

CF48100T (3U with MCB) Lithium-Iron User Manual

Version: V1.0

YHI POWER PTY LTD

Tel: 03 9588 1888

Website: www.yhipower.com.au

Email: inquiry@yhipower.com.au

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Revision History

Version	Date	Remark
V1.0	2024-8-23	First release

Preface

Manual instructions

This manual applies to CF48100T LFP battery system and intends to guide the reader to understand the structure, performance and application of the product.

Object

This manual is applicable to the following persons:

- Battery Installation Engineer
- Maintenance Engineer

Content abstract

The main contents of this manual are shown in the following table.

Chapter	Description
Chapter 1 Safety Precautions	Introduce the matters needing attention in the process of installation, use and storage.
Chapter 2 Product application and characteristics	The application and characteristics of the product.
Chapter 3 Hardware Architecture	The appearance size and panel components of the product.
Chapter 4 Installation	The steps of product installation and wiring.
Chapter 5 Use and Maintenance	Use and maintenance of the product.
Chapter 6 Troubleshooting	Common product fault treatment and special situation treatment.
Chapter 7 Working Principle	The working principle of the product
Chapter 8 Technical Parameters	The charge/discharge performance parameters and working environment parameters

The following safety symbols may appear in this manual. The meanings are shown in the following table.

Symbol	Instruction
	Danger: Used to warn of an urgent and dangerous situation that, may result in death or serious bodily injury if not avoided
	Warning: Used to warn of potentially dangerous situations, may result in death or serious bodily injury if not avoided.
	Caution: Used to warn of potentially dangerous situations, may result in moderate or minor bodily injury if not avoid.
	Caution: Used to provide warning information about the safety of equipment or environment. it may cause damage to equipment, loss of data, degradation of equipment performance, environmental pollution or other unpredictable results if not avoided, "Caution" does not involve personal injury.
	Notes: supplementary notes related to the content.

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1. Safety Precautions

Before performing operations, you must carefully read your local security regulations and relevant operational procedures to prevent personnel injury or equipment damage. Requirements involved in this manual are only used to complement the local security standards.

For requirements on security, refer to Table 1-1.

Table 1-1 Table of safety precautions

Classification	Requirements on Security
 <p>Installation!</p>	<ul style="list-style-type: none"> ● Before installing a battery, disconnect the active device from the battery. ● Do not wear electrically conductive objects such as watches, bracelets, or rings. ● Verify that the anode and cathode of a battery are not connected in reverse. ● Use tools with insulating handles. Do not place tools or metallic objects on batteries. ● Do not connect the anode and cathode of a battery by using metallic objects such as conductors. ● When a battery is installed, tiny sparks produced at junctions do not harm bodies or equipment.
 <p>Storage!</p>	<ul style="list-style-type: none"> ● Do not hit against the batteries, for example, needling, hammering, or treading. ● Do not put the batteries in high-temperature environment, for example, putting them into fire, or heating them. ● Do not put the batteries into a humid environment, for example, putting the batteries into water. ● Do not depart the batteries or change the structure of the batteries.
 <p>Charging and discharge!</p>	<ul style="list-style-type: none"> ● Do not perform charging or discharging on unqualified devices. Follow correct guidelines. ● Do not charge or discharge hot or deformed batteries or batteries with leakage. ● Do not continuously discharge batteries with extremely low voltages.
 <p>Use!</p>	<ul style="list-style-type: none"> ● Do not use batteries of different manufacturers, types, models, cycles at the same time. ● Recharge the batteries once if they are stored for more than three months. Test the capacity of the batteries if they are stored for more than six months. Recheck the batteries that are stored for more than one year and use them again if they are qualified. ● Recharge batteries in accordance with the battery storage recharging requirements. If the battery is damaged due to failure to recharge the battery as required, COSLIGHT is not responsible for the damage. ● Install and use the batteries abiding by the correct operation rules. COSLIGHT does not bear responsibilities for any irregularities. ● Do not connect power supplies or loads with unexpected power levels at two ends of a battery.

2. Product Application and Features

This chapter covers the following content:

- Product application 2-1
- Product features 2-2

2.1 Product application

The CF48100T LFP battery system is used in both standby and cycle scenarios and provide -48V DC for telecom equipment.

CF48100T LFP battery system is used in unattended or other kind of telecom site to provide backup power for communication equipment (such as: access network equipment, remote switching station equipment, mobile telecommunication equipment, transmission equipment, satellite earth station and microwave telecommunication equipment).

2.2 Product Features

CF48100T LFP battery has the following characteristics:

- High safety
 - The cathode material of the battery cell is LFP, which has high safety.
 - Battery system is equipped with high-performance BMS with the function of over-discharge, overcharge, over current, short circuit, temperature protection functions, which improve the safety of the battery.

- Remote control

Battery has the function of telemetry and remote communication which can communicate with the remote central monitoring center to realize unattended.

- Low noise

The system adopts self-cooling heat dissipation mode, which makes the whole product with low noise.

- Flexible configuration

The system can be configured with multiple batteries in parallel to improve the backup time duration and system output power.

- Strong environment adaptability

System charging temperature range is 0 °C~ 50 °C, discharge temperature range is -20 °C~ 55 °C.

- Easy operation

- Battery panel with on/off button, easy to switch on or off.
- The system provides RS232 interface, RS485 interface and dry contact interface, which is convenient for monitoring and networking.
- Intelligent management
 - The monitoring unit manages the battery charge and discharge by measuring the battery charge and discharge automatically
 - It has the function of over voltage and under voltage.
 - It can monitor various system parameters and status in real time.
 - It has the function of external power on activation and automatic data storage.

- With optional anti-theft functions

2.3 Application Scenario

The CF48100T product supports multiple sets of parallel connection, the number of lithium-ion battery connection is up to 16 sets. In scenario of multiple CF48100T sets, all communication ports of the battery can be connected through RS485, and the last port needs to be connected to the site management unit via RS485. The schematic diagram is shown as below:

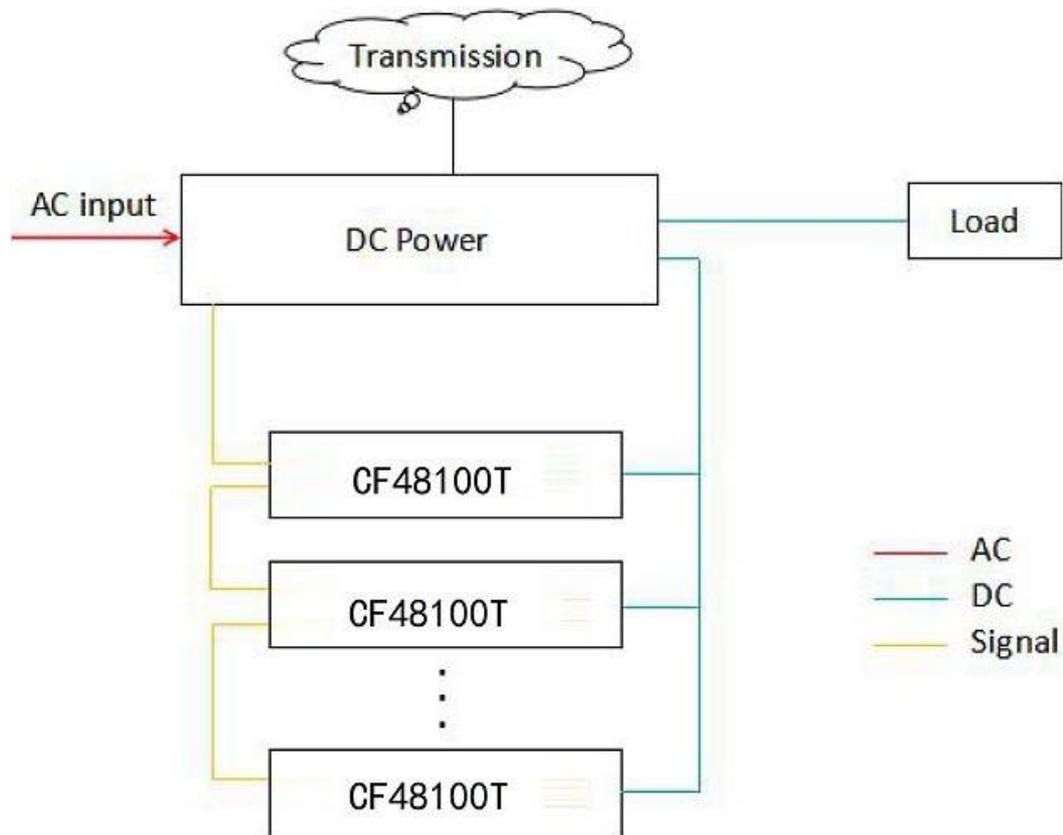


Figure 2-1 battery parallel connection and networking

3. Hardware Structure

This chapter covers the following content:

- Appearance and Dimensions 3-1
- Interface description 3-2
- Status display 3-3

3.1 Appearance and dimensions

The external dimensions and weight of the CF48100T LFP battery are as follows:

- Appearance dimension (width × depth × height) : 440mm×440mm×130mm (excluding lug, handle and terminal). This is shown in Figure 3-1.
- Weight: less than 40.5 kg.



Fig. 3-1 Battery appearance

3.2 Description of Interface

CF48100T LFP battery front panel is shown in Figure 3-2.

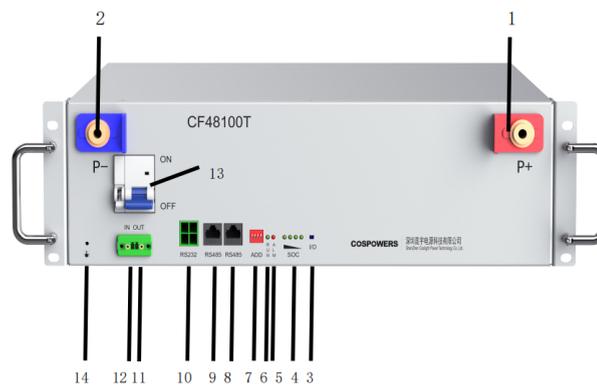


Fig. 3-2 Battery interface

Battery front panel interface are described in Table 3-1.

Table 3-1 Interface Information

S/N	Name	Printing logo	Instructions
1	Positive terminal	"P +"	Output +
2	Negative terminal	"P -"	Output -
3	Power on Button	I/O	In the standby state, press the button for 3 seconds, the battery can be turned off. In the state of battery off, press the button for 3 seconds to turn on the battery
4	Power status indicator	SOC	The green light indicates the remaining capacity of the battery.
5	Warning light	ALM	A red light that blinks or on when a warning or protection occurs.
6	Running lights	RUN	Green light is on when the system is running normally.
7	Address switch	ADDR	To set the communication address of the battery.
8	RS485A	RS485	For communication with background monitoring computer or battery communication.
9	RS485B	RS485	For communication with background monitoring computer or battery communication.
10	RS232 communication	RS232	For communication with backstage monitoring computer. BMS software upgrade maintenance.
11	Auxiliary contact point OUT	OUT	3.81 port with 2pin (important alarm output)
12	Auxiliary contact point IN	IN	3.81 port with 2pin(important alarm output)
13	Circuit breaker with auxiliary contacts		Anti theft cable connection
14	Earthing port	⊕	Earthing Connection

- The interface definition is shown in Figure 3-3.
- According to the RS485 communication address of each battery from 1 to 16, the battery address switch from left to right is shown in Table 3-2.

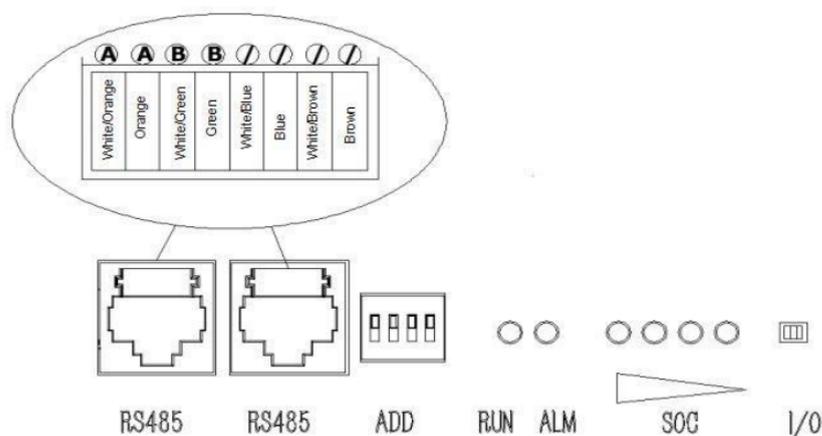


Figure 3-3 Definition of communication interface

Table 3-2 allocation mode of address switch

Address no.	Address switch 1	Address switch 2	Address switch 3	Address switch 4
1	OFF	OFF	OFF	OFF
2	OFF	OFF	OFF	ON
3	OFF	OFF	ON	OFF
4	OFF	OFF	ON	ON
5	OFF	ON	OFF	OFF
6	OFF	ON	OFF	ON
7	OFF	ON	ON	OFF
8	OFF	ON	ON	ON
9	ON	OFF	OFF	OFF
10	ON	OFF	OFF	ON
11	ON	OFF	ON	OFF
12	ON	OFF	ON	ON
13	ON	ON	OFF	OFF
14	ON	ON	OFF	ON
15	ON	ON	ON	OFF
16	ON	ON	ON	ON

- The factory default position of the address switch is address 16.

3.3 Status display (LED)

There are 6 LEDs in the front panel of the CF48100T LFP battery to show the operating status of the battery system. There are 1 running light (RUN), 1 warning light (ALM), 4 status indicator (SOC). These indicator lights are shown in Figure 3-4.

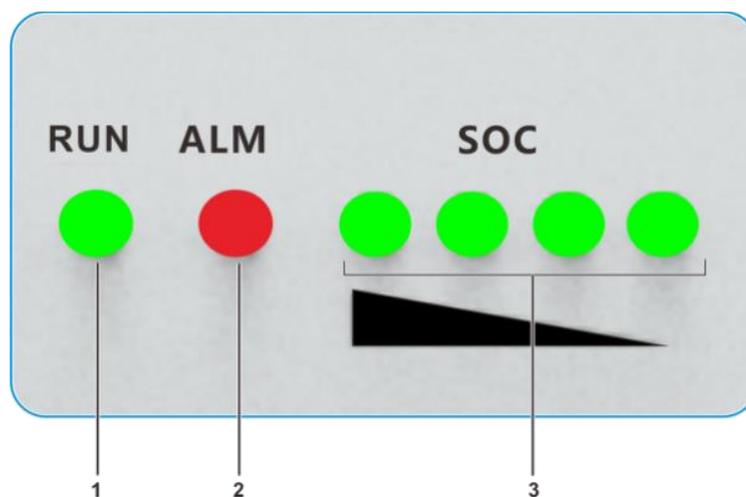


Fig. 3-4 Schematic diagram of status indicator lamp

1. Running lights; 2. Warning lights; 3. Indicator of battery status

Please refer to Table 3-3 for the status description.

Table 3-3 Indicator status description table

Category	State	RUN	ALM	Battery SOC				Instructions
Off	--	Off	Off	Off	Off	Off	Off	All off
Standby	Normal	Flash 1	Off	Display according to the SOC				/
	Alarm	Off	Flash 3	Off	Off	Off	Off	Blinking
Charge	Normal	On	Off	Display according to the SOC				The highest LED flashes (flash 2), and the others are always on
	Alarm	On	Flash 3					
	Protect	Off	On	Off	Off	Off	Off	Stop charging, alarm is always on
Discharge	Normal	Flash 3	Off	Display according to the SOC				/
	Alarm	Flash 3	Flash 3					
	Protect	Off	On	Off	Off	Off	Off	Stop discharging, ALM alarm is always on
System failure	Failure	Flash 2	Flash 2	Flash2				Battery cell failure of, temperature sensor, voltage detection, charging or discharging MOS failure was detected

- Flash 1: the time of light on is 0.25s, and the time of light off is 3.75s.
- Flash 2: the time of light on is 0.5s, and the time of light off is 0.5s.
- Flash 3: the time of light on is 0.5s, and the time of light off is 1.5s.

4. Installation

This chapter covers the following content:

- Open the box for inspection 4-1
- Install LFP batteries 4-1

4.1 Inspection

Refer to the packing list. Check if there is any sign of damage. Do not open it without permission if there is serious damage, and inform the agent and manufacturer immediately.

4.2 Installation of LFP batteries

Preparation

Fix the battery in the cabinet and connect the power cable and communication cable.

Steps

1. Place the battery inside the cabinet. And install the mounting flange. 4 M6×10 bolts and square snap nuts are used to fix the battery on both sides of the cabinet, as shown in Fig. 4-1.

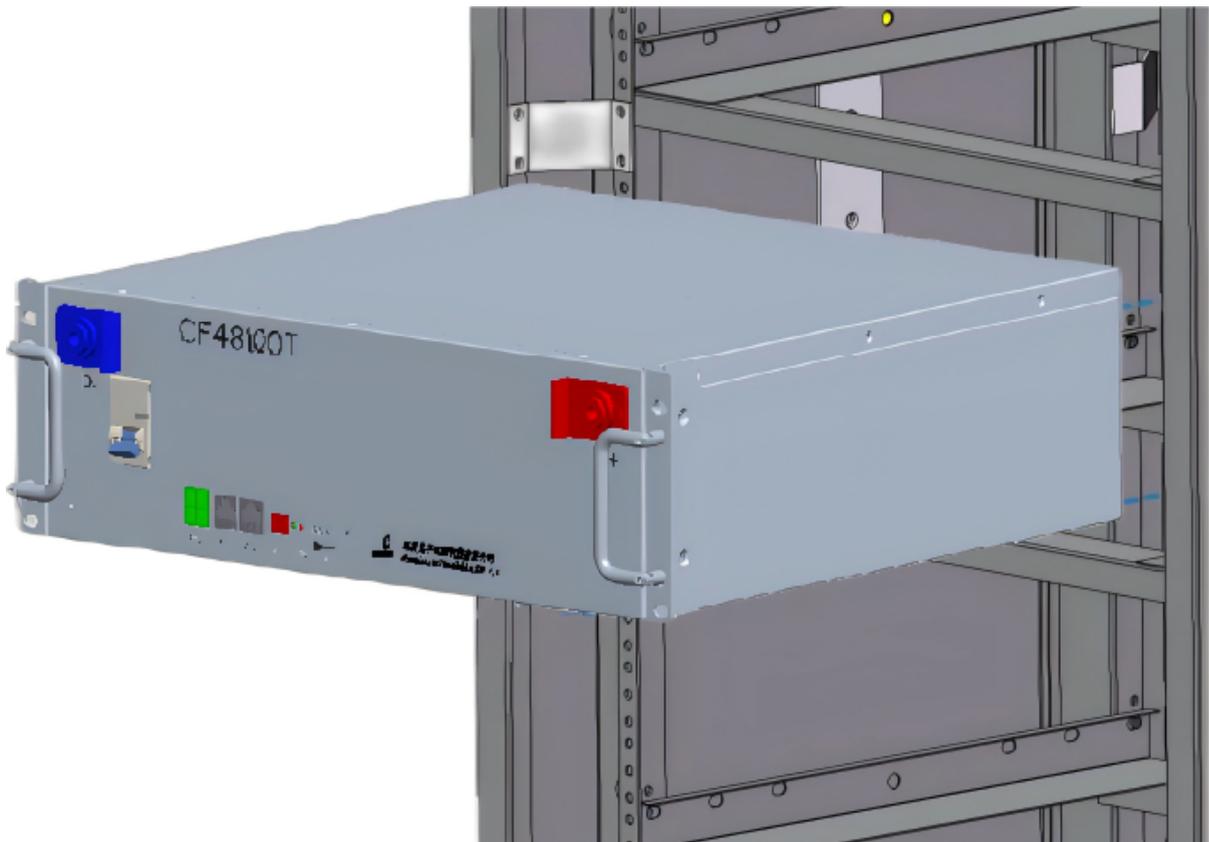


Fig. 4-1 install the mounting flange

2. Grounding. Unscrew the screw at the grounding hole on the battery panel, install the proper yellow and green wires on the OT terminal, then tighten earthing point with a screwdriver.

3. Connect the power cable. Connect the positive terminal of the battery to the positive terminal of the power supply system, and the negative terminal of the battery to the negative terminal of the power supply system. Note the color distinction between positive and negative polarity of the input and output terminals, as shown in Figure 4-2.

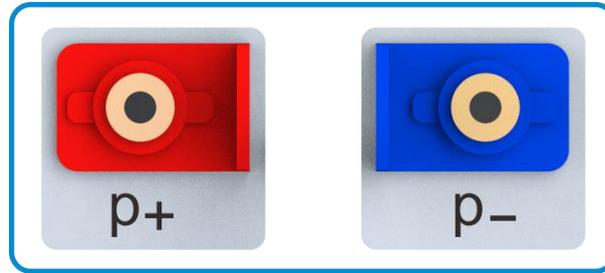


Figure 4-2 Battery terminals

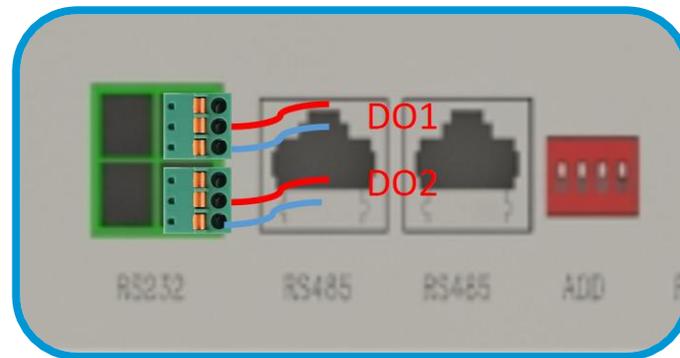
4. Connect communication cables. It can realize the communication between the battery and the SMPS through the 485 communication cable or realize the real-time communication between the battery and the monitoring equipment through the 485 communication cable, so as to monitor the running state of the battery. The communication cable connection diagram is shown in Figure 4-3.



Figure 4-3 Communication cable connection

5. Dry Contact connection: the dry contact can provide the important information output, DO1 is for important alarm and DO2 is for critical alarm, the default dry contact is NC,

DO1 output alarm : battery UV alarm and protection , cell UV alarm and protection, charge over temperature protection, discharge over temperature alarm and protection, charge under temperature alarm and protection, discharge under temperature alarm and protection, battery OT alarm, battery UT alarm, PCB OT alarm, discharge OC alarm and protection, short circuit protection, reverse connection protection, low SOC alarm and protection, etc.



DO2 output alarm: SOH abnormal and protection, cell damage alarm , BMS faulty alarm, anti theft alarm

The dry contact function can be set by monitor software.

6. When installing multiple groups of CF48100T LFP batteries in the site, RS485 cascade is adopted. Set the address code for each battery from 0000,0001... 1111. Connect the RS485A of battery 1 to the RS485B of battery 2. connect all the battery in this way till battery 16.



5. Use and Maintenance

This chapter covers the following content:

✓	Battery storage and transportation	5-1
✓	Power supply system setting	5-2
✓	Power on and activation	5-3
✓	System shutdown	5-4
✓	System maintenance	5-5
✓	Charge	5-6
✓	Discharge	5-7

5.1 Battery storage and transportation

5.1.1 Transport

- Batteries should be packed into boxes for transportation. Severe vibration, impact or extrusion should be prevented, also sun exposure and rain should be prevented.
- Do not turn over or tilt the battery during transportation.
- Batteries should be turned off during transportation to reduce the risk of power consumption and short circuit.

5.1.2 Storage requirements

- LFP battery storage environment temperature 0 °C to 40 °C; The recommended storage ambient temperature is 20 ~ 30°C.
- Relative humidity is not more than 75% stock in the clean, dry and ventilated indoor environment.
- Avoid contact with corrosive substances, stay away from fire and heat source.
- LFP battery needs to be recharged regularly during the storage process to avoid poor consistency of cells.

5.1.3 Recharge during storage

Long-term storage of batteries is not recommended. The battery shall be recharged according to the requirements in Table 5-1 for different temperatures after longtime storage

Table 5-1 Storage time/average temperature and supplementary electricity requirements

Storage Temperature	0-40 °C	Remark
Recharge period	6 Months	The battery with leakage or bulging is not allowed to use

Note:

1. If battery storage is more than 6 months, report to management in time.
2. The capacity test is required If the battery has been stored for more than 12 months
3. The maximum allowable number of recharge battery for storage is 3 times, and it is recommended to scrap if the maximum allowable number is exceeded and still not put into use. The maximum storage time is 24 months, and it is recommended to scrap if it is not put into use after 24 months.
4. There will be capacity loss in long-term storage of lithium batteries. Generally, the irreversible capacity loss of lithium batteries is 3% ~ 10% after 12 months of storage at the recommended storage temperature.

5.1.4 State checking before recharge

- Appearance check: no bulging, deformation or leakage of battery;
- Battery status checking: turn on the battery by pressing the button, check the status of battery indicator, there should be no alarm

5.1.5 Charging method

The battery can be recharged with a power supply system or battery charger. The recharge current is shown in Table 5-2 below.

Table 5-2 Battery recharge parameters

Supplementary electrical parameter	describe
Charging voltage	52 V
Charging current	0.3 C



Description:

It might be the cell imbalance alarm If there is a ALMLED blinking during charging, do not stop charging, maintain the battery in the charging state to 4 ~ 12 hours, the cell consistency can be improved

5.1.6 After battery recharge

- Remove the power cables and communication cables after recharge work is finished, and recovery the power system parameters to the default values.
- Long press I/O button to turn off battery and stock battery after packing
- Refer to the manufacture date which mention in the battery front panel sticker for the first time recharge.

5.2 Power system parameter setting

The battery is connected to the power supply system without communication, ensure the battery terminal side power is in the OFF state, and then switch on AC power. Using the CSU in accordance with the Power System User's Manual, and the battery related parameter settings are shown in Table 5-3.

Table 5-3 Power system parameter setting values

Parameter types	Recommended value	Value range
Charge Voltage	52.5 V	52.5 V ~ 54 V
Float Charge Voltage	50.5 V	50.5V ~ 54V
LLVD1 Voltage	47 V	≥ 45 V
LLVD2 Voltage	46 V	≥ 44 V
Charge current limit	0.3 C	0 C ~ 1 C
Battery1 Capacity	N × battery capacity (N is the number of battery packs connected to 1# air switch)	
Battery2 Capacity	N × battery capacity (N is the number of battery packs connected to 2# air switch)	
Battery3 Capacity	N × battery capacity (N is the number of battery packs connected to 3# air switch)	
Battery4 Capacity	N × battery capacity (N is the number of battery packs connected to 4# air switch)	
Voltage Temperature Coefficient	Temperature compensation coefficient : 0	

5.3 Power on and activation

CF48100T LFP battery should be activated externally at first use after install with DC power supply system. The battery does not need to be activated by pressing the on/off button.

In order to reduce the power loss in the process of storage and transportation of CF48100T LFP battery system, turn off the battery.

The relevant information



Caution!

- Do not start the battery by long pressing the battery I/O button when the power supply device is not powered on for the first time(no AC input), to avoid short circuit of the battery.
- For the scenario where multiple batteries are connected in parallel, ensure that the voltage difference between each battery is less than 1.0V before it is connected to the system, so as to avoid the large current protection caused by battery bank internal charging between batteries.

Steps

- Normal activation
 1. Make sure the battery is installed correctly, AC power air switch is off , and all batteries are in the off state.
 2. Turn on the air switch of all batteries.

3. Switch on AC power for rectifier works normally, and all batteries are activated.
4. Insert other rectifier modules into the system after normal battery charging.
- Multiple batteries are connected in parallel
 1. Make sure that the batteries are installed correctly and all batteries' air switch are off.
 2. Long press the battery power button to start the battery and measure the battery voltage with a multimeter.
 3. Turn on AC air switch, rectifier and CSU work normally;
 4. Turn down the rectifier output voltage at the power end to make it close to the lowest open circuit voltage of the battery. When the pressure difference is within 1 V, turn on the air switch of the battery to charge this battery.
 5. Turn up the rectifier output voltage at the power end to make it close to the second lowest open circuit voltage of the battery, and the pressure difference is less than 1V, turn on the air switch of the battery to charge the battery
 6. Follow this method to turn on all batteries
 7. Turn up the charging voltage of the power supply to

52.5V. Results

When the battery is successfully activated, the running light (RUN) is always on or flashing, the alarm light (ALM) is off, and the power status indicator light (SOC) is off or flashing according to the capacity, which means that the battery is ready to use.

Related tasks

If the ALM is available after the battery is turned on, it means that the battery is in an alarm state. Please refer to the alarm message content or using the monitor software to read the alarm. At the same time, refer to the trouble shooting for processing. please contact the Coslight if problem cant be solved.

5.4 System shutdown

When the battery needs to be stored for a long time, the battery need to be turn off to reduce its power consumption.

Steps

1. Long press the I/O button for more than 3 s, the battery will shut down automatically



Description:

- When the system has no charge and discharge standing (standby) for more than 48 hours, it will automatically enter the shutdown state.
- Battery voltage below the under-voltage protection value, automatic shutdown.

2. For multiple batteries in parallel, it is necessary to disconnect each battery MCB first then press each battery switch button to shut it down.(If the MCB is not off , it will cause the off battery to be reactivated due to the failure of the other battery)

5.5 System maintenance

The maintenance of CF48100T LFP battery system includes:

- Check whether the use environment of LFP batteries meets the requirements. The recommended ambient temperature is 15 °C~30 °C. The installation position should be away from heat source.

- CF48100T LFP battery system is strictly prohibited connect batteries in series, the maximum support 16 batteries in parallel use.
- Check whether the battery is charged properly. it is necessary to recharge the battery if the blow happened :
 - Battery over discharge to protection.
 - Battery can't be charged fully frequently (Have not been fully charged in continuous 90 days).
 - The battery is out of use or stored for more than 3 months.
- Check whether the appearance, terminals, wires, indicator lights, etc. of the battery and the matching switching power supply are normal regularly
- Check cell voltage through monitor software and the battery voltage should be above 3.3V in the floating charging state. At least a semi-annual examination is recommended.

5.6 Charging

- The charging current of the power supply is suggested to set at voltage 52.5V and less than 0.5C charging , and the battery capacity is set according to the capacity of the connected battery pack. Start the battery charging as described in 5.3
- BMS will automatically disconnect the charging loop automatically after the battery is fully charged, but will not disconnect the discharge loop, ensuring the battery discharge function.
- When the battery charging current exceeds the charging over-current protection value, or there is charging low temperature or high temperature alarm, or the cell voltage is too low or too high, the battery will start current limiting charging automatically, which charging current is approximately 10 A. Charging curve of the battery at room temperature is shown in Figure 5-1.

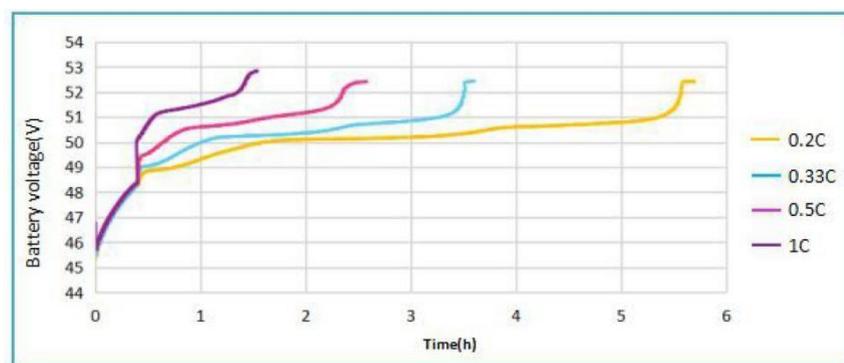


Figure 5-1 Charging curve

5.7 Discharge

Battery pack discharge current is not suggested to more than 1.0C. When multiple batteries are connected in parallel, discharge current is recommended not to exceed 0.8C of the total battery capacity. When the battery is discharged to a low capacity, an alarm will occur. When the battery continues to discharge to the low voltage protection value, the discharge will be cut off to protect the battery. When an external charge current is detected, the battery can be recovered.

The maximum discharge power of single CF48100T product is 4.5kW, and the maximum discharge power of multiple batteries in parallel is shown in Table 5-4 below:

Table 5-3 Power parameter setting values

Number of parallel batteries	2	3	4	5	6	.	16
Maximum discharge power (kW)	7.2	10.8	14.4	14.4	14.4	14.4	14.4

The discharge curve of the battery at normal temperature is shown in Fig. 5-2.

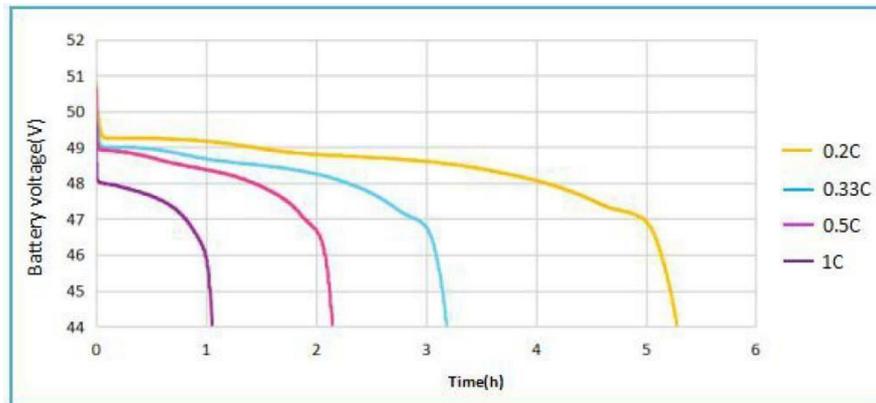


Fig. 5-2 Discharge curve

6. Troubleshooting

6.1 Product fault diagnosis

Common failures and solutions are shown in Table 6-1.

Table 6-1 Product fault table

Fault types	Fault phenomenon	Cause analysis,	Solution
Alarm	The ALM warning light is always on.	Indicates that the battery has major alarm or protection information. Check table 6-3 for details.	Analysis the problem according to alarm or protection name which can be get from monitor software, The problem will be solved after some charging and discharging cycles, please contact Coslight for support if the problem still cannot be solved
Temperature protection	ALM warning light is constantly on, no output from battery	Ambient temperature is too high or too low.	If the ambient temperature is too high, cooling is needed to ensure the ventilation and heat dissipation of the equipment on site. If the ambient temperature is too low, it is necessary to check the working condition of heating equipment
Communication failures	1. The monitor software cannot communicate with the battery 2. The software shows the communication failure. 3. Unable to read battery data.	The communication cable is abnormal. Computer USB port identification error or USB to 485 driver failed to install. Wrong address bit. There is an anomaly in BMS.	Check whether the communication connection line is normal. Change another communication cable to check. Check whether the serial port driver from USB to 485 is installed successfully. If there is still no communication after the completion of Item 1, 2, and 3, it may be that the BMS communication component inside the battery system is faulty. Please contact Coslight for support
No voltage output	The battery indicator is off. Battery output voltage is abnormal or virtual voltage.	The battery is not activated. The battery management system is abnormal.	Try to press the I/O button on the front panel for more than 3s. Make sure the battery is on. If there is still no voltage, please contact Coslight for help



Attention
!

Non-professional personnel shall not repair
without authorization!

6.2 Solution of special circumstances

Refer to the 6.2 for special cases

Special case	Fault phenomenon	Solution
Power failure	AC power failure is the most common situation in system operation.	<ul style="list-style-type: none"> • DC power supply is provided by CF48100T battery system when the power failure duration is short • Check the battery backup time if the power failure duration is too long • After the battery is under voltage protected, it is recommended to recharge the battery within 3 days.
Disaster accident	Catastrophic accidents include communication equipment failures caused by lightning strike, flooding, earthquake, fire and other disasters.	<ul style="list-style-type: none"> • Prevention is the priority. • The BTS station shall have the countermeasures and corresponding manpower and material resources to deal with these disasters. • BTS stations shall have emergency management regulations and emergency repair regulations for major accidents.

7. Working principle

This chapter covers the following content:

- BMS working principle 7-1
- LFP battery working principle 7-1

7.1 Working principle of battery management system(BMS)

Battery Management System (BMS) is the core component of battery protection and management.

The functions of the battery management system are:

- Ensure the safe and reliable of the battery.
- Enable full performance of the battery to extend the battery life.
- It acts as a bridge between the DC power supply and the battery.

Battery management system must meet the requirements of communication power supply system, so the safety management mode of battery management system is very important to the safety of batteries.

Battery management system mainly includes:

- Data acquisition unit
- Calculation and control unit
- Balanced unit
- Control executive unit
- Communications unit

7.2 Working principle of LFP battery

The basic principle of LFP battery is that in the process of charging and discharging, the corresponding lithium ions are embedded back and forth between the positive and negative electrodes to complete the power supply to the load.

LFP battery cell meets:

- The lithium iron phosphate material can ensure the high safety, high energy density and good cycle life of the lithium iron battery.
- Safety, high energy density and high cycle life.
- Non-toxic, pollution-free.
- In the case of overcharge, high temperature, short circuit or other unpredictable circumstances, it will not self-detonate or spontaneously combust.
- Compact appearance, light weight.
- Support high current discharge.
- Long service life.
- No memory effect.

8. Technical parameters

This chapter covers the following topics:

- ✓ Charging performance parameters 8-1
- ✓ Discharge performance parameter 8-1
- ✓ Working environment parameters 8-1
- ✓ Protection function and parameters 8-2

8.1 Charging performance parameters

Charging performance parameters of CF48100T are shown in Table 8-1.

Table 8-1 Charging Performance Parameter Description Table

Parameter	Value range	Recommended value
Charging voltage	52.5V ~ 55.0V	52.5 V
Charging current	0.2C-0.5C	0.5C

8.2 Discharge performance parameters

Refer to Table 8-2 for discharge performance parameters of CF48100T.

Table 8-2 Discharge Performance Parameter Description Table

Parameter	Value range
Discharge voltage	42.0V ~ 52.5V
Discharge current	0 A ~ 100.0 A

8.3 Working environment parameters

The working environment parameters of CF48100T are shown in Table 8-3.

Table 8-3 Description table of working environment parameters

Parameter	Value range	Note
Recommended Operating Temperature	15 °C~ 35 °C	-
Charging temperature	0 °Cto 50 °C	Cell surface temperature
Discharge temperature	- 20 °C~ 55 °C	Cell surface temperature
Storage temperature	- 20 °C~ 60 °C	-
Transportation temperature	To 40 °C~ 60 °C	-

Relative humidity	5% ~ 95%	No condensation, the battery system can work normally.
Altitude	4000 m	No more than 4000 m.
Atmospheric pressure range	70 kPa ~ 106 kPa	-
Site environment	-	Keep away from heat, no corrosive gas, no explosive gas, no destructive gas, no destructive conductive dust.

8.4 Protection functions and parameters

Charging performance parameters of CF48100T are shown in Table 8-4.

Table 8-4 Alarm and protection function parameters table

(Can be modified according to customer requirements)

S/N	Item	Sub-item	Default value	Set range
1	Automatic start up	activation voltage	48 V	Set by hardware
2	Automatic shutdown	Static shutdown time	12 h	0 h ~ 96 h
3	Battery module over-voltage	Alarm value	54.6 V	40 V ~ 60 V
		Alarm recovery value	54 V	40 V ~ 60 V
		Protection value	55 V	40 V ~ 60 V
		Recovery value	50.25 V	40 V ~ 60 V
4	Cell over-voltage	Alarm value	3.75 V	2V to 4V
		Alarm recovery value	3.6 V	2V to 4V
		Protection value	3.85 V	2V to 4V
		Recovery value	3.6 V	2V to 4V
5	Battery module under-voltage	Alarm value	46.5 V	40 V~60 V
		Alarm recovery value	48 V	40 V~60 V
		Protection value	45V	40 V~60 V
		Recovery value	48 V	40 V~60 V
6	Cell under-voltage	Alarm value	3.0 V	2 V to 4V
		Alarm recovery value	3.2 V	2 V to 4V
		Protection value	2.9 V	2 V to 4 V
		Recovery value	3.2 V	2V to 4 V
7	Charging over temperature	Alarm value	50 °C	25 °C ~ 65 °C
		Alarm recovery value	47 °C	25 °C ~ 65 °C
		Protection value	60 °C	25 °C ~ 65 °C
		Recovery value	57 °C	25 °C ~ 65 °C
8	Discharge over temperature	Alarm value	60 °C	25 °C ~ 65 °C
		Alarm recovery value	57 °C	25 °C ~ 65 °C
		Protection value	65 °C	25 °C ~ 65 °C
		Recovery value	62 °C	25 °C ~ 65 °C

9	Charging under temperature	Alarm value	5 °C	- 20 °C to 25 °C
		Alarm recovery value	8 °C	- 20 °C to 25 °C
		Protection value	0 °C	- 20 °C to 25 °C
		Recovery value	3 °C	- 20 °C to 25 °C
10	Discharge under temperature	Alarm value	-15 °C	- 20 °C to 25 °C
		Alarm recovery value	- 12 °C	- 20 °C to 25 °C
		Protection value	- 20 °C	- 20 °C to 25 °C
		Recovery value	- 17 °C	- 20 °C to 25 °C
11	Environment temperature	High ambient temperature alarm value	60 °C	25 °C ~ 65 °C
		High ambient temperature alarm recovery value	55 °C	25 °C ~ 65 °C
		Low ambient temperature alarm value	0 °C	- 20 °C to 25 °C
		Low ambient temperature alarm recovery value	5 °C	- 20 °C to 25 °C
12	BMS high temperature protection	Protection value	110 °C	25 °C ~ 120 °C
		Recovery value	80 °C	25 °C ~ 120 °C
13	Charge over-current protection	Alarm value	105 A	0.2 C ~ 2 C
		Alarm recovery value	100 A	0.2 C ~ 2 C
		Protection value	110 A	0.2 C ~ 2 C
		Recovery value	Automatic recovery	
14	Discharge Over-current protection	Alarm value	105 A	0.2 C ~ 2 C
		Alarm recovery value	100 A	0.2 C ~ 2 C
		Protection value	110 A	0.2 C ~ 2 C
		Recovery value	Charge recovery	
15	Short circuit protection	Protection value	250 A	Set by hardware
16	Low battery capacity	Alarm value	5%	0% ~ 60%
		Alarm recovery value	7%	0% ~ 60%
		Protection value (enable off by default)	0%	0% ~ 60%
		Recovery value	When there is charging current	/
17	Voltage difference	Alarm value	0.4 V	0.05V ~ 1.5V

		Alarm recovery value	0.3 V	0.05V ~ 1.5V
		Protection value	0.5 V	0.05V ~ 1.5V
		Recovery value	0.3 V	0.05V ~ 1.5V
18	Battery SOH is abnormal	Alarm value	50%	0% ~ 70%
		Alarm recovery value	60%	0% ~ 70%
		Protection value	30%	0% ~ 70%
19	Damage of cells	Protection value	1.5 V	1 V ~ 2.5V
		Recovery value	2 V	1 V ~ 2.5V



Note:

With the product upgrading and optimization, the above individual parameters may be slightly adjusted, please subject to of the actual products

Abbreviations

ALM - Alarm

BMS - Business Management System

CSU - Centralized Supervision Unit LED -
Light Emitting Diode