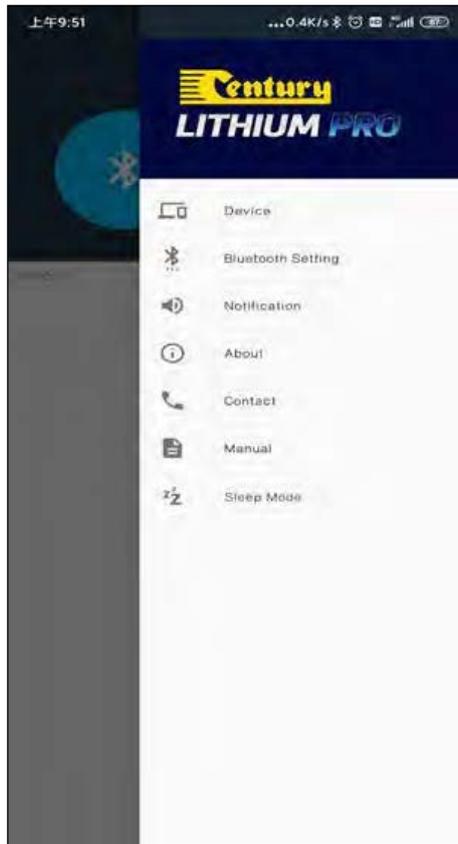
This screen displays the BMS protection function.



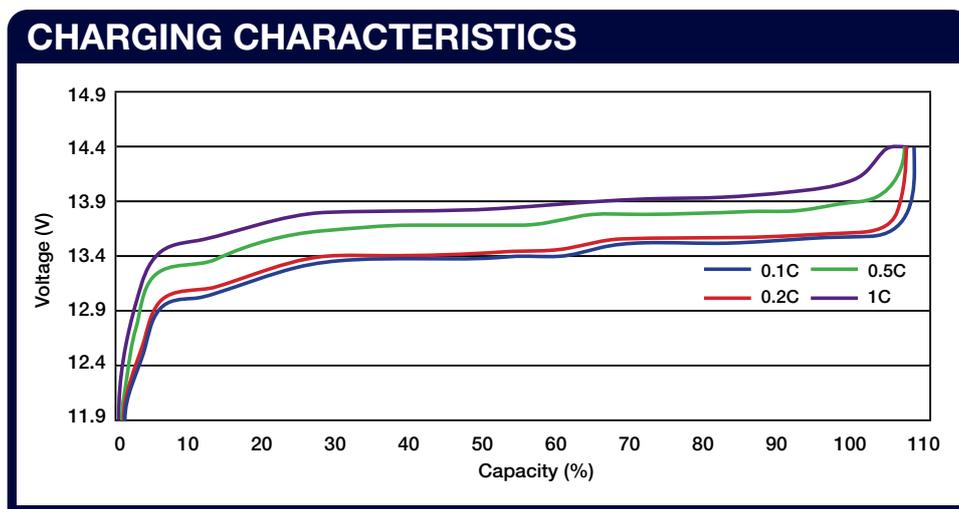
BMS Function	Automatic Shutoff	Recovery and Automatic Restart
Over Charge Voltage	Cell $\geq 3.7V$ or Battery $\geq 14.8V$; 3S max	Cell $\leq 3.45V$ or Battery $\leq 13.8V$
Over Discharge Voltage	Cell $\leq 2.5V$ or Battery $\leq 10.0V$; 3S max	Cell $\geq 2.8V$ or Battery $\geq 11.2V$
Over Charge Current	105A for 3S or 138A for 500mS or 284-345A for 17mS	After 13S, up to 3 consecutive times. Except at $>284A$, no auto recovery
Over Discharge Current	350A for 3S or 560-650A for 8mS	After 13S, up to 3 consecutive times. Except at $>560A$, no auto recovery
High Temperature on Charge	Above $50^{\circ}C$	Below $45^{\circ}C$
High Temperature on Discharge	Above $65^{\circ}C$	Below $55^{\circ}C$
Low Temperature on Charge	Below $0^{\circ}C$	Above $5^{\circ}C$
Low Temperature on Discharge	Below $-20^{\circ}C$	Above $-15^{\circ}C$
Short Circuit	Above 1200A, 400 μS	No automatic recovery

d. Touching the “  ” icon on any of the screen will bring up the ‘Menu’ screen.

Notification preferences can be set up on the smart device. CYB contact details, App information and user manual can be located in this area and the Sleep mode for the paired battery can also be set.

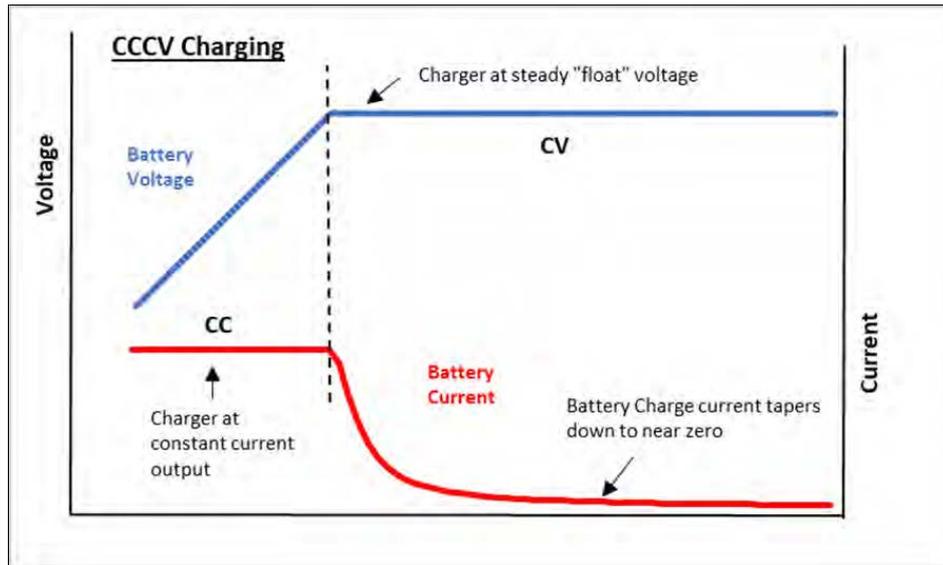


4.3 Charging



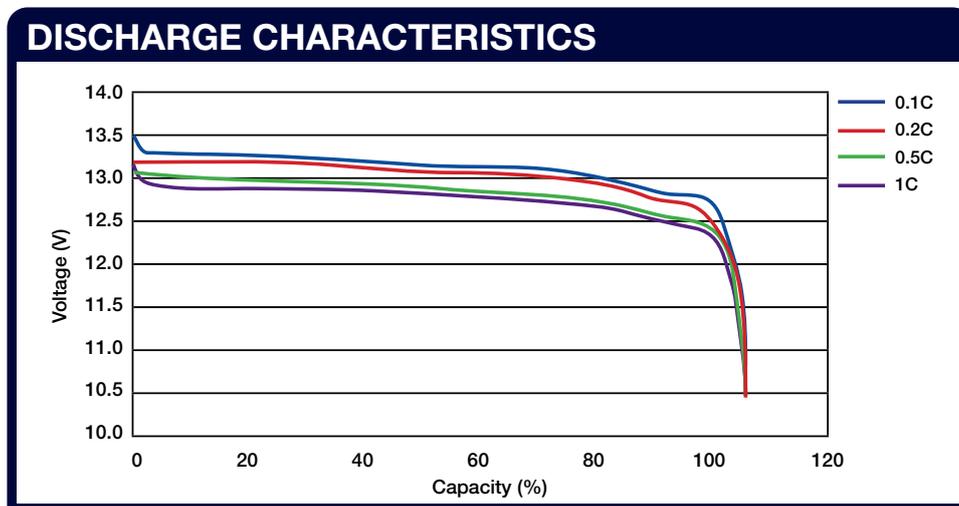
- The battery must be fully charged before first use.
- Ensure charging voltage does not exceed 14.6V. 14.4V is recommended.
- Ensure the charging current does not exceed the maximum charging current as indicated in the specification sheet. Any inrush current may activate the short circuit protection function and charging may stop.
- Ensure charging is carried out at an ambient temperature within the recommended range of 0°C~45°C. Below 0°C or above 45°C may cause irreversible damage (i.e., permanent loss of capacity) to the battery or even a safety risk.
- DO NOT charge the battery for more than 24 hours. Disconnect the LFP battery from the charger when the charger is no longer in use.
- DO NOT use a lead-acid battery charger if it has 'Equalisation' and 'De-sulphation' mode or function.
- DO NOT leave a lead-acid battery 'smart' charger connected to float charge the LFP battery. This type of charger will NOT maintain a proper voltage algorithm and can cause damage to LFP battery.
- Batteries connected in series do not need to be disassembled for individual recharging. However, each individual battery should be fully charged before being connected in series or parallel. Even after the charger is disconnected, the battery may not be ready until the cells are balanced. After charger has been disconnected allow 30 minutes rest time for the battery cells to balance.
- If charging batteries in series, ensure the charging voltage is less than 14.6V times the series number. For example, to charge 2 LFP batteries in series, the charging voltage should be less than 29.2V and the charging current should be as recommended in the specification sheet.
- DO NOT connect more than 2 LFP batteries in parallel. The voltage difference between the 2 LFP batteries must be below 100mV after being fully recharged and before the batteries are connected. The maximum charging current should be the same as single battery connection.
- Some constant voltage chargers that require the detection of battery terminal voltage to start charging may fail to activate the LFP battery from its state of under-voltage protection (Sleep Mode). The low impedance of LFP cells may result in an inrush of current interrupting the charge. If the charger trips out, reset the charger until charging continues normally.

- Constant current constant voltage charging (CCCV) is recommended for LFP batteries. Refer to diagram below for illustration:



4.4. Discharging

- Do not exceed the maximum discharge current as specified in the data sheet.
- Avoid discharging the LFP battery at its maximum current (1C) several times in succession, as this may cause the BMS to cut out.
- The maximum continuous load should not exceed 1100W. A maximum 1000W inverter can be connected to avoid damaging the battery including the BMS and the cells.



5. Troubleshooting

NO.	SIGN	POSSIBLE CAUSES	CORRECTIVE ACTIONS
1	Battery working time is too short	The charging voltage is lower than 14.4V, and the battery charging capacity is less than 100Ah	Use the standard charge voltage
		The load is too high, and the battery ends discharging prematurely	Reduce load wattage
		The ambient temperature is too high or too low, and the battery cannot be fully charged or discharged (capacity drop at low temperature range)	Keep working at normal ambient temperature
		The battery life is naturally attenuated, the capacity is reduced, and the working time is short	Replace the battery
2	BMS keeps cutting off during discharge	Discharge current is too high, trigger overcurrent protection	Reduce discharge current
		Voltage is too low, trigger low voltage protection	Recharge the battery
3	BMS keeps cutting off during charge	Charge current is too high, trigger overcurrent protection	Reduce charge current
		Voltage is too high, trigger high voltage protection	Disconnect the charger
4	BMS keeps cutting off when batteries connected in series or parallel	One battery triggers over-voltage, under-voltage and over-current protection, etc.	Check the load and charger situation. Ensure the system works under the specification
5	Bluetooth not detected	Battery under sleep mode	Activate the battery
		More than 10m away from the battery	Make sure the battery needs to be connected is within a reasonable distance
		The Bluetooth of the mobile phone does not detect the battery	Check the phone's Bluetooth function
6	Battery gets too hot	Frequent overload use/high current draw	Use according to battery specifications
		Working with the maximum continuous charge and discharge current for a long time, the heat dissipation environment is poor, resulting in heat accumulation	Ensure a good heat dissipation environment
7	Battery no voltage reading	The battery is over-discharged below 10V and is lower than the working voltage of the BMS, the BMS cannot work normally	Recharge the battery in time and confirm that the battery can be switched on normally. If the battery cannot be turned on again, replace the battery
		BMS power supply line is damaged, BMS cannot work normally	Replace the battery
		Internal power cord disconnected	Replace the battery
		BMS failed	Replace the battery
8	Sleep mode cannot be deactivated	The activation voltage is 1.2V lower than the battery voltage	Ensure that the charging activation voltage is 1V higher than the battery voltage
		The current of load is too small	Disconnect the load and reconnect the load to ensure that load resistance <5kΩ
9	Battery external damage - terminal, cover, casing	Improper operation such as drop, impact, etc.	Replace the battery
10	Battery exploded	High voltage due to improper charging causes BMS to fail, and the battery is not protected	Replace the battery
		Instant violent collisions, squeezing, puncture, rupture etc. making the battery unable to release energy	

6. Care & Maintenance

6.1 Maintenance Inspection

- Examine the external condition of the battery. The top of battery and terminal connections should be clean, dry, and free of corrosion.
- Check battery cables and connections are firmly secure.
- Check the battery state of charge (SOC) regularly. When not in use the Century Lithium Pro battery will partially self-discharge.
- Depending on the charging profile used, overtime the series and parallel configured batteries may not be equally charged. To fully balance batteries in either of these configurations, maintenance charge each battery individually at periodic intervals.

6.2 Cleaning

- Before cleaning, disconnect the battery from the charging source and the load.
- The surface of LFP battery can be cleaned with a soft, dry cloth made of non-electroconductive material.
- Keep the area around batteries clean, dry, and away from any flammable materials.

7. Storage

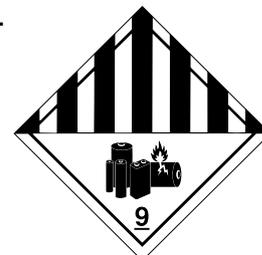
- Disconnect the battery from all electrical loads and from the charger to eliminate potential parasitic loads that may discharge the battery.
- Cover the LFP battery terminals with suitable non-electroconductive material (e.g. insulating tape or plastic caps).
- Observe the minimum and maximum storage temperatures.
- Store in a cool, dry place. There is no specific ventilation requirements for Century Lithium Pro batteries, however sufficient airflow should be ensured to prevent excessive heat build-up.
- Keep area free from flammable materials.
- Keep out of reach of children and animals.
- Do not store in direct sunlight.
- The battery should be stored at a state of charge of between 40% ~60% of its nominal capacity. Storing a deep discharged battery can result in permanent damage and reduced run time.
- Allowing the battery to self-discharge to a severely low state of charge may result in the battery not being able to be recovered.
- Check battery every 4 to 6 months, or more frequently in ambient temperatures exceeding 35°C, to determine if charging is required.



8. Transportation

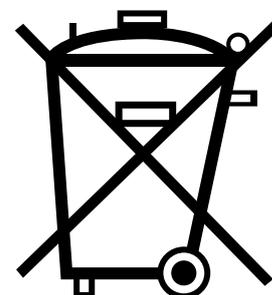
- Century Lithium Pro batteries are packed by the manufacturer to comply with all applicable national transportation regulations.
- If the battery is not installed, it must be transported in the original packaging or equivalent material.
- It is recommended that the battery should be below 60% SOC during transportation.
- Follow all applicable national transport regulations before transporting the Century Lithium Pro batteries.
- Transporting a used, damaged or defective LFP battery may be subject to restrictions. Use a qualified shipping agent properly certified for hazardous material shipment.
- The transport of a LFP battery is subject to the hazard classification UN3480, Class 9.

The following identification label must be attached to the package:



9. Disposal & Recycling

- Lithium batteries must not be disposed of with household or landfill waste and in line with relevant national and or local government regulations.
- Lithium batteries can be recycled but should not be mixed with lead acid batteries. It is important to prevent lithium-ion batteries being mixed with lead acid and or other battery types at any stage of the recycling process.
- Refer to relevant sections of this manual, if any batteries are collected, stored and transported for recycling.
- It is advisable to fully discharge used lithium-ion batteries prior to recycling.
- Tape or insulate the terminals of the battery with non-conductive material to prevent short circuits.
- In the case of a damaged battery, it must also be packaged according with the local transportation and environmental protection regulations.
- Century Lithium Pro LFP battery can be returned to CYB or a qualified disposal facility for recycling.



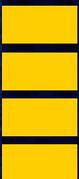
Further Information

If you have any questions concerning safety precautions, installing, or using a Century Lithium Pro battery please contact Century Yuasa Batteries.

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For more information visit
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