



# Power

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## User manual

GS-12V3Ah

GS-12V3Ah-P

GS-12V4Ah

GS-12V4Ah-P



# User manual GS-series

Dear customer,

this manual contains all required information for the installation, use and maintenance of the GS-12V3Ah / GS-12V3Ah-P and GS 12V4Ah / GS12V4Ah-P LiFePO<sub>4</sub> batteries. We ask you to read this manual carefully before using the product. The GS-12V3Ah / GS-12V3Ah-P and GS-12V4Ah / GS-12V4Ah-P are referred to as **LiFePO<sub>4</sub> batteries**.

This manual is aimed for the installer and user of the LiFePO<sub>4</sub> batteries. Only qualified, certified personnel are allowed to install and maintain LiFePO<sub>4</sub> batteries. Please read the directory at the beginning of this manual to find the relevant information. The measure of safety has to be maintained at all times while using the product so that installers, users and maintenance personnel can use the LiFePO<sub>4</sub> batteries safely.

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## **1. Security guidelines and measures**

### **1.1. General**

- Do not short-circuit the LiFePO<sub>4</sub> battery.
- Do not disassemble, crush, pierce, open or dismantle the LiFePO<sub>4</sub> battery.
- Do not expose the LiFePO<sub>4</sub> battery to heat or fire. Avoid direct sunlight exposure.
- Do not take the LiFePO<sub>4</sub> battery out of the original packaging until the point of use.
- In case of an electrolyte leak, the liquid should not encounter skin or eyes. In the case of contact, wash the affected area with water and consult a doctor.
- Always use a class 2 charger, which is specially designed for LiFePO<sub>4</sub> batteries.
- Pay attention to the plus (+) and minus (-) markings on the LiFePO<sub>4</sub> battery as well as on the device and ensure correct use. First connect the positive cable and then connect the negative cable.
- Do not mix batteries of different manufacturers, capacities, sizes or types.
- Keep the LiFePO<sub>4</sub> battery clean and dry.
- Secondary batteries must be charged before use. Always use the correct charger and read this manual for correct charging instructions.
- If the battery is stored for a longer period, remove it from the vehicle and store it in a dry and frost-free location after charging.
- Switch off all consumers connected to the battery after use, in order not to discharge constantly.
- Do not leave the LiFePO<sub>4</sub> battery connected to the charger for weeks.
- After long periods of storage, the battery must be charged with a class 2 charger.
- Keep the original product documentation or the link to our website ([www.gs-power.net](http://www.gs-power.net)) ready.

- Charge the battery always after use and also after a storage period. The battery has a low self-discharge (max. 10% per year).
- Do not charge the LiFePO<sub>4</sub> battery below 0 ° C / 32 ° F!







## 1.2. Disposal

 <p>The image shows a blue recycling symbol with the text "Li-ion" below it. To its right is a black trash bin icon with a large 'X' over it, indicating that the battery should not be disposed of in regular trash.</p>	<p>Dispose of the LiFePO<sub>4</sub> battery in accordance with the local, state and federal laws and regulations. Batteries can be returned to the manufacturer. Do not mix with other (industrial) waste.</p>
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## 1.3. Safety symbols and labels on the product

You will find various safety symbols and labels on the product. These markings are shown below. You must never remove these labels!

### The meanings of the symbols:

 <p>A blue circular icon showing a pair of safety glasses.</p>	<p>Wear eye protection</p>
 <p>A blue circular icon showing an open book with an information symbol 'i'.</p>	<p>Please refer to the operating instructions</p>
 <p>A yellow triangular warning icon with a black border, showing a hand being splashed with liquid.</p>	<p>Warning of caustic substances</p>
 <p>A yellow triangular warning icon with a black border, showing a bomb with a lit fuse.</p>	<p>Warning of explosive substances</p>
 <p>A red circular prohibition icon with a white background, showing a lit match and a cigarette with a flame, crossed out by a red circle and slash.</p>	<p>Open flames, smoking and sources of ignition are prohibited</p>
 <p>A red circular prohibition icon with a white background, showing two children walking, crossed out by a red circle and slash.</p>	<p>Please keep away from children!</p>

## 2. Introduction

### 2.1. Product description

GS-Power LiFePO<sub>4</sub> batteries are light, compact and offer a high level of performance.

The LiFePO<sub>4</sub> batteries were specially developed for motorsport.

Please note that LiFePO<sub>4</sub> batteries must be treated differently from conventional lead-acid batteries. We would like to ask you to pay attention to the warnings printed on the battery:

- Improper or negligent use creates the risk of fire and burns.
- Do not disassemble, crush, heat above 60 ° C or burn.
- Follow the warnings in these instructions for use and handling.
- Jump start should be avoided, for hazard of short-circuiting the battery, which can damage the battery.
- Only use a suitable charger for charging. e.g., IVT 3170 12V2A, IVT 3130 12V4,5A or IVT 3150 12V10A, more on [www.GS-Power.net](http://www.GS-Power.net).



This battery must not experience any external damage. If you notice any external damage, please do not use the battery.

- Never short-circuit the battery contacts.
- Do not connect the power cables reversed (polarity).
- Do not operate the LiFePO<sub>4</sub> battery beyond the published maximum specifications.

## **2.2. Intended Use**

The LiFePO<sub>4</sub> battery of the GS series serves as a voltage source for starting combustion engines that use a 12 V on-board network. In applications other than karts, external undervoltage and overvoltage protection must be used to protect the LiFePO<sub>4</sub> battery of the GS series from undervoltage and overvoltage. With our models with a BMS (Battery Management System) it is not necessary to use an external undervoltage and overvoltage protection, as this is handled by the BMS. The batteries with BMS switch off automatically even if they overheat. Do not connect multiple LiFePO<sub>4</sub> batteries in series or in parallel.

## **2.3. Glossary of terms**

Duration of the life cycle	The maximum service life of the product that can be achieved if the specifications are met
Charge cycle	A charge cycle is from fully charged to fully discharged to fully recharged again
CCCV	Constant Current - Constant Voltage
LiFeP04	Lithium iron phosphate
DoD	Depth of Discharge

## **2.4. Symbols used**

The following symbols are used throughout this manual:



A warning indicates that serious damage to the user and / or product can occur if an operation is not performed as described.



A warning sign indicates that problems can arise if an operation is not carried out as described. It can also serve as a reminder for the user.



### **3. Product specifications**

#### **3.1. Technical specifications**

##### **3.1.1. Electrical properties**

Designation	GS-12V3Ah GS-12V3Ah-P	GS-12V4Ah GS-12V4Ah-P
Rated Capacity	3 Ah	4 Ah
Energy	38,4 Wh	51,2 Wh
Nominal Voltage	12,8 V	12,8 V
Open Circuit Voltage	13,2 V	13,2 V
Self-discharge	< 10% pro Jahr	<10% pro Jahr
EqPb (equivalent to lead acid battery)	6 Ah bis 8 Ah	8 Ah bis 10 Ah

Table 2. Electrical properties

##### **3.1.2. Mechanical properties**

Designation	GS-12V3Ah / GS-12V3Ah-P	GS-12V4Ah / GS-12V4Ah-P
Dimensions (L x B x H)	150mm x 65mm x 92mm	150mm x 65mm x 92mm
Weight	0,65 kg / 0,7 kg	0,7 kg / 0,75 kg
IP Protection	IP69	IP69
Chemistry	LiFePO4	LiFePO4

Table 3. Mechanical properties

##### **3.1.3. Charging and discharging properties**

Designation	GS-12V3Ah / GS-12V3Ah-P	GS-12V4Ah / GS-12V4Ah-P
Charging method	CCCV	CCCV
Charging voltage	14.4V ± 0.5V	14.4V ± 0.5V
Maximum charging current	1,5A - 15.0A	1,5A - 15.0A
End-of-discharge voltage	8.2V ± 0.6V	8.2V ± 0.6V
Discharge current continuously	20A	20A
Discharge pulse current (3sec)	150A	150A

Table 4. Charge and discharge characteristics

### **3.1.4. Temperature properties**

Designation	GS-12V3AH / GS-12V3Ah-P	GS-12V4Ah / GS-12V4Ah-P
Charging temperature	0°C bis 45°C	0°C bis 45°C
Discharge temperature	-10°C bis 60°C	-10°C bis 60°C
Storage temperature short term (<1 month)	-10°C bis 45°C	-10°C bis 45°C
Storage temperature long term (> 1 month)	0°C bis 25°C	0°C bis 25°C

Table 5. Temperature Characteristics / Do not charge the Li-ion battery below 0 ° C below

### **3.1.5. Compliance data**

Designation	GS - Serie
Certifications	UN 38.3
Shipping classification	UN 3480

Table 6. Compliance data

### **3.2. Environmental conditions**



**The LiFePO<sub>4</sub> battery may only be used under the conditions specified in this manual. If you expose the LiFePO<sub>4</sub> battery to conditions outside the specified limits, this can lead to serious damage to the product and / or the user.**

Use the LiFePO<sub>4</sub> battery in a dry, clean, dust-free and well-ventilated room. Do not expose the LiFePO<sub>4</sub> battery to fire, water, solvents or excessive heat.






### **3.3. Optional components**

Designation	Ladeleistung
Battery charger IVT 3170 12V2A	2 A
Battery charger IVT 3130 12V4,5A	4,5 A
Battery charger IVT 3150 12V10A	10 A

Table 7. Optional Battery charger components

## **4. Installation**




### **4.1. General information**

-  **Never install or use a damaged battery.**
-  **Do not short circuit the battery.**
-  **12V systems only.**
-  **Do not connect the power cables in reverse (polarity).**
-  **Never install multiple Li-ion batteries in series.**

### **4.2. Unpacking**

Check the LiFePO<sub>4</sub> battery for damage after unpacking. If the Li-ion battery is damaged, contact your specialist dealer or GS-Power. Do not install or use the LiFePO<sub>4</sub> battery if it is damaged!

### **4.3. Commissioning the battery**

-  **Do not overcharge the LiFePO<sub>4</sub> battery.**
-  **When using the LiFePO<sub>4</sub> battery, always stay within the limits specified in chapter 2.**
-  **Do not operate the LiFePO<sub>4</sub> battery beyond the published maximum specifications.**

#### **4.3.1. Placement of the battery**

Before use, the LiFePO<sub>4</sub> battery must be positioned so that it does not move back and forth in its housing during use.

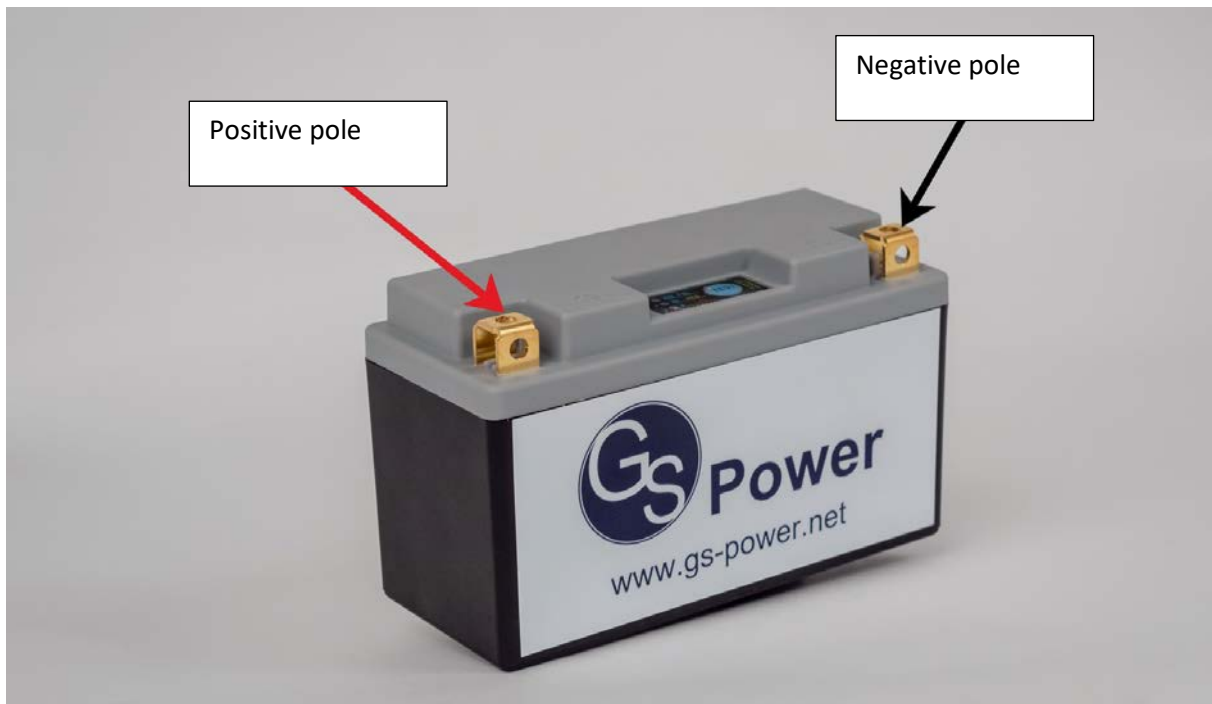
Use suitable brackets for mounting.

#### **4.3.2. Connection cable**

Use the appropriate cable for the ports so that no overheating or unnecessary losses occur.

#### 4.4. Connection of a charger to the battery

 **Make sure you have completed all the steps described in chapter 4 before connecting the battery to the charger.**



## **4.5. Disconnecting a battery**

- Disconnect the negative cable from the negative terminal (-) of the battery.
- Disconnect the positive cable from the positive terminal (+) of the battery.
- General information:



**Follow the safety guidelines and measures in Chapter 1.**



**Never overcharge the LiFePO<sub>4</sub> battery, as this will permanently damage the battery, by using a class 2 LiFePO<sub>4</sub>-capable charger, e.g., Staudte-Hirsch chargers.**

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**Charge the LiFePO<sub>4</sub> battery before use.**



**Disconnect the charger from the battery, if it is not going to be used for a long time.**

- Connect the charger as described.
- Charge the battery in case of an undervoltage shutdown or when the charge status drops below 20% to maintain the battery life.

We recommend the use of Staudte-Hirsch chargers.

The maximum charging current is 2A or 4.5 A depending on the charger.

The end-of-charge voltage is 14.4 V.

The charging status is indicated by LEDs. If all LEDs light up constantly, the battery is fully charged.

## **5. Using the battery**


### **5.1. Charging current**

The LiFePO<sub>4</sub> battery from GS-Power can be charged in about one hour (4.5A) or in about two hours (2A), depending on the charger.

When using more powerful chargers, do not exceed the charging current of 12 A.

## **6. Inspection and cleaning**

### **6.1. General information**

 **Never try to open or disassemble the LiFePO<sub>4</sub> battery! The inside of the LiFePO<sub>4</sub> battery does not contain any serviceable parts.**

- Disconnect the LiFePO<sub>4</sub> battery from all devices and chargers before performing any cleaning and maintenance work.
- Before cleaning and maintenance work, place the enclosed protective caps on the positive pole to prevent the poles from being touched.

### **6.2. Inspection**

- Check the cables and contacts for loose and/or damaged cables, contacts, cracks, deformations, leaks or damage of any kind. If damage to the LiFePO<sub>4</sub> battery is found, it must be replaced. Do not attempt to charge or use a damaged battery. Do not touch the liquid from a damaged LiFePO<sub>4</sub> battery.
- Consider replacing the LiFePO<sub>4</sub> battery with a new one if you meet any of the following conditions:
- The runtime of the LiFePO<sub>4</sub> battery drops below about 80% of the original runtime.
- The charging time of the LiFePO<sub>4</sub> battery is significantly longer.

### **6.3. Cleaning**

If necessary, clean the LiFePO<sub>4</sub> battery with a soft, dry cloth. Never use liquids, solvents or abrasives to clean the LiFePO<sub>4</sub> battery.

### **7. Retention**

Follow the storage instructions in this manual to optimize the life of the LiFePO<sub>4</sub> battery during storage. If these instructions are not followed and the LiFePO<sub>4</sub> battery is no longer charged when checked, consider it damaged. Do not try to charge it or use it. Replace this with a new LiFePO<sub>4</sub> battery.

The self-discharge of the LiFePO<sub>4</sub> battery is <10% per year.

- Charge or discharge the LiFePO<sub>4</sub> battery to 50% of its capacity before storage.
- Disconnect the LiFePO<sub>4</sub> battery from all devices and, if present, from the charger.
- Place the polar cap over the battery pole (+) during storage.
- Charge the LiFePO<sub>4</sub> battery to at least 50% of its capacity every year.

### **8. Transport**

Always check all applicable local, national and international regulations before transporting a lithium iron phosphate battery.

The transport of a disused, damaged or recalled LiFePO<sub>4</sub> battery may be specifically restricted or prohibited in certain cases.

The transport of the LiFePO<sub>4</sub> battery falls under the hazard class UN3480, class 9. for transport over water, in the air and over land, the LiFePO<sub>4</sub> battery falls into the packaging group PI965.



## **9. Recycling and disposal**

You must always discharge the battery before disposal. Use isolating tape or other approved covering on the battery terminals to prevent short circuits.

Recycling of batteries is recommended. Dispose of the LiFePO<sub>4</sub> battery in accordance with local, state and federal laws and regulations. Batteries can be returned to the manufacturer.

## **10. Troubleshooting**

Problem	Possible situation	Solution
The battery can not be charged	The battery is not correctly installed.	Check the installation of the Battery.
	The cells in the battery are damaged or the battery is dead.	Contact support from GS-Power.
The capacity of the battery is decreased.	The cells in the battery are damaged or the battery is dead.	Contact support from GS-Power.

Table 10. Troubleshooting



## **11. Warranty and liability**

- The customer is obliged to check immediately upon delivery whether the products have been damaged during transport. In the event of such damage, the customer must inform GS-Power as soon as possible, but no later than three (3) days after delivery, by means of a precise, written declaration stating the damage and, if possible, a photo. Failure to check the products within the specified time and to inform GS-Power or if the products are used at any point in time is clear evidence that GS-Power has handed over the delivery in a satisfactory manner.
- In the event that the customer proves that one of the delivered products does not correspond to the agreement, GS-Power has the option (at its own discretion after receiving the products returned by the customer) to either repair these products with new ones replace products or refund the invoice amount excluding shipping costs.
- GS-Power grants a two-year limited warranty on damage caused by manufacturing defects, starting with delivery. Damage caused by manufacturing defects does not include damage due to (a) general wear and tear, (b) short circuit, (c) overcharging, (d) deep discharge, (e) overheating of GS-Power products, (f) installation of the GS-Power product by persons who are not able to work with electrotechnical devices or components, (g) any other improper use contrary to the operating instructions or the safety instructions from GS-Power, (h) any use contrary to the product specifications of this product, (i) any act of nature beyond control.
- The warranty period for parts of the product that have been repaired or replaced under the warranty is twelve (12) months from the date of repair or delivery of the replacement.

- With the exception of the cases in clauses 11.3 and 11.4, GS-Power makes no express or tacit guarantee, including without limitation an implied guarantee of merchantability and suitability for a particular purpose or a guarantee arising from a trading behavior, a performance behavior or a use of the trade results. In particular, GS-Power rejects any assurance or guarantee that the product meets the customer's requirements, fulfills a specific function or achieves a desired result that has not been expressly specified by GS-Power.
- 11.6 Liability towards the customer expires in any case if the customer does not inform GS-Power in written form of the existence of the defect within ten (10) days after discovery of the defect so that GS-Power can investigate the damage.
- GS-Power's liability for damage suffered by the customer is in any case limited to the invoice amount for the products concerned. Unless this damage was caused by gross negligence or willful misconduct on the part of GS-Power. GS-Power can never be held liable for (a) damage caused by any of the circumstances listed in Clause 11.3 that result in damage to the GS-Power products or to any other device in the vicinity of these products, or (b) Consequential damages, including, but not limited to, lost profits, lost production, business interruption, loss of products and loss of capacity, regardless of the cause of such consequential damage, or (c) business value.
- If a court determines that the limitation of liability mentioned in section 11.7 cannot be asserted against a specific claim for damages by the customer, GS-Power is liable for property, financial and physical damage (including death) resulting from the application of this special GS-Power products, in any case limited to the amount that GS-Power's insurance company has actually paid out to GS-Power in accordance with the insurance coverage of this insurance policy for this particular type of damage. GS-Power has insured itself against certain risks, as described in the respective insurance. These contracts contain a customary restriction on the insurance benefit to be paid to GS-Power if and to the extent that the event is a covered event.



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