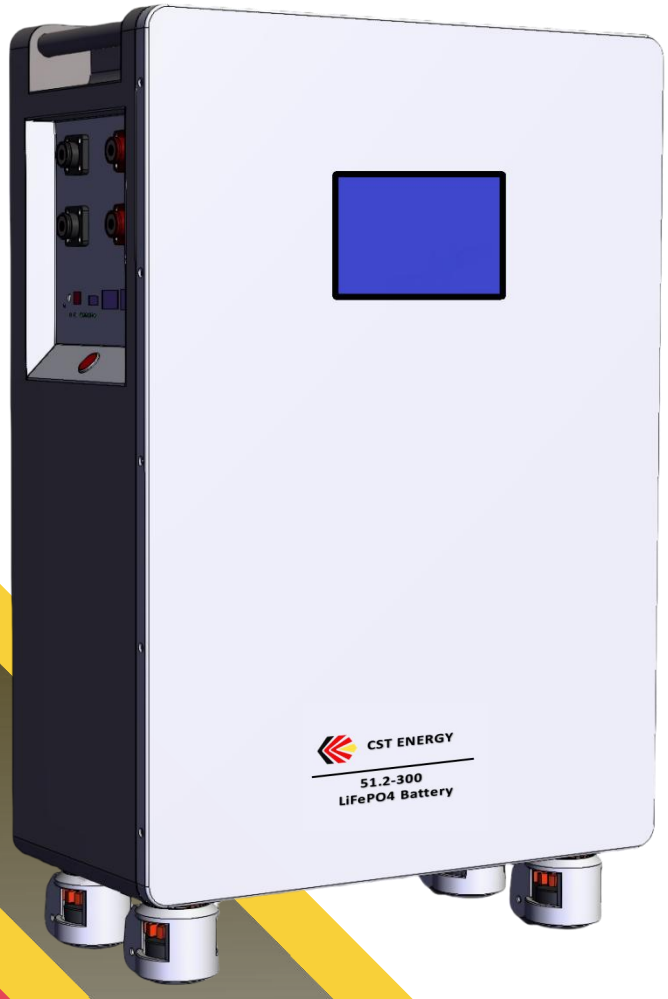
CST-LR-51.2-280

User Manual



Contents

01 Safety and General Introductions

1.1 Overview

This manual provides detailed product information and instructions of installation and operation for users of 51.2V280Ah series. Please read carefully before using the product and store it in a place where it can be easily accessed by installation, operation and maintenance personnel. Any changes to this manual will be made without notice to the user.

1.2 Safety description

1.2.1 Overview of Safety

◆Please read this manual carefully before installation.If the equipment is not installed according to the instructions in this manual and damage occurs, we have the right not to carry out quality assurance.

◆All operations and wiring must be performed by highly trained and professional electrical technicians.

◆When installing, do not touch other parts of the chassis except for the terminals.

◆All electrical connections must comply with local electrical safety standards.

◆If this equipment requires maintenance, please contact your local designated system installer and maintenance personnel

1.2.2 Handling

Warning

◆Ensure that the battery system is protected from damage during transportation and storage.

◆Be careful and consider the weight of the battery when lifting it.

◆Do not hit, pull, drag or step on the device, and do not put extraneous objects into any part of the battery system.

◆Transport must be carried out by trained professionals and the operations during the process must be documented.

◆Ensure that the equipment is placed firmly and not tilted; tilting the equipment may lead to equipment damage and personal injury.

◆Make sure there is CO2, Novac 1230 or FM-200 fire extinguisher nearby.

◆When extinguishing fires, please use fire extinguishers of recommended materials, not water or ABC dry powder extinguishers; firefighters must wear protective clothing and self-contained breathing apparatus.

◆The battery is at risk of explosion when the temperature exceeds 150°C.

◆When installing and maintaining heavy equipment, use proper tools and take protective measures. Improper handling can result in personal injury.

◆Cables used in high temperature environments may cause the insulation layer aging, breakage, cable and heat generating devices or heat source area between the periphery of the distance of at least 30mm.

◆The same type of cable should be tied together, different types of cable at least 30mm apart, prohibit each other entangled or cross-placed.

1.2.3 Installation

Warning

◆Please read this manual carefully before installation. We reserve the right not to warrant the equipment if it is damaged as a result of not following the instructions in this manual.

Warning

◆Before proceeding with the installation, make sure that the energy storage battery is free of any electrical connections.

Warning

◆Please follow the contents of this manual for installation conditions environment, spacing, etc.

◆Please install the inverter in a dry and ventilated location, otherwise it may affect the operation of the inverter.

◆Installation steps are detailed in this manual, please read them carefully before installation.

1.2.4 Electrical connection

Warning

◆Before making electrical connections, make sure the battery switch of the energy storage system is "OFF" and the air switch is turned off.

◆It must be performed by a trained and professional electrical technician and in compliance with this manual and relevant local regulations.

◆Do not place flammable and explosive materials around the energy storage battery.

Warning

◆Please install the energy storage battery in a dry and ventilated location, otherwise it may affect the operation of the energy storage battery.

◆Installation steps are detailed in this manual, please read it carefully before installation.

1.2.5 Liability limitation version

The equipment manufacturer will not be responsible for any direct or indirect liability for damage to the battery system or property damage caused by:

◆The battery system has been modified, modified or parts replaced without authorization from the equipment manufacturer.

◆Non-equipment manufacturer technicians change and clear the battery system serial number.

◆The design and installation of systems with other equipment does not meet

◆Non-equipment manufacturer technicians change and clear the battery system serial number.

◆The design and installation of systems with other equipment does not meet standards, safety regulations and other relevant requirements.

◆Equipment damage caused by failure to comply with the requirements of the battery system user manual.

◆Equipment damage caused by improper use or misuse of the battery system. Equipment damage due to inadequate ventilation of the battery system.

◆ The maintenance procedures regarding the battery system do not follow acceptable standards.

◆Damage to equipment caused by force majeure, such as: earthquake, storm, lightning, over voltage, fire, etc.

◆Any damage to the equipment caused by external factors.

1.2.6 Increase

The battery needs to be fully charged before installation.

To install a new battery on an old energy storage system, it is necessary to fully charge all the batteries of the old energy storage system first, and then install a new battery (the new battery must also be fully charged).

02 Battery parameters

item	General Parameter	Note
Standard Voltage	51.2V	
Commumication Protocol	CAN /RS485	
Depth of Discharge	80% DOD	
Cycle Life	6000 (@ 80% DOD)	
Protection	Over temperature, over current, short circuit, over charging, over-discharging, Low voltage	
Charge Specifications		
Recommended Charge Current	100A	Constant Current 0.5C Constant Voltage 58.4V 0.02 C cut-off
Maximum Charge Current	200A	Constant Current 1C Constant Voltage 58.4V
Maximum Charge Voltage	58.4V	
Discharge Specifications		
Recommended Discharge Current	100A	
Maximum Discharge Current	200A	
Recommended Low Voltage Disconnect	44.8V	
Battery Low Voltage Protection	43.2V	
Battery Recovery Voltage	47.2V	
Mechanical Specifications		
Dimenstions:	L:520*W:252*H:807（mm)	
Net Weight	130(KG)	
Compliance Specifications		
Certifications	CE	
Shipping Classification	UN 38.3, UN 3480, MSDS	
Temperature Specifications		
Discharge Temperature	-20~ 55℃	
Charge Temperature	0~55℃	
Storage Temperature	Less than 1 year: -20~25℃ ; less than 3 months: -20~40℃ Less than 7 day : -20~65℃	Humidity：60±25%R.H.
Number of series and parallel connection	Parallel connection is supported but series connection is not supported	

03 Product introduction

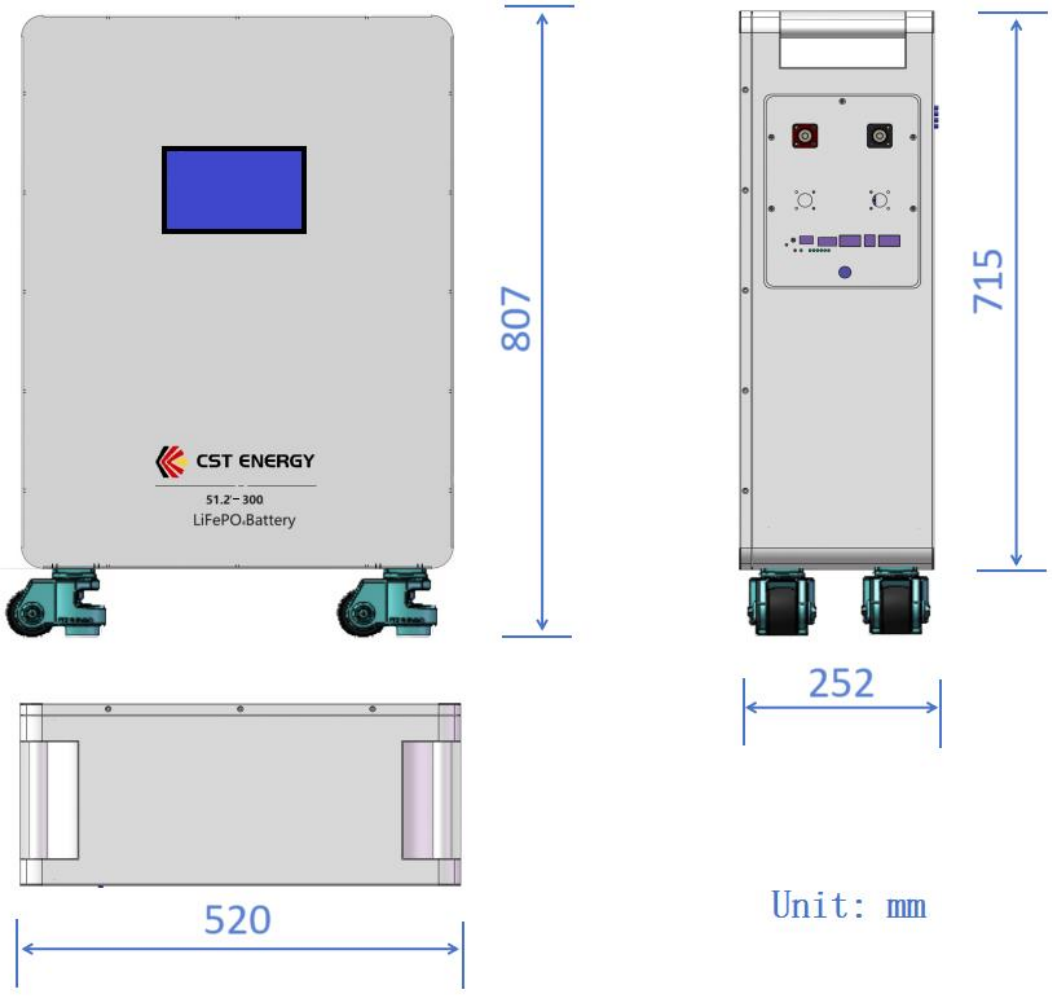
3.1Product description

CST-LR-51.2-280 is a battery system with an operating voltage range of 43.2~58.4V. It is used in home energy storage applications with low voltage inverter to achieve the goal of home energy storage. Built-in BMS (battery management system) can manage and monitor battery information which are includes voltage, current and temperature. What's more, BMS can balance battery charge to extend cycle life.

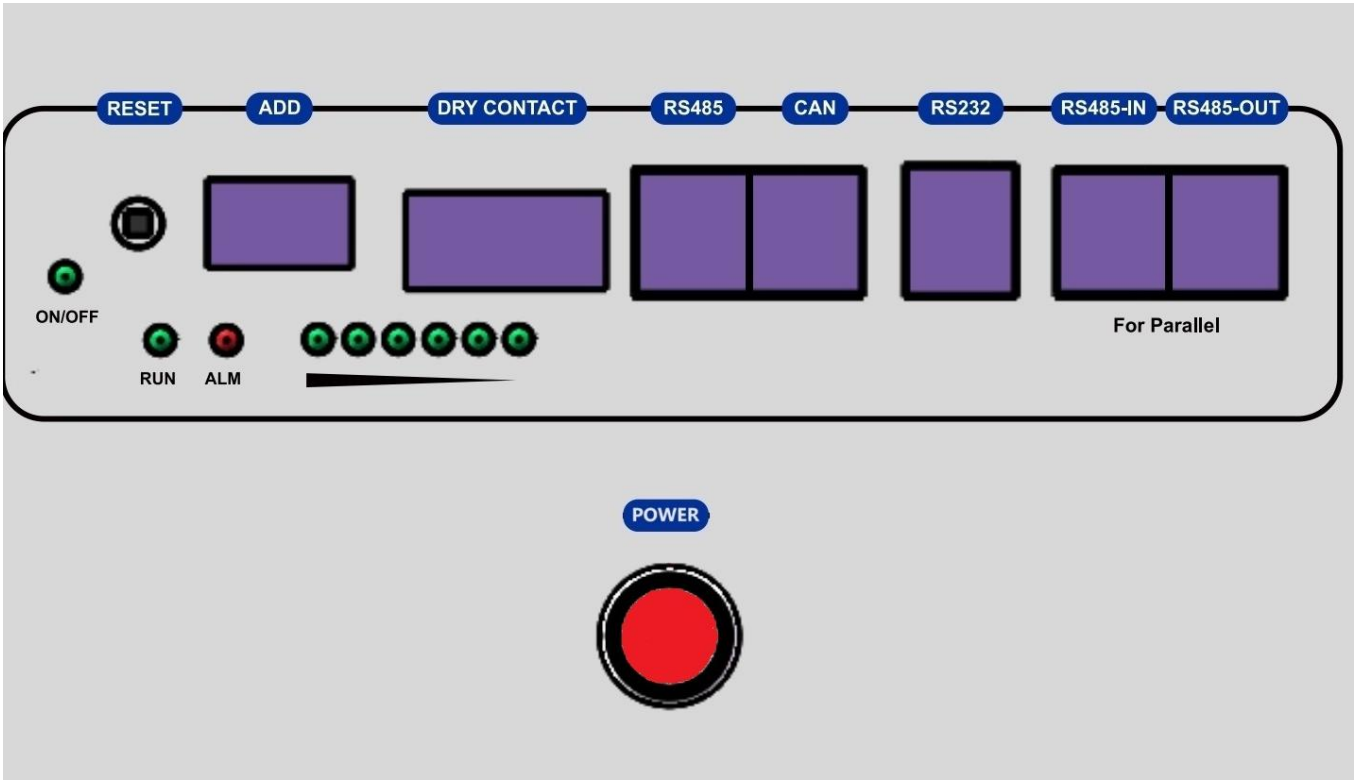
The protection functions of BMS include over-discharge, over-charge, over-current and high/low temperature; CST-LR-51.2-280 can automatically manage charging status, discharge status and balance status.

Multiple batteries can be connected in parallel to expand capacity and power. It can meet the requirements for larger capacity and longer power support time. It can be up to 4 parallel operations.

3.2 Description of the size



3.3 Switching Panel Introduction



Panel indicator information description:

No.	Name	Description	Remarks
1	POWER	Control panel switch	Battery start switch
2	RS485-IN RS485-OUT	Battery communication port in parallel	Communication within parallel battery packs
3	RS232	RS-232 bus communication port	Communication between the main battery
4	RS485/CAN	Bus communication port	Communication between the main battery pack and inverter
5	DRY	Dry contact	
6	ADD	System communication address	Set the address code of the battery PACK to distinguish between different packs
7	RESET	Reset key: To reset the system, press the reset key for 5 seconds to shut down the whole machine	The battery pack can be automatically activated by external power supply when the battery is turned off
8	ON/OFF	Battery status	When the LED light is steady on, it indicates the working state; otherwise, it indicates the sleeping state
9	RUN	Indicates the running status of the device	
10	ALM	Indicate the fault status, indicate with a red light, when there is a fault	Blinking indicates an alarm. Steady on indicates protection
11	SOC	Indicates the battery capacity status	Each LED indicates the amount of power remaining

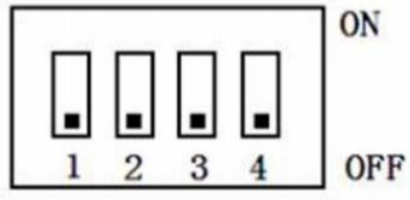
3.4 BMS Can Communicate With The Inverter

No.	1	2	3	4	5	6
Brand	PYLONTECH	GROWATT	Schneider Electric	LUXPOWER TEK	victron energy	SMA
RS485 or CAN	RS485/CAN	RS485/CAN	RS485/CAN	RS485/CAN	CAN	CAN
No.	7	8	9	10	11	12
Brand	SOROTEC Power Solutions Expert	GOODWE	STUDER	MUST	solis	eneigy
RS485 or CAN	CAN	CAN	CAN	CAN	CAN	CAN
No.	13	14	15	16	17	18
Brand	TBB POWER	PACEEX	SRNE 硕日	Voltronic Power	Deye	SAKO
RS485 or CAN	CAN	RS485	RS485	RS485	RS485	RS485

The above brands of inverters can be adapted to connect to the battery system.

Note: Refer to **Attachment 1** for the connection method.

3.5Design Of Communication Address For Multi Machine Parallel System



When packs are used in parallel, you can use the DIP switch on the BMS to set addresses to distinguish different packs.Do not set the same addresses. For the definition of the DIP switch on the BMS, see the following table

Address bits (binary) Binary Address	Switch position				illustrate explain
	1	2	3	4	
0001(1)	ON	OFF	OFF	OFF	Select "SLAVE1(0001)"for single-channel 485 communication
0010(2)	OFF	ON	OFF	OFF	Select "SLAVE2(0100)"for single-channel 485 communication
0011(3)	ON	ON	OFF	OFF	Select "SLAVE3(1100)"for single-channel 485 communication
0100(4)	OFF	OFF	ON	OFF	Select "SLAVE4(0010)"for single-channel 485 communication
0101(5)	ON	OFF	ON	OFF	Select "SLAVE4(1010)"for single-channel 485 communication
0110(6)	OFF	ON	ON	OFF	Select "SLAVE4(0110)"for single-channel 485 communication
0111(7)	ON	ON	ON	OFF	Select "SLAVE4(1110)"for single-channel 485 communication
1000(8)	OFF	OFF	OFF	ON	Select"SLAVE4(0001)"for single-channel 485 communication
1001(9)	ON	OFF	OFF	ON	Select"SLAVE4(1001)"for single-channel 485 communication
1010(10)	OFF	ON	OFF	ON	Select "SLAVE4(0101)"for single-channel 485 communication
1011(11)	ON	ON	OFF	ON	Select "SLAVE4(1101)"for single-channel 485 communication
1100(12)	OFF	OFF	ON	ON	Select "SLAVE4(0011)"for single-channel 485 communication
1101(13)	ON	OFF	ON	ON	Select "SLAVE4(1011)"for single-channel 485 communication
1110(14)	OFF	ON	ON	ON	Select "SLAVE4(0111)"for single-channel 485 communication
1111(15)	ON	ON	ON	ON	Select "SLAVE15(1111)"for single-channel 485 communication

04 Storage & Packaging

4.1 Storage environment

If the equipment is not immediately installed for use, please make sure that the storage environment meets the following conditions:

◆The equipment should be packed in packing boxes and the boxes should be sealed after placing desiccant in the packing boxes.

◆If installation is not performed within 3 days after unpacking, it is recommended that the equipment be stored in the box.

◆Storage SOC: 25~50% SOC, one charge/discharge cycle required for every 3 months of storage.

◆Storage temperature range: -20℃~40℃ for no more than 1 month; 0~35℃ for no more than 1 year.

◆Humidity range: 0~95% no condensation. The battery interface cannot be installed when there is moisture condensation.

◆The equipment should be stored in a cool place, out of direct sunlight.

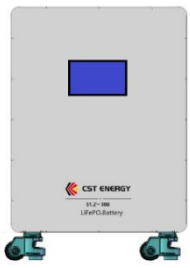
◆Equipment storage should be away from flammable, explosive, corrosive and other items.

◆No rain on the equipment.

4.2 Packing list

◆Before unpacking the battery, please check if there is any damage to the outer packaging and check the model number of the battery. If there is any abnormality, please do not unpack the box and contact the after-sales service center as soon as possible.

◆After unpacking the battery, please check if the product delivery is complete according to the package information. If there is any abnormality, please contact the after-sales service center as soon as possible.

Packing list					
Name	Qty	Photos	Name	Qty	Photos
Mainframe box	1		User Manual	1	
Data cable	1		Power cable	2	

05 System installation

5.1 Installation environment

◆The battery works best at 20℃~40℃ temperature.

◆Avoid installation in direct heat and rain environment.

◆Avoid installing in close proximity to high temperature heat sources or low temperature cold source environments.

◆Avoid installation in areas with extreme variations in ambient temperature.

◆Avoid installation in strong interference environments.

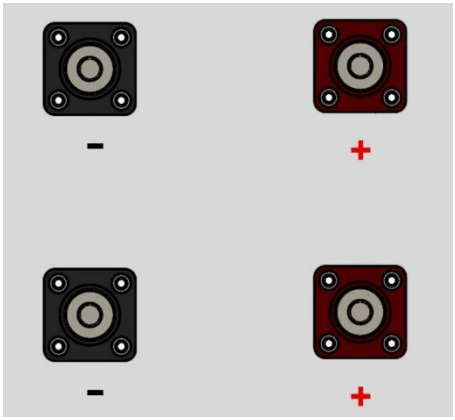
◆Avoid installation in sites that are accessible to children.

◆Avoid installing in areas prone to water accumulation.

◆Do not place flammable or explosive items around the equipment.

5.2 Connection to power cable

5.2.1 Connection to the inverter



◉ Red power cable pressure corresponds to the red outer skin harness, black power cable corresponds to the black outer skin harness, harness cross-sectional area 35mm². The wire material should meet the outdoor use standard.

◉ Withstanding voltage level DC1500V, temperature resistance -40℃~200℃.

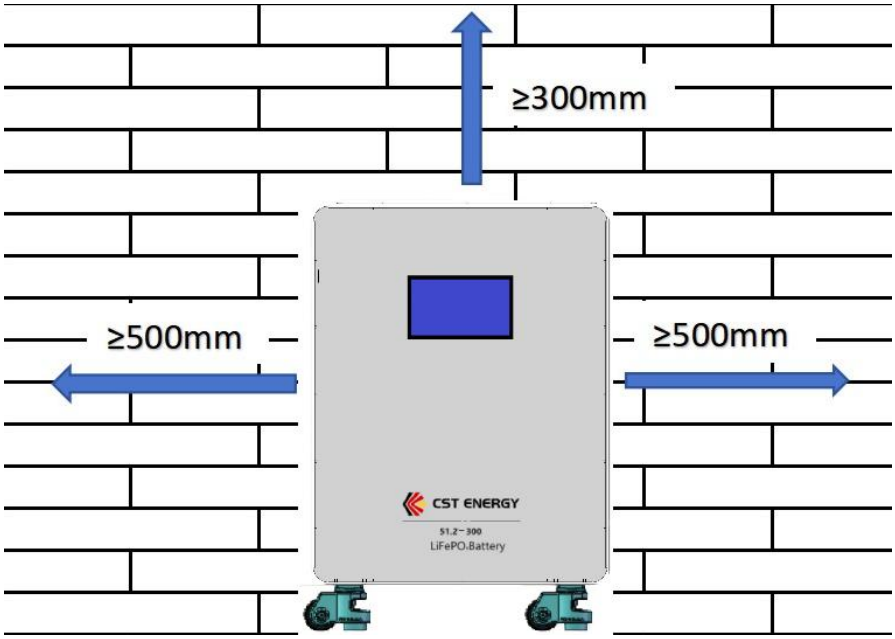
◉ When using a stand-alone machine, the two power interfaces are connected either way, and the other power interface needs to be covered with a protective cover.

◉ When using multiple machines in parallel, connect the positive terminal of the power interface between batteries to the positive terminal and the negative terminal to the negative terminal. The last battery is reserved for one way power interface should be covered with a protective cover.

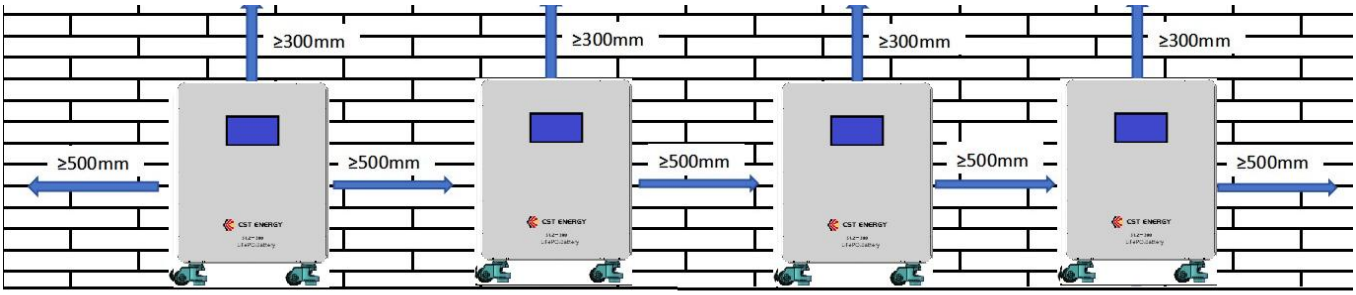
◉ The parallel power cables between cells should be as short as possible in compliance with the installation connection.

5.2.2 Installation distance

The left and right distance between pack is the recommended distance, and the distance is reduced as much as possible on an operable basis.



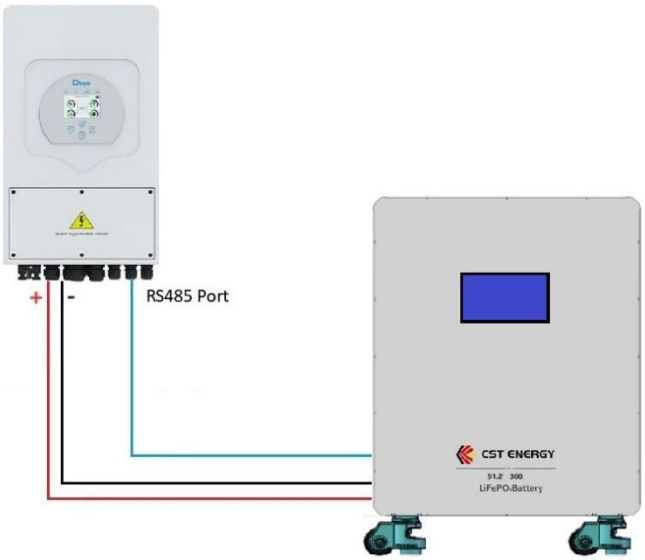
5.2.3 Installation distance



06 System Wiring

6.1 Battery wiring overview diagram

6.1.1 Connection to the inverter

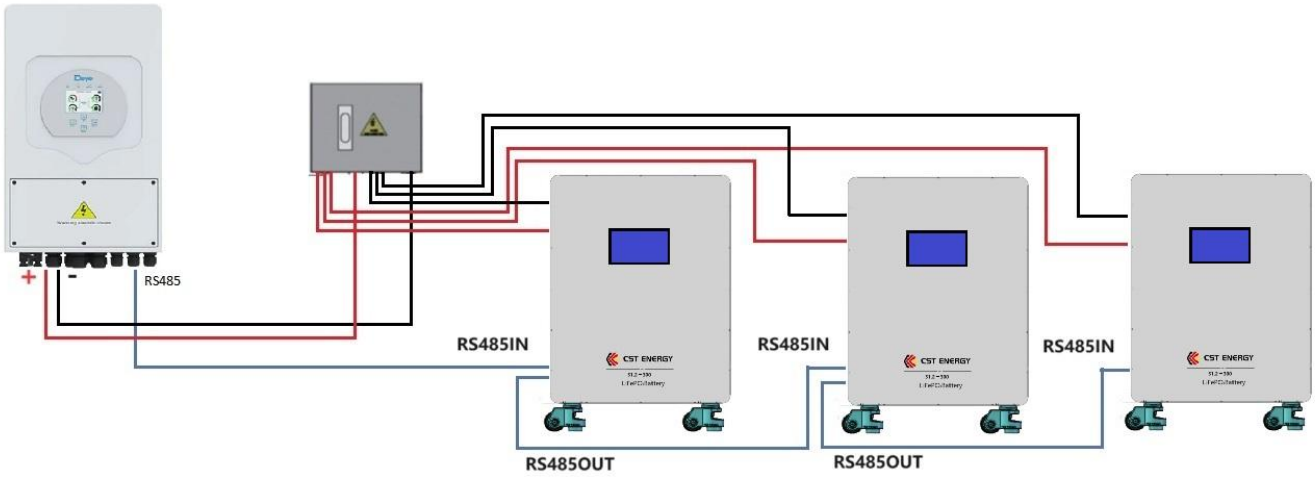


---------- Positive harness

---------- Negative harness

---------- RS485 or CAN Communication cable

Parallel connection



---------- Positive harness

---------- Negative harness

---------- RS485 or CAN Communication cable

Note: For operational safety and regulatory compliance, a separate DC overload protector or disconnect between the battery and inverter is required.

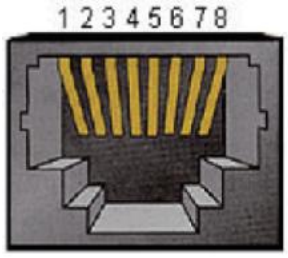
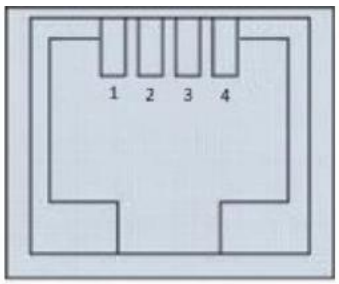
Supports up to four batteries max packs in parallel.

Warning: All wiring must be performed by a professional. Using the proper cable for battery connection is very important for safe and efficient system operation. To reduce the risk, please use the cables provided by our company, or the cable specification recommended by us.

CAUTION!	Do not place any objects on the positive and negative outputs of the battery, otherwise it may cause short circuit or heat. Be sure that the positive and negative connectors are installed in place, otherwise the battery may overheat. Before making connections, make sure that the circuit breaker or isolation between the inverter and the battery is disconnected and that the positive battery terminal (+) must be connected to the positive inverter terminal (+) and the negative battery terminal (-) must be connected to the negative inverter terminal (-).

6.2Connection to communication cable

The product has RS485, CAN, and external communication port, all using 8P8C vertical RJ45 socket. You need to make sure the wiring is correct when communicating.

	
CAN、RS485 1、 RS485 2	RS232

CAN Port Name		RS485 Port Name		RS485 B Port Name		RS232 Port Name	
RJ45 Label	Definition	RJ45 Label	Definition	RJ45 Label	Definition	RJ45 Label	Definition
1,2,7,8	GND	1,8	RS485-B	1,8	RS485-B	1，2，6	GND
3,4	CAN-H	2,7	RS485-A	2,7	RS485-A	4	RX
5,6	CAN-L	3,4,5,6	GND	3,4,5,6	GND	3	TX
						5	GND

DIP switch setting

Address	DIP switch setting			
	1	2	3	4
1	ON	OFF	OFF	OFF

The dialing address needs to be set to “1” when the product communicates with the inverter.

07 System Operation

7.1 Turn on

Note: Please check the power and communication cables again, make sure they are correctly connected before power on.

7.2 Standby

Press the metal switch on the side of the battery, the ON/OFF indicator turns off and the battery enters standby mode.

7.3 Display screen operation

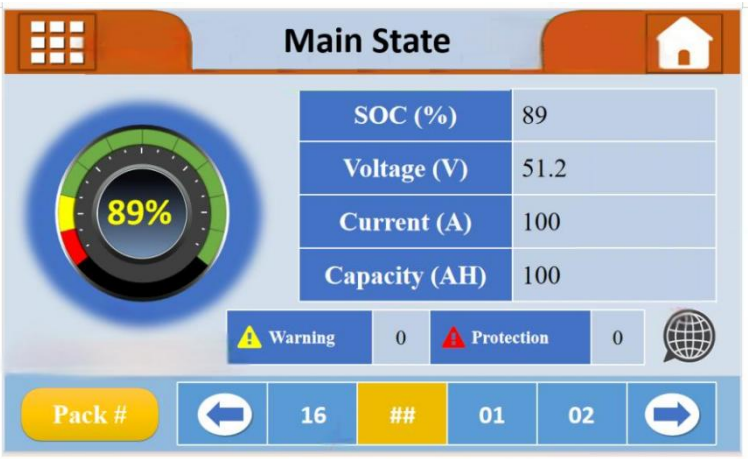
7.3.1 Icon Description:

	Main menu , click to enter the main menu
	Homepage, click to enter the homepage
	System Settings/Language Selection

7.3.2 Introduction of the UI

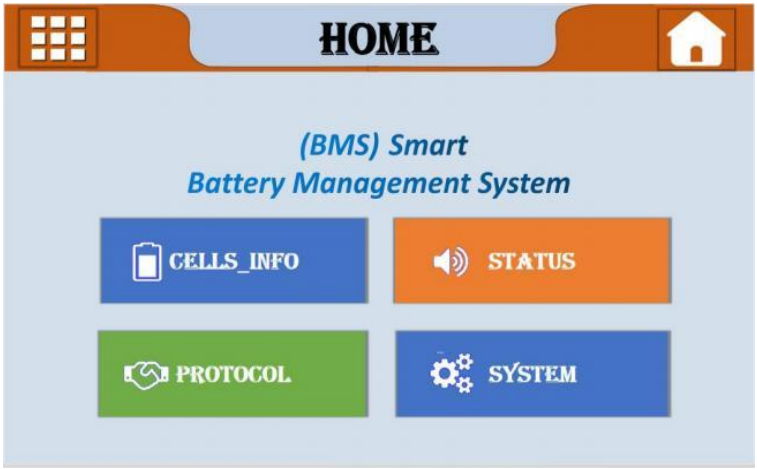
Description: Welcome page, power on for 3 seconds, used for program preparation communication and data exchange with BMS motherboard; Then enter the main status page;

Main state page

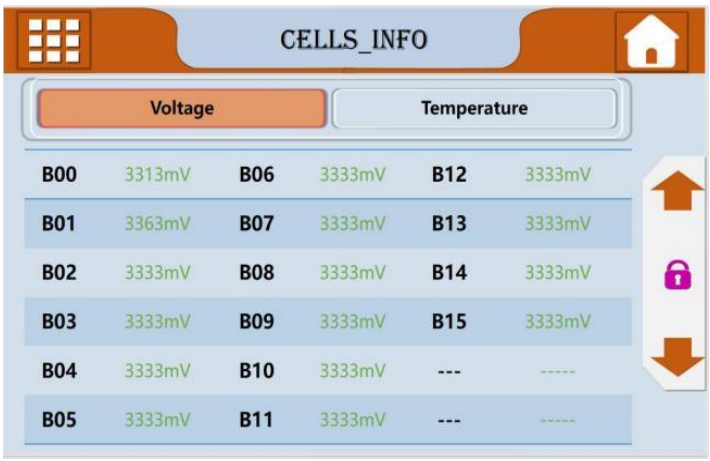


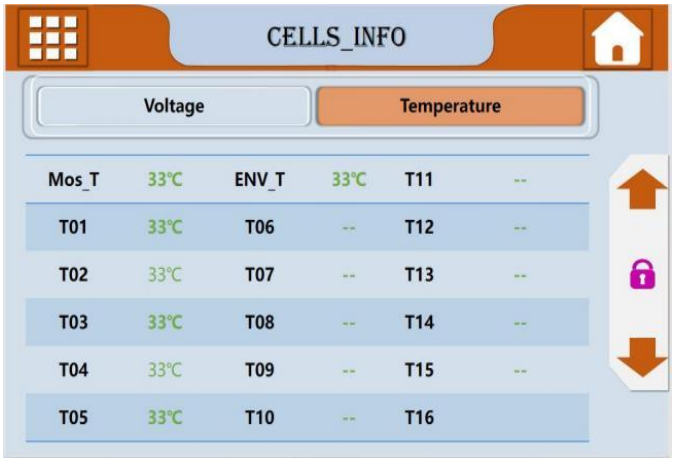
Note: After 3 seconds ,it will enter main state page;From now on, will automatically enter the main page when active screen;

Menu Page

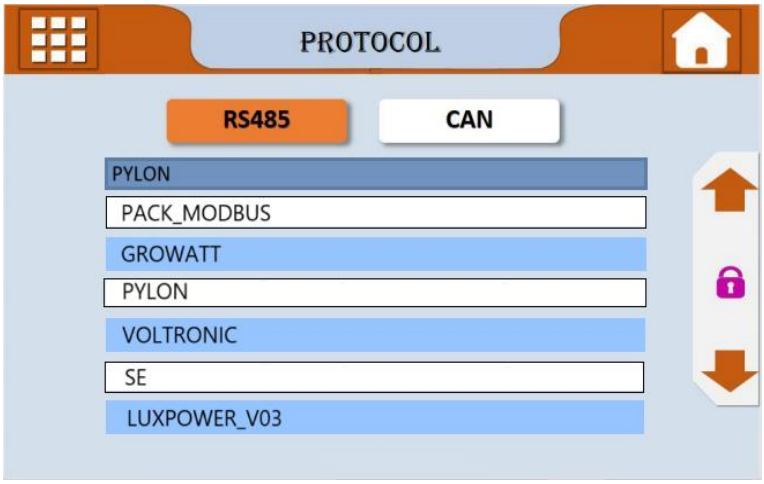


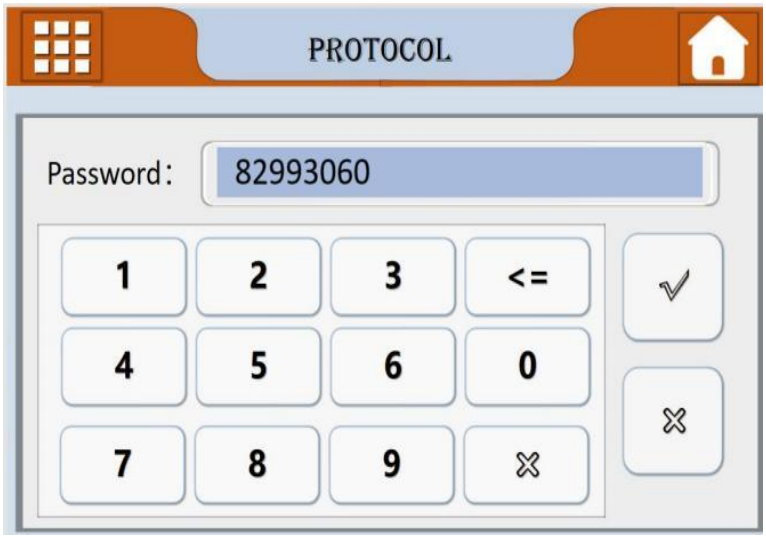
Cells info





Protocol page





Note: The default unlock password is 82993060; When modifying the protocol again, exit the current protocol and re authenticate.

System page

Menu structure:

- Welcome interface (power on for 3 seconds, enter the main status interface)
- Min state page
  - SOC(Total)
  - Current
  - Voltage
  - Warning
  - Protection
  - Pack selector （Parallel selection）
  - Language selection icon, linked to [System Settings]
- HOME （Menu）
  - Cells Info
    - Voltage
      - Cell 01 Voltage
      - Cell 02 Voltage
      - … …
      - Cell 16 Voltage
    - Temperature
      - NT1
      - NT2
      - NT3
      - NT4
      - Mos_T
      - ENV_T
      - … …
  - BMS Status
  - Warning/Protect/Fault

- PROTOCOL
  - CAN
    - GOOD WE PROTOCOL
    - LV BMS Protocol(CAN) for Solar Inverter Family EN_V 1.5
    - PYLON PROTOCOL 2.0
    - Pylon CAN bus protocol V 2.0.420211122
    - SMA PROTOCOL
    - SMAFSS-Connecting Bat-TI-en-20W
    - GROW ATT_PROTOCOL
    - Growatt BMS CAN-Bus-protocol-low-voltage
  - RS485
    - USER_485_VOLTRON
    - Voltronic Inverter and BMS 485 communication protocol 20200325(1)
    - PYLON
    - RS485-protocol-pylon-low-voltag
    - Luxpowertek Battery Protocol RS 485_V 01
- SYSTEM
  - Language select （English, Chinese, Traditional Chinese, Russian, etc）
  - System No.
    - PACK SN
    - Product model
    - BLUETOOTH SN

7.3.3. Hibernation/Shutdown

In normal operating mode, after 3 minutes of no non-touch, the system will enter sleep/shutdown mode. In the shutdown/sleep mode, clicking on any position on the color screen will activate the display screen and enter the main status page. At the same time, the authorization will be reset to zero.

7.3.4. Permission specification

Permissions are divided into three levels:
1、No permission: you can browse the welcome page, main status page; Restrict the browsing of other cell details and fault alarm details;
2、Operator rights: can browse all page, can choose language options, can not set and modify the protocol;
3、Administrator rights: you can browse all page, you can choose language options, you can set and modify the cooperation;
4、Protocol permission security: re-enter the protocol setting page need to re-enter the administrator password, exit the protocol page entered password will be cleared;
5、Password: administrator password:82993060, operator password:87654321

7.4 LED Indicator status description

Status	Normal Alarm Protection	ON/ OFF	RUN	ALM	Power Indicator LED						Memo
		●	●	●	●	●	●	●	●	●	
Power Off	Dormancy	Off	Off	Off	Off	Off	Off	Off	Off	Off	All off
Standby	Normal	On	Flash1	Off	Based on power						Standby status
	Alarm	On	Flash1	Flash3							Modular low power
Charging	Normal	On	On	Off	Based on power (Maximum power indication LED Flash2)						Maximum power indication LED Flash2, ALM does not flash during overcharge alarm.
	Alarm	On	On	Flash3							
	Overcharge protection	ON	On	Off	On	On	On	On	On	On	If there is no utility power, the indicator turns to standby
	Temperature, over current, failure protection	On	Off	On	Off	Off	Off	Off	Off	Off	Stop charging
Discharging	Normal	On	Flash3	Off	Based on power						
	Alarm	On	Flash3	Flash3							
	Low power protection	On	Off	Off	Off	Off	Off	Off	Off	Off	Stop discharging
	Temperature, over current, short circuit, bad connection, failure protection	On	Off	On	Off	Off	Off	Off	Off	Off	Stop discharging
Failure		Off	Off	On	Off	Off	Off	Off	Off	Off	Stop charging/discharging

7.5 Capacity learning

Newly installed batteries will set the nominal capacity and capacity of circulation according to the battery capacity, and carry out a capacity learning, otherwise capacity inaccuracy problems may occur. Capacity learning operation: first fully charge to over-voltage protection, then discharge to under-voltage protection, and then charge again.

7.6 Description of capacity indication

Status		Charging						Discharging					
Capacity indicator		L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●
Capacity (%)	0~16.6%	Off	Off	Off	Off	Off	Flash2	Off	Off	Off	Off	Off	On
	16.6~33.2%	Off	Off	Off	Off	Flash2	On	Off	Off	Off	Off	On	On
	33.2%~49.8%	Off	Off	Off	Flash2	On	On	Off	Off	Off	On	On	On
	49.8%~66.4%	Off	Off	Flash2	On	On	On	Off	Off	On	On	On	On
	66.4%~83%	Off	Flash2	On	On	On	On	Off	On	On	On	On	On
	83%~100%	Flash2	On	On	On	On	On	On	On	On	On	On	On
Running Light		On						Flash （Flash3）					

08 Maintenance

Item	Value
If the battery is not put into use, the battery needs to be fully charged and discharged to 25~50%.	Every 3 months
Check whether the wall bracket is installed loosely, if so, please tighten the corresponding position.	Every 6 months
Check if there is any damage to the shell, if there is, please refinish the paint or contact the after-sales service center.	Every 6 months
Check whether the exposed wire is worn, if so, please replace the corresponding cable or contact the service center.	Every 6 months
Check whether there is debris accumulation around the battery, if there is, please clean up so as not to affect the battery heat dissipation.	Every 6 months
Check for water or pests to avoid long-term battery intrusion.	Every 6 months

WARNING

◆If you find any problem that may affect the battery or the battery and energy storage inverter system, please contact the after-sales service, disassembly is prohibited.

◆If you find the conductive wire internal copper wire exposed, it is forbidden to touch, high voltage danger, please contact the after-sales personnel, forbidden to disassemble.

◆If other emergencies occur, please contact the after-sales staff first and operate under the guidance of the after-sales staff, or wait for the after-sales staff to operate on site.

8.1Requirements for replenishment and charging during normal storage

Batteries should be stored in an environment with a temperature range of -10 ℃ ~ +45 ℃, and perform regular maintenance at 0.5C (100A) current according to the table below until 40% SOC after long-term storage.

Temperature of storage environment	Relative temperature of storage environment	storage time	SOC
Lower than-10℃	/	Forbid	/
-10~25℃	5%~70%	≦12months	30%≦SOC≦60%
25~35℃	5%~70%	≦12months	30%≦SOC≦60%
35~45℃	5%~70%	≧3months	30%≦SOC≦60%
Higher than 45℃	5%~70%	Forbid	/

8.2 Replacement or expansion

Battery maintenance requires specialized personnel.

1. Please cut off the entire system including the Inverter and battery system before replacing or expanding the capacity; disconnect the Inverter and battery system from the power grid at the same time.

2. Turn off the battery power and disconnect the connection line between the battery and the Inverter after confirming that the Inverter is disconnected from the power grid.

8.4.Emergency situations

Please cut off the power supply and turn off the battery in case of an emergency.

1) Wet battery

Please keep it away from the person if the battery pack gets damp or soaked in water, and then contact **CONSTANCE ENERGY CO., LTD**. or an authorized dealer for technical support.

2) Fire

Don't use water! Must only use dry powder fire extinguishers; if possible, move the battery pack to a safe area before it catches fire.

3) Leaking battery

Avoid contact with the leaked liquid or gas if the battery pack leaks electrolyte. Take the following actions immediately if anyone comes into contact with the spilled material.

Inhalation: Evacuate contaminated areas and seek medical assistance.

In contact with eyes: Flush eyes with running water for 15 minutes and seek medical assistance.

In contact with skin: Wash the affected area thoroughly with soap and water and seek medical assistance.

Ingestion: Provokes vomiting and seek medical assistance.

Attachment 1：

Communication settings between inverters of various brands and battery BMS

Inverter brand		RS485 or CAN	Protocol Name
PACE		RS485	PACE_RS485_Modbus_UN
SRNE		RS485	RS485 Modbus V1.3
Voltronic		RS485	Voltronic RS485 Inverter V1.5
PYLON		RS485	PYLON RS485 LV V3.5
		CAN	PYLON CAN Inverter EMS
Growatt		RS485	Growatt RS485 V2.02
		CAN	Growatt CAN LV V1.05
Schneider		RS485	Schneider V2.0
		CAN	Schneider CAN V2.0
Luxpower		RS485	Luxpower tek RS485 Inverter V0.3
		CAN	Luxpower tek CAN V1.0
Victron		CAN	Victron CAN
Sorotec		CAN	Sorotec CAN Inverter V1.0
SMA		CAN	SMA CAN V2.0
GoodWe		CAN	GoodWe CAN Inverter LV V1.7
STUDER		CAN	STUDER CAN V1.02
MUST		CAN	MUST CAN PV1800F
GINLONG		CAN	GINLONG CAN LV V1.0
Senergy		CAN	Senergy CAN V1.1
TBB		CAN	TBB CAN V1.05
Deye		RS485	PYLON RS485 LV V3.5
SAKO		RS485	PYLON RS485 LV V3.5

CST ENERGY

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