

IONIC



OWNER'S MANUAL



DEEP CYCLE BATTERIES



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Important Notes

PLEASE READ THE ENTIRE INSTRUCTION MANUAL BEFORE OPERATING YOUR IONIC DEEP CYCLE BATTERY. SAVE THESE INSTRUCTIONS. REVIEW ALL CAUTIONARY MARKINGS ON THIS PRODUCT AND IN THIS MANUAL.

FULLY CHARGE THE BATTERY BEFORE FIRST USE AND CHARGE EVERY SIX(6) MONTHS FOR OPTIMAL PERFORMANCE.

YOUR IONIC DEEP CYCLE BATTERY IS FITTED WITH BUILT-IN SAFETY PROTECTIONS VIA AN INTEGRATED BATTERY MANAGEMENT SYSTEM (BMS). THESE SAFETY PROTECTIONS MONITOR AND CONTROL THE UNIT. HOWEVER, PLEASE NOTE THAT THE BMS CIRCUITRY CAN BE DAMAGED IF THE BATTERY IS SHORTED OR EXPOSED TO A REVERSE POLARITY SITUATION.

PER IATA AND DOT INSTRUCTIONS, LITHIUM BATTERIES ARE TO BE SHIPPED AND TRANSPORTED AT 30% STATE OF CHARGE OR LESS.

WARNING! DO NOT use this product near or in the presence of propane tanks, natural gas or any other explosive fumes where an electric sparks could cause ignition. Also follow instructions and caution markings on engine and listed in vehicle manual to reduce risk of battery explosion.



Thank You

Thank You for choosing Ionic Batteries. The Ionic Deep Cycle Lithium-ion battery is a high quality, light weight, powerful, durable and portable power storage solution.

Performance and safety are paramount in this innovative product. Our goal is to provide the ultimate power storage device with the highest performance and complete reliability for long term use. We designed the Ionic Deep Cycle Battery to offer the best value in the industry. Thank you again for choosing Ionic.

"Ionic Batteries is working to enhance current and future lithium-ion battery technology to reduce the present limitations and in doing so, offer products to consumers that outperform and are safer than those currently on the market" ~Martin Koebler

Power storage wherever you need it!™

Deep Cycle Features



Ionic Batteries **BMS**

Ionic's battery management system (BMS) is inside each battery case and uses high power MOSFETs to turn OFF or ON the power from the terminals instead of using bulky solenoids. This allows for compact, faster power switching with higher solid-state reliability. Ionic's

MOSFET configuration also allows for enhance controls and protections including reverse polarity, short circuit and overheating protection.



Prismatic cells

Other types of cells in the industry, like cylindrical cells, only come in certain sizes and battery fit may be poor, or impossible, as they can be too wide or too tall or create internal hot spots. Ionic prismatic cells are rectangular packages which can be freely designed and sized according to the size requirements of the battery case. Ionic offers perfect drop-in case sizes for traditional lead acid applications.



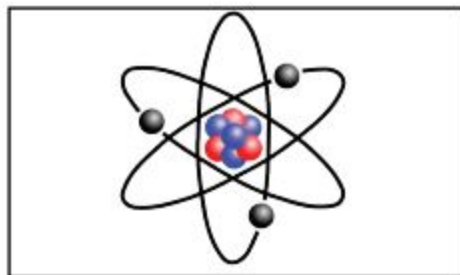
Bluetooth application

Select Ionic Lithium-ion Deep Cycle Batteries include Bluetooth functionality. Both IOS and Android applications are available online. The Ionic Bluetooth app will monitor the Ionic LiFePo4 battery's state of charge, voltage, temperature, life cycles, and will log critical events. Due to bluetooth application limitations, the application can only connect to one battery at a time. See specification TABLES 4 A thru 4 C on pages 16 & 17 for specific models.



Quality Engineering

Ionic's innovation laboratory prides itself on the design and construction of its batteries utilizing the highest quality components in all phases of design and construction. The Ionic built-in intelligent components guarantee the safety and quality of each Ionic product.



Lithium advantage

The obvious advantages are weight savings, higher cycles and low self-discharge rate versus old lead acid technology. In addition, lithium-ion Deep Cycle batteries do not require ventilation like lead-acid batteries as they do not vent explosive gasses under normal use. Also our batteries can be installed in any orientation (upright or sideways) as they have no fluid in the battery that could spill if the battery is placed on its side or at an angle.



Cell Balancing

Ionic Deep Cycle Batteries have a micro-processor controlled internal cell balancing designed to maximize the performance of each cell in the battery. Due to our cell pack construction (using prismatic cells), we have fewer cells to manage than our competitors for even greater reliability.

Battery General Information

What are Lithium Batteries?

Lithium-ion batteries are rechargeable batteries (known as secondary batteries) that utilize highly refined lithium metal salts as the anode and other materials like Cobalt Oxide and Iron Phosphate as the cathode. In this configuration, lithium ions move from the anode to the cathode through a separator during discharging and back when charging. These popular batteries are used for consumer electronics because they provide high energy density, possess no memory effect and have a slow loss of charge when not in use. These batteries come in a wide variety of shapes and sizes. Compared to lead-acid batteries, lithium-ion batteries are lighter and provide a higher open circuit voltage, which allows for power transfer at lower currents.

The term "Lithium-ion" battery is a general term for the family of batteries. There are many different chemistries for Lithium-Ion batteries including LiCoO₂ (cylindrical/prismatic cell), LiPo, and LiFePO₄ (cylindrical/prismatic cell). Ionic mostly focuses on designing, manufacturing and marketing LiFePO₄ batteries for its starter and deep cycle batteries.

Initial capacity

A new deep-cycle battery will not immediately deliver its full rated capacity. This is normal and should be expected since it takes time for a deep cycle battery to reach maximum performance or peak capacity. Ionic's Lithium-ion deep cycle batteries will reach rated capacity in less than 10 cycles. When operating batteries at temperatures below 80°F (27°C), they will deliver less than the rated capacity. For example at 0°F (-18°C) the battery will deliver 50% of its capacity and at 80°F (27°C) it will deliver 100% of its capacity. When operating batteries at temperatures above 80°F (27°C), they will deliver more than the rated capacity but battery life will be reduced. The life of a battery is difficult to predict and will vary by application, frequency of usage and level of maintenance.

What are LiFePO4 Batteries?

Lithium Iron Phosphate (LiFePO4) batteries provide several advantages over traditional batteries such as Lead Acid and other lithium chemistries. LiFePO4 batteries provide much higher specific capacity, superior thermal and chemical stability, enhanced safety, improved cost performance, enhanced charge and discharge rates, enhanced cycle life and come in a compact, lightweight package. LiFePO4 batteries also offer a cycle life of over 2,000 charge cycles!

How does Ionic's Deep Cycle capacity (Ah) rating compare to lead-acid Ah ratings?

Ionic Deep Cycle Batteries have a true lithium capacity rating at 1C discharge rate, meaning a 12Ah Deep Cycle lithium-ion battery will be able to provide 12A for 1 hour. On the other hand, most lead-acid batteries have a 20hr or 25hr rating printed for its Ah capacity meaning the same 12Ah lead-acid battery discharging in 1 hour would typically only provide 6Ah of usable energy. Going below 50% DOD will damage a lead-acid battery, even if they claim to be a deep discharge battery. Thus a 12Ah lithium battery would perform closer to a 48Ah lead-acid battery rating for higher discharge currents and life performance.

Ionic lithium-ion batteries have 1/3 the internal resistance of a similar capacity lead-acid battery and they can be safely discharged to 90% DOD. Lead-acid internal resistance rises as they are discharged; the actual capacity which can be used may be as little as 20% of the mfg. rating. Discharging in excess will damage the lead-acid battery. Ionic's lithium-ion batteries hold a higher voltage during discharge Ionic batteries have substantially lower mass than lead-acid batteries and they warm up much quicker, enhancing performance.

Need Assistance? Please contact customer service at 704-360-9311 or ionicbatteries.com

Deep Cycle versus starter batteries?

There are Lithium-ion starter batteries in the marketplace. Starter batteries have higher current cells and a Battery Management System(BMS) designed to handle the higher current required to start a vehicle or engine. Starter batteries deliver a large amount of current but only for a short time. They would not work well as an extended range energy storage device. Deep Cycle Batteries have cells and a BMS designed for energy storage which requires a lower current compared to a starter battery, but they have a high capacity for a much longer run time. If batteries were athletes, a starter battery would be sprinter and a deep cycle battery would be marathon runner. We do not recommend using the two battery types interchangeably as the cell and BMS structures are different.

How long will my “Deep Cycle” battery last?

There are several factors that affect the life of a battery. Weather, temperature, recharge cycles, depth of discharge (DOD), discharge current, charging current, charging method, vibration and duration of static use can all have dramatic effects on battery life. A properly maintained Deep Cycle Battery should last roughly three times as long as a lead-acid battery used in similar conditions. Life expectancy is 8-10 years with normal use.

Battery Cycle Life

Battery manufacturers rate the cycle life of their batteries by comparing the level of discharge on the battery and the frequency of cycling. Higher battery discharge will result in a shorter cycle life. In reverse, a smaller discharge percentage will extend the expected cycle life of the battery as the battery will provide more charge/discharges. Ionic estimates an average life cycle of its Deep Cycle Batteries at 3000 cycles with average use. As noted, life cycles will vary based on use parameters and operating conditions.

Battery Disposal

Batteries must NEVER be disposed of in household waste. To reduce environmental impacts, bring your battery to a certified recycling depot at the end of its life.

State of Charge (SOC)

SOC shows approximately how much battery life remains on your Ionic Deep Cycle battery based what the voltage currently reads, also know as State of Charge (SOC). Note: The battery should be transported in 30% SOC.

Battery Charge Remaining	12V	24V	48V
100%	14.6V	29.2V	58.4V
80%	13.28V	26.56V	53.12V
60%	13.14V	26.28V	52.56V
40%	13.11V	26.21V	52.42V
20%	12.89V	25.78V	51.56V

TABLE 3 - SOC PERCENTAGES BY VOLTAGE

Discharge Rates

Discharge and recharge rates should be considered when selecting and sizing a battery bank. Battery manufacturers publish multiple discharge rates for each battery model, which range from 100 hrs to 1 hr. These are often referenced for various type of applications. The most common in Renewable Energy applications is the 20 hr rate as this closely matches a 1 day period. The rating, (ex C20) refers to a controlled load (Amps) which can be placed on the battery for a period of time. A high amp draw may be run for a shorter period of time and vice versa. As an example, a 400 AH battery can support a controlled 20 Amp draw for 20 hours (C20).

Alternatively, the same battery can support a controlled 34 Amp draw over a 10 hour period (C10), meaning it supplies 340 AH capacity for that period of time. Batteries which are discharged should be recharged as promptly as possible. A Renewable Energy PV system should be designed to provide a charge current that is capable of recharging the batteries quickly, efficiently and within the window of time when the system is generating peak power (peak sun). The charge current should be within 10-20% of the 20 Hr AH rate (C20) rate of the battery bank, or the C4, C5, or C6 rate of the battery.

Often customers who need to supplement charge with a generator do not run it long enough to allow the batteries to reach a full state of charge on a regular basis.

Finally the last issue with some systems, after installing/commissioning end users will inadvertently add more loads after the installation causing problems with how often the battery bank needs to be recharged, thus increasing cycle life usage. This needs to be avoided, and can be by properly educating the customer at the time of sale.

Battery Selection

Choosing the appropriate battery for the application is key to long battery life and performance. Once the load is determined a battery bank should be selected to meet the system design. If a battery bank of a specific capacity is needed, it is important to select a battery model which offers sufficient capacity, but also minimizes the number of parallel strings required to accomplish the desired voltage and capacity. Systems with multiple parallel strings of batteries will often experience an imbalance of charge.

Determining the capacity requirement for off-grid systems is done by completing an audit of energy consumption based on actual load requirements. The load is calculated by the total amount of power necessary to support the load for a 1 day period and then factors in how many days it may be required before recharging. In a typical Renewable Energy system the 1 hr AH rate (C25) is used when sizing systems to cover three days of autonomy or less. The 100 hr AH rate (C100) is used when designing systems to cover more than 3 days of autonomy. Most systems are designed for a 1-2 day rate, due to the cost of batteries versus the cost of adding a generator and/or additional renewable energy sources. This is also most typical for solar applications as these systems allow the battery bank to be charged each day. Deep cycle batteries will perform best when they are maintained at a float charge.

It is also important to use the battery bank on occasion every 6 months fully discharge and then fully charge. It is important to be aware that as load profiles change this too will affect how quickly battery capacity will be reduced. Often a backup system is sized to meet the load requirement at the time of install, but this demand will increase with every small addition to the load.

Battery Installation

Equipment needed

Proper personal protective equipment (Ex: Safety Glasses), Insulated wrench, Voltmeter or multimeter, Discharge tester (if available), Smart Battery charger.

Battery cable selection and preparation

Battery cables provide the link between the batteries, equipment and charging system. Faulty connections can lead to poor performance and terminal damage, meltdown or fire. To ensure proper connections, please use the following guidelines for cable size. (See Table 1) Table values are for cable lengths less than 6 feet (1829 mm). In series/parallel battery banks, it is preferable for all series cables to be the same length, and all parallel cables to be the same length. Battery cabling should be selected allowing a maximum voltage drop of 2% or less across the entire length of the cable.

Terminal types

Ionic Deep Cycle Batteries are equipped with connection terminals tailored for the most common use of each battery's size and power. Terminal M8 Batteries are equipped with standard posts and battery posts are available as an accessory. (See Figure 1)

CABLE/WIRE GAUGE (AWG)	RECCOMENDED MAX AMPS
14	25
12	30
10	40
8	55
6	75
4	95
2	130
1	150
0	170
00	195
0000	260

TABLE 1 - WIRE GAUGE RECOMMENDATIONS



Terminal F2

12 Volt 6Ah, 12 Volt 9Ah &
12 Volt 12Ah
Batteries



Terminal F8

12 Volt 20Ah &
24 Volt 10Ah
Batteries



Terminal M8 (Standard)

12 Volt 30Ah &
12 Volt 50Ah
Batteries



Terminal M8 with Battery Post
(Optional Accessory)

12 Volt 30Ah &
24 Volt 50Ah
Batteries



Terminal 3/8 UNC Threads

12 Volt: 80Ah, 100Ah & 125Ah
24 Volt 50Ah & 48 Volt 25Ah
Batteries

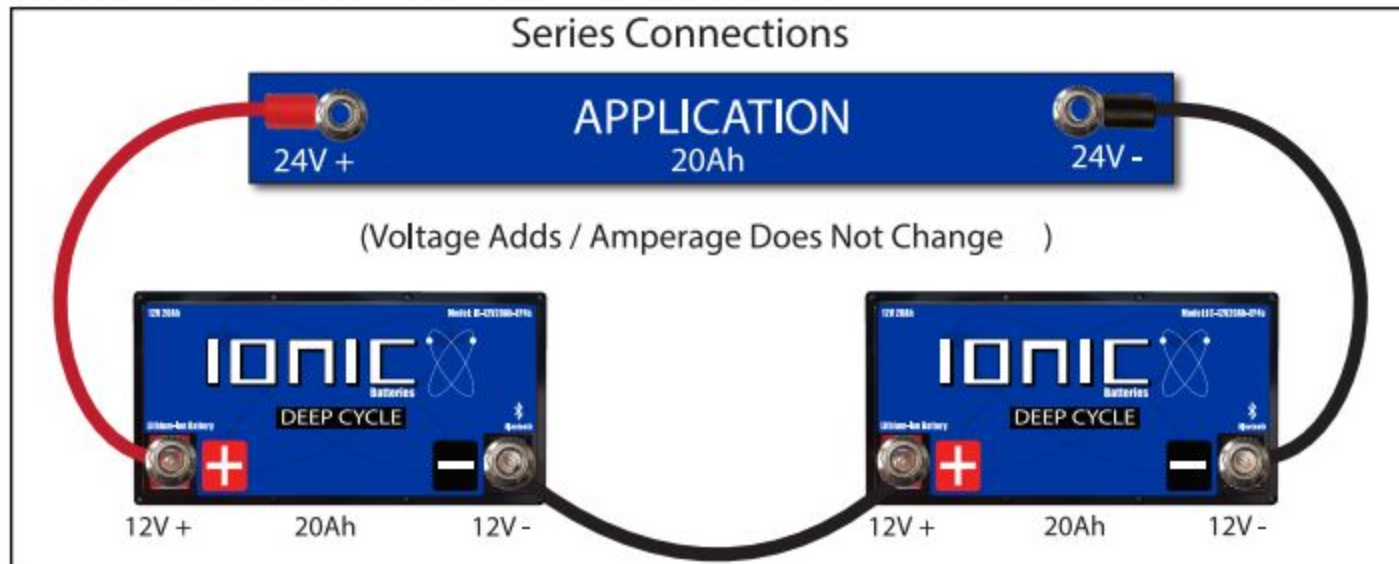
FIGURE 1 - TERMINAL TYPES

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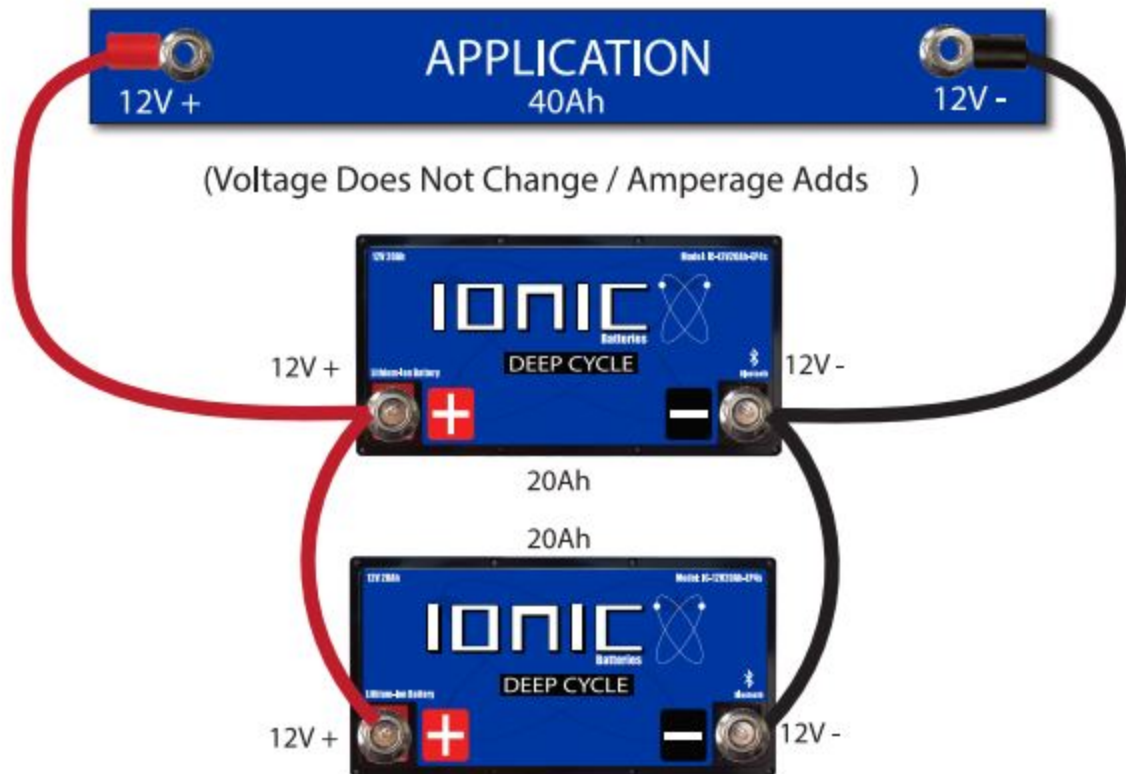
Series or Parallel connections

Applications often demand more voltage or ampere capacity than the capacity of one battery. By connecting multiple batteries in series, parallel or series parallel configurations, you are able to increase the output voltage or battery bank amperage as needed. To increase voltage, batteries are connected in series. Capacity of the battery bank remains the same as voltage increases. To increase the available amount of current and capacity, batteries are connected in parallel. In this situation it is best to use lower voltage, higher capacity cells to minimize the amount of parallel strings. Select Ionic Batteries are capable of Series connections.

(See the Technical Specification Tables 4A thru 4C on pages 16 & 17)



Parallell Connections



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Making the Connection

- Utilize an Insulated wrench and do not over Torque any screw connectors
- Connect the positive red wires to the positive (+) red terminals on the battery and connect the negative (-) black wires to the black terminals.
- If using flat washers, it is very important to ensure the battery cable lug connection is contacting the base surface of the terminal, and the washer is placed on top of the wire connection. Do not place washer between the battery terminal and the battery wire, which creates high resistance and can cause terminal meltdown. It is important that fasteners be tightened to the appropriate torque for each terminal type.
- Table values are for cable lengths less than 6 feet (1829 mm). In series/parallel battery banks, it is preferable for all series cables to be the same length, and all parallel cables to be the same length. (See TABLE 1, PAGE 6)

Be sure to turn off all electrical components before wiring.

NOTICE: Battery Protection Circuit and “sleep” Mode

Your Ionic battery has a protection circuit that will attempt to put the battery in “sleep mode” if you have a short circuit, over/under voltage situation, have reversed the polarity or you pulled too much current(overload). The Battery Management System(BMS) may not be able to protect the battery from damage in all circumstances. Assuming the Battery Management System(BMS) was successful in protecting the battery and it was not damaged, you may need to “wake” up the battery. You can trigger the BMS to wake up the battery by trying the following:

- 1) You could try using a different power supply(charger), some are better at triggering a wake-up.
- 2) Apply a small load like a low power light or appliance.
- 3) Put the battery in parallel with a second battery. Positive post to positive post, negative post to negative post.

Circuit protection

Battery Protection Type		12V	24V	48V
Overcharge Protection	Over-charge protection	~15.2V-	~30.4V-	~60.8V-
	Over-charge release	~14.4V-	~28.8V-	~57.6V-
	Over-charge release method	~<14.4V-	~<28.8V-	~<57.6V-
Over Discharge Protection	Over-discharge protection	~10V-	~20V-	~40V-
	Over-discharge release	~10.5V-	~21V-	~42V-
	Over-discharge release method	~<10.5V	~<21V	~<42V
Over Current Protection	Discharge over current protection	Battery Specific		
	Protection delay time	Battery Specific		
	Over current release method	Battery Specific		
Short Circuit Protection	Accidental shorts only(DO NOT SHORT)	-	-	-
Battery Temperature Protection	Charge over temperature protection	65±5°C	65±5°C	65±5°C
	Charge over temperature release	50±5°C	50±5°C	50±5°C
	Discharge over temperature protection	65±5°C	65±5°C	65±5°C
	Discharge over temperature release	50±5°C	50±5°C	50±5°C
	Charge low temperature	-	-	-

TABLE 2 - CIRCUIT PROTECTION TYPES

Need Assistance? Please contact customer service at 704-360-9311 or lithiumbatteries.com

Battery Charging

Lithium-ion battery environment

Batteries should be stored and installed in a clean, cool and dry place, keeping water, oil, and dirt away from the batteries. If any of these materials are allowed to accumulate on the batteries, tracking and current leakage can occur, resulting in self-discharge and possible short-circuits. Battery chargers should also be installed in well-ventilated, clean areas that are easily accessible. The recommended operating temperature range is between -4°F to 122°F (-20°C to $+50^{\circ}\text{C}$) with a humidity of $<90\%$. Elevated battery electrolyte temperatures of $>80^{\circ}\text{F}$ (27°C) will reduce operating life, while lower battery electrolyte temperatures of $<80^{\circ}\text{F}$ (27°C) will reduce battery performance. It is important to minimize temperature variations between the cells, therefore, do not arrange the batteries where they are too tightly packed together which restricts airflow. The batteries should have a minimum of 0.50" (12.7 mm) of space between them to allow for adequate airflow. There are no liquids in the Deep Cycle Batteries. Because the chemistry is a solid, the battery can be mounted in any direction and there are no worries about lead plates cracking from vibration.

Lithium-ion charging levels

Proper charging is imperative to maximize battery performance. Both under- or over-charging batteries can significantly reduce the life of the battery. Most chargers are automatic and pre-programmed, while others are manual and allow the user to set the voltage and current values. Never charge a frozen battery. Ionic Deep Cycle Batteries may be used below freezing but charging below freezing causes plating/crystallization which weakens the battery making it more likely to fail due to vibration or hard use. Avoid charging at temperatures above 122°F (50°C).

Charging profile

For Ionic 12V Deep Cycle batteries, you should set your charger profile to charge up to 14.6 volts for 30 minutes and then float charge at 13.8 volts. For 24V Deep Cycle batteries, you should set your charger profile to charge up to 29.2 volts for 30 minutes and then float charge at 27.6 volts. For 48V Deep Cycle batteries, you should set your charger profile to charge up to 58.4 volts for 30 minutes and then float charge at 55.2 volts. **Note that all 12V batteries above 12Ah, configured in Series, must be charged individually at 12V. Our 12V 12Ah battery has special circuitry that will allow the batteries to be charged in series as configured (ie. 12V12 in Series at 24V can be charged with a 24V charger).**

Slow or Fast charging

The charger voltage should always match the battery voltage or less. The newest Ionic chargers are designed to be left connected and powered on continuously. Chargers that do not have a "trickle charge" feature should be discontinued after the charging process is completed. To slow charge a battery use a charger with an amperage that is about 10 percent of the battery's total amp-hours. To do a fast charge use a charger output that is about 40-45 percent of the battery's amp-hours. Slow charging results in lower battery temperatures and enhances the longevity of the battery and is therefore recommended by Ionic when possible.

As an example, using a 100Ah battery, you would slow charge it by using a 10A charger and the battery would take about 10 hours to charge. You would fast charge it by using a 45A charger and it would charge in a little over 2 hours to charge. (See TABLE 5, PAGE 16 for our charger recommendations for each Ionic model)

Need Assistance? Please contact customer service at 704-360-9311 or lithiumhub.com

Low temperatures

Many battery users are unaware that lithium-ion batteries cannot be charged below 0°C (32°F). Although the pack appears to be charging normally, plating of metallic lithium can occur on the anode during a sub-freezing charge. This is permanent and cannot be removed with cycling. Batteries with lithium plating are more vulnerable to failure if exposed to vibration or other stressful conditions. Lithium-ion batteries do warm up quickly with use as compared to lead-acid, so you may be able to get them above freezing with some use, allowing for a charge. It all depends on how cold of an environment you have and caution is advised.

Lithium-ion batteries capacity decreases when operating below freezing temperatures(32F/ 0C). The current is still available, but the stored capacity will decrease. The colder the temperature the less capacity available. Both lead-acid and lithium-ion cells have increased internal resistance as the temperatures fall. Lithium batteries have more internal resistance in extreme cold temperatures of 0°F (-18°C) or lower, however, the batteries can be warmed up much quickly simply by putting a load on the battery, such as turning on your headlights for 15 to 30 seconds. Since Ionic batteries have substantially lower mass than lead-acid batteries, they warm up much quicker.

Recommended Battery and Charger configurations (Wiring Diagrams)

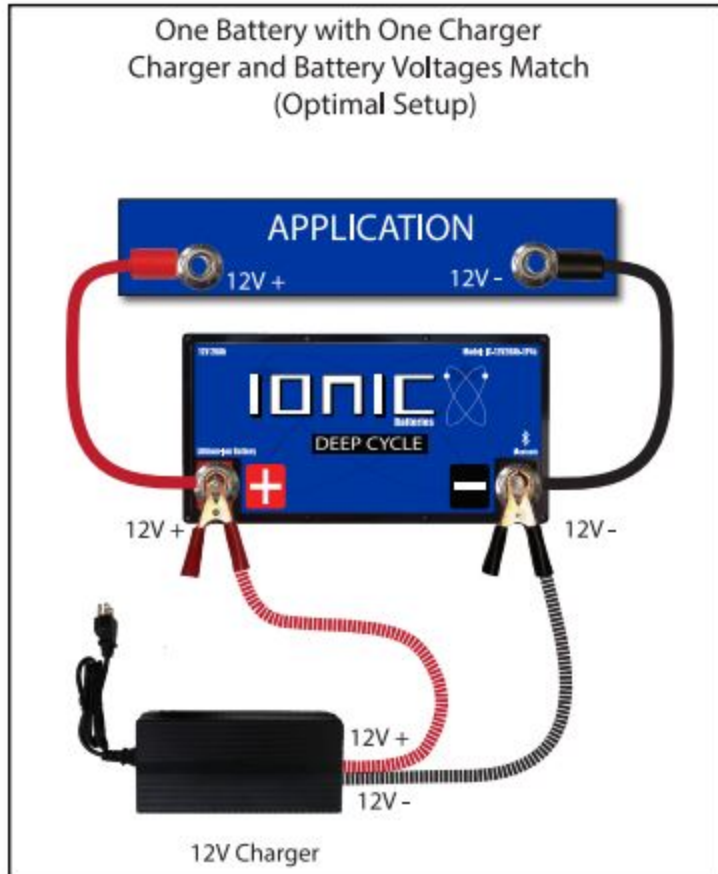
This figure shows the most basic connection between a battery charger and a single battery. The green "APPLICATION" box refers to the final application the battery is powering like your recreational vehicle or golf cart. The dashed charger cables are often a temporary connection but could be permanent if desired.

The positive charger output (red) connects to the positive(+) battery post. The negative charger output (black) connects to the negative(-) battery post. Always remember:

- 1) positive connects to positive and negative connects to negative .
- 2) the charger and the battery must have the same voltage.

The following pages show additional configurations recommended by IONIC for battery bank wiring and charging. If you have any questions do not hesitate to call us at 704-360-9311.

Be sure to turn off all electrical components before wiring.

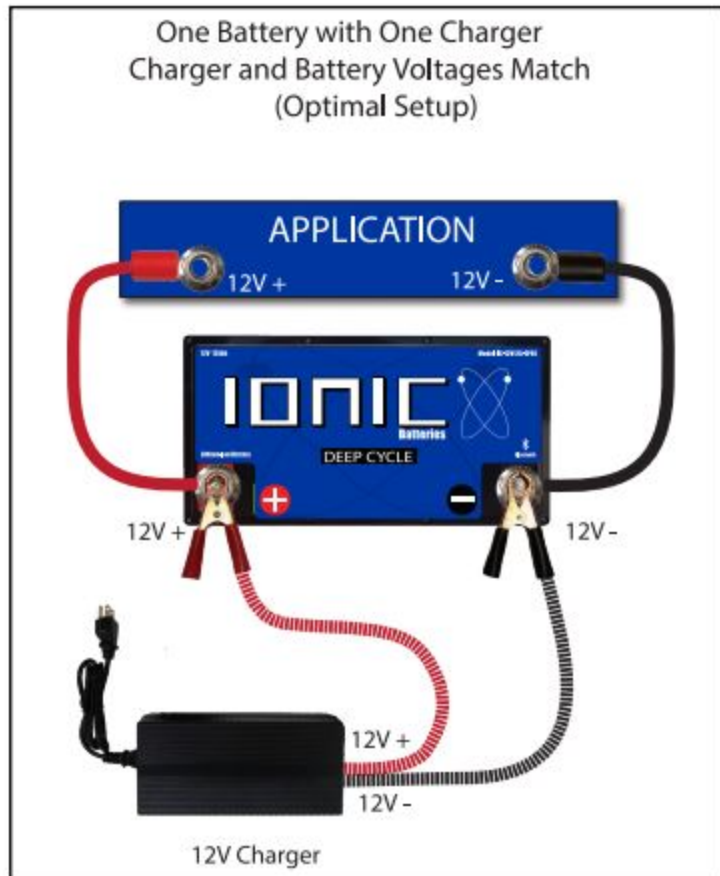


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- 2) the charger and the battery must have the same voltage.

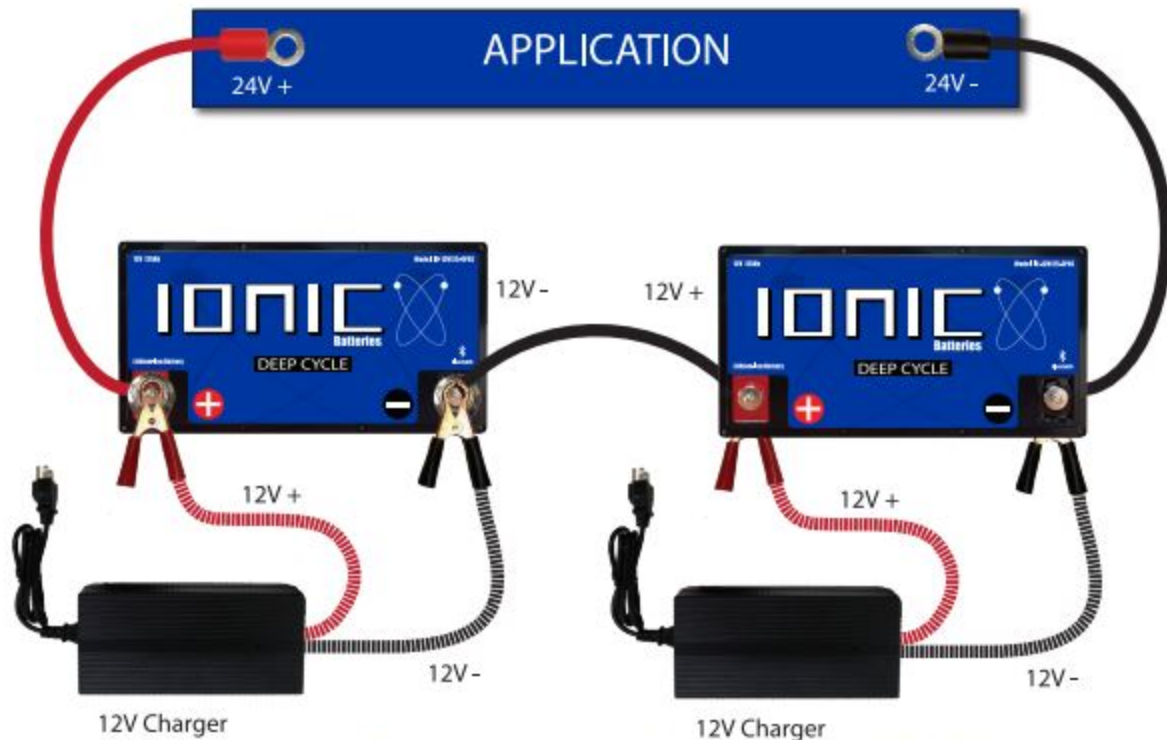
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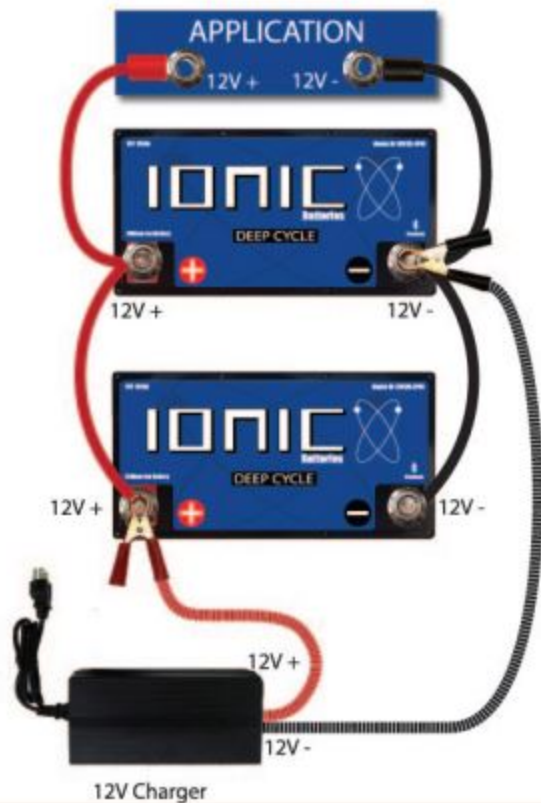
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Two Batteries in Series with Two 12 Volt Chargers
(24V Output with 2 12V Batteries in Series)
(Optimal Setup)

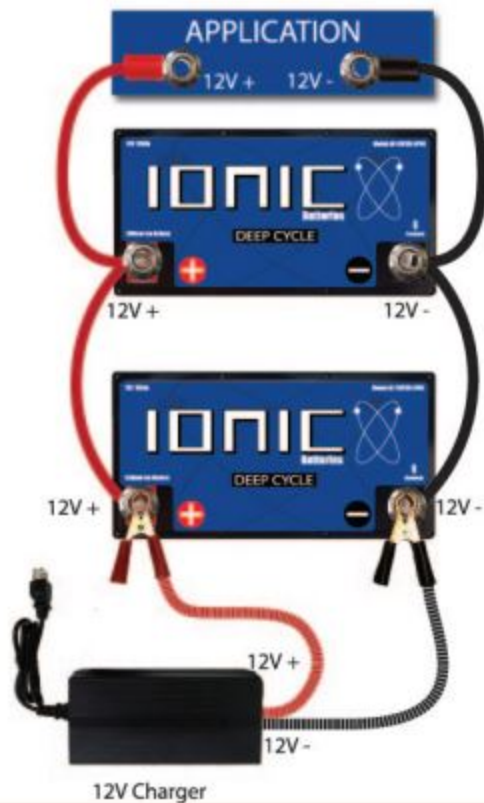


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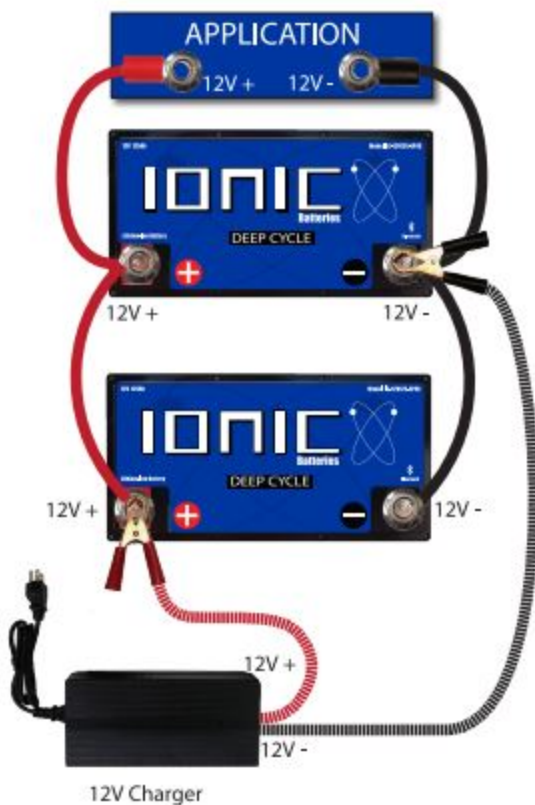
Two Batteries in Parallel with One Charger
(Preferred Option for 10A + Chargers)



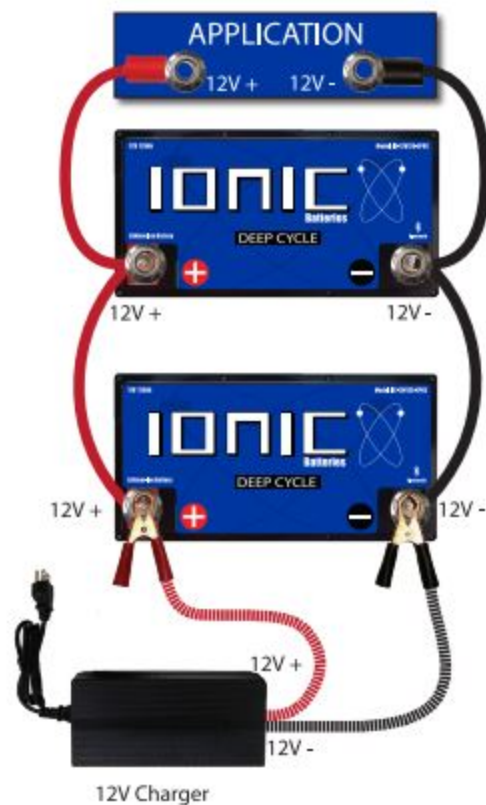
Two Batteries in Parallel with One Charger
(Preferred Option for under 10A chargers)



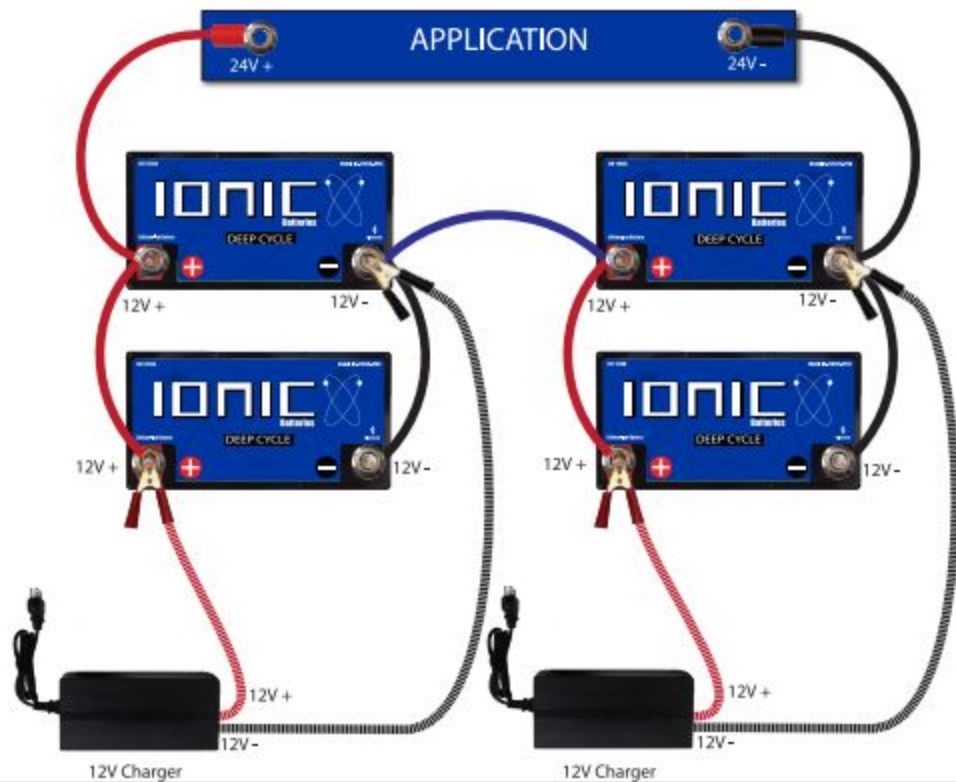
Two Batteries in Parallel with One Charger
(Preferred Option for 10A + Chargers)



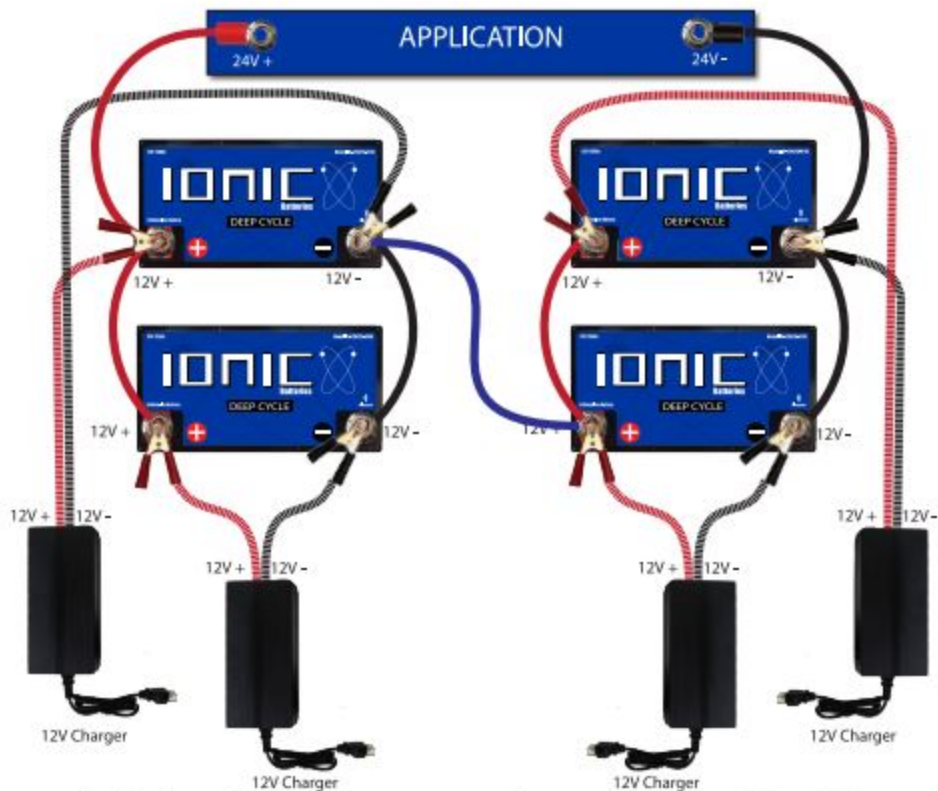
Two Batteries in Parallel with One Charger
(Preferred Option for under 10A chargers)



Four Batteries in Series/Parallel with Two Chargers
(Two 12V Chargers / 24V system)
(Optimal Setup)



Four Batteries in Series/Parallel with Four Chargers
(Four 12V Chargers / 24V system)
(Optimal Setup)



Need Assistance? Please contact customer service at 704-360-9311 or lithiumhub.com

Battery Preventative Maintenance



Inspect the exterior

Examine the outside appearance of the battery. The tops of the batteries and terminal connections should be clean and dry, as well as free of dirt and corrosion. The case should show no signs of cell expansion which could cause the case to bulge or split. If the cells have expanded they should not be used and immediately discarded per local regulations.

Check battery cables and connections. Replace any damaged cables and tighten any loose connections. Do not over torque, as you may damage the terminal.

Cleaning the exterior

Check the battery for cleanliness at regular intervals and keep terminals and connectors free of corrosion. Terminal corrosion may adversely affect the performance of the battery and present a safety hazard. Clean the top of the battery, terminals and connections with a cloth or brush. Do not allow any cleaning solution to get inside the battery if used. Keep the area around batteries clean and dry.

Battery Storage

- Charge batteries before placing in storage.
- Store in a cool, dry location, protected from the elements.
- Disconnect from equipment to eliminate potential parasitic loads that may discharge the battery.
- Batteries gradually self-discharge during transit and storage.
- Batteries in storage should be given a boost charge when they are at 70% SOC
- When batteries are taken out of storage, recharge before use.
- Check battery cables and connections. Replace any damaged cables and tighten any loose connections.

Power storage wherever you need it!



Technical Specifications

Voltage	12V	12V	12V	12V
Capacity	6Ah, 77Wh	9Ah, 115Wh	12Ah, 158Wh	20Ah, 256Wh
Chemistry	LiFePo	LiFePo	LiFePo	LiFePo
Weight	2.0lbs (0.9kg)	2.8lbs (1.3kg)	3.5lbs (1.6kg)	6.6lbs (3.0kg)
Dimensions	5.9"x2.55"x3.7" 150x65x94mm	5.9"x2.55"x3.7" 150x65x94mm	5.9"x4"x3.7" 150x102x94mm	7.1"x3"x6.5" 180x76x165mm
Life Cycles	3000 @ 80% DOD	3000 @ 80% DOD	3000 @ 80% DOD	3000 @ 80% DOD
Max Charge Voltage	14.6 ±0.1V	14.6 ±0.1V	14.6 ±0.1V	14.6 ±0.1V
Recommended Float Charge Voltage	13.9±0.1V	13.8±0.1V	13.9±0.1V	13.9±0.1V
Discharge Cut-Off Voltage	~8.0V	~8.0V	~8.0V	~8.0V
Output Voltage Range	8.0~14.6V	8.0~14.6V	8.0~14.6V	8.0~14.6V
Max Charge Current	6A	9A	6A	20A
Max Discharge Current	6A	9A	12A	30A
Pulse Discharge Current	35A (3S)	35A (3S)	55A (3S)	68A (3S)
Bluetooth	N/A	N/A	Bluetooth	N/A
Operating Temperature	-20~60C -4F~140F	-20~60C -4F~140F	-20~60C -4F~140F	-20~60C -4F~140F
BCI Group Size	None	None	None	None
Terminal	F2	F2	F2	M6

TABLE 4 A- TECHNICAL SPECIFICATIONS

Voltage	12V	12V	12V	12V
Capacity	30Ah, 384Wh	50Ah, 640Wh	100Ah, 1280Wh	125Ah, 1600Wh
Chemistry	LiFePo	LiFePo	LiFePo	LiFePo
Weight	11.7lbs (5.3kg)	16.5lbs (7.5kg)	30.0lbs (13.5kg)	34.2lbs (15.5kg)
Dimensions	7"x6.5"x7.7" 178x165x196mm	7"x6.5"x7.7" 178x165x196mm	12.55"x6.5"x9.2" 319x165x234mm	12.55"x6.5"x9.2" 319x165x234mm
Life Cycles	3000 @ 80% DOD	3000 @ 80% DOD	3000 @ 80% DOD	3000 @ 80% DOD
Max Charge Voltage	14.6 ±0.1V	14.6 ±0.1V	14.6 ±0.1V	14.6 ±0.1V
Recommended Float Charge Voltage	13.8±0.1V	13.8±0.1V	13.8±0.1V	13.8±0.1V
Discharge Cut-Off Voltage	~8.0V	~8.0V	~8.0V	~8.0V
Output Voltage Range	8.0~14.6V	8.0~14.6V	8.0~14.6V	8.0~14.6V
Max Charge Current	15A	25A	50A	60A
Max Discharge Current	40A	50A	100A	100A
Pulse Discharge Current	170A (3S)	150A (3S)	350A (3S)	350A (3S)
Bluetooth	Bluetooth	Bluetooth	Bluetooth	Bluetooth
Operating Temperature	-20~60C -4F~140F	-20~60C -4F~140F	-20~60C -4F~140F	-20~60C -4F~140F
BCI Group Size	25	25	31	31
Terminal	M6	3/8 UNC Thread	3/8 UNC Thread	3/8 UNC Thread

TABLE 4 B- TECHNICAL SPECIFICATIONS

Voltage	12V	12V	12V	12V
Capacity	30Ah, 384Wh	50Ah, 640Wh	100Ah, 1280Wh	125Ah, 1600Wh
Chemistry	LiFePo	LiFePo	LiFePo	LiFePo
Weight	11.7lbs (5.3kg)	16.5lbs (7.5kg)	30.0lbs (13.5kg)	34.2lbs (15.5kg)
Dimensions	7"x6.5"x7.7" 178x165x196mm	7"x6.5"x7.7" 178x165x196mm	12.55"x6.5"x9.2" 319x165x234mm	12.55"x6.5"x9.2" 319x165x234mm
Life Cycles	3000 @ 80% DOD	3000 @ 80% DOD	3000 @ 80% DOD	3000 @ 80% DOD
Max Charge Voltage	14.6 ±0.1V	14.6 ±0.1V	14.6 ±0.1V	14.6 ±0.1V
Recommended Float Charge Voltage	13.8±0.1V	13.8±0.1V	13.8±0.1V	13.8±0.1V
Discharge Cut-Off Voltage	~8.0V	~8.0V	~8.0V	~8.0V
Output Voltage Range	8.0~14.6V	8.0~14.6V	8.0~14.6V	8.0~14.6V
Max Charge Current	15A	25A	50A	60A
Max Discharge Current	40A	50A	100A	100A
Pulse Discharge Current	170A (3S)	150A (3S)	350A (3S)	350A (3S)
Bluetooth	Bluetooth	Bluetooth	Bluetooth	Bluetooth
Operating Temperature	-20~60C -4F~140F	-20~60C -4F~140F	-20~60C -4F~140F	-20~60C -4F~140F
BCI Group Size	25	25	31	31
Terminal	M6	M6	3/8 UNC Thread	3/8 UNC Thread

TABLE 4 B- TECHNICAL SPECIFICATIONS

Technical Specifications

Voltage	24V	24V	48V
Capacity	10Ah, 256Wh	50Ah, 1280Wh	25Ah, 1280Wh
Chemistry	LiFePo	LiFePo	LiFePo
Weight	6.6lbs (3.0kg)	32.0lbs (14.5kg)	32.0lbs (14.5kg)
Dimensions	7.1"x3.0"x6.5" 180x75x166mm	12.4"x6.5"x8.5" 318x165x215mm	12.55"x6.5"x9.2" 319x165x234mm
Life Cycles	3000 @ 80% DOD	3000 @ 80% DOD	3000 @ 80% DOD
Max Charge Voltage	29.2 ±0.1V	29.2 ±0.1V	58.4 ±0.1V
Recommended Float Charge Voltage	27.6 ±0.2V	27.6 ±0.2V	55.2 ±0.1V
Discharge Cut-Off Voltage	~16.0V	~16.0V	~32.0V
Output Voltage Range	8.0~25.6V	16.0~29.2V	16.0~29.2V
Max Charge Current	10A	25A	25A
Max Discharge Current	15A	50A	50A
Pulse Discharge Current	55A (3S)	140A (3S)	115A (3S)
Bluetooth	N/A	Bluetooth	Bluetooth
Operating Temperature	-20~60C -4F~140F	-20~60C -4F~140F	-20~60C -4F~140F
BCI Group Size	None	31	31
Terminal	F8	3/8 UNC Thread	3/8 UNC Thread

TABLE 4 C- TECHNICAL SPECIFICATIONS

Charger Recommendations

Ionic Batteries Product		Recommended Chargers			
Ionic Model Number	Description	Normal(slow) Charge		Fast Charge	
		Amperage	LithiumHub Model	Amperage	LithiumHub Model
IC-12V6-EP	12V 6Ah Lithium Deep Cycle	1A	LH-12V1-CHP	4A	LH-12V4-CHP
IC-12V9-EP	12V 9Ah Lithium Deep Cycle	1A	LH-12V1-CHP	4A	LH-12V4-CHP
IC-12V12-EP	12V 12Ah Lithium Deep Cycle	1A	LH-12V1-CHP	4A	LH-12V4-CHP
IC-12V20-EP	12V20Ah Lithium Deep Cycle	4A	LH-12V4-CHP	10A	LH-12V10-CHP
IC-12V30-EP	12V 30Ah Lithium Deep Cycle	4A	LH-12V4-CHP	10A	LH-12V10-CHP
IC-12V50-EP	12V 50Ah Lithium Deep Cycle	10A	LH-12V10-CHP	20A	LH-12V20-CHP
IC-12V100-EP	12V 100Ah Lithium Deep Cycle	10A	LH-12V10-CHP	45A	LH-12V45-CHP
IC-12V125-EP	12V 125Ah Lithium Deep Cycle	10A	LH-12V10-CHP	45A	LH-12V45-CHP
IC-24V10-EP	24V 10Ah Lithium Deep Cycle	2A	LH-24V2-CHP	5A	LH-24V5-CHP
IC-24V50-EP	24V 50Ah Lithium Deep Cycle	10A	LH-24V10-CHP	20A	LH-24V20-CHP
IC-48V25-EP	48V 25Ah Lithium Deep Cycle	10A X 2	LH-24V10-CHP(X2)	20A X 2	LH-24V20-CHP(X2)

TABLE 5 - Ionic RECOMMENDED CHARGERS

Need Assistance? Please contact customer service at 704-360-9311 or ionicbatteries.com

BLUETOOTH GUIDE

Download the Application for your Phone:

Android app

Ionic Batteries



Ionic offers all-new smart battery with bluetooth technology

[MORE INFO](#) [INSTALL](#)

Download the App for your phone or tablet.

The "Ionic" Android App from the Play store


or

The "Ionic" Apple App from the Apple Store

Apple app

Ionic Batteries

[INSTALL](#)



Today Games Apps Updates ³ Search

(Bluetooth Available in Select Models, see the Specification Tables 4A -4C in this manual, Pages 16 &17)

Page one



Link Device

Click to pair your battery to your device.

Page two



Battery Dashboard

Displays all of your basic battery information

Page three



Monitor Usage

Voltage Current Temperature Cycle Life

Page four



System Information

Log History of any unusual battery activity

Page five



Contact Us

Customer Service Place an Order

Need Assistance? Please contact customer service at 704-360-9311 or ionicbatteries.com

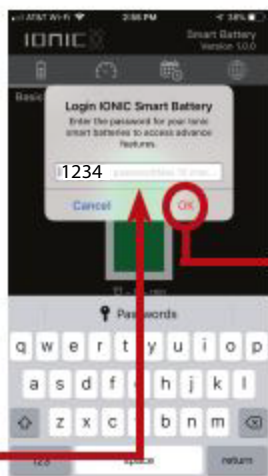
BLUETOOTH GUIDE

Page two menu



Settings

Access additional
battery settings
and information



Login

Password: 1234



Rename Device

Customize your
battery name

Battery information page

HV = High Voltage
(Over-Charge)

Charger voltage too high

LV = Low Voltage
(Over-Discharge)

Application voltage too low



OCC = Over Current Charge

Charger current too high

OCD = Over Current Discharge

Application current too low

LTD = Low Temp Discharge

Battery used (discharged) below operating temperature range

LTC = Low Temp Charge

Battery charged below freezing (may damage with HC)

HTD = High Temp Discharge

Battery overheated while in use

HTC = High Temp Charge

Battery overheated while charging

Indicator Status

● = Good

● = Error

Cell Voltage

Used to ensure cell voltage balanced
(Maximum Cell Delta +/- 200 mV)

Take action if you have error code. Ex: If battery code shows too hot, disconnect and allow it to cool.

Need Assistance? Please contact customer service at 704-360-9311 or ionicbatteries.com

TROUBLESHOOTING GUIDE

1

Over-charged Battery

If you charge your "Deep Cycle" battery above 15V for 12V battery, the BMS inside the battery terminal will turn off. The cut-off voltage settings will vary slightly depending on current levels, temperature and part tolerances. To turn ON the battery again, disconnect the charging source and let the battery rest for several seconds (~30 sec) it should come on. In the event the 12V battery had voltages higher than 18V, the internal BMS is damaged and will not turn ON.

2

Poor wire connections

The main system cables that run to your DC distribution (loads) should be connected across the whole bank as illustrated in the diagrams in this manual. This ensures the whole battery bank is charged and discharged equally, providing optimal performance. The main system cables and the cables joining the batteries together should be of sufficient size (diameter) to handle the total system current. Ensure the terminals and connectors are making a solid connection and are tight.

3

Clean Terminals?

Make sure that the terminals are free of plastic caps, paint, rust, dirt, or grease that can hinder the connection. Clean the terminals as required to ensure a proper connection between the wires and battery terminals.

4

Not charging to 100%

Make sure that you are using a lithium battery charger. You can use a lead acid charger in non-sulfate mode but the battery will not charge to 100% (about 14.6 Volts)

Need Assistance? Please contact customer service at 704-360-9311 or lithiumbatteries.com



5

BMS damaged?

Your Ionic battery has a protection circuit that will attempt to put the battery in "sleep mode" if you have a short circuit, over/under voltage situation, had reversed the polarity or you pulled too much current (overload). The Battery Management System (BMS) may not be able to protect the battery from damage in all circumstances. The BMS itself may be damaged in the process of protecting the cells. In this case, if the cells were protected, you will need to have the BMS replaced by Ionic. The BMS cost is usually a fraction of the total cost of the battery.

6

Shorted Battery?

If the battery is crystallized, it will be shorted and will need to be replaced. Crystallized batteries cannot be charged or jump started.

7

"Dead Battery"?

If the battery is completely dead; it will show voltage below 4V. The battery may be awoken using the process layed out in Item 9 of this guide "Sleep Mode". If that process does not work, a cell may be damaged and the battery will need to be replaced.

8

"Overdraw"?

Make sure the load is not exceeding the rated continuous output current. If the electrical load exceeds the limits of the BMS, the BMS will shut down the pack. To reset, disconnect the electrical load and troubleshoot your load and make sure that the continuous current is less than the maximum continuous current for the pack. To reset the pack, attach the charger back to the battery for a few seconds. If you need a battery with additional current output, please contact us.

Need Assistance? Please contact customer service at 704-360-9311 or ionicbatteries.com

TROUBLESHOOTING GUIDE

9

Sleep Mode?

Your Ionic battery has a protection circuit that will attempt to put the battery in "sleep mode" if you have a short circuit, over/under voltage situation, had reversed the polarity or you pulled too much current(overload). The Battery Management System(BMS) may not be able to protect the battery from damage in all circumstances. Assuming the Battery Management System(BMS) was successful in protecting the battery and it was not damaged, you may need to "wake" up the battery. You can trigger the BMS to wake up the battery by trying the following:

- 1) You could try using a different power supply(charger), some are better at triggering a wake-up.
- 2) Apply a small load like a low power light or appliance.
- 3) Put the battery in parallel with a second battery. Positive post to positive post, negative post to negative post.

10

Deep Cycle batteries as a Starter Battery?

These batteries are designed and developed to be used for lower discharge current applications. The larger 50Ah and 100Ah "Deep Cycle" batteries can be used to start engines with but NOT the smaller batteries (6Ah, 9Ah, 12Ah, 20Ah, 30Ah). If you have a question about applications please call us or e-mail info@lithiumhub.com and our customer service professionals will be happy to help.

Need Assistance? Please contact customer service at 704-360-9311 or lithiumhub.com

11

Not charged

Ensure the Battery has been charged. If the Battery has not been used for 6 months, charge before attempting use.



12

Battery Capacity has decreased

Capacity loss may be due to crystallization caused by charging in freezing temperatures. Overheating or over-discharging the battery may also cause a permanent loss in capacity.

13

Battery Case is bulging

Case bulging due to battery pack expansion is a sign of cell failure and use of the battery should be discontinued immediately and if out of warranty, the battery should be disposed of safely.

Battery cells can be damaged by overcharging, over discharging, operating in an environment outside of the temperature specifications, short circuiting or reversing the polarity. The BMS will attempt to protect the cells but may not be able to do so depending on the circumstance. A failed BMS may be replaced but cell replacement is usually not economical

14

Charger shuts off quickly

When a charge is initiated and the voltage of the battery bank rises very quickly and the charger goes quickly into the float charge cycle or shuts off, this usually indicates the battery is fully charged.

This could also be an indication of sulfated batteries which may be causing a lower than normal impedance in reference to the charger. Capacity of the battery will be reduced and may be confirmed by running a load test.

Limited Warranty

Eight (8) year warranty

Period of Coverage: Ionic deep cycle batteries are warranted to the original purchaser or subsequent owner from the original purchase date from LithiumHub for 60 Months (5years) for Ionic deep cycle batteries. A \$150 repair or replacement fee will be charge for the 6th, 7th and 8th year for the 12V30Ah, 12V50Ah, 12V100Ah, 12V125Ah (Heater), 12V300Ah (Heater), 24V50Ah, 36V50Ah, 36V30Ah. The Ionic deep cycle battery is considered good providing 70% SOC (State of Charge) of it's original capacity.

Warranty Coverage: This product is warranted by LithiumHub, Inc. to be free from defects in material and workmanship.

This Limited Warranty does not cover defects or damage due to: accidents, acts of God, misuse, abuse, abnormal use, abnormal conditions, alternation of to the product, attachment to any unauthorized accessory; improper use of an electrical power supply that causes malfunction; loss of power; dropped or crushed product; tampering with or attempt to modify the product; unauthorized opening of the product; transportation damage; theft, vandalism, loss of use during the period the product is at a repair facility or otherwise awaiting parts or repair; Failure to operate this product in accordance with the instructions provided in this Owners' Manual supplied with this product. If product is used for commercial or industrial purposes the warranty will be void.

DISCLAIMER: No warranty, written or oral, other than the above warranty is valid with regard to this product. Manufacturer shall not in any way be liable to the purchaser or any third party for any damages the purchaser or any third party may suffer as a result of use, intended or unintended or misuse of this product in conjunction with any device, equipment or accessory other than the appropriate device or equipment for which the product is designed.

Customer Commitment

At Ionic Batteries, we are committed to offering you the best value in the marketplace. If you have any questions or concerns, do not hesitate to contact us. If you need repair service please contact us via phone or our website to make arrangements. Once you have a return authorization, please return the product for warranty service to LithiumHub. Contact us at info@lithiumhub.com or 704-360-9311 for return authorization number (RMA #) and return address for repairs or service.

www.ionicbatteries.com

Customer service at 704-360-9311

info@lithiumhub.com

Distributed by LithiumHub
113C Denver Business Park Dr
 Mooresville, NC 28115

WARNINGS

1. Keep out of reach of children.
2. Do not damage, drop or crush this product. Do not attempt to use this product if it has been dropped, punctured, run over or damaged in any way including damage to the clamp or cables.
3. Do not insert foreign objects (including fingers and metal objects) into any input or output ports on the Power Pro. This item may short circuit causing personal injury or fire.
4. Do not expose unit to rain or snow. Do not charge this item in wet conditions.
5. Do not use this product in explosive environments (dust, bilge, gaseous fumes or flammable materials) or in the presence of flammable materials such as carpeting, paper, cardboard or upholstery etc.
6. Do not burn or incinerate this product.
7. Use only recommended attachments. Use of attachments NOT sold by Ionic Batteries or included with the Power Pro may result in a risk of fire, electric shock or injury to persons or damage property.
- 8 Do not disassemble this product. Refer servicing to qualified service professional when service or repair is required. Failing to adhere to this may result in risk of fire or electric shock.
9. Never charge a frozen battery.
10. Store in a cool dry location and do not expose the unit to temperatures over +140F or below -4F.
11. Be sure to turn off all electrical components before wiring.
12. If the unit needs to be disposed of for any reason, please dispose properly by calling your nearest lithium battery recycle facility at 1-800-8-BATTERY.
- 13 If the product malfunctions or is having problems, discontinue use and contact Ionic Batteries at 704-360-9311, our website www.ionicbatteries.com or via email at info@lithiumhub.com



WARNING! RISK OF EXPLOSIVE GASES. Working in the vicinity of a lead acid battery is dangerous. Lead acid batteries generate and vent explosive gases during normal operation. Always properly ventilate bilge or engine compartment before working in the vehicle's engine compartment. **DO NOT** use this product near or in the presence of propane tanks, natural gas or any other explosive fumes. Also follow instructions and caution markings on engine and listed in vehicle manual to reduce risk of battery explosion.

DO NOT INTENTIONALLY SHORT THE BATTERY TERMINALS

Your Ionic Deep Cycle Battery is equipped with short-circuit protection in the event you accidentally short-circuit the battery. Do not intentionally short-circuit the battery terminals.

California Prop 65

WARNING: Pursuant to California Proposition 65, this product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

WARNING! RISK OF ELECTRIC SHOCK OR FIRE. Discontinue use of this product if it is damaged in any way.

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