



Flex POWER RVMP-220168 LiFePO4 Deep Cycle Battery Owner's Manual

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OWNER'S MANUAL

LiFePO4

LITHIUM IRON PHOSPHATE DEEP CYCLE RECHARGEABLE BATTERY

12.8v 100Ah



Read this manual carefully before operation.
This manual includes important guidance for safety operation.

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Welcome to the FLEX POWER® Family!

Thank you for choosing the Flex Power® LiFePO4 Battery. This Li-ion rechargeable battery is 12.8 volts (V) 100 Ampere-hours (Ah). This battery has been specifically engineered for efficiency, performance, and safety. Before using, please read this manual carefully and carefully follow all instructions and safety precautions. The manufacturer, seller, distributor, wholesaler, re-seller, and/or servicer do not accept responsibility for any damages due to the failure of anyone to observe and carefully follow the instructions and warnings in this manual and the failure to do so will void portions of the warranty.

Product Dimensions

Length	13" (330m)
Width	6.8" (173mm)
Height	8.66" (220mm)

Product Features

Overview

Rechargeable Lithium Iron Phosphate Battery TC–LiFePO4 Series Connection Range:

- Super safe lithium iron phosphate (LiFePO4) chemistry reducing the risk of explosion or combustion due to high impact, over-charging or short circuit situation
- Battery Management System (BMS) controls the parameters of the battery to provide optimum safety by protecting against over-charging and over-discharging
- BMS enhanced design balances the battery cells, optimizing battery performance
- Delivers twice the power of lead acid batteries, even at high discharge rates, while maintaining high energy capacity
- Faster charging and lower self-discharge
- Up to 10 times more cycles than lead acid batteries
- Compact and only 40% of the weight of comparable lead acid batteries
- Rugged impact resistant ABS case and cover flame retardant to UL94:V0

Approvals

- UL 1973
- UL 1642 cell certificate
- UN 38.3 Certified
- ISO9001:2015 – Quality management systems

Intelligent Battery Management System

The PSL-BTC Series come with an intelligent battery management system which monitors current and voltages during charge and discharge. This protects the battery from overcharge and over-discharge.

The BMS embeds smart balancing algorithms that control all cell voltages in the battery, making sure they are constantly at the same voltage level, optimizing battery capacity.

Bluetooth Enabled.

Monitor the State of Charge (SoC), State of Health (SoH), current, capacity, temperature, number of cycles, and voltage levels of the battery and individual cells from our app: <https://rvmp-lifepo4-battery-app.rvmp.co>



<https://rvmp-lifepo4-battery-app.rvmp.co>

Product Specifications

General Performance Specifications

#	Item	Values
1	Nominal Voltage	12.8V
2	Rated Capacity	100AH at a Constant Current of 0.33C to 9.2V
3	Life Expectancy (Years)	10 years (1 cycle/day)
4	Cycle Life (100% DoD)	> 4000 cycles
5	Assembly Method	4S2P
6	Housing Material	ABS
7	Series Connection	4 in Series
8	Parallel Connection	4 in Parallel
9	Internal Monitoring	BMS
10	Communication	Bluetooth

Charge Specifications

#	Item	Values
1	Charge Temperature Range	32-113°F (0~45°C)
2	Charge Voltage	14.6±0.2V
3	Recommended Float Charge Voltage (For Stand by Use)	13.8V
4	Max Charge Current	100A at 68°F (20°C)
5	Recommended Charge Current	20A
6	Charge Cut-off Voltage	15V
7	Standard Charge	0.33C constant current charge to 14.6V then constant voltage 14.6V charge until charge current declines to ≤0.05C

Discharge Specifications

#	Item	Values
1	Discharge Temperature Range	-4~140°F (-20~60°C)
2	Recommended Output Voltage Range	2.8~10.8V
3	Max Continuous Discharge Current	100A at 68°F (20°C)
4	Peak Discharge Current	300A, @T<3Sec or @T<140°F (60°C)
5	Discharge Cut-off Voltage	10.8V
6	Standard Discharge	Constant Current 0.5C
7	Discharge Temperature Characteristics	14~77°F (-10~25°C) 70% 32~72°F (0~25°C) 80% 77 / 77°F (25 / 25°C) 100% 77~77°F (25~55°C) 95%

Storage Specifications

#	Item	Values
1	Self-discharge Rate	<3% / Month
2	Storage Temperature Range	< 1 Month -4~+140°F (-20~+60°C), 5~75%RH < 6 Months 14~+113°F (-10~+45°C), 5~75%RH
3	Recommended Storage SOC	Recommended storage range is 50% State of Charge. We recommend cycling the battery once every 6 months if it is in long-term storage.

BMS Specifications

#	Item	Values
1	Voltage	Charging 14.6V Balance 13.8V
2	Continuous current	Self-discharge $\leq 3\%$ /month Max Charging $\leq 100\text{A}$ Max Discharging $\leq 100\text{A}$
3	Over-charging Protection	Over-charging Voltage $3.75 \pm 0.05\text{V}$ Over-charge Delay Time 1~3S Over-charging Release Voltage $3.6 \pm 0.05\text{V}$
4	Over-discharging Protection	Over-discharging Voltage $2.5 \pm 0.05\text{V}$ Over-discharge Delay Time 1~3S Over-discharging Release Voltage $2.70 \pm 0.10\text{V}$
5	Short Circuit Protection	Do not short circuit the electrodes.
6	Impedance	Charging high temperature protection $140 \pm 41^\circ\text{F}$ ($60 \pm 5^\circ\text{C}$) Charging high $122 \sim 131^\circ\text{F}$
7	Over-temperature Protection	Charging low temperature protection $0 \pm 41^\circ\text{F}$ ($0 \pm 5^\circ\text{C}$) Charging low temperature release $41 \sim 50^\circ\text{F}$ ($5 \sim 10^\circ\text{C}$) Discharge low temperature protection $-4 \pm 41^\circ\text{F}$ ($-20 \pm 5^\circ\text{C}$) Discharge low temperature release $14 \sim 5^\circ\text{F}$ ($-10 \sim -15^\circ\text{C}$)

Selecting A Battery For Application

Choosing the appropriate LiFePO₄ battery for any application, whether the application is based on current draw or power draw, is easier with a LiFePO₄ battery than with a sealed lead acid (SLA) battery. The capacity of a lithium battery, as illustrated by Figure 1, is substantially independent of the discharge current. Thus, the selection of the lithium battery is simply the discharge current requirement multiplied by the time over which the discharge current is required. For instance, if a 10A draw is required for 2 hours or a 5A draw is required for 4 hours, a 20Ah lithium battery is appropriate for the application.

The second aspect of a lithium battery that makes it easier to size for an application is that the cutoff voltage (as displayed in Figure 2) is 10V, independent of discharge rate. Whereas with an SLA battery, the voltage changes with discharge rate. The cut-off voltage of a lithium battery is also controlled via the protection circuit. It is good practice to set the cutoff voltage to be slightly higher than the recommended cut-off voltage. This will keep the battery from shutting down due to protection.

Selection of LiFePO₄ Based on Power Draw

Choosing the appropriate lithium battery based on power draw is also easier than with an SLA battery. The voltage drop during discharge for a lithium battery is essentially constant, as shown in Figure 2. The constant voltage drop leads to a constant power through discharge, as power is voltage times current draw. As with capacity, power draw is a simple calculation for the selection of the battery.

For instance, a voltage of a lithium battery can be assumed to be a constant 12.8 V during discharge, hence if 256 Whr are required for the application to be delivered for a 2 to 4 hour discharge a 10 Ah battery can be used (e.g. $12.8\text{ V} \times 5\text{ Ah} \times 4\text{ Hr} = 256\text{ Whr}$ and $12.8\text{V} \times 10\text{ Ah} \times 4\text{ Hr} = 256\text{ Whr}$) to deliver constant power.

Environmental Factors

Impact of Ambient Temperature on Capacity

The impact of ambient temperature on capacity is shown in Figure 3. In general, increasing temperature increases the capacity of a LiFePO₄ battery. The effect is shown in the Discharge Specifications table. Discharging the battery below -10°C is not recommended. Depending on application, the self-heating of the battery may counteract the effects of the low temperature and extended the ambient temperature range over which the battery will discharge.

Cycle Life (Including the Effects of Ambient Temperature)

Cycle life in Figure 3 is to 100% Depth of Discharge (DoD) at 25°C, 45°C and 55°C. The cycle life at other DoD can be approximated by the ratio of the DoD to 100%, for example a 50% DoD at 25°C would result in 2000 cycles based on Figure 3. For temperatures other than those shown on the graph, an interpolation can be done at that temperature.

For temperatures below 25°C, the cycle life at 25°C can be used. When compared to an SLA battery at 25°C, a LiFePO₄ battery's cycle life is ten times longer. Even at elevated temperatures, the LiFePO₄'s cycle life is still longer than an SLA's when at room temperature, as demonstrated in Figure 3. Therefore, in replacing an SLA with LiFePO₄, the LiFePO₄ will always have a longer cycle life.

Charging

The lithium battery follows a similar charge profile as an SLA battery. It starts with constant current (CC) followed by constant voltage (CV). The standard LiFePO₄ profile is 0.2C CC charge to 14.6V, then a CV at 14.6V charge until the charge current declines to $\leq 0.05C$. A fast charge current of 1C may be used as necessary. Note that continual fast charging may shorten the battery life and therefore capacity. Any charger with a lithium setting is suitable. However, when using an SLA charger the protocols used for charge initialization and maintenance must be considered.

The biggest difference between LiFePO₄ and SLA is the way the battery responds upon initial charging when over-discharged and the preferred maintenance when fully charged. Using an SLA charger with a de-sulfication setting will damage the battery, and chargers with an OCV detection setting may fail to wake up an over-discharged battery. After the end-of-charge, it is not necessary to keep the LiFePO₄ battery on a float charge, but may be maintained with a topping charge if the voltage drops. If a charger has a float setting, it will not damage the LiFePO₄ battery.

Battery usage specification

- When the battery is used alone, it can be used directly.
- When the battery needs to be used in parallel or in series, each battery shall be fully charged according to the standard charging method before parallel or in series.
- The maximum series number of batteries shall NOT exceed four, and the parallel number shall NOT exceed four.

WARNING

- Battery must be far away from any heat source, high voltage, and not exposed in sunshine for long time.
- Never throw the battery into water or fire;
- Never reverse two electrodes when use the battery;
- Never connect the positive and negative of battery with metal;
- Never knock, throw or trample the battery;
- Never disassemble the battery without manufacturer's permission and guidance.
- Never use mixed with other type of battery;

ATTENTION

- Keep the battery against high temperature. Otherwise it will cause battery heat, get into fire or lose some function and reduce the life.
- When the battery runs out of power, please charge your battery timely (≤ 15 day).
- Please use the matched or suggested charger for this battery.
- Stop using if the battery emits any smell, heat, distortion or has any abnormalities.
- If the battery leaks and gets into the eyes or skin, do not wipe, instead, rinse it with clean water and see doctor immediately.
- Please keep away from children or pets.

Warranty

This Limited Warranty ("Warranty") outlines applicable coverage and claims procedures for Products, as defined herein, sold as Flex Temp™ Aftermarket Division which is referenced herein as "Warrantor", "we", "us" or "our".

Coverage. Subject to the following terms and conditions, we warrant ONLY to you as the original consumer ("you" or "your") who purchases the product directly from Flex Temp™ Facility or authorized Flex Temp™ Dealer, that the products that we manufacture, distribute and/or sell to you that are not already covered by a separate written warranty from another manufacturer (the "Product(s)") will be free from defects in materials and workmanship at the time of retail sale. We will honor this Warranty for a period of one (1) year from the date of retail purchase, and only for Products sold and used in the United States and Canada.

Service. For Products having a covered defect within the Warranty period, we will, in our sole and absolute discretion, repair or replace the Product or related component with a new or refurbished component or provide a pro rata refund of that portion of the Product. Labor will be allowed if a designated flat rate time is outlined by us and will be limited to the published flat rate amount. There is no other warranty.

Notice. Proof of purchase must be provided to us to be eligible for coverage. No remedy will be required or offered unless we receive written notice of a claimed defect. You must make any claim of defect, including without limitation under this Warranty, in writing, with full particulars, promptly after the defect was or reasonably should have been discovered, and in any event no later than thirty (30) days of its discovery. Your written notice must describe the defect, provide your name and address, and state the location of the Product. As a condition of coverage, we must be provided access to the original Product for inspection, testing, or other work at our discretion. The Product must remain unmodified. We will not consider any claims for Products (or any components thereof) that are not in their original form. Failure to give us proper notice of a claimed defect, or performing any modification, replacement, attempted repair, self-help, or alteration of the Product or other product into which our Product has been incorporated without our prior written approval and before we inspect or test the Product, will constitute an absolute waiver and release of all claims under this Warranty.

Transferability. THIS WARRANTY IS NOT ASSIGNABLE OR TRANSFERABLE. THIS WARRANTY EXTENDS ONLY TO YOU, THE ORIGINAL CONSUMER PURCHASING A PRODUCT DIRECTLY FROM WARRANTOR'S FACILITIES AND WILL NOT BE CONSTRUED TO EXTEND TO ANY THIRD-PARTY. THERE ARE NO THIRD-PARTY BENEFICIARIES TO THE WARRANTY'S TERMS.

Limitations. ANY IMPLIED WARRANTY THAT MAY ARISE BY LAW IS LIMITED IN DURATION TO THE TERM HEREIN AND TO THE COVERED PRODUCTS. THE REPAIR, REPLACEMENT, OR REFUND PROVIDED HEREIN IS EXCLUSIVE AND IN LIEU OF ALL OTHER REMEDIES. EXCEPT AS PROVIDED IN THIS WARRANTY, ALL PRODUCTS ARE BEING SOLD "AS IS" AND "WITH ALL FAULTS." ALL RISKS AS TO PRODUCT QUALITY OR PERFORMANCE NOT CONTEMPLATED BY THIS WARRANTY WILL BE BORNE EXCLUSIVELY BY YOU, THE PURCHASER. IF A PRODUCT PROVES DEFECTIVE AFTER ITS PURCHASE, YOU, NOT US, ASSUME THE ENTIRE COST OF ALL NECESSARY SERVICING OR REPAIR THAT IS NOT COVERED UNDER THIS WARRANTY. IN NO EVENT WILL WE BE LIABLE FOR COSTS OF REMOVAL OR REINSTALLATION OF THE PRODUCTS, OR ANY EXPENSE RELATED TO REINSTALLATION. WE WILL HAVE NO LIABILITY TO ANYONE FOR CONSEQUENTIAL, SPECIAL, INCIDENTAL, INDIRECT, EXEMPLARY, OR PUNITIVE DAMAGES OF ANY KIND WHATSOEVER, INCLUDING WITHOUT LIMITATION PROPERTY DAMAGE, LOST PROFITS, LABOR COSTS, OR ANY OTHER PECUNIARY DAMAGE, WHETHER DUE TO ANY DEFECT IN THE PRODUCTS, BREACH, DELAY, NON-DELIVERY, NON-PERFORMANCE, RECALL, OR ANY OTHER REASON. ALL CLAIMS FOR NEGLIGENCE AND FOR FAILURE OF ESSENTIAL PURPOSE ARE EXPRESSLY WAIVED AND RELEASED. UNDER NO CIRCUMSTANCES WILL OUR LIABILITY FOR ANY DEFECT IN THE GOODS, WHETHER BASED ON CONTRACT, TORT, WARRANTY, OR ANY OTHER THEORY, EXCEED THE PURCHASE PRICE OF THE PRODUCTS. YOU ACKNOWLEDGE AND DECLARE THAT THESE LIMITATIONS AND WAIVERS HAVE BEEN BROUGHT TO YOUR ATTENTION AND EXPLAINED, THAT YOU

HAVE READ AND UNDERSTAND ALL TERMS AND AGREE TO BE SO BOUND, AND THAT YOUR RECEIPT OF THE WARRANTY AND PRODUCT, AND ANY PAYMENT FOR THESE, SIGNIFIES THAT YOU HAVE VOLUNTARILY AND KNOWINGLY CONSENTED TO ALL TERMS, INCLUDING THE WAIVERS AND LIMITATIONS CONTAINED HEREIN.

Specific Rights. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

Some states do not allow limitations on how long an implied warranty lasts, so that limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so that limitation or exclusion may not apply to you.

Exclusions. This Warranty only covers the Products. Due to the intended use of our Products, any and all items and components not sold by us but attached to, incorporated into, or using our Products carry NO WARRANTY WHATSOEVER from us regardless of circumstance. We will not be liable for any defects, whether due to workmanship, materials or any other reason whatsoever, for those items and components not sold by us. This Warranty also does not cover customer instruction, installation and labor (except as provided herein), parts supplied by others, abuse, misuse, neglect, improper installation or improper repair by anyone other than us, improper usage, overloading, accidents, unreasonable use, improper loading, improper operation, improper repair, improper maintenance, normal wear and tear, color fade, mold, mildew, corrosion, rust formation, modifications, or attempted repair by anyone other than a qualified repair facility. This Warranty does not cover chemical damage caused by acids, fuel, oil, or other chemicals. Use of our Products in or as part of a unit in a rental fleet, or for a commercial purpose, voids your rights under this Warranty.

Third-Party Events. In the event of any accident, injury to person, damage to property, loss, or other occurrence involving a Product, you must notify us in writing of the circumstances within thirty (30) days of the event or within ten (10) days of notification to you, whichever is earlier. Notwithstanding this, you must notify us immediately if a survey, test, or inspection is to be conducted on a Product, and provide us with the opportunity to participate in any such survey, test or inspection, or to permit us to conduct our own survey, test or inspection in advance. Your failure to comply with this paragraph will constitute a waiver and release of all rights under this Warranty.

Statute of Limitations. Any action, lawsuit or other proceeding, under this Warranty or otherwise, related to the Product must be commenced within one (1) year after the earlier of (a) the expiration of the Warranty coverage period, (b) our alleged failure to repair the defect at issue; or (c) the date on which your claim accrues under applicable law. Unless prohibited by law, the performance of repairs will not prevent the limitations period from expiring, nor will any tolling or estoppel doctrine apply. This Warranty does not extend to future performance. Some states do not allow a reduction in the statute of limitations, so that reduction may not apply to you.

Applicable Law & Venue. This Warranty will be governed by and construed in accordance with the laws of the State of Ohio without regard to principles of conflicts of law. To the full extent permitted by law, any disagreement, dispute, controversy, or claim arising out of or relating to this Warranty or Product must be brought, if at all, only in a state court in Columbus, Ohio, or a federal court in the Southern District of Ohio, having jurisdiction over the subject matter. You irrevocably consent that such court will have personal jurisdiction over you and waive any objection that the court is an inconvenient forum. YOU WAIVE ANY RIGHT TO A JURY TRIAL AND CLASS ACTION RELATING TO THIS WARRANTY, AND MAY NOT JOIN OR CONSOLIDATE CLAIMS AS A REPRESENTATIVE OF A CLASS ACTION OR IN A PRIVATE ATTORNEY GENERAL CAPACITY. In the event you bring any claim against us in violation of this Warranty or for claims waived or released under this Warranty, you agree to pay our attorney and paralegal fees and costs to defend such suit.

Modifications. We will not be liable for commitments, promises, or agreements made by any employee, agent, or dealer that is not in accordance with this Warranty. The current WARRANTIES and terms outlined on the Warrantor's website applicable on the date of purchase take precedence over any other WARRANTIES, whether oral or written. We reserve the right to alter our WARRANTIES from time to time, as the laws and our business needs and industry change. Any conditions or exceptions that may be stated in any communication or document to us from any entity or individual, including but not limited to you, shall be of no effect unless specifically agreed to in writing and hand-signed by our authorized representative.

Miscellaneous. Any legally or otherwise invalid provision hereof will be considered severable, with all remaining provisions enforceable. We have all rights and remedies given to sellers by applicable law, and our rights and remedies are cumulative and may be exercised from time to time. No waiver by us of any provision of this Warranty will be effective unless in writing, nor will it operate as a novation or waiver of any other provision or affect our right to exercise thereafter any right or remedy. We will not lose any right because we have not exercised that right in the past.


OWNER'S RESPONSIBILITY

To ensure trouble free warranty coverage it is important that you register your hot water heater. You may register on-line at the links presented below or by filling out and returning to RVMP the warranty registration card supplied with your hot water heater.

Registering your product confirms your warranty coverage and provides a direct link between you and RVMP if we find it necessary to contact you. Please visit www.rvmp.co to complete your warranty registration information.

RV Mobile Power, LLC
Phone: (855) HAPPYRV
www.rvmp.co
Email: support@rvmp.co

Documents / Resources

	<p>Flex POWER RVMP-220168 LiFePO4 Deep Cycle Battery [pdf] Owner's Manual RVMP-220168 Flex Power LiFePO4 Deep Cycle Battery, RVMP-220168, Flex Power LiFePO4 Deep Cycle Battery, Power LiFePO4 Deep Cycle Battery, LiFePO4 Deep Cycle Battery, Deep Cycle Battery</p>
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References

- [🔋 The Best RV Products: RV Generators, RV Water Heaters, Solar || RVMP](#)
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- [🌐 RVMP Flex Power FORCE App Download](#)
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