

CFE LFP Battery User Manual

A world-class manufacturer of lithium-ion power batteries and energy storage systems. Focus on promoting sustainable environmental protection development commitments, and make active efforts and contributions to achieve carbon neutrality.

Thank you for purchasing our product. Please read this manual carefully before using it, and operate it strictly in accordance with the product manual. After reading it, please keep it in a safe place for future reference.

The copyright belongs to CFE. If there is any infringement, please contact us immediately and we will deal with it in time.



Warning

| About operation



Before using the product, please read the product specification, instruction manual and precautions carefully to understand the use method and application scope of the product.



If the product is used incorrectly, the circuit is connected incorrectly, the input power or the load function parameters do not match the performance parameters marked in the product specification, etc., these phenomena are improper use. The company does not assume any responsibility for damage to the product, load and surrounding connections due to improper use.



Batteries cannot be used outdoors in rainy and snowy weather. During daily use, keep it away from heat and high voltage, and prevent children from playing with the battery, and do not hit the battery.



Do not short-circuit the positive and negative poles of the battery, do not disassemble the battery by yourself, and do not leave the battery in a damp place to avoid danger.



Discarded batteries should be handled safely and properly, do not put into fire or water.



The battery pack should be stored at ambient temperature (ambient temperature: charge 0 to 45 °C, discharge -20 to 60 °C). and should be charged to a capacity of 40%~60%. Working and storage humidity: <90% RH. To prevent the battery from being over-discharged, a full charge must be performed once the storage time exceeds 2 months.



The battery pack should be used under specified conditions, and battery performance over one year of storage is not guaranteed.



The battery must meet relevant regulations during transportation, such as packaging, documentation, and labeling requirements.

CFE S, S Pro series Battery Series & Parallel Guidance

1. Batteries cannot be used in mixed batches, only the same batch can be used in series or parallel
2. Each battery must be fully charged before the batteries are connected in series or in parallel, and the voltage difference of the battery pack should be within 100mV
3. When the battery is under voltage, the BMS will perform shutdown protection. At this time, press the switch on the display, and the display will light up, but the battery has no output at this time; you can connect the battery to the inverter to charge or use the charger to charge and activate the battery, and the display switch can also wake up the battery.
4. During the battery charging process, the charging mode will change from CC to CV, and when the OLED display shows full power, the mode will automatically switch to CV mode. After the battery is fully charged, it will automatically enter the balance state. Do not remove the charger at this time and continue to charge the battery until the OLED display voltage is 14.6V (12.8V battery)/29.2V (25.6V battery)
5. The maximum current of the battery system used in series or parallel is 100A
6. When the batteries are used in series or in parallel, the DIP switches must be set correctly according to the user manual. Confirm all the power cables and communication cables are connected correctly, then the load can be connected. Finally, according to the order from the last slave battery to the master battery, turn on the battery in turn, please be sure to start the master battery at last (the power cables should be as thick as possible and has good conductivity, the contact surface of the connection is large, and there is no looseness, etc.)
7. When the batteries are used in series or in parallel, the battery which connected to the positive pole of the load is used as the master battery, other batteries are slaves, and the negative pole of the last slave is connected to the negative pole of the load.
8. Do not press the button to turn off any battery or change the DIP switch during use, If you want to change the mode, please turn off all the batteries in turn according to the power-on sequence, and finally disconnect the load. Then you can reset the mode according to the user manual.

PCS Recommended charging and discharging protection threshold parameters:

12V system PCS recommended charging voltage for series connection is $3.55V \times 4 = 14.2V$, discharge cut-off protection voltage is $2.85V \times 4 = 11.4V$

24V PCS recommended charging voltage for series connection is $3.55V \times 8 = 28.4V$, discharge cut-off protection voltage is $2.85V \times 8 = 22.8V$

48V PCS recommended charging voltage for series connection is $3.55V \times 16 = 56.8V$, discharge cut-off protection voltage is $2.85V \times 16 = 45.6V$

If the PCS can not set the calculation of voltage accuracy to the decimal place, the unified decimal place to fix the round up, such as: 11.4V according to 11V, 45.6V according to 46V adjustment

S, S Pro product Series parameter table

Single battery rated voltage/V	12.8V	12.8V	12.8V	25.6V	25.6V	51.2V
Rated capacity of a single battery/Ah	50Ah	100Ah	200Ah	100Ah	200Ah	200Ah
Single battery standard charging current/A	25A	50A	50A	50A	50A	50A
Maximum discharge current of a single battery/A	50A	100A	100A	100A	100A	100A
Maximum discharge power of a single battery/W	650W	1300W	1300W	2600W	2600W	5200W
The maximum number of serial connections in the system/PCS	4	4	4	2	2	1
Series system maximum voltage/V	51.2V	51.2V	51.2V	51.2V	51.2V	51.2V

Remarks: S series can only be used in series, S Pro series can be used in series or parallel, S series and S Pro series batteries cannot be connected in one system, The batteries need to be fully charged before connecting in series; when using the LFP S Pro Battery, you need to connect the communication cable (485) and adjust the DIP switch (DIP)

Description and operation process of Active Balancing mode:

1. The premise of using the Active Balancing mode: the voltage difference between each battery in the system before series or parallel $\geq 0.3V$
2. Cut-off condition of Active Balancing mode: the voltage difference between each battery in the system is less than $0.1V$
3. Connect the batteries in parallel according to the parallel mode, no need to connect the inverter, ensure that the parallel cable, communication cable, and DIP settings are all correct, for all connected battery, turn DIP switches 2, 3, and 4 upward; 1, 5, 6, 7, 8 down. In the order from the last slave battery to the master battery, turn on the batteries and enter the Active Balancing mode.



Active
Balancing

Instructions and operating procedures for single battery use mode:

When the battery leaves the factory, it will be configured as a single battery by default, and the setting mode is the dial 1234 up and 5678 down.

If you need to use single battery only, please make sure that the dial setting is correct before use, otherwise it will not turn on.



single battery



Default config

Series or Parallel battery use mode:

Please refer to the instructions for the 1234 dial position of the DIP switch, and the 5678 dial position is always down.

Parallel dialing

BatteryQty	2pcs	3pcs	4pcs
Master			
S1			
S2			
S3			

Series dialing

BatteryQty	2pcs	3pcs	4pcs
Master			
S1			
S2			
S3			

S Pro battery indicator operating status description

The green indicator light flashes every 1S	The battery is working normally
The green indicator light flashes rapidly at high frequency	The battery is faulty and the corresponding fault code is displayed on the screen
The indicator light off	The battery is off and not working

S Series Common Fault Codes and Solutions

Error code	Fault description	Troubleshooting
098	Undervoltage in non-charging state	Charge the battery individually
099	Overvoltage in non-charging state	Discharge the battery individually
100	Battery over temperature	Disconnect the load, move the battery away from the heat source, and restart the battery after the temperature drops to the ambient temperature.
101	Battery under temperature	Disconnect the load, wait for the battery temperature rise to the ambient temperature, then restart the battery
102	MOS over temperature	Disconnect the load, move the battery away from the heat source, and restart the battery after the temperature drops to the ambient temperature.
103	MOS under temperature	Disconnect the load, wait for the battery temperature rise to the ambient temperature, then restart the battery
104	Hardware overvoltage	Discharge the battery individually
105	Software overvoltage	Discharge the battery individually
106	Software undervoltage	Charge the battery individually
107	Discharge overcurrent	Disconnect the load and reduce the battery discharge current
108	Charge overcurrent	Disconnect the charger to reduce battery charging current

S PRO Series Common Fault Codes and Solutions

Error code	Fault description	Troubleshooting
061	Cell undervoltage	Charge the battery individually
062	Cell overvoltage	Discharge the battery individually
063	Hardware short circuit	Disconnect the load, restart the battery
064	Hardware overcurrent	Disconnect the load, restart the battery
065	Software short circuit	Disconnect the load, restart the battery
066	Software overcurrent	Disconnect the load, restart the battery

067	Battery over temperature	Disconnect the load, move the battery away from the heat source, and restart the battery after the temperature drops to the ambient temperature.
068	Battery under temperature	Disconnect the load, wait for the battery temperature rise to the ambient temperature, then restart the battery.
069	Battery charging current high	Disconnect the load, reduce battery charging current
070	MOS over temperature	Disconnect the load, move the battery away from the heat source, and restart the battery after the temperature drops to the ambient temperature.
081	Parallel voltage difference high	Enable parallel equalization mode or fully charge each battery individually
082	Slave battery communication offline	Check the slave battery communication cable
084	Parallel short circuit	Disconnect the load, reconnect all cables then restart the batteries
085	Series overcurrent	Disconnect the load, reconnect all cables then restart the batteries
086	Charge overcurrent	Disconnect the load, reconnect all cables then restart the batteries
101	Battery over temperature	Disconnect the load, move the battery away from the heat source, and restart the battery after the temperature drops to the ambient temperature.
102	Battery under temperature	Disconnect the load, wait for the battery temperature rise to the ambient temperature, then restart the battery.
103	BMS over temperature	Disconnect the load, move the battery away from the heat source, and restart the battery after the temperature drops to the ambient temperature.
107	Charging temperature failure	Disconnect the charger, Disconnect the load, move the battery away from the heat source, and restart the battery after the temperature drops to the ambient temperature.
109	Battery undervoltage warning	Disconnect the load and charge the battery
110	Warning of excessive voltage difference when connecting in series or parallel	Fully charge each battery individually, then connect the batteries in series or parallel

Tips:

1. The user can query the fault solution according to the fault code displayed on the screen;
2. If there is a fault code outside the table, please contact the dealer or after-sales to solve it;
3. The fault code shown may change due to the different battery version, and it is not compatible with the previous version. The problem can be solved through the dealer or after-sales service. with the previous version. The problem can be solved through the dealer or after-sales service.

Warranty of CFE LFP Battery

This warranty specified below applies to CFE LFP battery to consumer through authorized reseller or CFE. The accessories and tool kits provided are not included. If the unit suffers major failure you will be provided with a replacement unit and your warranty will be transferred to the new unit. The units must only be used with controllers or equipment which is explicitly deemed compatible by CFE.

1. Purpose

The purpose of this warranty is to define the matters related to warranty policy of products.

2. Warranty Condition

2.1 Warranty Period

The products warranty period is two (2) years or 1500 cycles @80% DOD whichever comes first. The Warranty commences from:-

- (1) the date of installation or
- (2) the 180th day after date the Product was manufactured, whichever is earlier.

This Warranty period covers a capacity equivalent to 1 cycle per day.

Cycle: Discharge the nominal capacity of a charged battery and charge it afterwards.

Test conditions: 0.2C Charging/Discharging, @25°C 80% DOD.

Regarding Self-discharging degradation, 180 days after ex-work is ensured.

If the casing, display screen, handle, and power terminal can be proved by the user and approved by CFE to be non-artificial damage, CFE will provide free replacement materials within one year and be responsible for the replacement.

2.2 Limitation of Warranty scope

Under this Warranty, CFE is responsible for either battery replacement or battery repair.

In no event will CFE be liable for any consequential, incidental or punitive damages (including without limitation of loss of profit, harm to goodwill or business reputation, or delay damages) arising from or out of the Product or its installation, use, performance or non-performance, or any defect or breach of warranty, whether based on contract, warranty, negligence, strict liability, or any other method or convention.

Subject to below, CFE will, at its sole option, repair or replace the Products or any part thereof, if such Products are faulty or defective in manufacture or materials. CFE will endeavor to replace any Products which require to be replaced under this Warranty with products of equivalent appearance, size, and functionality on a like for like basis. Replacement of Products may not be brand new but with quality and specification compliant with the Product specifications. Where this is not feasible, due to technological advancements, CFE will supply another type of product of at least the same value and standard, although it may be of different size, shape, color and/or capacity.

If the Products are replaced within the Warranty Period, the remaining Warranty Period will be automatically transferred to the replacement products. In respect of valid claims under this Warranty, the end-user will not be charged for reasonable costs associated with the making of a warranty claim, including warranty processing costs, the cost of replacement parts and freight. Reimbursement for necessary and reasonably incurred costs or expenses in making valid warranty claims under this

Warranty may be claimed. Documentary evidence in support of such claim will be required.

2.3 Exclusions of Warranty

Damage or impairment to the Products resulting from any of following activities are NOT covered by this Warranty:

- Installation or use with any devices not approved as compatible by CFE.
- Failure to install or use the battery in the way intended, or as demonstrated in the installation manual including incorrect-installation of cables and connections.
- Failure caused by charger or inverter unit.
- Incorrect transportation, storage, installation or wiring by consumer or installer; if buyer fails to use the original packing materials provided by seller during the transportation of equipment the products damage or failure shall not fall under the warranty scope of the product.
- Mistreatment of the product including incorrect installation environment, incorrect temperatures or using the units other than in the specified manner.
- Damage caused by any impact, physical trauma to the unit such as dropping or mishandling.
- Attempts to change the functionality of the unit in any way.
- Exposure of the Product to movement or shaking following installation, or temperatures of more than 50°C or below -10°C;
- Using the battery outside of the clearly stated performance criteria for the unit.
- Water ingress, corrosive gas damage or installation in dirty environments causing particles to affect performance.
- Anyone other than those authorized by CFE may not modify, disassemble, repair or replace the product;
- The unit must have clearly identifiable and authentic serial number and labels on the unit.
- Products suffered any external influences including unusual physical force, electrical stress (power failure surges, inrush current, lightning, flood, fire, accidental breakage, etc)
- Extensive superficial damage to the case demonstrating impact or mishandling or poor protection of the battery.
- Product damage and defect caused by deliberately or willful act.
- Products failure is not reported to seller or CFE authorized service partner within 1 week of appearance.
- The Product not being operated for any period of 6 months or more.
- Unusual physical or electrical stress caused by Force majeure, such as power failure surges, inrush current, lightning, flood, fire, accidental breakage, etc.;

3. Performance Warranty

CFE guarantees that CFE LFP battery will retain more than or equal to 70% of usable capacity(80%of Nominal capacity) for 2 years or 1500 cycles @80% DOD whichever comes first. The Warranty commences from:-

- (1) the date of installation or
 - (2) the 180th day after date the Product was manufactured, whichever is earlier.
- Capacity measurement condition (referenced IEC: 62619)

Ambient temperature: $25 \pm 2^{\circ}\text{C}$

Total energy/Usable energy measured under specific conditions from CFE 0.2CC-CV at DC side.

If you suspect CFE's verification, the Product must be tested by an EU certified origination or a third-party certification testing agency accredited by CFE. Meanwhile, the cost of any 3rd party evaluation service charge should be beard by yourself, unless your claim is proven to be valid, in which case CFE will be responsible for the testing costs.

4. Warranty Policy

If on arrival the product is not of acceptable quality the customer is entitled to have the goods repaired or replaced.

5. About Service Products/Parts

Service product or accessory could be used as new or refurbished condition and CFE guaranteed which performance is equal to or higher than replaced device. If the product is no longer sold in the market, CFE would replace it with different kind of product with equal or higher functions and performances, or the residual annual depreciation value of the buyer paid price within the time limit for performance guarantee.

6. Claim Policy

Whether to repair or replace the product will be determined by CFE in its sole discretion.

Claims under this warranty must be made from authorized distributor whom the product was purchased. Meanwhile, you must notify your distributor or CFE of a claim by:

- Give a call or E-mail to your distributor;
- Contract with CFE hotline or Email us directly.

within 48 hours of a faulty discovered.

The following items must be included:

- The original purchase receipt or equal valid document;
- Description of the alleged defect(s) to your distributor or CFE after service hot line or send email to CFE;
- The product's serial number and the initial installation date.

If you suspect that the battery is faulty, you should return the device to your distributor, and the user will be responsible for the logistics cost of returning the product. After inspection by designated experts, if the product is deemed to be faulty, we will issue a replacement or repaired equipment, and the user will be responsible for the logistics cost of returning the equipment to us (based on standard acceptable logistics costs). If the product has been tested without failure, the user should bear the cost of testing and testing in addition to the reasonable logistics cost.

7. Out Of Warranty

In the event the Product is out of warranty, CFE may (in its discretion) provide certain after-sales service to Original Buyer, but all the costs and expenses, such as parts, labour costs and travel expenses, shall be borne by Original Buyer. To request such after-sales service Original Buyer must provide sufficient information about any defects, to enable CFE Partner to determine whether such defects are capable of repair.

8. Warranty Restriction

Unless otherwise specified herein, to the extent permitted by applicable law, the Warranty Letter and above remedies shall be exclusive and replace all other guarantees and remedies, oral or in writing, expressed or implied. To the extent permitted by applicable law, CFE expressly reject any and all legal or implied warranty, including but not limited to warranties of merchantability, fitness for a particular purpose and hidden or potential defects. If CFE cannot abandon implied warranty as prescribed by applicable law or the guarantee specified by applicable laws, all of such guarantees and warranties shall limit to implied warranty as prescribed by applicable law or the scope within applicable laws and shall be under mandatory application according to applicable law. No distributor, agent or staff of CFE and / or CFE Authorized Service Partner is authorized to make any revision, extension or addition to the quality Warranty. The legality and enforceability of remaining clauses herein shall not be affected or damaged if any of clauses herein is adjudged to be illegal or unenforceable. Unless otherwise specified herein, to the maximum range permitted by applicable law, CFE will not be liable for any direct, indirect, special, accidental or derivative losses caused by the purchase or use of Products and its system, including but not limited to the loss of use, loss in income, actual or expected loss in revenue (including contract revenue losses), loss of the use of money, loss of anticipated savings, loss of business, loss of opportunity, loss of goodwill, loss of reputation, personal injury or damage loss, or the indirect or derivative loss or damage (including any expense arising from the replacement of equipment and property, resumption of production, etc.) caused by any reasons. LIABILITY FROM ANY CAUSE WHATSOEVER SHALL IN NO EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY PRODUCT OWNER TO CFE FOR SUCH PRODUCT GIVING RISE TO THE LIABILITY. EXCEPTED FROM THIS IS LIABILITY ON THE GROUNDS OF CULPABLE INJURY TO LIFE, PHYSICAL INJURY OR INJURY TO HEALTH AND THE MANDATORY LIABILITY FROM INTENT OR GROSS NEGLIGENCE.

9. Miscellaneous

This Warranty shall form part of the purchase contract in respect of the Products and shall be complied with by all parties involved.



CFE-LFP Battery

Certificate of conformity

Inspectors: _____

Inspection date: _____

CF Energy Co., Ltd.

G2

CF Energy Co., Ltd.

First-class power battery system supplier

First-class supplier of energy storage and microgrid

This user manual is applicable to CFE LFP Battery S, S Pro series battery which produced after May 2022