



MANUAL

Manual covers LiONCore models, 55111 - 551117



Using LiFePO₄ batteries can be hazardous!

Thank you for purchasing a LiONCore battery from electroVOLT. The LiONCore Series of lithium-ion batteries offers the kind of power solution you've been looking for. Available in several popular power ranges this robust series of off-the-shelf batteries can meet all your power needs and is an excellent replacement option for everyday SLA / AGM batteries. LiONCore batteries are built to last using Lithium Iron Phosphate (LiFePO₄) technology and an onboard BMS. Enjoy your new power solution.

Read this manual in its entirety before attempting to use this product. Failure to observe any of the following precautions can result in fire, explosion and cause personal injury.

SAFETY WARNINGS:

1. Before and after every use of a LiFePO₄ battery, carefully inspect the pack to ensure no physical damage, moisture or corrosion of terminals is evident.
2. Always handle LiFePO₄ batteries with extreme care and take all necessary care to avoid battery packs being dinged, dented, punctured, or otherwise damaged.
3. Keep battery packs out of the reach of children and pets.
4. Do not disassemble, modify, or attempt any form of repair of a LiFePO₄ battery.
5. Do not short circuit battery terminals.
6. Store your batteries in a cool, dry place between 40-80 F° / 4-26 C°. All battery packs should be stored away from any flammable materials with the terminals covered.
7. Batteries should be stored at nominal voltage which is the voltage displayed on the battery label.
8. LiFePO₄ batteries must be fully charged and returned to nominal voltage (displayed on the battery label) at least once every three months when not in use.
9. Always take precautions to cover the battery terminals to avoid accidental short circuit.

10. Always transport LiFePO₄ batteries with the terminals covered using a non-conductive material such as electrical tape.
11. Keep LiFePO₄ batteries out of direct sunlight and environments that might exceed 55°C (131°C).
12. Always keep a class D chemical fire extinguisher nearby, in case of fire when storing, handling, charging or using LiFePO₄ battery packs.
13. Never charge a LiFePO₄ battery near any flammable materials.
14. For *best performance and cycle life* allow a battery to cool to an ambient temperature of 10°C to 35°C (50°F to 95°F) before recharging.
15. Use only a properly specified LiFePO₄ charger that matches the requirements for your battery. Refer to the battery data sheet for the proper voltage and charging amperage values.
16. Make sure the battery connections are securely connected in the proper polarity and free of corrosion.
17. Battery packs should be properly secured in the application to prevent movement and damage to the battery while in use.
18. To prevent irreversible damage to your LiFePO₄ batteries, proper selection should be made based on the amp draw requirements of the application. Refer to the data sheet of your specific battery to determine the rated continuous discharge current.
19. Damaged or ruptured battery packs or cells may leak electrolytes which can cause moderate to severe irritation including burning and dryness of the skin and eyes. For contact with the skin thoroughly wash the affected area with soap and warm water. For contact with the eyes, rinse thoroughly with cool water. Seek immediate medical attention for any burns.
20. Always use insulated tools when making contact, connecting or disconnecting batteries.
21. Keep sparks, flames and sources of static electricity away from batteries.
22. Never place objects on top of batteries.
23. Always disconnect any load prior to connecting or disconnecting battery terminals.
24. Never immerse in water or use high pressure water to clean a battery.



Using LiFePO4 batteries can be hazardous!

Failure to observe any of the following precautions can result in fire, explosion and cause personal injury.

CHARGING INSTRUCTIONS & SAFETY WARNINGS

1. Do to international shipping regulations, LiFePO4 batteries are not shipped fully charged. All ElectroVolt LiFePO4 battery packs should be fully charged prior to the first use. Do not charge in series or parallel during initial charge.
2. Make sure the battery connections are resurely connected in the proper polarity and free of corrosion.
3. Only use a properly specified LiFePO4 charger that matches the requirements for your battery. Refer to the battery data sheet for the proper voltage and charging amperage values.
4. For the maximum lifecycle and thorough charging of your LiFePO4 battery, do not exceed the max charge rate listed on the battery data sheet. Always confirm and follow your specific battery's recommended charge rate and maximum voltage as shown on the battery *data sheet.

IMPORTANT INFORMATION REGARDING OVER-DISCHARGE & SAFETY WARNINGS

1. Batteries should be stored at nominal voltage which is the voltage dispayed on the battery label.
2. LiFePO4 batteries must be fully charged and returned to nominal voltage (displayed on the battery label) at least once every three months when not in use.
3. To prevent irreversible damage to your LiFePO4 batteries, proper selection should be made based on the amp draw requirements of the application. Refer to the *data sheet of your specific battery to determine the rated continuous discharge current.

**Data sheets available for download at www.vpwllc.com*



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BATTERY DISPOSAL INSTRUCTIONS & SAFETY WARNINGS

1. Any battery that has been subjected to conditions outside of normal use, shows signs of damage or has been retired from use should be disposed of properly. We recommend transporting these battery packs to an approved disposal facility while observing the applicable safety warnings above.
2. Check with your local waste facility to determine if they can handle disposal of lithium batteries and if they are permitted. Many stores also offer free recycling of rechargeable batteries. To find a drop-off location near you please visit: <http://www.call2recycle.org/locator>

Failure to follow any of the instructions and safety warnings contained within this document may cause irreversible damage to the battery pack or the application and will void all warranties.

SPECIFICATIONS

MODEL #	NOMINAL VOLTAGE (V)	CAPACITY (Ah)	STD. CHARGE CURRENT (A)	MAX CONT. CHARGE CURRENT (A)	MAX CONT. DISCHARGE CURRENT (A)	PEAK DISCHARGE CURRENT < 5s (A)	TERMINAL TYPE	RECOMMENDED TERMINAL TORQUE	TERMINAL BOLT SPECIFICATIONS	DIMENSIONS	WEIGHT
551111	12.8	7	1.4	7	7	14	F2	N/A	F2	150 x 65 x 101mm / 5.9 x 2.6 x 4in	2.2lbs / 1kg
551112	12.8	10	2	10	10	20	F2	N/A	F2	151 x 100 x 104mm / 5.9 x 3.9 x 4.1in	3.3lbs / 1.5kg
551113	12.8	20	4	20	20	40	M5	17.5 in-lb	M5	181 x 77 x 170mm / 7.1 x 3 x 6.7in	5.7lbs / 2.6kg
551114	12.8	33	6.6	33	33	66	M6	26.25 in-lb	M6-1, 13mm	196 x 132 x 154mm / 7.7 x 5.2 x 6.2in	10.3lbs / 4.7kg
551115	12.8	75	15	75	75	150	M6	26.25 in-lb / 2.94 Nm	M6-1, 13mm	260 x 168 x 212mm / 10.2 x 6.6 x 8.3in	24.2lbs / 11kg
551116	12.8	100	20	100	100	200	M8	61.25 in-lb / 6.86 Nm	M8-1.25, 12mm	327 x 172 x 218mm / 12.9 x 6.8 x 8.6in	30.8lbs / 14kg
551117	12.8	200	30	100	100	200	M8	61.25 in-lb / 6.86 Nm	M8-1.25, 12mm	522 x 239 x 221mm / 20.5 x 9.4 x 8.7in	59.4lbs / 27kg

BATTERY MANAGEMENT SYSTEM (BMS)

ElectroVolt LiONCore batteries come with a built-in battery management system (BMS) that protects the battery for increased safety and prolonged life expectancy. The ElectroVolt BMS protects against the following conditions:

High Voltage / Over Charge Protection

If one or more of the battery cells exceeds the pre-defined upper voltage threshold during charging the BMS will disconnect to prevent charge current from continuing. With this protection active discharge is always allowed.

Passive cell balancing is activated by the BMS at the top of each charge cycle which ensures that all cells remain at the same state of charge increasing battery performance and extending battery longevity.

Low Voltage / Under Charge Protection

If one or more cells falls below the pre-defined lower voltage threshold during discharging the BMS will disconnect the load to prevent current from continuing. With this protection active charging is always allowed.

High Current Protection

To prevent damage to the BMS and cells the BMS will not allow current that exceeds the pre-defined value. After high current disconnection the battery will automatically reset once the load is removed.

High Temperature Protection

To prevent damage to the battery cells the BMS will not allow charge or discharge current when the pre-defined temperature value is exceeded. Release of this protection occurs once the temperature of the battery falls below the pre-defined release temperature.

Short Circuit Protection

To prevent damage to the battery cells the BMS isolates the cells in a short circuit condition and will automatically reset once the short circuit is removed.

For specific protection values please refer to the *data sheet for your battery.

**Data sheets available for download at www.vpwillc.com*

BATTERY INSTALLATION

Use properly sized cable and cable lugs (as applicable) to handle the expected load (figure 1) keeping all cables as short as possible. Torque battery terminal connections to the specified values using the supplied flat washer, split washer and bolts (as applicable). (reference specifications chart on previous page). See figure 2 for proper order of the split washer (A) and flat washer (B).

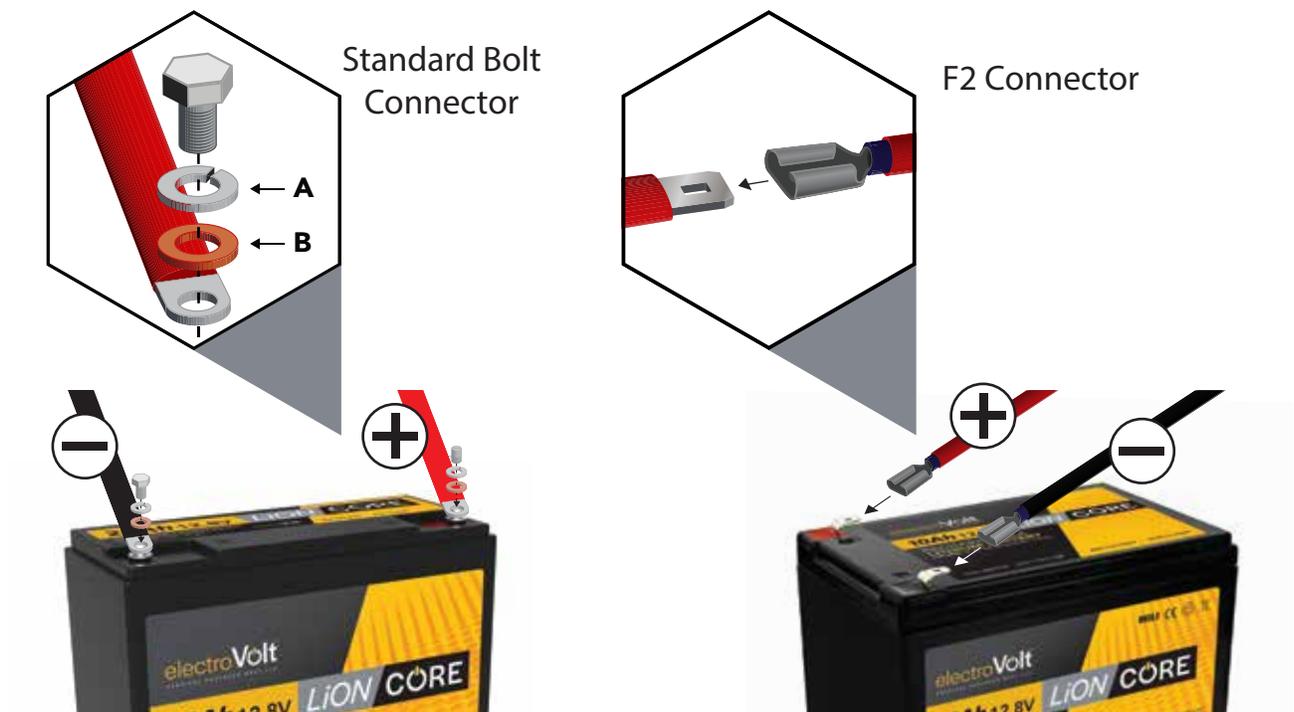
figure 1

CABLE/WIRE GAUGE SIZE, AWG (mm ²)	AMPACITY (Amps)
14 (2.08)	20
12 (3.31)	25
10 (5.26)	35
8 (8.36)	50
6 (13.3)	65
4 (21.1)	85
2 (33.6)	115
1 (42.4)	130
1/0 (53.5)	150
2/0 (67.4)	175
4/0 (107)	230

Table values are from NEC Table 310.15(B)16 for copper cables rated at 167°F (75°C), operating at an ambient temperature of no more than 86°F (30°). Lengths in excess of 6 feet (1829 mm) may require heavier gauge wire to avoid unacceptable voltage drop. 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.

For more information refer to the National Electric Code for correct cable/wire size, which can be located at www.nfpa.org

figure 2



CHARGING

For best results LiONCore LiFePO4 batteries should only be charged using LiFePO4 approved chargers. Charging with lead-acid battery chargers may not allow the BMS to properly balance or equalize cell voltages resulting in reduced performance and life expectancy. Charging LiONCore batteries with lead-acid chargers which utilize an automatic desulfation or equalization mode is strictly prohibited.

ElectroVolt LiONCore LiFePO4 batteries are not shipped fully charged and must be charged prior to the first use or initial installation in a series string. Do not charge in series or parallel during the initial charge.

When using ElectroVolt LiONCore LiFePO4 batteries in series, ElectroVolt recommends charging each battery individually at least every fourth use to avoid imbalance.

CHARGING TEMPERATURE

For optimal performance and longevity charging LiONCore LiFePO4 batteries below 10°C (50°F) should be avoided. ElectroVolt LiONCore LiFePO4 batteries can be safely charged between 0°C to 45°C (32°F to 113°F).

All ElectroVolt LiONCore LiFePO4 batteries have built-in battery management system (BMS) that protects the battery from damaging over-temperature conditions. At the pre-defined high temperature threshold value the BMS will disconnect charge or discharge current. Release of this protection occurs once the temperature of the battery falls below the pre-defined release temperature. Please refer to the *data sheet for your battery for the BMS high temperature cut-off and release values.

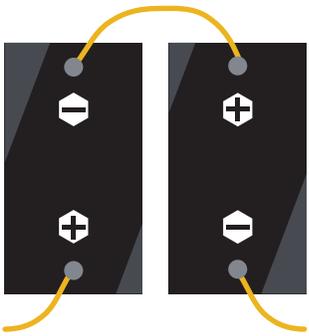
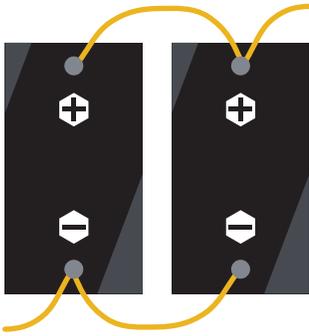
SERIES OR PARALLEL SYSTEMS

ElectroVolt LiONCore LiFePO4 batteries can be connected in series to increase system voltage OR in parallel to increase system capacity. **Do not connect ElectroVolt LiONCore LiFePO4 batteries in both series and parallel. Multiple battery systems should be created using only one battery type and capacity from ElectroVolt.**

DO NOT EXCEED FOUR BATTERIES IN SERIES OR TWO BATTERIES IN PARALLEL OR IRREVERSIBLE DAMAGE WILL OCCUR VOIDING ALL WARRANTIES. (See example on next page)

*Data sheets available for download at www.vpwillc.com

PROPER SERIES AND PARALLEL CONNECTIONS:

	SERIES CONNECTION	PARALLEL CONNECTION
		
	<p>To increase voltage, connect batteries in series. This will not increase the system capacity.</p>	<p>To increase capacity, connect batteries in parallel. This will not increase the system voltage.</p>
EXAMPLE	<p>Two 12.8V batteries rated at 100Ah. Connected in series.</p>	<p>Two 12.8V batteries rated at 100Ah. Connected in parallel.</p>
	<p>System Voltage: $12.8V + 12.8V = 25.6V$ System Capacity: 100Ah</p>	<p>System Voltage: 12.8V System Capacity: $100Ah + 100Ah = 200Ah$</p>

When connected in parallel the continuous and peak discharge current values should be in accordance with the ratings of a single battery per the battery *data sheet.

Check battery cables and connections frequently. Retorque terminal bolts to proper specifications and replace damaged cables as needed.

Battery cable lugs and terminals should be clean, dry and free of corrosion. Clean terminals only with a dry cloth or non-metallic brush as needed.

*Data sheets available for download at www.vpwllc.com

ELECTROVOLT WARRANTY POLICY

Warranty Coverage

All products sold by ElectroVolt are inspected before leaving the factory and are guaranteed to be free of defects in material and workmanship appearing within 1 year from the original date of shipment. During that period, as its sole responsibility and as the purchaser's sole remedy under this warranty, ElectroVolt will repair or replace defective products or, at its sole discretion, issue a credit memo for the purchase price of such products.

Other Warranties

THE ABOVE WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.

Exclusions

There is no "industry standard" for life expectancy of a rechargeable battery. The cycle life of batteries varies greatly by chemistry and construction and can be greatly affected by how batteries are used, charged and stored. These factors are outside our control and thus our warranty only covers defects in materials or workmanship.

ElectroVolt will not be liable for warranty replacement of batteries that are used outside of normal operating parameters. If you are unsure about how to use or handle any of our products contact ElectroVolt for assistance.

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14028 N. OHIO STREET / RATHDRUM, ID 83858 / 800.705.0620 / SALES@VPWLLC.COM

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