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# Lithium Battery System Product Manual

## (V 1.1)



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# Introduction

Thank you for choosing ABC Energy Storage System.

The energy storage module comprises of lithium-ion rechargeable batteries with 5.12 kWh capacity, and the controller enables a central of multiple modules. This manual provides information regarding safety precautions to prevent possible accidents and how to use the product. Please read this manual carefully before use for safety and keep this manual handy for reference.

## Main Features

Some main features of the products are as:

### Long Life Span

The battery can be expected to remain serviceable for more than 5 years, considering that it is charged and discharged once in a day at room temperature (25 °C).

### Cell

Olivine-type lithium iron phosphate batteries with excellent thermal stability and storage characteristics are used in this product. The module also incorporates a self-monitoring function for the detection of any abnormalities in energy storage.

### Compact Design

The height is nicely designed in 2U, in favor of standard residential and industrial applications.

### High Scalability


Multiple energy storage modules can be connected in parallel, and the capacity can be customized according to the intended use.


## Safety Precautions


Energiecel Energy products are designed with full consideration of safety. However, all electrical appliances can be dangerous if used inappropriately; it can cause a fire or electric shock that leads to severe injury or death. For your protection, please read these safety precautions thoroughly.

### Definitions of Symbols

Below are symbols used in this manual and the unit. Please read through the following definitions before reading the manual.

	<p><b>Warning</b></p>	<p>If you ignore these instructions, it can lead to a fire or electric shock causing serious injury or death.</p>
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	<p><b>Caution</b></p>	<p>If you ignore these instructions, it can lead to electric shock or other accidents causing injury or harm to nearby products.</p>
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	<p><b>Warning</b></p> <p>If you do not follow the instructions below, it can lead to a fire or electric shock causing serious injury or death</p>
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**Instruction**

Use designated cable. A non-designated cable use can cause electric shock. Be sure to use the cable designated in this manual.

**Prohibited**

Do not damage cables. If you damage a cable, it can cause a fire or electric shock.

1. Do not work over or damage a cable.
2. Do not place heavy objects on a cable or pull the cable.
3. Do not place a heater near the cable, which may result in the cable overheating.
4. Do not tuck down a cable when installing in a rack.
5. When you unplug a communication cable, be sure to hold the plug and pull it.

**Instruction**

Connect a power cable and communication cable properly.

1. If you connect a power cable improperly, contact resistance will increase and it may damage the parts or cause a fire.
2. Insert the connector of the communication cable all the way in. If it is connected improperly, the system may be deactivated.

**Prohibited**

Do not install in a closed area. If the module/controller is installed in a closed area with no air-conditioning, heat may build up inside the set and cause a fire.

**Prohibited**

Do not place the set in direct sunlight or near a heater. Doing so can cause deformation, a breakdown, or a fire. Pay extra attention when you place the set near windows.

**Prohibited**

Do not install the set where excessive oil smoke, steam, moisture or dust is contained in the air. If the set is installed in such a place, it may cause a fire or electric shock.

**Instruction**

1. Wear insulating gloves and protection glasses during installation and connection .

2. Wear insulating gloves and protection glasses during installation and connection of the set to prevent electric shock or other injuries.

**No Wet**

1. Do not allow water and/or foreign objects inside the module.
2. Water or foreign objects inside the module can cause a fire or electric shock.
3. Should this occur, however, turn off the "POWER ON/OFF" switch on the controller to shut down, and remove the power connector from the POWER CONNECTOR terminal of the module.

**Do not disassemble**

Do not open the set unnecessarily. Opening and modifying the set can cause a fire or electric shock.



**Caution**

If you ignore any of the following instructions, it can cause injury or damage to nearby products

**Prohibited**

Do not cover the vent. If the vent is covered, heat may build up inside the set and cause a fire.

1. Do not put the set in a poorly ventilated and narrow space.
2. Remove any dust buildup in the vent.
3. Do not place the set upside down or sideways.
4. Do not place on a shag carpet or bed.
5. Do not cover the vent with a cloth, etc.

**Instruction**

Install in a stable place.

1. If you install the set in an unstable place, such as an unstable rack, it may fall and cause injury.
2. Do not install upside down or sideways. The set may drop and cause injury.

**Instruction**

Use the designated packaging materials for transportation. If you do not use the designated packaging materials, the packaging material may be damaged by vibration during transportation and it may cause injury.

**Instruction**

Install based on the designated way of installation. If you do not follow the designated way of installation, the set may drop due to the strength poverty and can cause injury.

**Instruction**

Fix a rack to the floor. If a rack falls by the weight of the set, it may cause serious injury or death.

**No Wet**

Do not touch with wet hands If you touch the set with wet hands, it may cause electric shock.

**Instruction**

Install other equipment or accessories properly. If you inadequately install other equipment or accessories sold separately, they may fall and cause injury. When you install any of the following accessories, install it properly based on this manual.

**Instruction**

Set up cables properly If your foot is caught by a cable, the set may fall and cause injury. Connect and install cables carefully.

**Instruction**

Power off at a malfunction In case any malfunction happens, please turn off the POWER ON/OFF switch in order to shut down, and remove the power connector from the POWER CONNECTOR terminal of the module.

**Prohibited**

Do not put anything, stand or sit on the set If you put anything on the set, it may fall and cause injury. Also, if it is used as a stool, for example, it may topple and cause injury.

**Instruction**

Follow related laws or ordinances for disposal. When you dispose of this product, do not dispose as general or household waste.

**Instruction**

Disposal with specified method Contact technical vendor when you discard. Do not disassemble, destroy, or disposal in the fire.



**Danger**

If liquid is leaking from the module, observe the following measures.

Do not allow the liquid to come in contact with skin or clothing.

If the liquid comes in contact with skin or clothing, wash thoroughly with plenty of water.

If the liquid gets into the eyes or mouth, flush immediately with clean water, and immediately seek medical treatment.

Contact customer service.

## Precautions of Use

In the case of a failure, or any of the abnormalities shown below, turn off the set and contact customer services.

1. Abnormal sound, smell or smoke.
2. Water or particles inside the product.
3. The product is dropped, or the cabinet is damaged.

Charge and discharge the product according to the control signals of the controller. Do not hammer a nail or punch a hole in the product.

Replace the module with a new one if discharge time at room temperature is noticeably short, even from fully charged.

### **Do Not:**

Disassemble.

Modify the product (Modification may destroy the protection function inside, or cause abnormal charge/ discharge, heat generation, gas eruption, or fire.).

Touch the rear output terminal except for installation.

Throw the product into fire or heat, or otherwise expose the set to heat or naked flame.

Submerge the product in liquid or allow it to become wet. n Apply strong shock, crush, or drop.

Use for medical purposes.

Place any foreign objects inside.

Connect any devices that exceed the operating voltage and current range.

Do not unplug the power connector from the POWER CONNECTOR terminal while power is turned on.

## Specifications and Functions

### **System Introduction**

This Energy Storage System is consisted of 2 sets of battery modules (A&B). In each module, there are 8pcs of 100 Ah LFP cell. The overall system also provides standard communication port, i.e. CAN / RS485 to monitor the working status and communicate with upper machine as well as the PowerConversion System (PCS) in front. The system schematic drawing is presented in Figure 1.

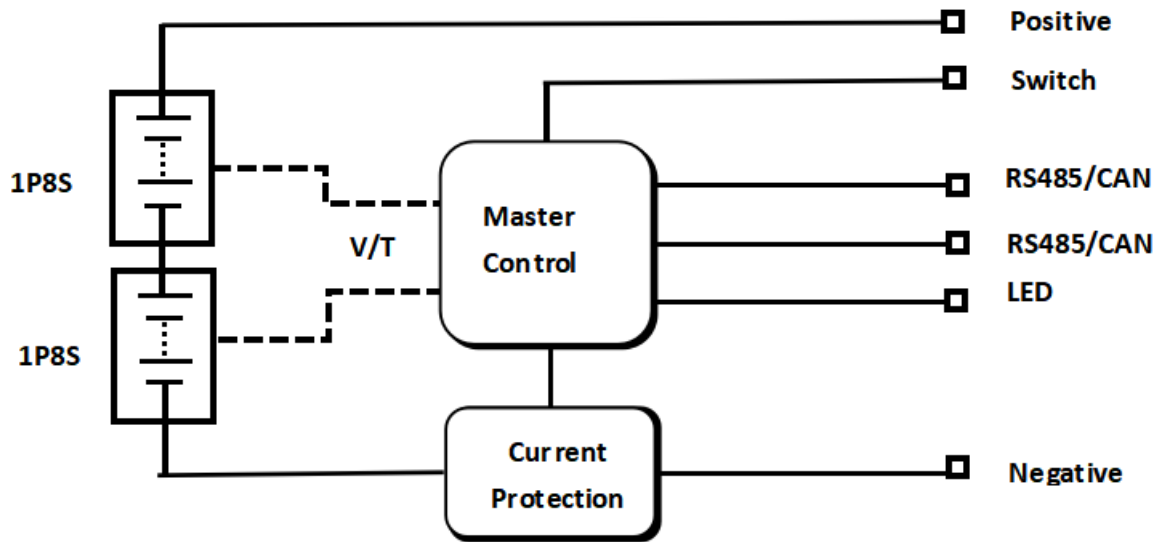


Figure 1- System Schematics

## Dimensions

Energiecel dimensions are presented in Figure 2. It is well designed for 19 inch cabinet, wall mount or vertical mounts where needed.

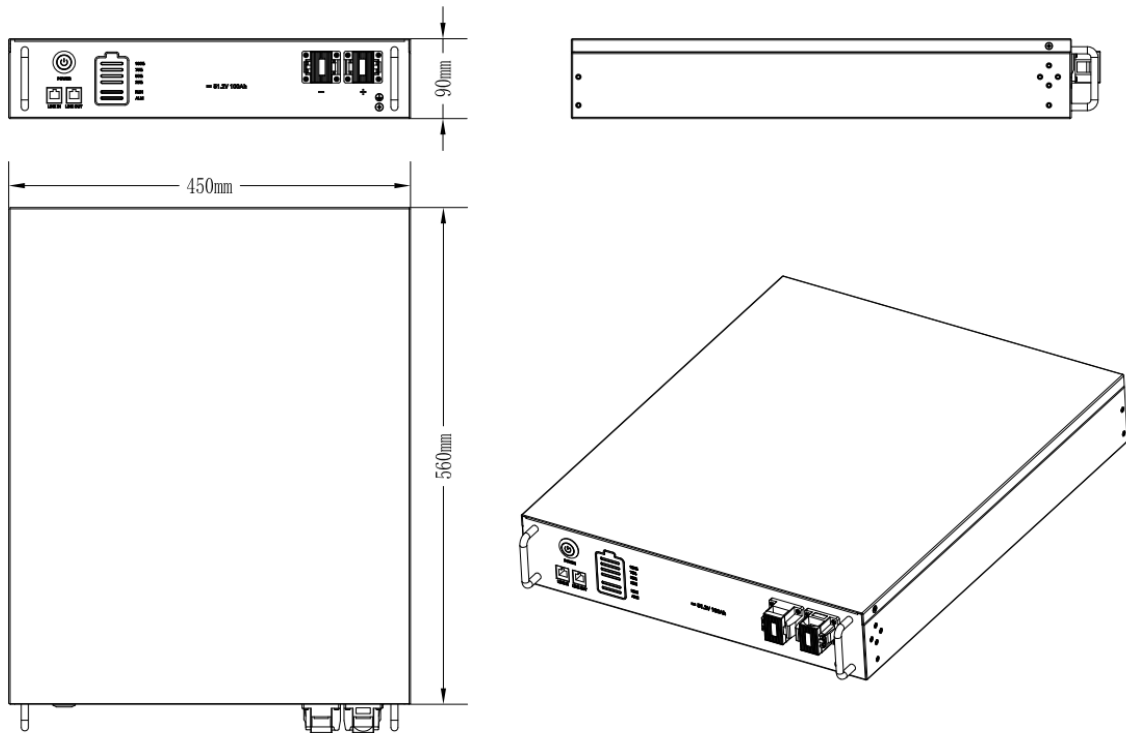


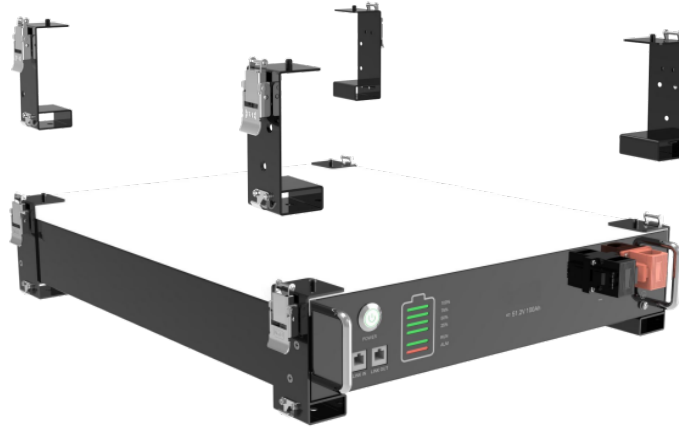
Figure 2- Energiecel Dimension



## Installation Accessories

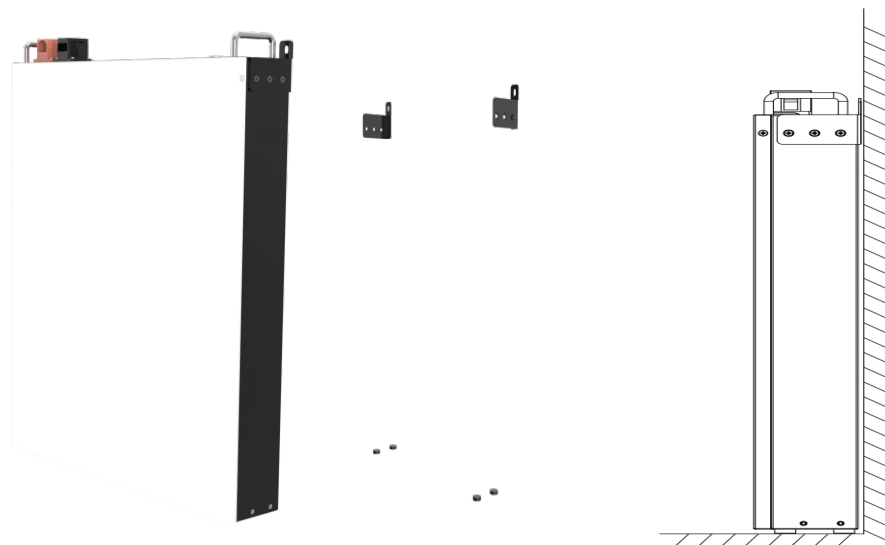
### A. Horizontal Installation

Accessories	Qty
Pack Holder	4
Screw	10



### B. Floor-mounting Installation

Accessories	Qty
Mounting bracket	2
Expansion screw	2
Screw	6
Silicon mat	2



**C. Wall-mounting Installation**

Accessories	Qty
Wall mount support bracket	2
Wall mount back steel base	1
Screw	10
Expansion screw	2



**D. Cable**

Accessories	Qty
1.5 meter of CAT6E LAN cable	1



## Installing Instructions

Some instructions for installing the equipment must be followed. (Refer to our Engineer)  
 Power Lite requires adequate clearance for installation, cabling and airflow. Do not place any other objects within the clearance space, except those explicitly required by the installation (e.g. conduit, a junction box, or an electrical disconnect depending on local installation codes).  
 Do not install anything above Power Lite that limits access to the unit or that might fall and damage the unit. Do not mount Power Lite upside down.

## Specifications

Model Name/ Number	Energiecel
Item	Specifications
Cell Type	LiFePo4 (LFP)
Rated Voltage (V)	51.2
Rated Capacity (Ah)	100
Rated Energy (kWh)	5.12
Packing	1P16S
Working Voltage Range (V)	44.8~57.6
Standard Charging Current (A)	50
Standard Discharging Current (A)	100
Standard Charging Method	0.5C CC to 57.6V; CV at 57.6V till current is 0.05C
Working Temperature (°C)	Charging: 0 ~ 50; Discharging: -20 ~ 55
Working ROH	20% ~ 80%
Storage Temperature (°C)	-20~50
Self- Discharging Rate	≤3% (25 °C, 50% SoC)
SoC @ end of Product line	70%
Insulation Resistance (MΩ)	>100
Inner Resistance of single Cell (mΩ)	0.34±0.05 , (fresh cell 30 ~ 40% SoC)
Weight (kg)	Approx. 42
Dimensions	560*450*89 , (not include connector, MSD and other parts)

## Definition of Voltage Sampling Connector

Pin	Wire No.	Signal	Wire Size ( mm <sup>2</sup> )	Remarks
1	B0	Signal	0.3	Cell# 1-
2	B2+	Signal	0.3	Cell# 2+
3	B4+	Signal	0.3	Cell# 4+
4	B6+	Signal	0.3	Cell# 6+
5	B8+	Signal	0.3	Cell# 8+
6	B10+	Signal	0.3	Cell# 10+
7	B12+	Signal	0.3	Cell# 12+
8	B14+	Signal	0.3	Cell# 14+
9	B16+	Signal	0.3	Cell# 16+
10	NC	NC	NC	NC
11	B1+	Signal	0.3	Cell# 1+
12	B3+	Signal	0.3	Cell# 3+
13	B5+	Signal	0.3	Cell# 5+
14	B7+	Signal	0.3	Cell# 7+
15	B9+	Signal	0.3	Cell# 9+
16	B11+	Signal	0.3	Cell# 11+
17	B13+	Signal	0.3	Cell# 13+
18	B15+	Signal	0.3	Cell# 15+

## Definition of Temp. Sampling Connector

Pin	Wire No.	Signal	Wire Size ( mm <sup>2</sup> )	Remarks
1	T1+	Signal	0.3	Temp. # 1+
2	T2+	Signal	0.3	Temp. # 2+
3	T3+	Signal	0.3	Temp. # 3+
4	T4+	Signal	0.3	Temp. # 4+
5	T1-	Signal	0.3	Temp. # 1-
6	T2-	Signal	0.3	Temp. # 2-
7	T3-	Signal	0.3	Temp. # 3-
8	T4-	Signal	0.3	Temp. # 4-

## Front View



Figure 3- Front View

Item	Name	Model	Remarks
①	Power button	22M-EDYZ-G	Turn power ON and OFF
②	RS485/CAN	Communication port	RS485/CAN Internal connection
③	RS485/CAN	Communication port	RS485/CAN Internal connection
④	LED indicator	LED Lights Indicator	Battery Status and Alarm
⑤	Port Negative	ACTB079-N15SLKY-M6	Black
⑥	Port Positive	ACTB079-N15SRKY-M6	Orange
⑦	GND	PM4	Yellow-Green, 10AWG

## Ports CAN/RS485

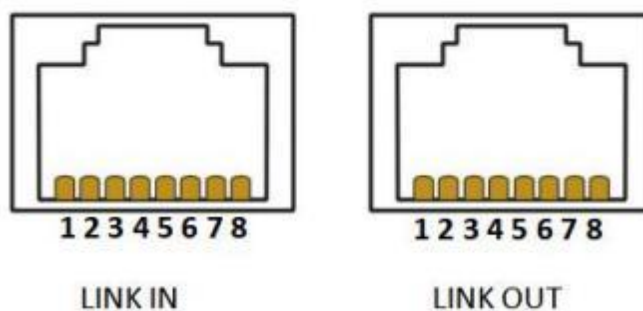



Figure 4- CAN/ RS485 connections


Port	Pin(s)							
	1	2	3	4	5	6	7	8
LINK IN	RS485- B	RS485-A	NC	CAN- H	CAN- L	GND	RS485-A	RS485- B
LINKOUT	RS485- B	RS485-A	NC	CAN- H	CAN- L	GND	RS485-A	RS485- B

# Installation

## DC Cable Requirements

	<p><b>Caution</b></p> <p>DC Cable must be a multicore wire.</p>
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Material	Specifications	Outer Dimmer	Max. Voltage	Rated Current
Silicone wire	6 AWG	8.5mm	1000V	120A

	<p><b>Danger</b></p> <p>Turn off system before doing electrical connection . Ensure all the cables are in electrical safe condition.</p>
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## LAN Cable



CAT6E LAN Cable

	<p><b>Caution</b></p> <p>Please use the specified CAT6E LAN cable and refer to the pin definition to connect to inverter.</p>
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## Single Unit

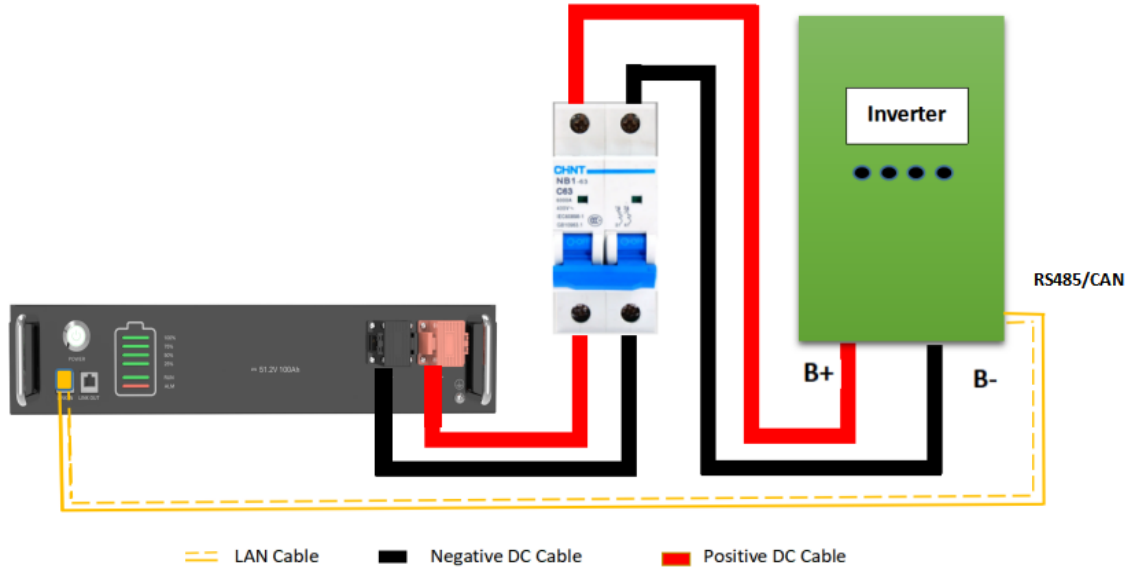


Figure 5- Single Unit connection of Energiecel

## Multi -Units in Parallel (4 sets as an example)

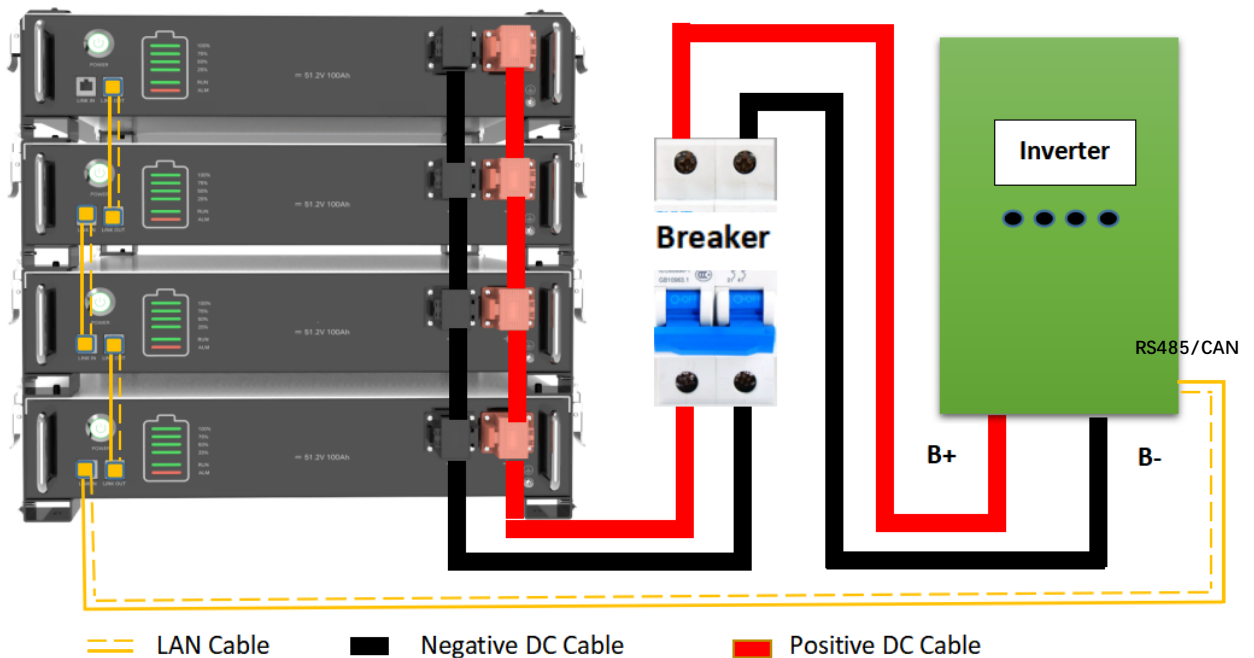


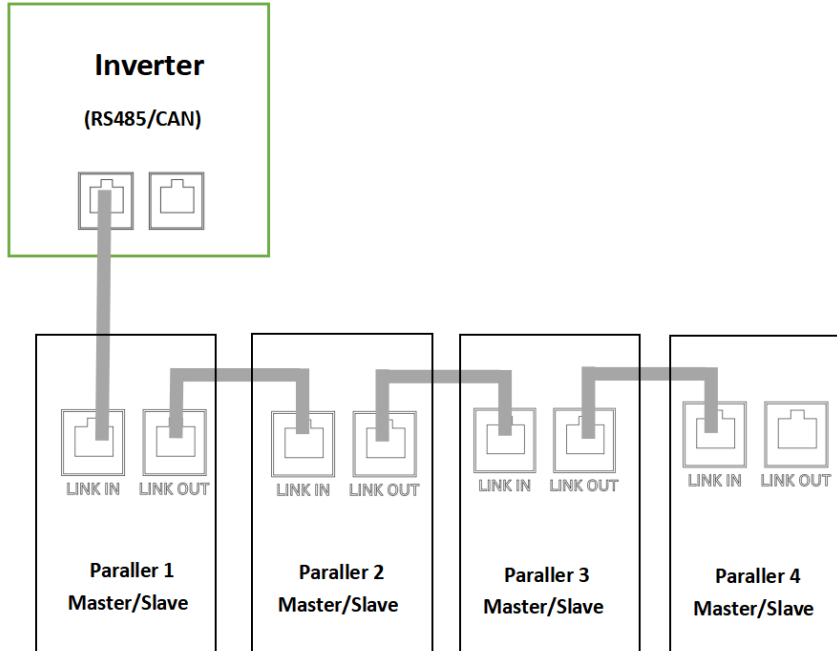
Figure 6 - Multi- Units Connection of Energiecel

Master Pack and Slave Pack Energiecel can be used as single unit as well as multi-units (in parallel) mode. The customer must inform supplier if multi-units mode is required. The Master Pack can be used individually, but Slave Pack cannot be used individually.

## Method to set up Master Pack and Slave Pack

Automatic assign host / ID

Master/Slave machine dial code diagram



## Power ON and OFF

### System Power ON

Installation (including DC cable, communication wire connection ) is properly down.  
 Press Power Switch button, green LED should be twinkling and then turn into function mode.  
 (system status can be red from LED signal, as shown below)

### System Power OFF

*Attention: It must be confirmed that the system is off before taking off DC cables.*  
 Press power switch button, Green LED should be twinkling and then turn into stop mode.



## Sleep and Wake-up Function

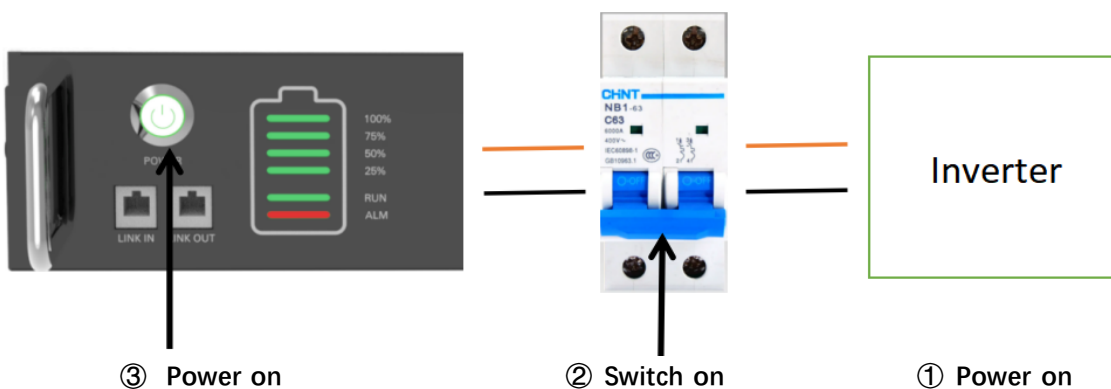
Number	Sleep Condition	Wake-up Condition	Mark
1	Total Voltage lower than 40V for more than 2 minutes	Charging or Restart	Power switch on
2	Monomer lower than 2.5V for more than 2 minutes	Charging or Restart	Power switch on

## Power On Setup

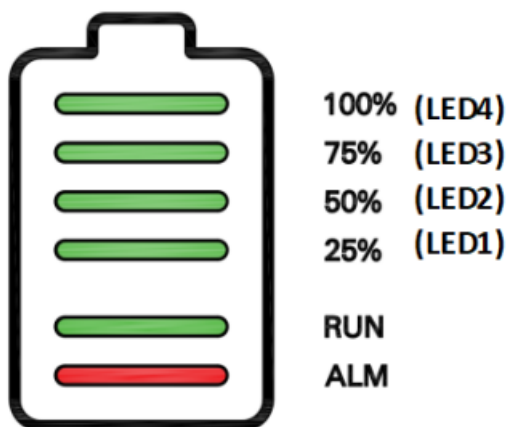
Short press the power button to power on the battery system.







### ATTENTION

If there is a DC breaker between battery and inverter. Before you power on battery system, please switch on the breaker first, to prevent BMS protection triggered.



## System Status Instructions






Status	Normal/ Warning/ Protection	RUN	A alarm	LED Indicator				Remarks
								
Power off	Hibernate	Off	Off	Off	Off	Off	Off	
Standby	Normal	Twinkle 1	Off	Battery percentage				Standby
	Warning	Twinkle 1	Twinkle 3					
Charging	Normal	Continuous	Off	Battery percentage				
	Warning	Continuous	Twinkle 3					
	Overcharging	Off	Continuous	Off	Off	Off	Off	Stop Charging
Discharging	Normal	Twinkle 3	Off	Battery percentage				
	Warning	Twinkle 3	Twinkle 3					
	Over- discharging	Off	Continuous	Off	Off	Off	Off	Stop Discharging
	Over- current, Shortcut	Off	Continuous	Off	Off	Off	Off	Stop Discharging
Temperature	Protection	Off	Continuous	Off	Off	Off	Off	Stop Charging & Discharging
Malfunction	Battery Failure, Voltage. Sampling Failure, Current Sampling Failure, MOS Damage	Off	Continuous	Off	Off	Off	Off	Stop Charging & Discharging

## LED Twinkle Status

Status	ON	OFF
Twinkle 1	0.25s	3.75s
Twinkle 2	0.5s	0.5s
Twinkle 3	0.5s	1.5s

## Battery Percentage Indicator

Battery	LED1	LED2	LED3	LED4
				
0-25%	ON	OFF	OFF	OFF
25%-50%	ON	ON	OFF	OFF
50%-75%	ON	ON	ON	OFF
75%-100%	ON	ON	ON	ON

# Transportation and Storage

## Transpiration

It is forbidden to encounter serious vibration and shock during transportation.

## Storage

If the system is not placed to use, the system must be properly stored. Otherwise, if any issues, Energiecel shall not be liable.

It should be stored in 50% SoC status.

It should be stored at ventilation environment, Temp. < 35 °C, ROH <65%.

It should be stored avoiding humid condition.

It should be stored in place where they can be monitored by professionals.