energy storage system

Residential ESS Lithium-ion Battery

CFE-6 User Manual

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Version 1.2

About this Manual

The Manual is intended for the CFE-6 Residential ESS, the hybrid inverter and any other equipment are not included.

Contents

1 Safety Instructions

1.1 Important Safety Instructions

This manual contains important instructions for:

CFE-Residential ESS Lithium-ion Battery product

This manual must be followed when installing and using this product.

The product is designed and tested in accordance with international safety requirements IEC 62619/IEC 62040/UL1973, but as with all electrical and electronic equipment, certain precautions must be observed with regard to product installation and/or operation. To reduce the risk of personal injury and ensure safe installation and manipulation of the product, it is required to carefully read and follow all instructions, cautions and warnings in this manual.

1.2 Warnings in this Document

A warning describes a possible hazard to equipment or personnel, which calls attention to a procedure or practice. Improper enforcement or compliance with warnings could result in damage or destruction of part or all of the equipment and/or other equipment connected to the equipment or personal injury.

Symbol	Description
	Beware of risk of electric shock
	Heavy enough may cause severe injury
	Keep the battery away from open flame or ignition sources
	Keep the battery away from children
	Do not dispose of the product with household waste
	Recycling
	Read this manual before installation and operation

For safety reasons, installers are responsible for familiarizing themselves with the contents of this manual and all warnings before performing installation.

If the battery is not used for more than 6 months from the production date, it shall be charged once. The failure caused by the overdue failure to perform the standard operation is not within the scope of warranty.

1.3 Battery handling guide

Use the battery pack only as directed.

1.4 Response to emergency situations

The CFE-Residential ESS Lithium-ion Battery is designed with multiple safety strategies to prevent hazards resulting from failures. However, can't guarantee their absolute safety for uncertain situations.

1.4.1 Leaking batteries

If the battery pack leaks electrolyte, direct contact with the leaking liquid or gas must be avoided. Contact with electrolyte may cause skin irritation and chemical burns due to its corrosiveness. If one is exposed to the leaked substance, the following actions should be taken:

Inhalation: Evacuate the contaminated area, and seek medical attention immediately.

Eyes contact: Rinse eyes with flowing water for 15 minutes, and seek medical attention immediately.

Skin contact: Wash the affected area thoroughly with soap and water, and seek medical attention immediately.

Ingestion: Induce vomiting as soon as possible, and seek medical attention immediately.

1.4.2 Fire

In case of a fire, make sure that an ABC or carbon dioxide extinguisher is placed nearby and do not extinguish the fire by water.

WARNING

The battery pack may catch fire when heated above 130°C.

If a fire breaks out where the battery is installed, please take the following actions:

1) Extinguish the fire before the battery catches fire.

2) If the battery has caught fire, do not try to extinguish the fire, and evacuate people immediately.

Do not approach in case of any contact with poisonous gases once the battery catches fire.

1.4.3 Wet battery

If the battery is wet or submerged in water, do not try to access it. It's proper to contact customer careline or your distributor for technical assistance.

1.4.4 Damaged battery

If the battery is damaged, please contact customer careline or your distributor for appropriate countermeasures as soon as possible, because damaged batteries are dangerous and must be handled with extreme caution. Damaged batteries are not suitable for use and may pose a danger to people or property. If the battery seems to be damaged, it also should be returned to your distributor.

CAUTION

Given the high possibility of damaged batteries exporting electrolyte or flammable gas, the correct action is to contact your distributor for advice and information immediately. Such cases will be addressed within 48h.

1.5 Installers

CFE-Residential ESS Lithium-ion Battery is suggested to be installed by skilled workers or electricians. A skilled worker is defined as a person who has received professional training and qualified electrician or possesses all of the following skills and experience:

- ✓ Knowledge of the functional principles and operation of on-grid energy storage systems.
- ✓ Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
- ✓ Knowledge of the installation of electrical devices.
- ✓ Knowledge of adherence to this manual and all safety precautions and optimal practices.

1.6 Scrap battery

For scrap battery, please treat with local laws or regulations to recycle.

1.7 Customer careline

The contact information for e-mail assistance is given as below. This e-mail is available 24/7 and we will register your problems and provide reasonable solutions within 48h.

Customer careline	+86 400 996 8377

2 Product Introduction

2.1 Technical data

Model	CFE-6
Total Energy*	6.144 kWh
Max. Discharge Power	6.144 KW
Rated Capacity	120 Ah
Voltage	48~56 Vd.c
Nominal Voltage	51.2 Vd.c
Operating Condition	Indoor
Charge Operating Temperature	0~45℃
Discharge Operating Temperature	-10~55℃
Dimensions (W*D*H)	442*500*133 mm
Weight	45±0.5 kg
IP Rating	IP 20

Protective Class	I
Relative Humidity (RH)	0~95% (No condensed water)
Cooling Type	Ambient cooling
Case Material	Metal
Color	White
Installation	Cabinet
Communication	CAN/RS485
Protection Mode	Triple Hardware Protection
Battery Protection	Over-Current/ Over-Voltage/ Short Circuit/ Under-Voltage/ Over Temperature
Safety Certificate	UN3480/CE/CB
Warranty & Cycle Life	10 years or 5000 Cycles (Whichever is earlier)

- Testing Conditions Based on Temperature 25℃ at The Beginning of Life.
- Total Energy/Usable Energy Measured Under Specific Conditions From 0.2C CC/CV

2.2 Indicator and ports

The four green lights on the front of the battery display the SOC status of the battery, and the other red and green lights indicate the operating status of the battery.

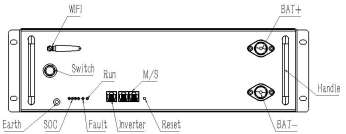
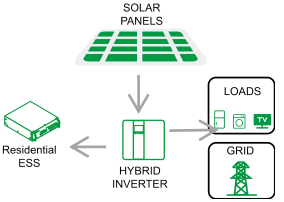
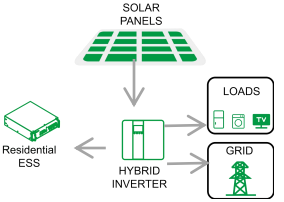
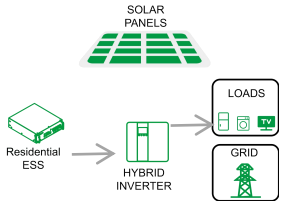
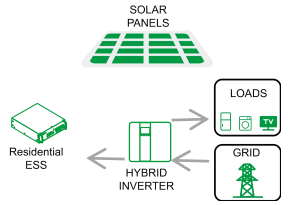


Table 2-1 Designations on the battery

Item	Designation	Definition
1	Running	Battery normally working without fault
2	Fault	Battery is in a warning state
3	SOC	Each green light represents 25% of the battery capacity.
4	Inverter	PIN1-PIN8：RS485-B、RS485-A、/、CANH、CANL、/、/、/
5	M/S IN	PIN1-PIN8：DI、GND、/、CANH、CANL、/、/、/
6	M/S OUT	PIN1-PIN8：DO、GND、/、CANH、CANL、/、/、/

2.3 How it works

Morning	Afternoon
	
Optimized self-consumption will be achieved. ESS is used to store excess energy produced by PV system.	Extra energy will be fed into the grid when ESS is fully charged and system has already reached its self-consumption requirement.
Evening	**Night**

	
ESS will power the AC load at sunset.	If the ESS capacity is insufficient to meet self consumption requirement, electricity will be obtained from the grid.

2.4 Work Mode

2.4.1 Single Mode

Used for scenarios where a single PACK is used independently. In a single-machine scenario, the BMS performs signal acquisition, communication control, safety protection, etc. on a single PACK according to the preset logic.

2.5 Feature

CFE-Residential ESS Lithium-ion Battery is characterized with:

- ✓ **Energy storage unit:** This battery is suitable for PV solar system compatibility.
- ✓ **Battery management system (BMS):** The battery's built-in BMS monitor prevents the battery from running outside its design limitations. See **Troubleshooting** in **Chapter 8.**
- ✓ **Monitor:** The battery's BMS built-in WIFI (Matching) module can help check the battery running information in the mobile phone.

3 Guidance for batteries during shipment

1) Cartons that have been crushed, punctured, or torn in such a way that contents are revealed shall be set aside in an isolated area and inspected by a skilled person. If the package is deemed to be not shippable, relevant contents shall be promptly collected and segregated. Meanwhile, it is required to contact the consignor or consignee.

2) The DC circuit of Residential ESS has been disconnectd before outgoing.

3) A precautionary label must be affixed to the shipping carton to alert individuals that the battery within the package has been disconnected; otherwise, the battery should not be transported.

4) We have conducted comprehensive tests of our equipment distributed around the world to ensure safety for shipping transport. These products shall be handled with care and immediately inspected if visibly damaged. It needs to contact with customer careline in case of any visible damage to cartons to confirm whether the battery could be used safely or not.

4 Installation Prerequisites

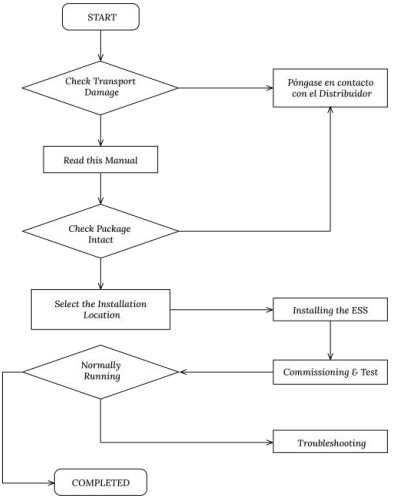
4.1 Installation location

Make sure that the installation location meets the following conditions:

- ✓ The building is designed to withstand earthquakes.
- ✓ Far away from the sea to avoid salt water and humidity.
- ✓ The floor is flat and level.
- ✓ No flammable or explosive materials nearby.
- ✓ Optimal ambient temperature is between 15℃ and 30°C.
- ✓ Temperature and humidity stay at a constant level.
- ✓ Minimal dust and dirt in the area.
- ✓ No corrosive gases present, including ammonia and acid vapor.
- ✓ The Residential ESS is rated at IP20, so the battery could be installed indoors.
- ✓ If the ambient temperature exceeds the operating range, battery will protect itself by shutting down. The optimal operating temperature of the battery is 15°C to 30°C. Frequent exposure to severe operating conditions would exacerbate the performance and lifetime of the battery.

4.2 Installation process

The battery should be installed according to the following flow chart.



4.3 Installation materials

Following installation materials should be prepared by installers.

- ✓ Power cable
- ✓ Communication cable
- ✓ Earth wire

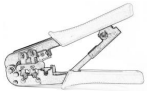
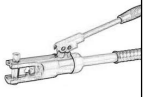
NOTICE

Make sure that the cross-sectional area of charging cables is 25 to 35 mm2.

A breaker between battery and inverter is recommended to install, and its min. current should be over 150A or comply with local regulations.

4.4 Tools

To install the battery pack, those following tools are probably required:

			
Phillips screwdriver	Torque wrench	Cable crimper	Wire clamp
			
Voltmeter	Tape measure	Drill	Flat-head screwdriver

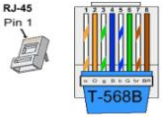
In order to protect the safety of operators and installers, it is necessary to select and employ suitable tools and measuring instruments that are certified for precision and accuracy.

4.5 Safety instruments

When dealing with the battery, following safety gears should be equipped. Installers must meet relevant requirements of IEC 60364 or domestic legislations and other relevant international standards.

		
Insulated glove	Safety goggles	Safety shoes

4.6 Communication cable



If needed, the network cable should be made as shown in that diagram. But the network cable between battery and inverter should be produced following the definition of inverter.

If available,a LAN cable tester can be used to check whether the cable is faulty.

4.7 Storage

If the battery is not to be installed immediately, it should be removed from operation. It is secure and proper to be stored in an appropriate location, if long period storage is needed. Instructions for storage are:

- ✓ Do not stack more than 8 battery boxes.
- ✓ The temperature of battery stored is recommended in the range of 0°C to 45°C.
- ✓ Do not expose to water

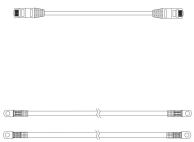
The ESS box should be upright and not stacked upside down when being stored.

If the ESS needs to be stored over 3 months, the DC circuit of battery is suggested to be disconnected. Otherwise, the battery would discharge at a minimum rate and capacity degrades with storage time. Generally, the battery self-consumption is less than 5w. And, if the battery is stored over 6 months, it is suggested to connect the battery with inverter for system commissioning.

5 Battery Installation

5.1 Package items

These items are included in the package

		
Battery*1	Output Cable *2 communication Cable*1	User Manual

5.2 Checks before installation

Check the battery voltage.

WARNING

If this checking process is executed for any reason after the battery is fully installed, make sure that the inverter is turned off or disconnected from battery while checking the battery.

	Press the switch to ensure it is in the open state, and then measure the voltage at the terminal interface with a voltmeter. If the voltage is lower than 44 V, do not use the battery and contact customer careline or your distributor.

5.3 Installation of the battery

NOTICE

	The symbol is located on the front of battery. For parallel connection, the earth wire must be installed. Apply silica gel or paint around the earth terminal after the earth cable is connected.

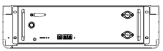
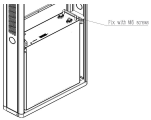
5.3.1 Connect with 51.2Vdc Inverter

To prevent the battery from moving, make sure the battery is properly installed.

NOTICE

If the battery is installed above the floor or on a platform, make sure that the wall or platform is capable of supporting the battery's weight.

5.3.1.1 Cabinet fixation

NOTICE	
	1.Install the battery on the fixed bracket of the cabinet.
	2.Fix it with two M6 screws.Tighten the screws to a torque around 2.5 N·m.

, .

The installed location shall be restricted access or installed in a cabinet which provides protection for pets and children.

5.4 Cable connections

WARNING

Before connecting battery with inverter, please make sure the inverter turns off.

6 Commissioning

6.1 Commissioning battery

If there is only one battery installed, the following steps are used to put it in operation:

1) Press the switch to ensure it is in the open state .
2) Make sure that the Run light is on. If it stays off, do not use the battery and contact your distributor.
3) Turn the inverter on, and wait for the start-up sequence to complete fully.

6.2 Shutting down battery

Shut down the battery only when there is no charge or discharge current.

1) Press the switch to ensure it is in the off state.
2) Make sure that every light on the battery is off.

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