



VT5000ES48Lithium Battery Product Manual

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1. Introduction

Thank you for choosing ViTech Power 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.

1.1. Main Features

Some main features of this product are:

■ Long Life Span

The battery can be expected to remain serviceable for more than 10 years, considering that it is charged and discharged once in a day at room temperature (25 °C).

■ Long Life Span

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 3U, in favor of standard industrial applications.

■ High Scalability

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



1.2. Safety Precautions

ViTech Power 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.

	Warning	If you ignore these instructions, it can lead to a fire or electric shock causing serious injury or death.
	Caution	If you ignore these instructions, it can lead to electric shock or other accidents causing injury or harm to nearby products.



Warning

If you do not follow the instructions below, it can lead to a fire or electric shock causing serious injury or death.

■ 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.

1.3. Precautions for Use

- In the case of a failure, or any of the abnormalities shown below, turn off the set and contact ViTech Power 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.
- 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.

2. Specification and Functions

2.1. System Introduction

VT5000ES48 Energy Storage System is consisted of 2 sets of 1P8S lithium cell modules. In each 1P8S lithium cell module, there are 8 pcs of 100 Ah LFP cell. The overall system also provides standard communication port, i.e. CAN and RS485, to monitor the working status and communicate with upper machine as well as the Power Conversion System (PCS) in front. The system schematic drawing is presented in Figure 1.

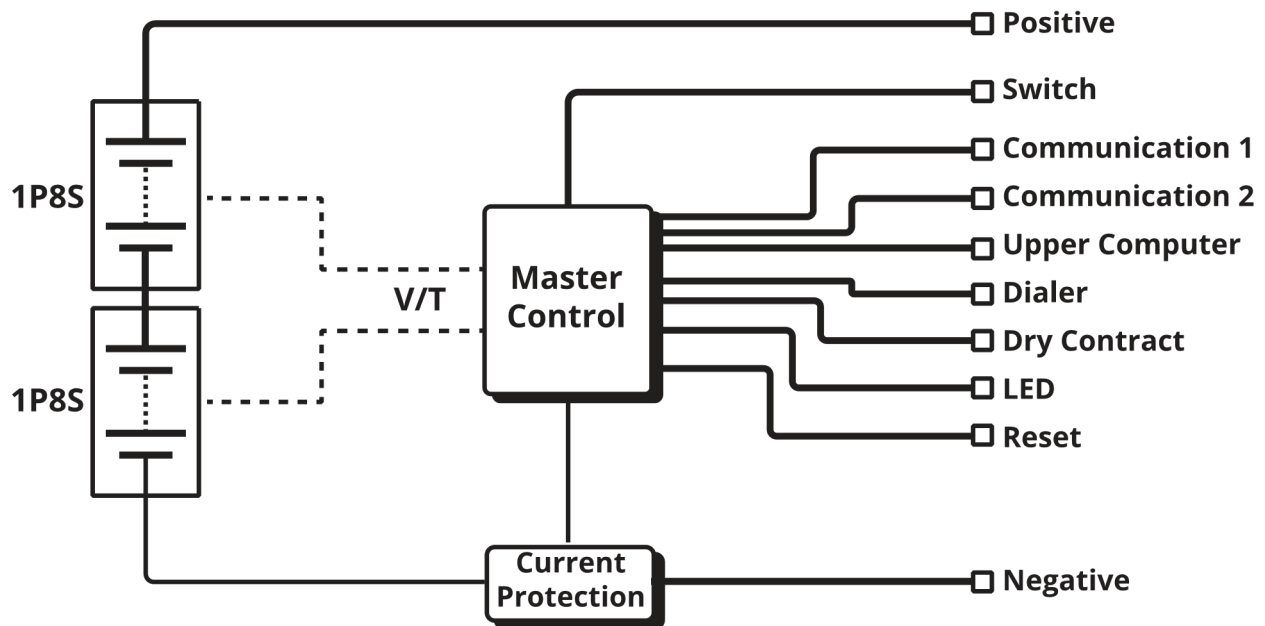


Figure 1 - System schematics

2.2. Dimensions

VT5000ES48 dimensions are presented in Figure 2. It is well designed for 19 inch cabinet.

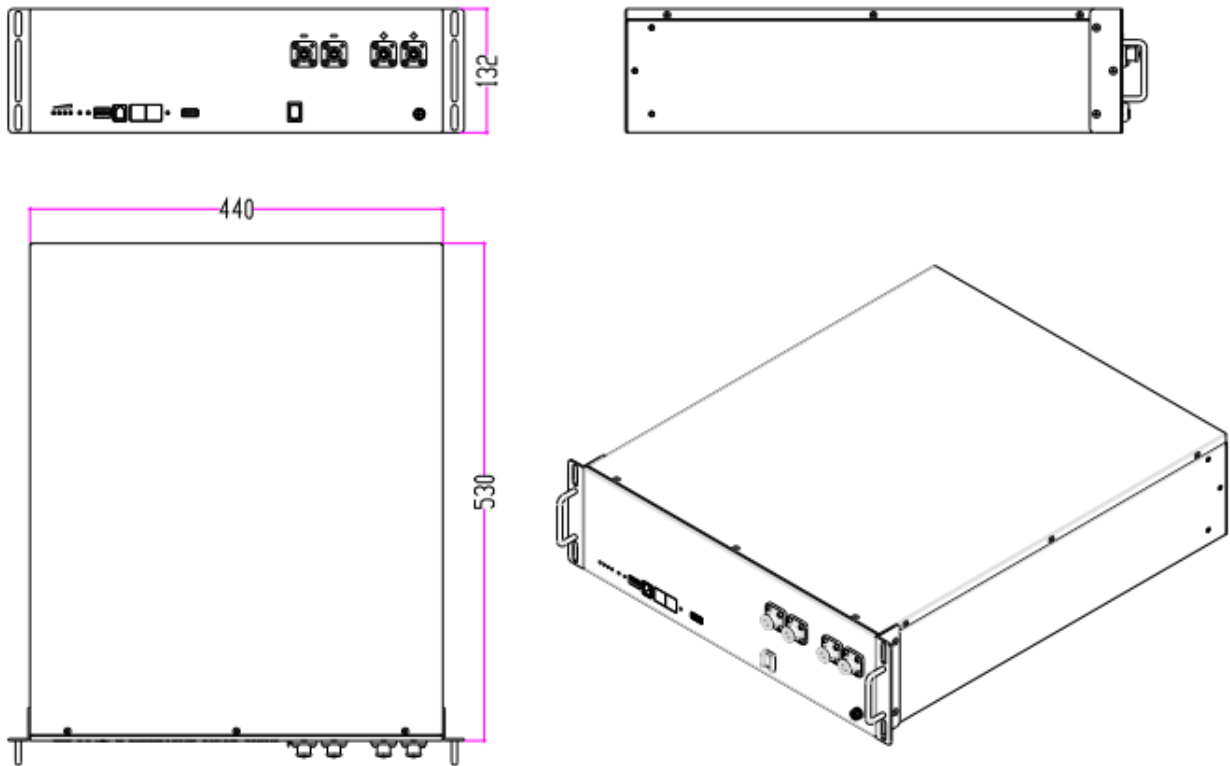


Figure 2 - VT5000ES48 Dimension

2.3. Specifications

Specifications of VT5000ES48	
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
Max. Continuous Charging Current (A)	50
Standard Discharging Current (A)	50
Standard Charging Method	0.5C CC to 57.6V; CV at 57.6V till current is 0.05C
Working Temp. (°C)	Charging: 0 ~50; Discharging: -20~55
Working ROH	20%~80%
Storage Temp. (°C)	-20~50

Self-discharging rate	≤5% (25 °C, 50% SoC)
SoC @ end of product line	40%
Insulation Resistance (MΩ)	>100
Voltage Difference in each module (mV)	≤20
Inner Resistance of single Cell (mΩ)	0.34±0.05 (fresh cell 30~40% SoC)
Weight (kg)	Approx. 48
Dimension (mm)	440*530*132 (not include connector, MSD and other parts)

2.4. Installing Instructions

Some instructions for installing the equipment must be followed. (Refer to our Engineer)

2.4.1. Definition of Voltage Sampling Connector

PIN	Wire No.	Signal	Wire size (mm ²)	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+

2.4.2. Definition of Temp. Sampling Connector

PIN	Wire No.	Signal	Wire size (mm ²)	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-

2.4.3. Front View

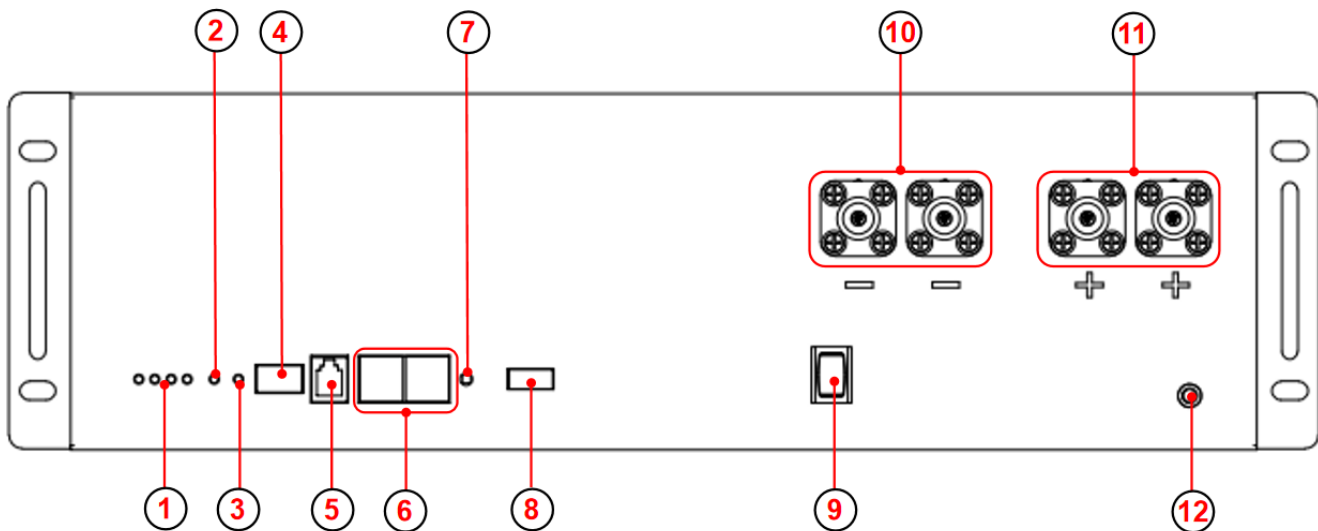


Figure 3 - Front View of VT5000ES48

Item	Name	Model	Remarks
1	SOC LED x4		
2	Alarm LED		
3	RUN LED		
4	Dialer		
5	Communication port	RJ11	RS232 To upper machine
6	Communication port *2	RJ45	CAN To PCS RS485 Internal Connection
7	Reset		Waken system from malfunction status
8	Dry Contact		
9	Power On/Off Switch		
10	Port Negative x2	PSR6XAB	Black 5.7, 25 mm ²
11	Port Positive x2	PSR6XBB	Orange 5.7, 25mm ²
12	GND	M6	Yellow-Green, 10 AWG

2.4.4 Port RS485 and RS232

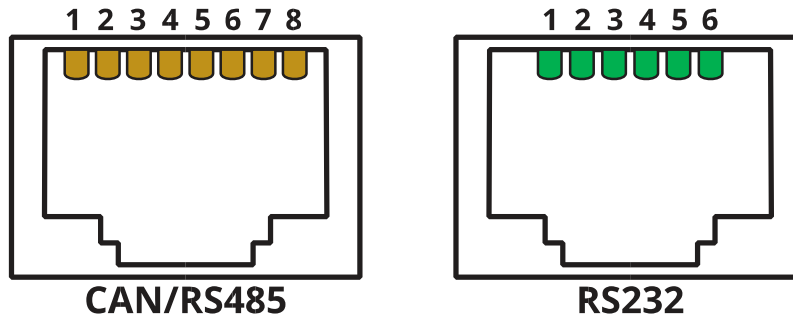


Figure 4 - CAN/RS485 and RS232 connections

	Description
CAN	Pin 1: CAN-H Pin 5: CAN-L Pin 2, 3, 4, 6, 7: NC Pin 8: GND
RS485	Pin 1, 4, 5: NC Pin 2, 7: RS485-A Pin 3, 6: RS485-B Pin 8: GND
RS232	Pin 1, 2, 6: NC Pin 3: BMS transmit; Computer receiver Pin 4: BMS receiver; Computer transmit Pin 5: GND

3. Installation

3.1. DC Cable Requirements

Size	Outer Diameter	Max. Voltage	Max. Current
21-33 mm ²	10-12 mm	1000 V	120 A



Caution

DC cable must be a multicore wire.

3.2. DC Cable



Danger

- Turn off system before doing electrical connection
- Ensure all the cables are in electrical safe condition

3.2.1 Material List



Plug



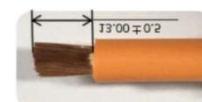
Isolation Cap



Tail-hood

3.2.2 Steps

1. Put wire through isolation cap and Tail-Hood.
2. Swipe outer isolation layer of DC cable.



- The red is used for the positive, and the black is for negative
The end of the cable is bunched at the terminal using a wire clamp.



- Tighten the isolation cap and plug contact.



- Put the positive and negative plug on to the system and tighten it.
- Use isolation cap for unused DC plug.

3.3. DC Cable Connection

3.3.1 Single Unit

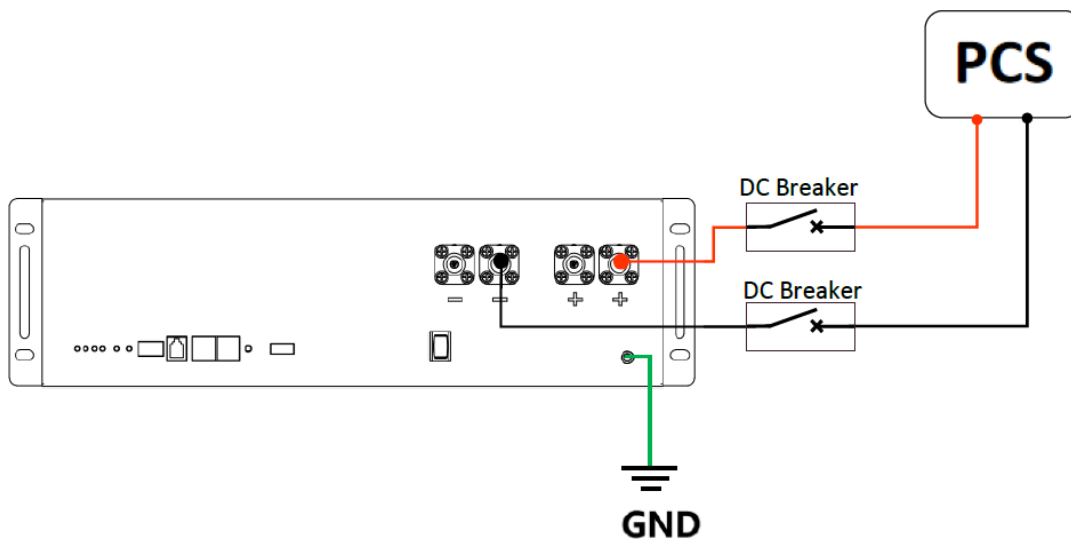


Figure 5 - Single Unit Connection

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

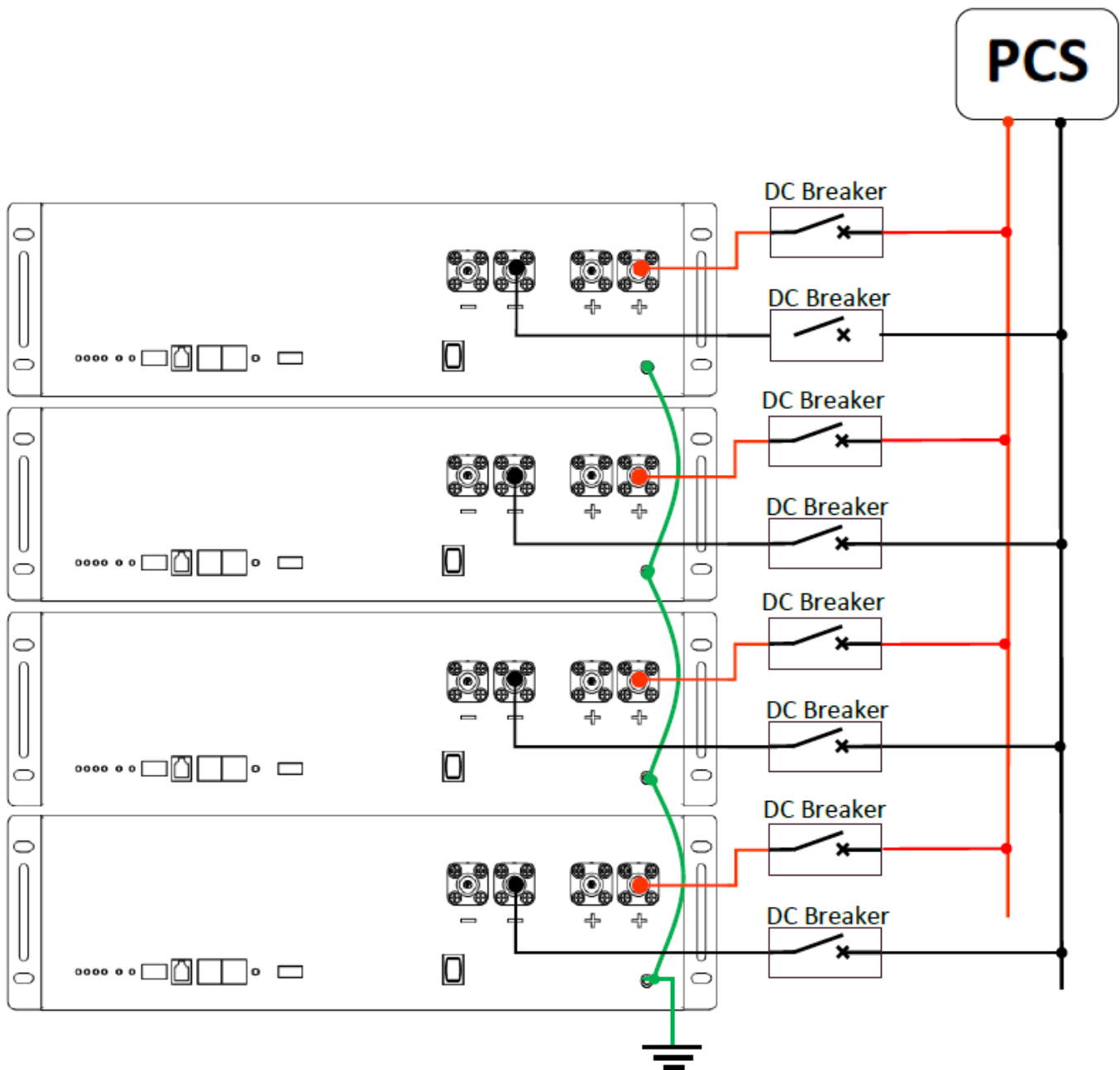


Figure 6 - Multi-Units Connection

Master Pack and Slave Pack VT5000ES48 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.

3.3.3. Method to set up Master Pack and Slave Pack

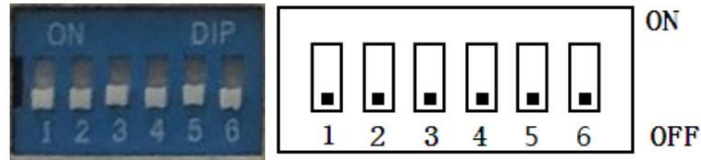
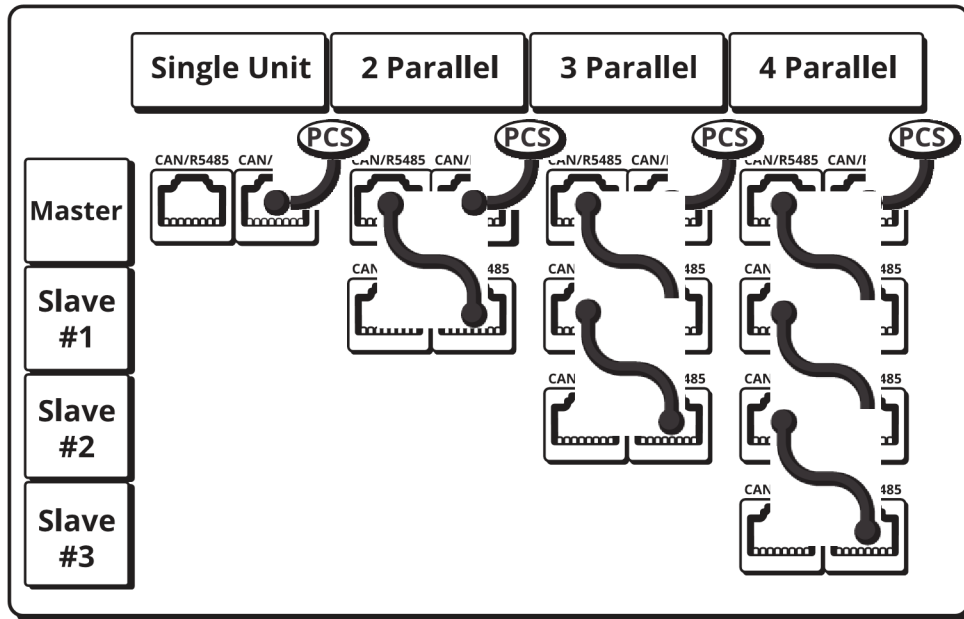
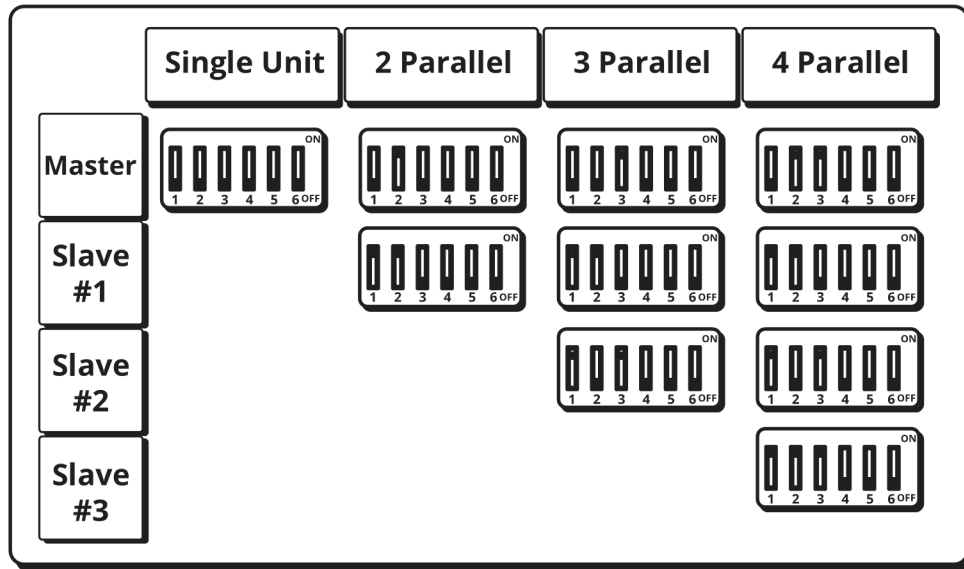


Figure 7 - Dial Diagram

Master/Slave machine dial code diagram:



4. Power ON and OFF

4.1. Instruction

Please double check the Precautions for use in section 1.3.

4.1.1 System Power ON

- Installation (including DC cable, communication wire connection and dialer switch) is properly done.
- 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)

4.1.2. 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

4.1.3. Sleep and Wake-up Function

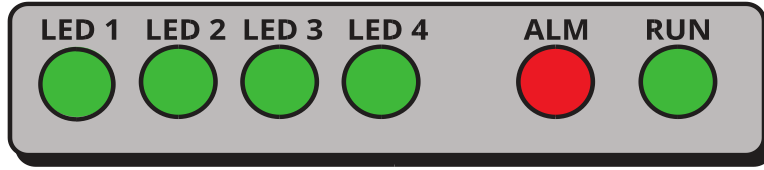
Number	Sleep Condition	Wake-up Condition	Mark
1	Forced sleep by upper computer	Reset button	
2	Forced sleep by soft switch	Soft switch	Only those equipped with soft switch can pass the call Wake up
3	Total Voltage is lower than 48V or monomer is lower than 2.8V, and continuous No charge and discharge current for 4 hours, no communication goes to sleep	Reset button Soft switch Communication Charging	Only those equipped with soft switch can pass the call Wake up

4.1.4. Buzzer Function

- 0.25s per 1s in case of fault
- 0.25s per 2s during protection

4.1.5. System Status Instruction

There are 6 LED indicator, 4 green LED gives status of SoC, 1 red Alarm LED and 1 green Running Status LED (indicating charging, discharging etc.)



Status	Normal/Warning/Protection	RUN	ALM	SoC				Remarks
		●	●	●	●	●	●	
Power Off	Hibernate	no	no	no	no	no	no	
Standby	Normal	Twinkle 1	no	Real SoC				Temp. Warning ALM Twinkle 3
	Warning	Twinkle 1	no					
Charging	Normal	Twinkle 2	no	Real SoC				/
	Warning	Twinkle 2	no					Temp. Warning ALM Twinkle 3
	Overcharging	Twinkle 1	no					Overcharging, ALM no
	Overheat, Low Temp., Over-current	Twinkle 1	Twinkle 2					
Discharging	Normal	Continuous	no	Real SoC				
	Warning	Continuous	Twinkle 3					Overcharging, ALM no
	Over-discharging	Twinkle 1	no					
	Overheat, Low Temp., Over-current, Shortcut	Twinkle 1	Twinkle 2					
Malfunction	Warning	no	Continuous	no	no	no	no	BMS Damage, MOS Damage, Temp. sampling malfunction

4.1.6. LED Twinkle Status

Status	On	Off
Twinkle 1	0.25s	3.75s
Twinkle 2	0.5s	0.5s
Twinkle 3	0.5s	1.5s

4.1.7. SoC Indicator

SoC	LED			
	●	●	●	●
	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

5. Transportation and Storage

5.1. Transportation

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

5.2. Storage

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

- It should be stored in 60% 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.

6. Disclaimer

It should be noted that ViTech Power shall not be liable if any necessary materials are added to this user's manual without further inform of customers.



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