



# USER MANUAL

FOR LITHIUM BATTERY  
ENERGY STORAGE SYSTEM

VERSION 1.0



**LEGACY24100/150/300**  
**LEGACY48100/150/300**  
**LEGACY51.2-100/150/300**

# Contents

1. Introduction.....	2
2. Battery Specifications.....	3
3. Important Safety Warning.....	4
3.1. Before connecting.....	4
3.2. Necessary installation Tools.....	4
3.3. Personal protective equipments.....	4
3.4. During operation.....	5
4. Unpacking & Overview.....	5
4.1. Packing list.....	5
4.2. Product over.....	5
5. Installation.....	6
5.1. Selecting mounting location.....	6
5.2. Mounting the pack.....	6
6. Communication.....	8
6.1. Battery and PC communication(note:insert the RS232 port).....	8
6.2. The communication PIN of battery and the invterter.....	9
6.3. Dial settings of battery ADS address.....	9
6.4. How to connect Growatt inverter (RS485A).....	10
6.5. How to connect Growatt inverter (Canbus).....	12
6.6. How to connect Deye inverter.....	14
Appendix 1.....	16
WARNING:.....	17
Product Responsibilities and Consulting.....	18

**Note: Please comply with all warnings and operating instructions in this manual strictly. Save this manual properly and read carefully the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully.**

## 1. Introduction

The Energy storage pack is an essential component of the photovoltaic power generation system. It can provide electricity for the connected load, and it can also store photovoltaic solar modules, fuel generators, or wind energy generators by charging the remaining energy in case of emergency. When the sun goes down, energy demand is high, or there is a power outage, you can use the energy stored in the system to meet your energy needs at no additional cost. In addition, the energy storage Pack can help you achieve energy self-consumption and ultimately achieve the goal of energy independence.

According to different power conditions, the energy storage PACK can output power during peak power consumption, and can also store energy during low power consumption. Therefore, when connecting the matching photovoltaic modules or inverter arrays, external equipment is required to match the energy storage the working parameters of the pack to achieve the highest operating efficiency. For a simple diagram of a typical energy storage system.

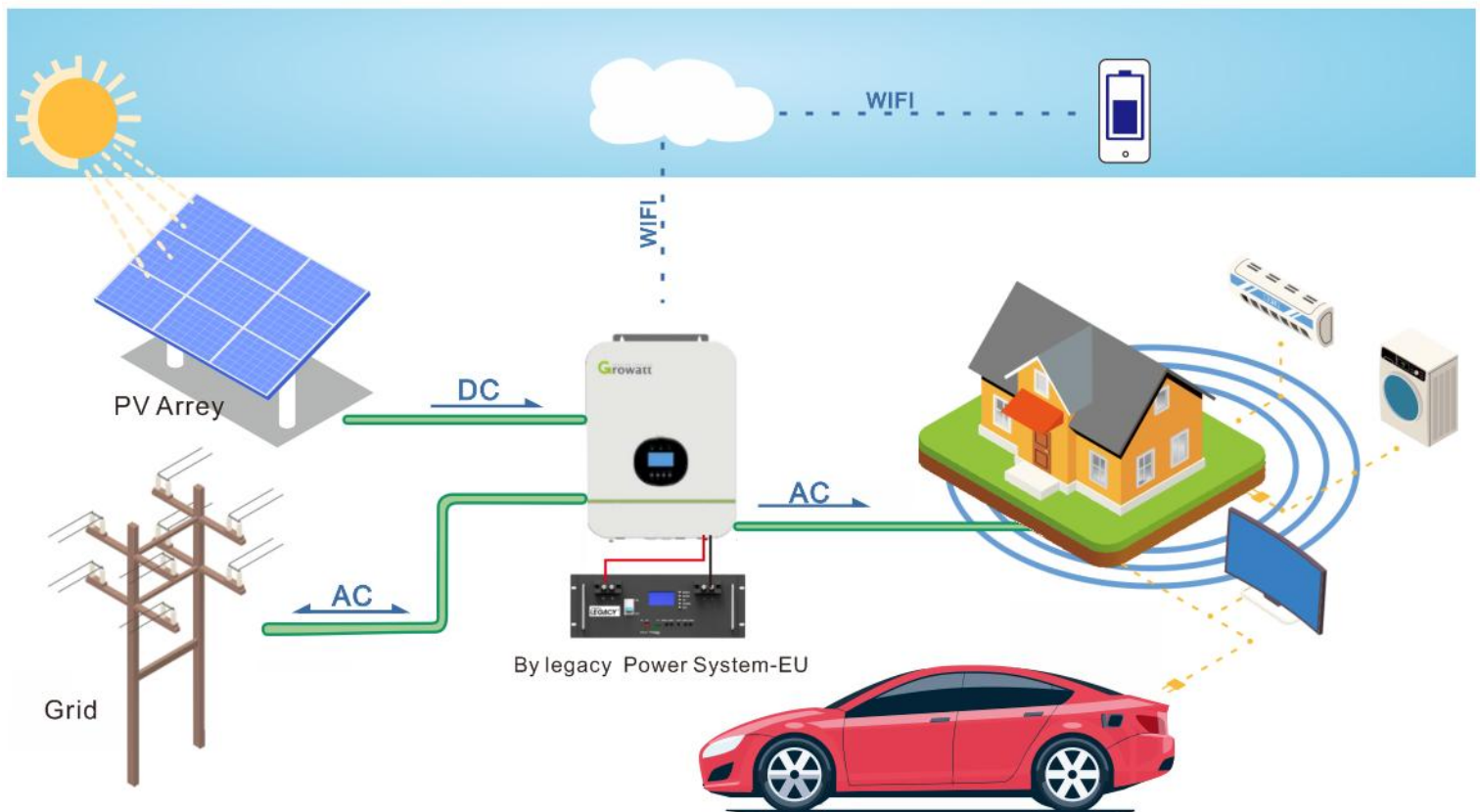


Figure 1 Energy storage System Overview

It is very important and necessary to read the user manual carefully before installing or using the battery. Failure to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, death, or may damage the battery and the whole system.

- If the battery is stored for a long time, it is requirement that they are charged every three to six months, and the SOC should be no less than 80%,after fully discharging,The battery needs to be recharged within 12 hours.
- Do not expose cable outside;Do not use cleaning solvents to clean the battery.
- All battery terminals must be disconnected before maintenance.

## 2. Battery Specifications

No	Item	General Parameter		
1	Combination method	24V	48V	51.2V
2	Rated Capacity(Ah)(typical)	100/150/200	100/150/200	100/150/200
3	Factory Voltage(V)	25.6-26.4V	48-50V	51-53V
4	Rate power(Wh)	2560/3840/5120	4800/7200/9600	5120/7680/10240
5	Charging Voltage(V) recommend/max	28/28.8V	54/54.6V	57/57.6V
6	Charging Current(A) recommend/max	0.2C/0.5C	0.2C/0.5C	0.2C/0.5C
7	Float charge Voltage(V)	27.6V	53.5V	55.5V
8	Discharge Cut-off Voltage(V)	<=22V	<=41V	<=44V
9	Max Discharging current(A)	0.5C		
10	Charging Current limits(A)	10A /20A		
11	Charge over Current protect(A)	110/110/Adjustable		
12	Discharge over Current protect(A)	110A/110A/220A		
13	Internal Impedance	≤100mΩ		
14	Communication protocol	CAN/485	CAN/485	CAN/485
15	Host software and Communication protocol	RS232/485	RS232/485	RS232/485
16	Operation Temperature Range	Charge:0~55℃		
		Discharge: -20~55℃		
17	Storage Temperature Range(recommend)	0℃~25℃		
18	Combination method	24V	48V	51.2V
19	Rated Capacity(Ah)*Parallel	PACK*Parallel	PACK*Parallel	PACK*Parallel
20	Factory Voltage(V)	25.6-26.4V	48-50V	51-53V
21	Charging Voltage(V)recommend/max	28/28.8V	54/54.6V	57/57.6V
22	Charging Current(A)recommend/max	0.1C/0.2C(total)	0.1C/0.2C(total)	0.1C/0.2C(total)
23	Float charge Voltage(V)	27.6V	53V	56V
24	Discharge Cut-off Voltage(V)	<=24V	<=48V	<=50V
25	Max Discharging current(A)	90*Parallel/150*Parallel/180*Parallel		
26	Charging Current limits(A)	10A/20A*Parallel		
27	Charge over Current protect(A)	110/110/Adjustable*Parallel		
28	Discharge over Current protect(A) Adjustable	110/110/Adjustable*Parallel		
29	Internal Impedance	≤100mΩ	≤100mΩ	≤100mΩ
30	Communication protocol	CAN or 485	CAN or 485	CAN or 485
31	Host software and Communication protocol	RS232/485	RS232/485	RS232/485
32	Operation Temperature Range	Charge:0~50℃		
		Discharge: -20~55℃		
33	Storage Temperature Range(recommend)	0℃~25℃		

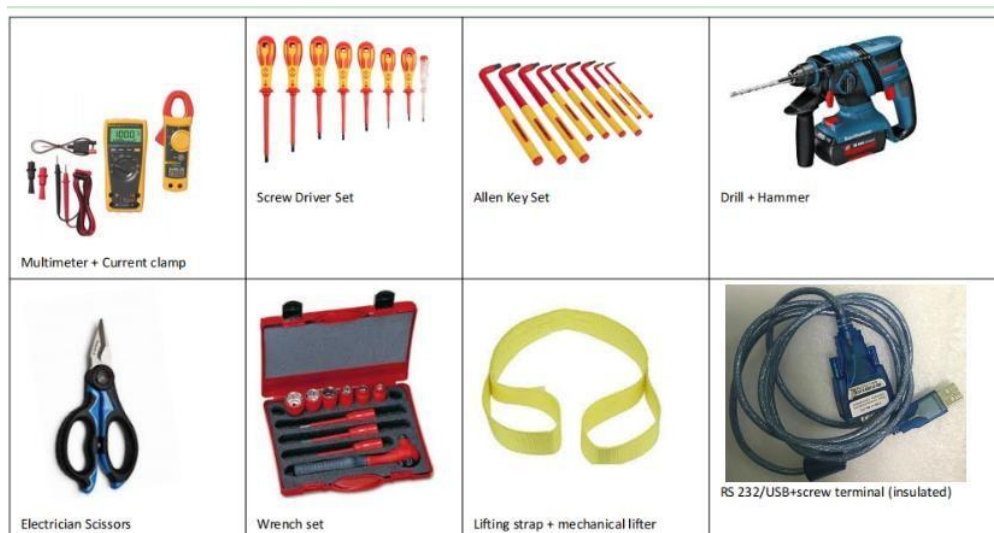
### 3. Important Safety Warning

- Do not expose the battery to flammable or harsh chemicals or vapors.
  - Do not paint any part of the battery, include any internal or external components.
  - Do not connect battery with PV solar wiring directly.
  - Any foreign object is prohibited to be inserted into any part of the battery
- Our company will not bear any warranty claims for direct or indirect damage caused by violation of the above Item

#### 3.1. Before Connecting

- After unpacking, please check the battery and pack list first, if the battery is damaged or spare parts are missing, Please contact the dealer.
  - Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode;
  - Wiring must be correct, do not mix-connect the positive and negative cables, and ensure no short circuit with the external device;
  - It is prohibited to connect the battery with AC power directly;
  - The BMS in the battery is designed for 24VDC/48VDC, DO NOT connect battery in series;
  - It is prohibited to connect the battery with different type of battery;
  - Please ensure the electrical parameters of battery system are compatible to inverter;
- Keep the battery away from fire or water.

#### 3.2. Necessary installation Tools



#### 3.3. Personal protective equipments






### 3.4. During operation

- ◆ If the battery system needs to be moved or repaired, the power must be cut off first and the battery is completely shutdown;
- ◆ It is prohibited to connect the battery with different type of battery;
- ◆ It is prohibited to put the batteries working with faulty or incompatible inverter;
- ◆ In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited;
- ◆ Please do not open, repair or disassemble the battery. We do not undertake any consequences or related responsibility due to violation of safety operation or violating of design, production and equipment safety standards.

## 4. Unpacking & Overview

### 4.1. Packing List

You will receive the following parts(Not a full set), sample as follow picture.For customized requirements, please place an order with the manufacturer.

Legacy Battery pack	Inverter common cable(RJ45)	Manual *1
		

\*NOTE : Types of communication tools need extra order.

### 4.2. Product Over

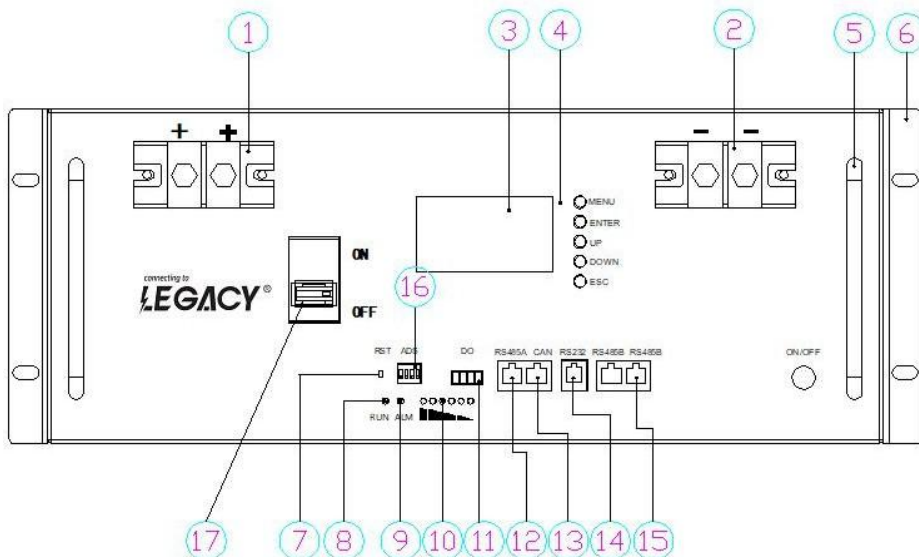


Figure 2 A General battery shape.Front view

No.	Description	Silk-screen	Remark
1	Pack positive pole	P+	Output terminal
2	Pack negative pole	P-	Output terminal
3	LCD		
4	LCD key		
5	handle		
6	Fixed bracket		
7	reset	RST	Press and hold for 3 seconds to turn the battery on/off; long press for 6 seconds to reset the battery system
8	Run LED indication	RUN	
9	ALARM LED indication	ALM	Lift heavy objects
10	Capacity LED indication		
11	DRY connect port	DRY CONTACT	
12	485A communication port	RS485A	Connect to inverter
13	CAN communication port	CAN	Connect to inverter
14	RS232 communication port	RS232	Host software
15	RS485B communication port	RS485B	Parallel use
16	ADS Coder	ADS	Set Battery address code
17	Air switch	ON/OFF	
18	Power switch	ON/OFF	

## 5. Installation

### 5.1. Selecting Mounting Location

Consider the following points to install the energy storage Pack:

- Do not mount the Pack on flammable construction materials. Mount on a solid surface;
- Install this Pack module at eye level in order to allow the readability of LCD display at all times.
- For proper air circulation to dissipate heat, please leave a gap of about >0.3 meter from the ground, 30 cm from the side of the device.
- The ambient temperature should be between 0°C and 40°C and relative humidity should be between 25% and 85% to ensure optimal operation.
- The recommended installation is flat wise adherence.

Install the battery module in a dry, protected area with no excessive dust and sufficient air circulation. Do not operate in locations where the temperature and humidity are outside the specified range.

### 5.2. Mounting The PACK



**WARNING!!** Remember that this Pack is heavy so please be careful when removing it from the package, or install it .

**When installing the Pack bracket, use appropriate screws to fix it. After that, the equipment should be firmly bolted. The pack can be run indoors or outdoors. However, only professional personnel can enter this area for installation or maintenance.**

- Step 1:

When receiving the product, first check whether all parts are complete, if not, please report to the Dealer .

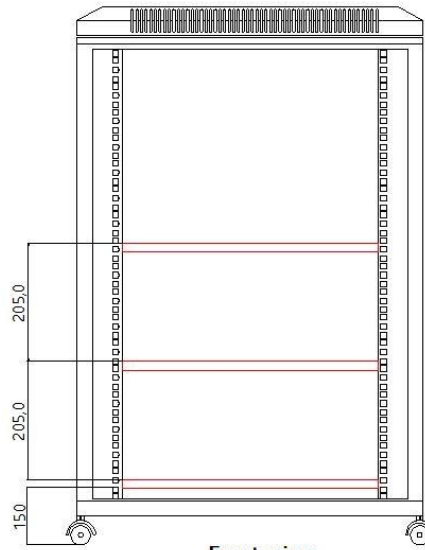
- Step 2:

Ensure that the Pack is installed on the Rack. Choose a suitable installation location and require the battery pack to be placed at a safe.

The first load-bearing plate should be at least 15cm away from the ground. The distance between the load-

bearing plates is about 205mm.

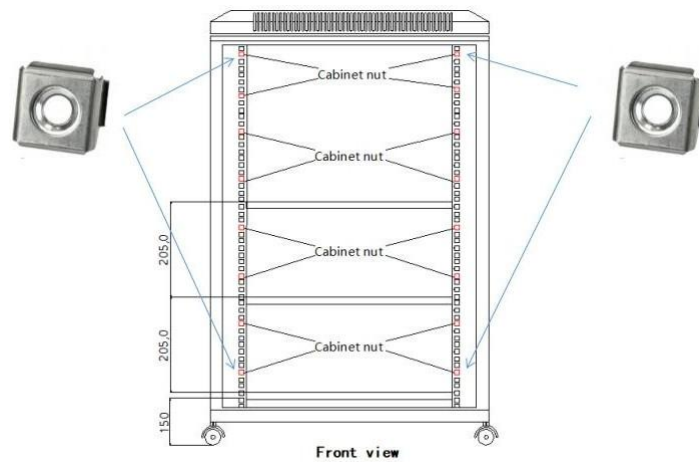
We recommend that the installation distance be 205mm.



Front view  
Figure4.

● Step 3:

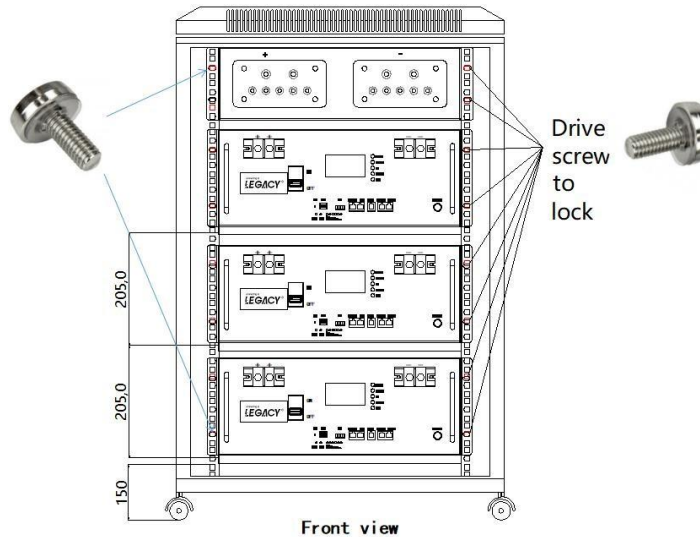
Mark the position of the nut on the cabinet with the mounting bracket, and clamp the nut into the cabinet. See Figure5.



Front view  
Figure 5

● Step 4:

As shown in the below, install the battery pack. The pack is too heavy, Please use a special lifting device to lift the pack for operation and safety protection. Put the battery module into the cabinet and screw it, as shown in Figure 6.



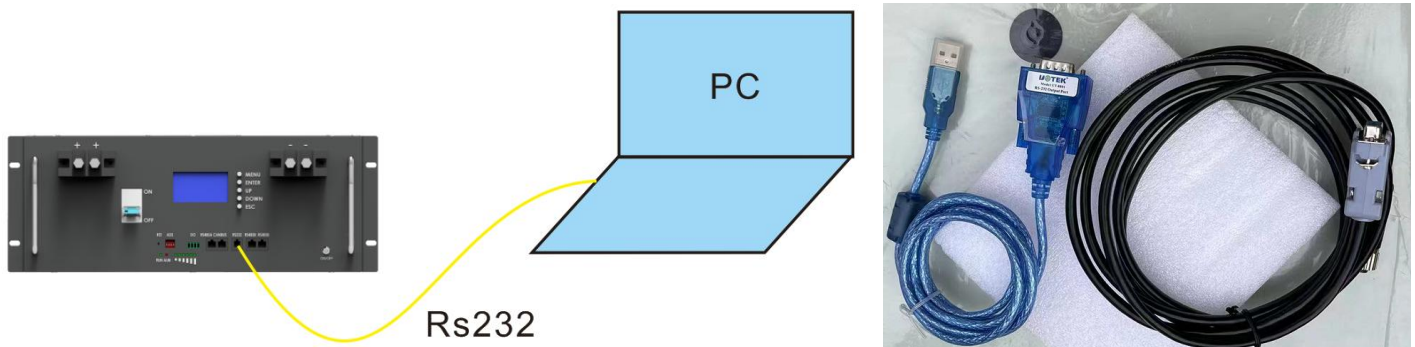
Front view  
Figure 5



## 6. Communication

### 6.1. Battery and PC communication(note:insert the RS232 port)

6.1.1 Prepare a computer (Win7 system or above), use a special cable to connect the battery and the PC



6.1.2 Install software (Please ask the manufacturer for the installation package)

名称	修改日期	类型	大小
Config	2022/2/25 11:23	文件夹	
<b>PbmsTools V2.5FN</b>	2020/3/2 15:59	应用程序	669 KB
PbmsTools V2.5FN.exe.config	2021/12/17 16:31	CONFIG 文件	1 KB

6.1.3 After the installation is complete, run this program, the battery and PC communicate successfully

**PbmsTools V2.5FN**

Realtime Monitoring | Multi Monitoring | Memory Info. | Parameter Setting | System Config. | Export Datas

Serial Port: Port COMB, Baud Rate 9600, Pack 1, Pack Qty 1, ADDR 1, Interval(S) 1. Buttons: Close, Try Connect.

System Status: CHARGING-ON (selected), CHARGING, CHG-LIMIT-OFF, ACin, DISCHARGING-ON, DISCHARGING, HEATER-OFF, Fully.

Alarm Status: None

Protect Status: None

Fault Status: None

Switch Control: CHG Circuit Close, Sound Alarm Open, CHG Limiter Close, DSG Circuit Close, LED Alarm Close, Shutdown Off.

Cell Voltage(mV): MaxVolt 10 (3206), MinVolt 1 (3204), VoltDiff 2. Vcell 1-16 values: 3204, 3205, 3205, 3205, 3205, 3205, 3204, 3205, 3204, 3204, 3206, 3204, 3205, 3204, 3205, 3205.

Temperature: Tcell 1: 19.9, Tcell 2: 19.8, Tcell 3: 19.7, Tcell 4: 19.8, MOS\_T: 21.7, ENV\_T: 22.6.

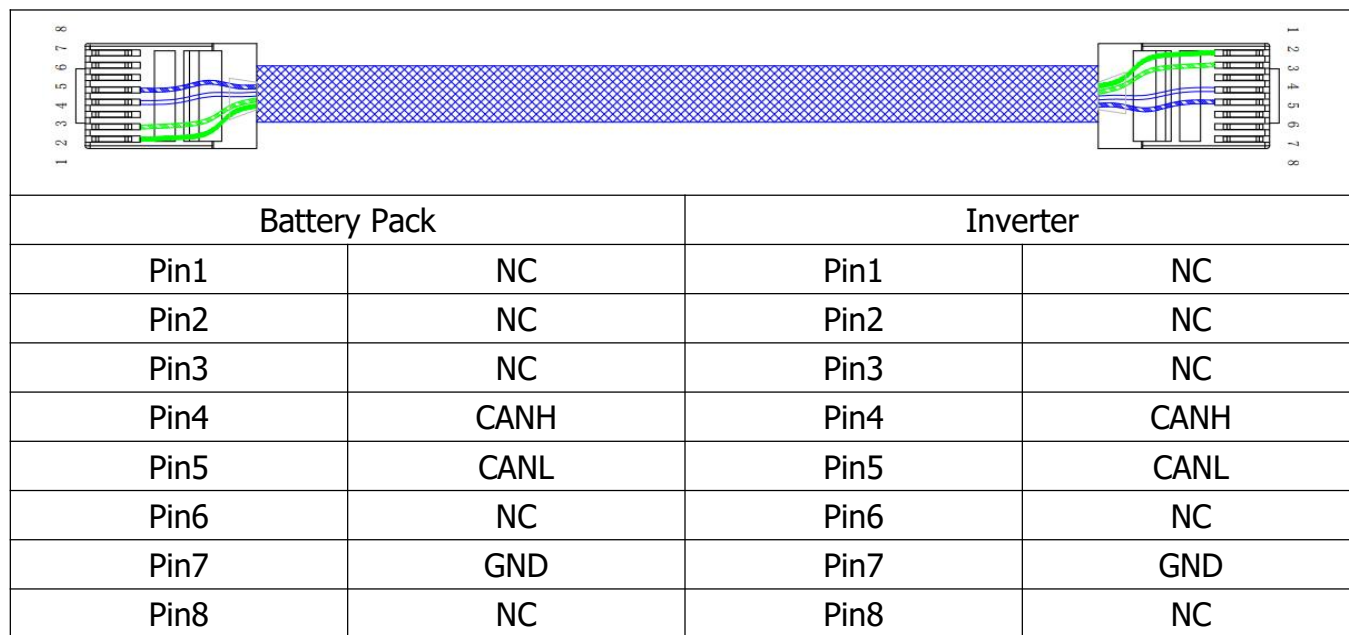
Pack Information: Pack Voltage 51.363 V, Pack Current 0.00 A, SOC 48%, SOH 100%, RemainCapacity 96810 mAh, FullCapacity 200000 mAh, Battery Cycle 0.

VER: P16S100A-14555-2.01 | BMS S/N: 9865201410053X | PACK S/N: A635-2202-00028 | COMM: Normal

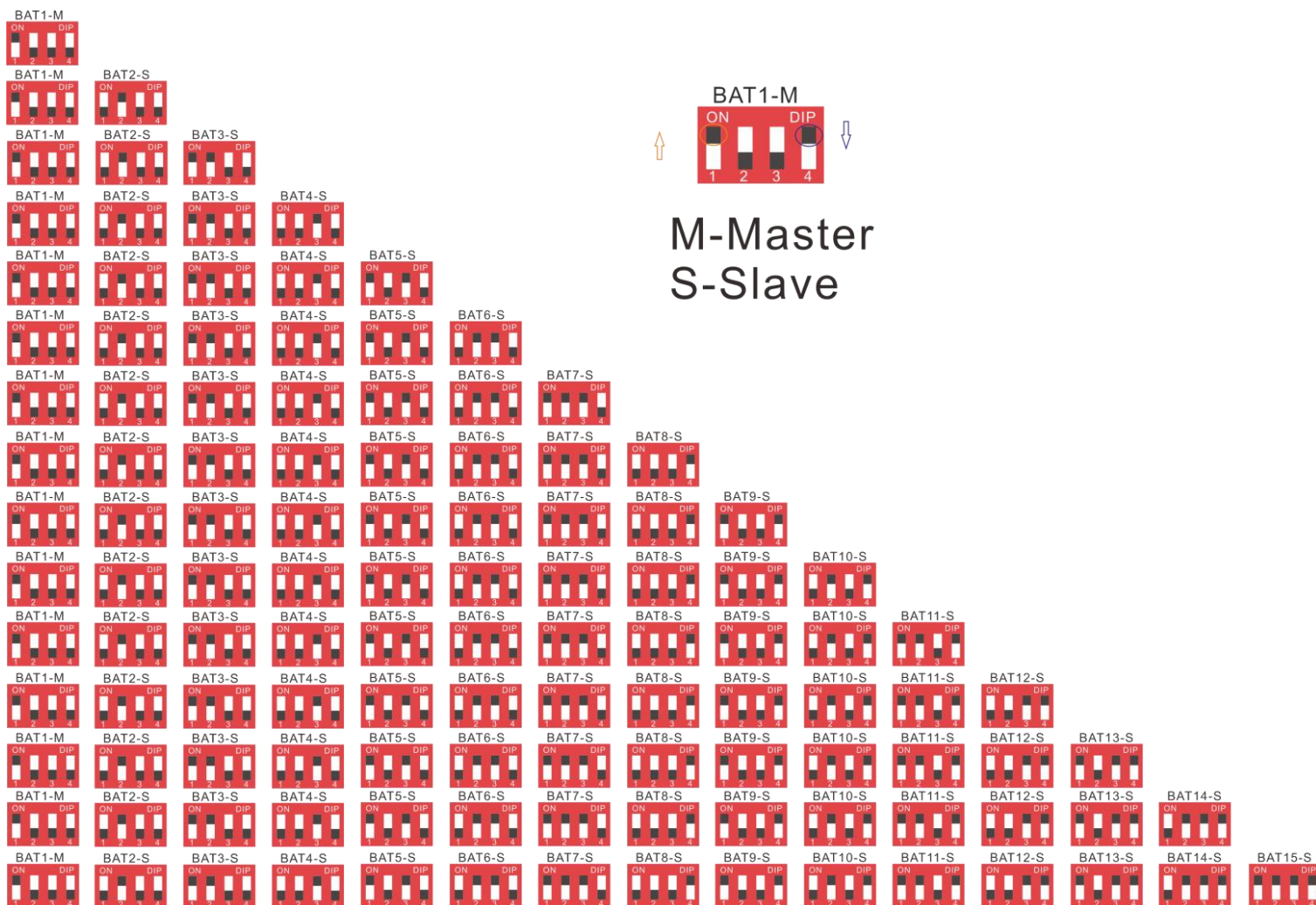
10:13:33 2022/02/28

### Troubleshooting

### 6.2. THE COMMUNICATION PIN OF BATTERY AND THE INVERTER:

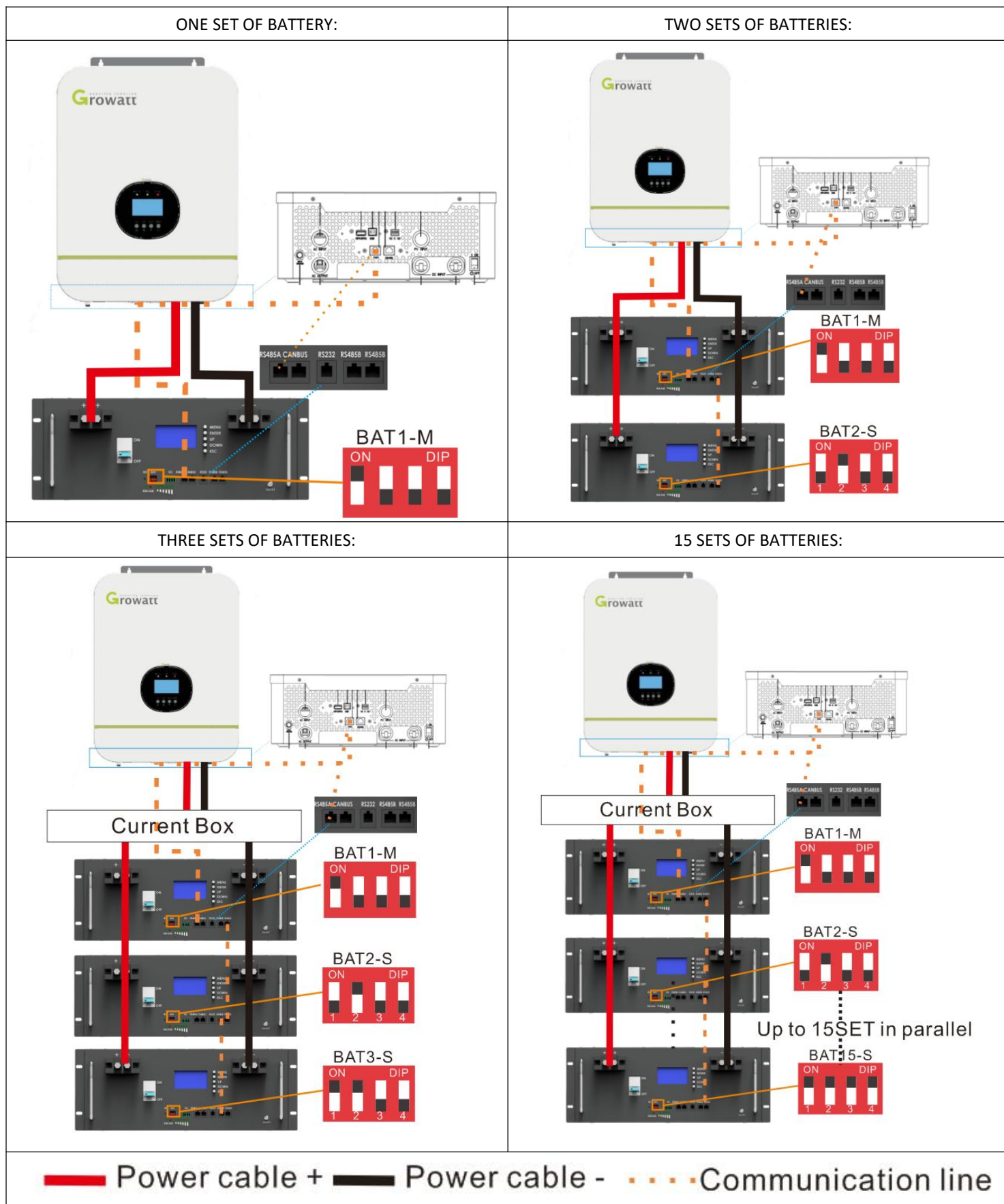


### 6.3. DIAL SETTINGS OF BATTERY ADS ADDRESS:



## 6.4. HOW TO CONNECT Growatt INVERTER (RS485A)

### 6.4.1 THE COMMUNICATION PIN OF BATTERY AND THE INVERTER (RS485A) :



6.4.2 RS485 COMMUNICATION SETTING OF THE INVERTER:

1) LCD SETTING AS BELOW:



2) CLICK ON "ENTER" AND "DOWN/UP" TO SELECT "05" AND "LI" (LITHIUM MODE) :



05	Battery type	AGM (default)	BATT AG1 005°
		Flooded	BATT FLd 005°
		Lithium (only suitable when communicated with BMS)	BATT LI 005°
		User-Defined	BATT USE 005°
		User-Defined 2 (suitable when lithium battery without BMS communication)	BATT US2 005°

If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 19, 20 and 21.  
If "User-Defined 2" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 19 and 20 (full charging voltage point of lithium battery). The inverter will stop charging when the battery voltage reaches this setting.

3) CLICK ON "ENTER" AND "DOWN/UP" TO SELECT "36" AND "L04":

RS485 Communication protocol	Protocol 1	PtCL L01 036°
	Protocol 2	PtCL L02 036°
	:	:
	Protocol 50	PtCL L50 036°

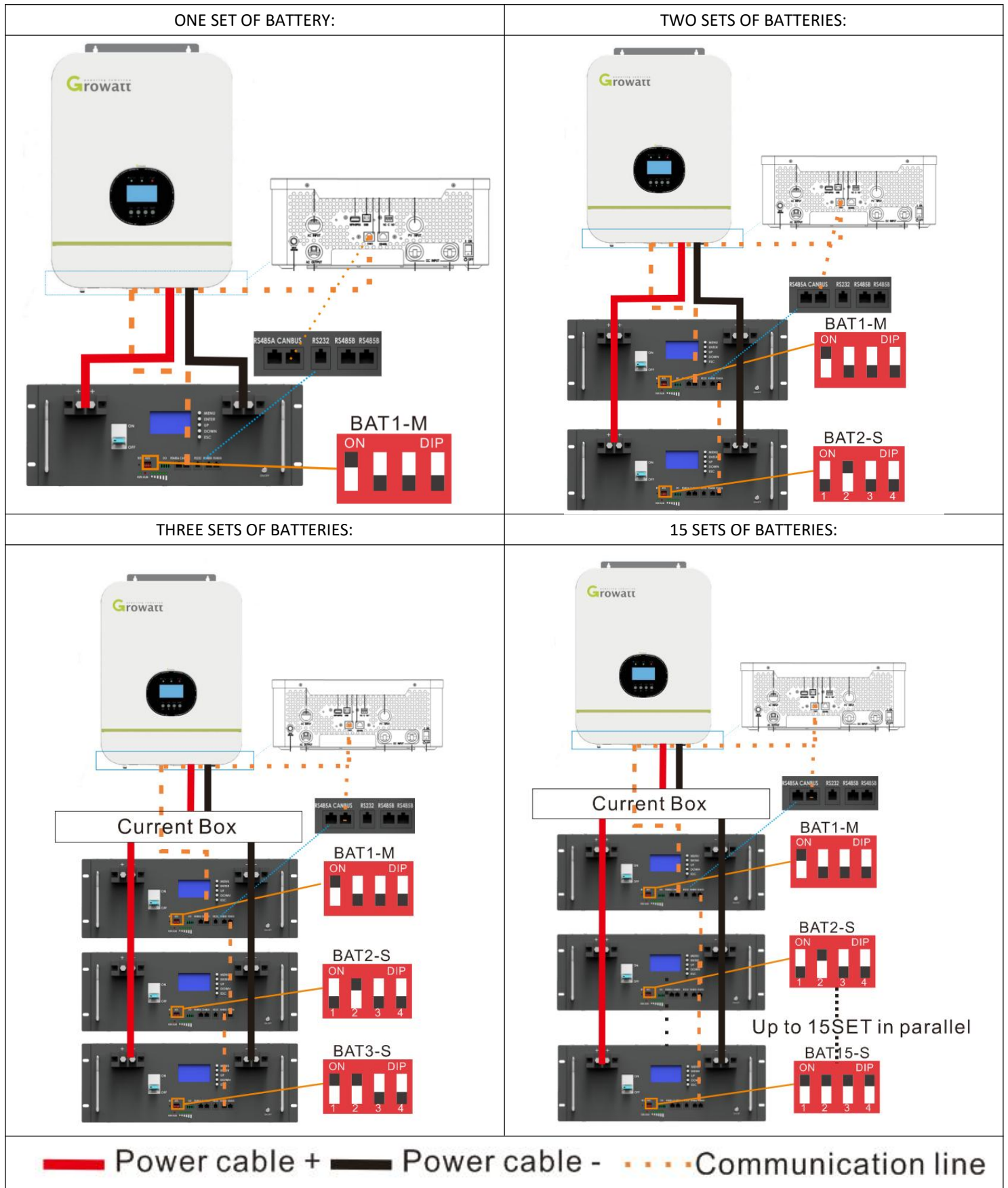


4) CLICK ON "ESC", THEN WAIT TILL THE CONNECTION DONE.



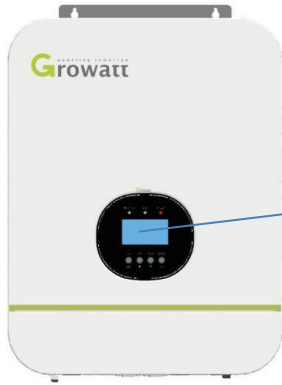
## 6.5. HOW TO CONNECT Growatt INVERTER (Canbus)

### 6.5.1 THE COMMUNICATION PIN OF BATTERY AND THE INVERTER (Canbus) :



6.5.2 RS485 COMMUNICATION SETTING OF THE INVERTER:

1) LCD SETTING AS BELOW:



2) CLICK ON "ENTER" AND "DOWN/UP" TO SELECT "05" AND "LI" (LITHIUM MODE) :



		AGM (default) bAtt AG 005°
		Flooded bAtt FLd 005°
		Lithium (only suitable when communicated with BMS) bAtt LI 005°
05	Battery type	User-Defined bAtt USE 005° <small>If "User-Defined" is selected, battery charge voltage and low DC out-off voltage can be set up in program 19, 20 and 21.</small>
		User-Defined 2 (suitable when lithium battery without BMS communication) bAtt US2 005° <small>If "User-Defined 2" is selected, battery charge voltage and low DC out-off voltage can be set up in program 19, 20 and 21. It is recommended to set to the same voltage in program 19 and 20 (full charging voltage point of lithium battery). The inverter will stop charging when the battery voltage reaches this setting.</small>

3) CLICK ON "ENTER" AND "DOWN/UP" TO SELECT "36" AND "L52":

CAN Communication protocol	Protocol 51	PtCL L51 036°
	Protocol 52	PtCL L52 036°
	⋮	⋮
	Protocol 99	PtCL L99 036°

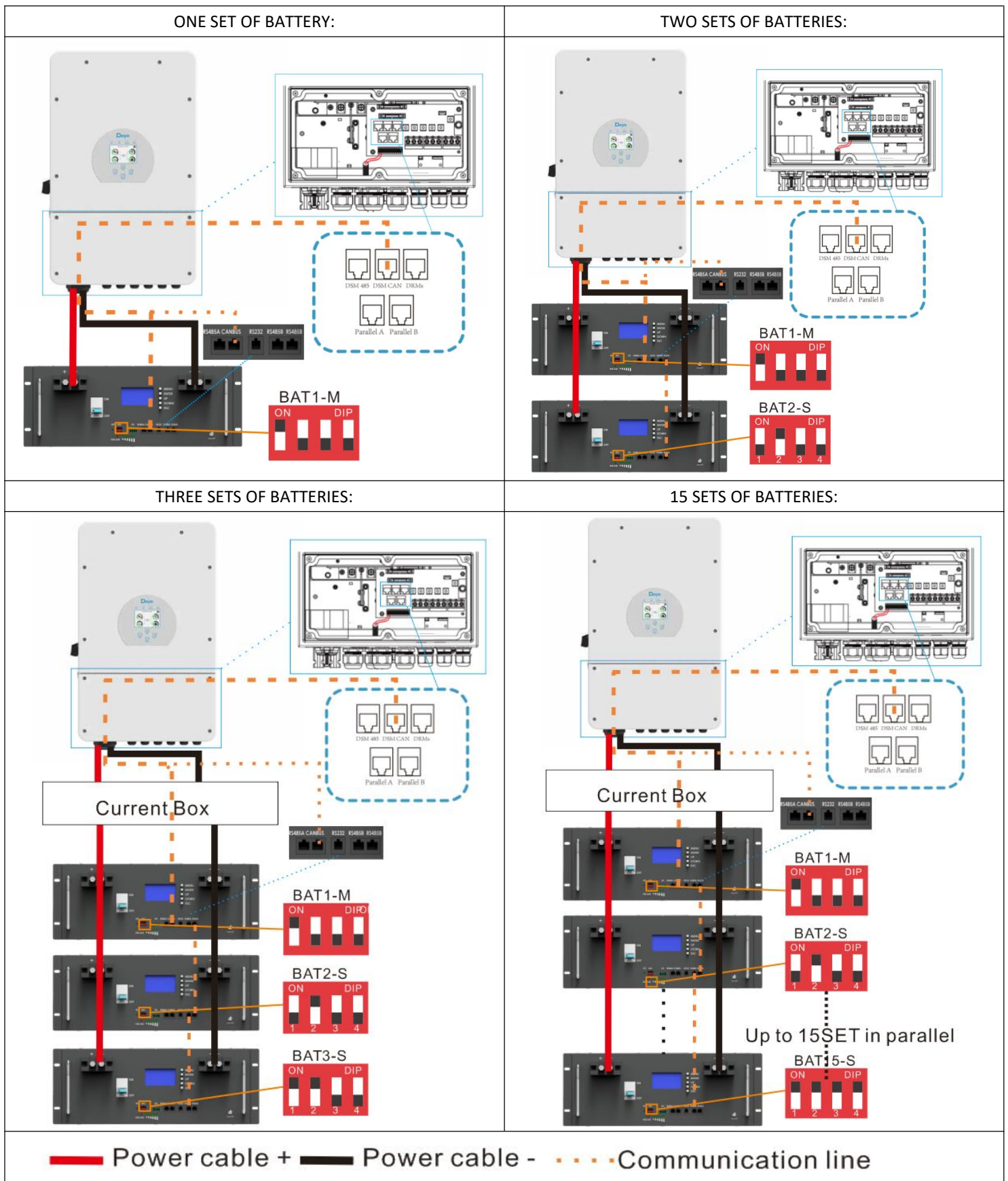


4) CLICK ON "ESC", THEN WAIT TILL THE CONNECTION DONE.



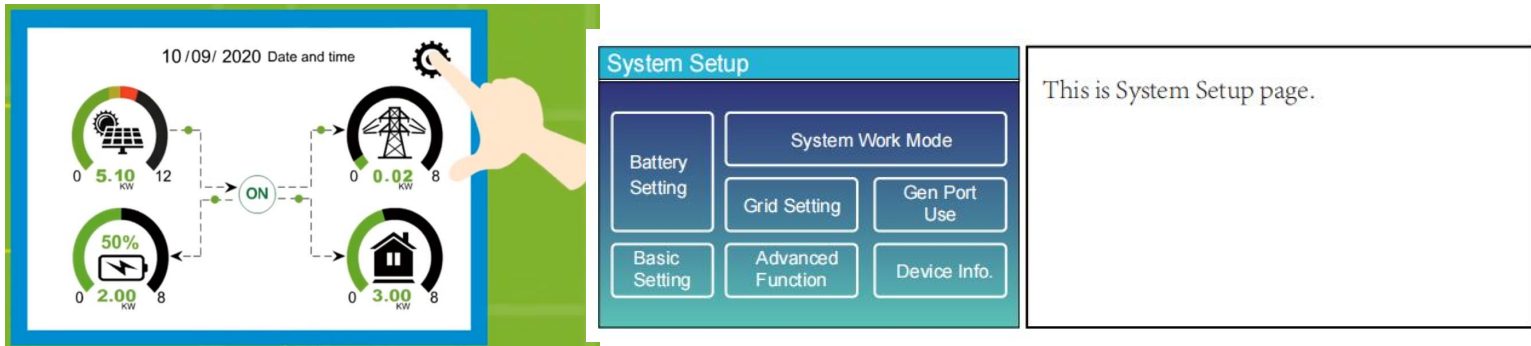
## 6.6. HOW TO CONNECT DEYE INVERTER

### 6.6.1 THE COMMUNICATION PIN OF BATTERY AND THE INVERTER (Canbus) :

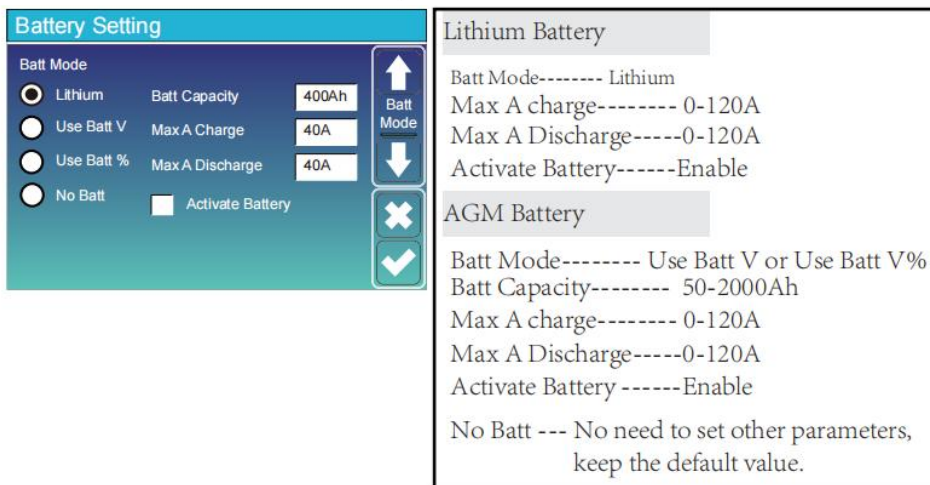
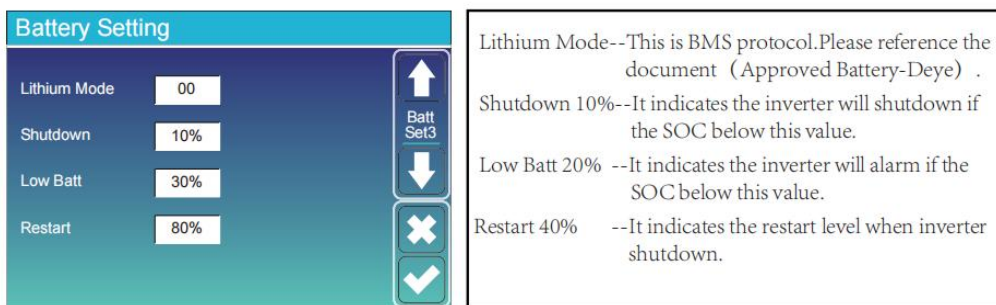


### 6.6.2 THE COMMUNICATION SETTING OF THE INVERTER:

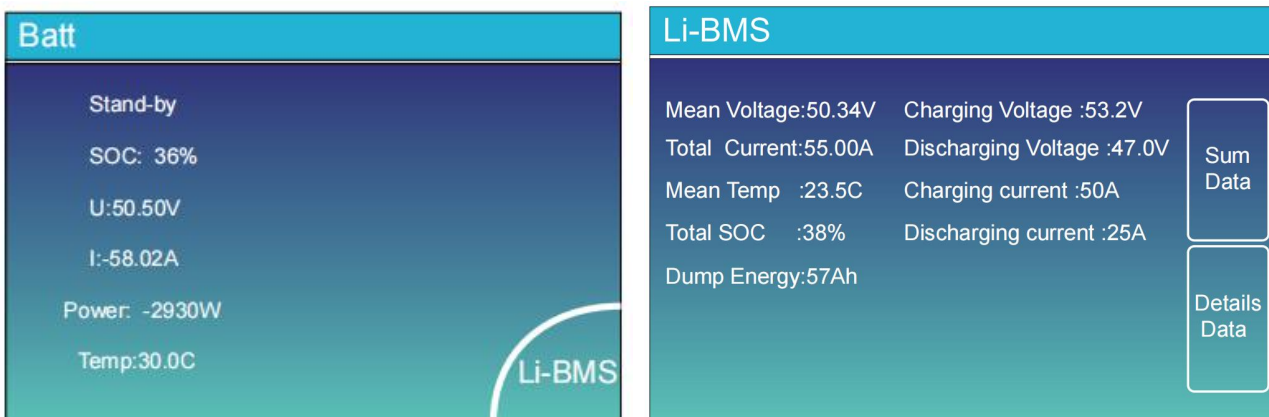
1) CLICK ON "SETTING" ON THE LCD:



2) CLICK ON "BATTERY SETTING", SELECT "LITHIUM" AS BATTERY MODE:



3) AFTER LITHIUM MODE SUCCESSFULLY CONNECTED, BMS WILL UPLOAD THE DATA AS BELOW:





## Appendix 1

### SOC Indicator & Status Indicator Guides

Chart 1: Battery Status

Status	Normal/ Warning/ Protection	Capacity LED								Description
		RUN	ALM	●	●	●	●	●	●	
Shut Down	Shut down	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All OFF
Standby	Normal	Flash	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Standby
Charge	Normal	ON	OFF	Based on capacity						
	Warning	ON	Flash	Based on capacity						
	Protection	ON	ON	Based on capacity						
Discharge	Normal	ON	OFF	Based on capacity						
	Warning	ON	Flash	Based on capacity						
	Protection	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	
Fault	Protection	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging or discharging

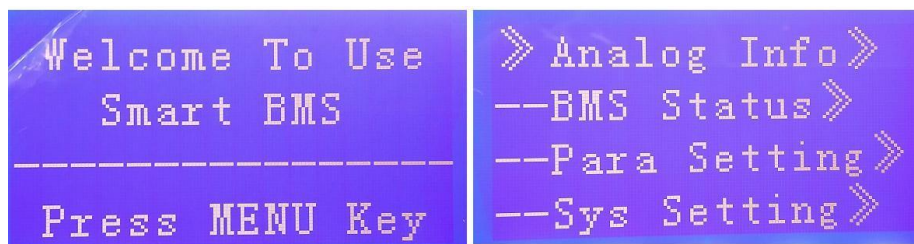
Chart2: LCD screen display.

#### 1. Display rendering



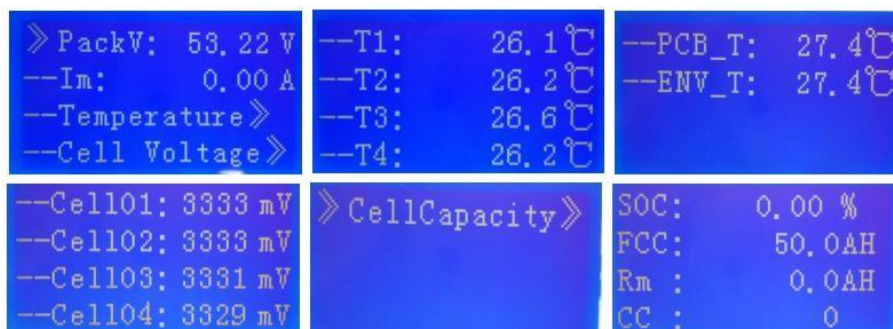
#### 2. Main menu page

After BMS is activated, will show the welcome screen, press the "MENU" button to enter the main menu page. As shown in the figure below:

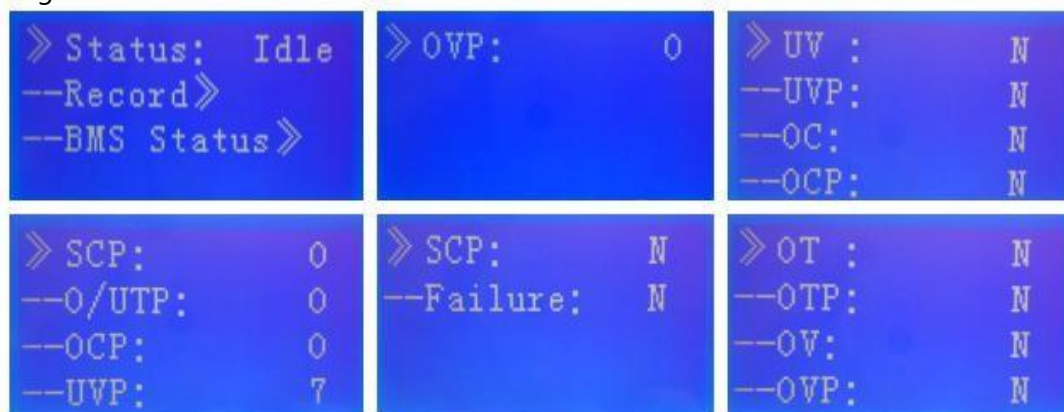


#### 3. Battery parameters page

When the cursor "»" is point to "Battery Parameters Acquisition", press "ENTER" key will enter the page of "Battery Parameters Acquisition", As shown in the figure below:

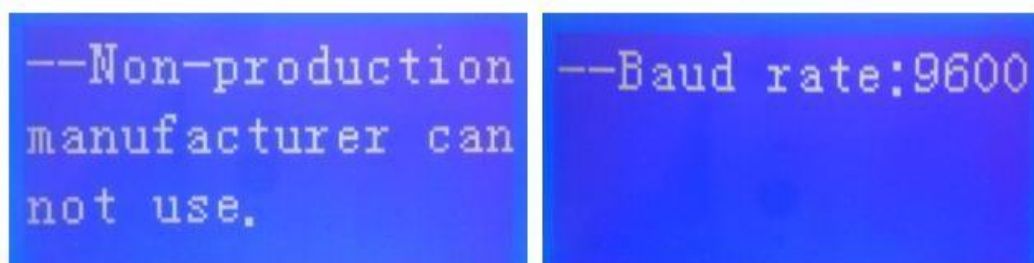


When the cursor "»" is point to "Battery Status", press "ENTER" key will enter the page of "Battery Status", As shown in the figure below:



#### 4. Parameter Settings

Screen can not set parameters Baud Rate: 9600 ,Can not be set.



#### 5. Key description

- SW1----MENU, SW2----ENTER, SW3----UP, SW4----DOWN, SW5---- ESC.
- Each item is "»" or "--" as a beginning, among them "»" shows the current cursor position, press "UP" or "DOWN" key can move the cursor position; with "»" end of the project, the content of the said project has not shown, press "ENTER" key can enter the corresponding page.
- Press "ESC" key can be returned at the next higher level directory; In any position, press "MENU" key can return to the main menu page.
- When BMS inter sleep mode, press any key, can activate the screen.
- Inter standby mode, with no keystrokes 1 minutes later, LCD will enter Shutdown mode press any key, screen can be activ.

### WARNING:

#### (1) Emergency process:

##### 1.The external device catches fire and explodes:

- A: Under the condition of ensuring safety, non-operating personnel immediately move to a safe location;
- B: Under the condition of ensuring safety, the operator immediately cut off the external power supply of the equipment and the internal power supply.
- C:Use fire-fighting equipment for fire-fighting treatment (the use of fire-fighting sand, fire-fighting blankets, fire- fighting water pipes)
- D:If you cannot completely extinguish the fire, please call the local fire department for help. E:Keep the accident site data so that the source of the accident can be traced.

##### 2.The Pack catches fire and explodes:

- A: Under the condition of ensuring safety, non-operating personnel immediately move to a safe location;
- B: Under the condition of ensuring safety, the operator immediately cut off the external power supply of the equipment and the internal power supply.
- C:Use fire-fighting equipment for fire-fighting treatment (first the use of fire-fighting sand, fire-fighting blankets, then fire-fighting water pipes for cool the Pack)
- D:If you cannot completely extinguish the fire, please call the local fire department for help. E:Keep the accident site data so that the source of the accident can be traced.

## **Product Responsibilities and Consulting**

We will not be liable for the accidents resulting from operation breaking this specification and user manual.

- We will not send separate notice, provided that the contents of this specification are changed due to improvement of product quality or technological upgrading; provided that you want to understand the latest information of this product, please contact us.
- The shelf life of this product is within 36 months after it is delivered; we will maintain the product, which is in the warranty period for free of charge, provided that it has any product.
- quality problems within the specified operation range; we may replace the relevant parts, if we fail to maintain it, so as to achieve the purpose of sustainable use without performance reduction; our after-sales service personnel will propose the specific maintenance and troubleshooting methods.

In case of any questions, please contact us.

**THANK YOU FOR CHOOSING LEGACY  
LET'S DEVELOP TRUST AND BUSINESS**

