

PRODUCT SPECIFICATION

Product _____ Low-voltage BMS _____

Name:

Model: _____ TB03-P16S(100A/120A/150A/200A/300A) _____

Version: _____ V2.5 _____

Compiler: Lucas

Reviewer: Ethan

Ratify: Gary

2026-1-10

2026-1-11

2026-1-12

The copyright of this document belongs to Shenzhen Tringo Control Co., Ltd., and it shall not be copied without written approval

Revision History			
Date	Revision version	Revision Notes	Reviser
2025-9-20	V1.0	New formulation	Sherry
2025-10-15	V2.0	Wi-Fi/Bluetooth module structure and size optimization; power board current calibration value recording optimization.	Sherry
2025-10-17	V2.1	Optimize drawings	Sherry
2025-12-16	V2.3	Optimize communication interface	Sherry
2026-1-23	V2.4	Optimize pictures	Sherry
2026-4-16	V2.5	Optimize parameters	Zhao Haimei

Catalog

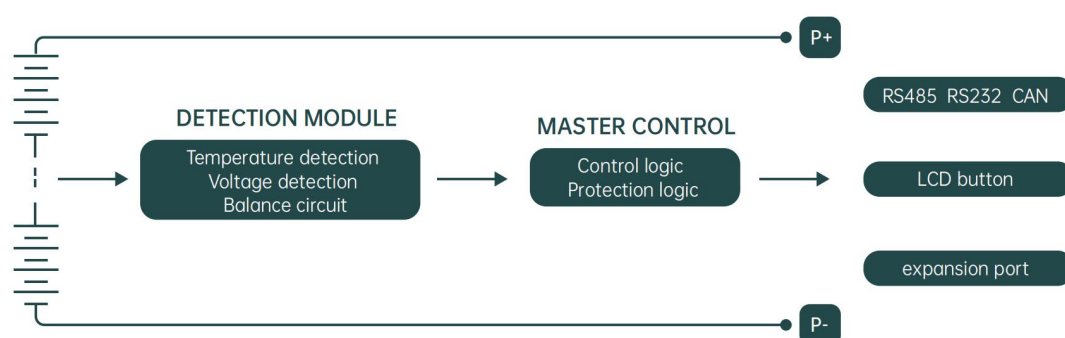
1. Overview of the solution	4
1.1. Introduction	4
1.2. Solution topology diagram	4
1.3. Application environment	4
2. Overview of product	5
2.1. Product details list	5
2.2. Expandable Accessories and Customization Options	5
2.3. Parameter list	6
2.4. Communication protocol list	7
2.5. Main board size	8
2.6. Power board dimensions	10
3. Port function	11
3.1. Main board port function diagram	11
3.2. Main board port definition table	12
3.3. Communication port diagram	15
3.3.1. Parallel communication RS485-2 and Host computer communication port RS232	15
3.3.2. Inverter communication port RS485-1 and CAN	15
3.4. LED indicator instruction	16
4. BMS installation instructions	17
4.1. Safety regulations requirements	17
4.2. BMS installation steps	19
4.3. BMS parallel instructions	20
4.3.1. Auto-Addressing Parallel System Setup	20
5. Parameters list	23
6. Configure parameters and protocols	27
7. Main function description	28
7.1 Voltage detection and protection	28
7.2 Current detection and protection	29
7.3 Temperature detection and protection	29
7.4 Balance function	30
7.5 Pre-charging function	30
7.6 Communication function	30
7.7 SOC calculation and calibration	31
8. Version comparison table	31

1. Overview of the solution

1.1. Introduction

TB03-P16S is suitable for low voltage household storage system, supporting up to 16 cells in series, a total of 16-channel voltage detection, 5-channel temperature detection (4-channel cell detection, 1-channel MOS detection); It can realize a variety of fault alarms and protections, such as over-charging, over-discharging, over-current, over-temperature, under-temperature, short-circuit, etc., The battery main circuit employs a three-tier protection strategy incorporating MOS, controllable fuses, and circuit breaker tripping mechanisms to thoroughly eliminate safety risks. This solution is equipped with two RS485 channels, one CAN communication interface, and one RS232 interface, ensuring full compatibility with mainstream inverters on the market. The product can be connected in parallel through the RS485 to realize multi-groups and the maximum number of parallel groups is 16. It can use the host computer to set parameters, troubleshooting, remote monitoring through WIFI to achieve remote management.

1.2. Solution topology diagram



1.3. Application environment

Index item	Parameter&Description
Use ambient temperature range	-20°C ~ 70°C
Storage environment temperature range	-40°C ~ 85°C
Use ambient humidity range	5 ~ 95 (45°C±2°C) %RH
Storage environment humidity range	≤95 (45°C±2°C) %RH
Atmospheric pressure	76 ~ 106 Kpa
Altitude	≤2000 m; above 2000 m Meet 《GB/T-7251.1》
Heat dissipation mode	Natural heat dissipation

IP rating

IP20

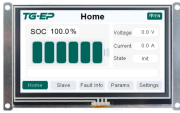
2. Overview of product

2.1. Product details list

Name		Quantity	Unit	Remarks
BMS main board		1	Pc	
BMS power board (100A/120A/150A/200A/300A)		1	Pc	Multi-current level compatible
Display screen (Optional)		1	Pc	For optional configurations, refer to Section 2.2
Battery SOC Indicator Board (Optional)		1	Pc	For optional configurations, refer to Section 2.2
WIFI/Bluetooth (Optional)		1	Pc	For optional configurations, refer to Section 2.2
Wire harness	Voltage Sampling Wire	1	Set	
	NTC Temperature Sensor	1	Set	
	Power Board Cable	1	Set	
	Display Screen Communication Wire	1	Pc	
	Switch wire	1	Pc	
	External breaker trip cable (optional)	1	Pc	

2.2. Expandable Accessories and Customization Options

Category	Optional	Product Photo	Configuration Description
Display	2.8" LCD Screen		Basic parameter display and configuration, suitable for general energy storage systems to meet common monitoring requirements.
	4.3" Resistive Touch Screen		Designed for industrial environments; supports glove and general object touch operation. Enables local parameter configuration and parallel system data viewing.

	4.3" Capacitive touch screen		Fast touch response with high-definition display. Supports local parameter configuration and parallel system data viewing.
	Segment LCD Display		Basic parameter display and configuration, suitable for general energy storage systems to meet common monitoring requirements.
Battery Level Indication	On-board LED Level Bar (Main Board)	/	Native integrated solution on the main board, directly showing battery level and system status. Low cost and high integration.
	External Battery Level Indicator Board		Independent external solution for flexible installation.
Communication	On-board WIFI/Bluetooth Wireless	/	Supports wireless data transmission and remote monitoring via mobile APP. Optional, not configured by default.
Current Limiting	On-board Current Limiting Board	/	Hardware current limiting at 10A. Optional, not configured by default.

2.3. Parameter list

Parameter item	Parameter&Description
Main board external size	150*100mm
Power board external size	100A/120A:115*110mm 150A/200A:170*110mm 300A:300*110mm
Working mode	Normal working mode, sleep mode
Rated voltage	51.2VDC
Rated current	100A/120A/150A/200A/300A
Maximum continuous charging current	100A/120A/150A/200A/300A
Maximum continuous discharge current	100A/120A/150A/200A/300A
Power consumption	Normal operation power consumption ≤6W
Battery side static sleep current	≤0.3mA
Number of single voltage detection channels	16 Channels

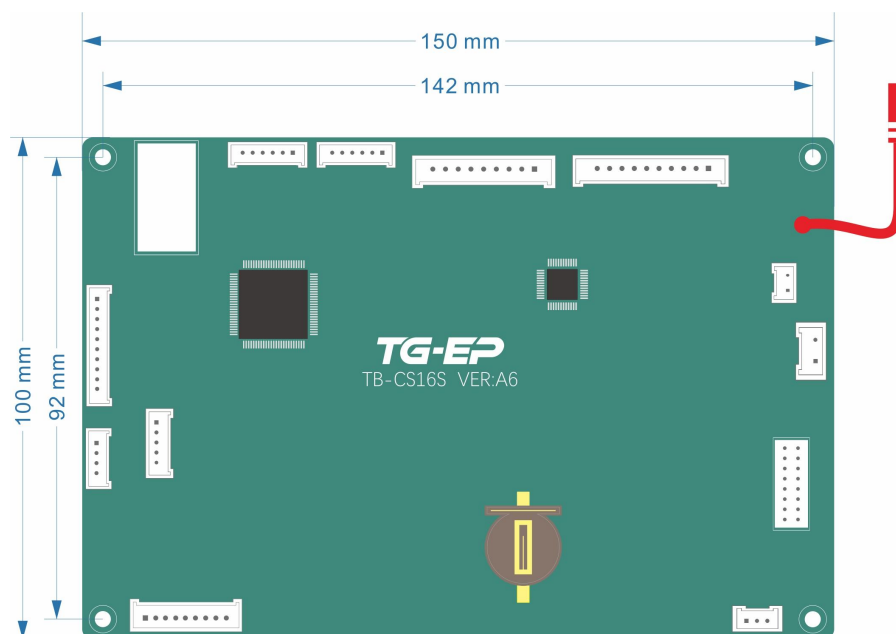
Parameter item	Parameter&Description
Individual voltage detection	2 ~ 4.5VDC, $\leq \pm 10\text{mV}$, $-10^{\circ}\text{C} \sim +55^{\circ}\text{C}$
Busbar current detection	$> 50\text{A}$, $\pm 2\%$; $\leq 50\text{A}$, error $\leq 1\text{A}$
Temperature detection number and accuracy	5-channel temperature acquisition channel (4-channel cell detection, 1-channel MOS detection) Cell and MOS temperature detection: $\leq \pm 3^{\circ}\text{C}$ @ $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Battery total voltage detection accuracy	0 ~ 60V DC, $\leq \pm 0.1\text{V}$
SOC accuracy	$\leq \pm 5\%$
Single battery balancing method	Passive discharge balancing, $100\text{mA} \pm 20\%$
Power Level Segments	4 ~ 6
Communication mode	1*CAN、2*RS485、1*RS232、WIFI/Bluetooth
Data storage	≥ 10000 historical data records
Pre-charging function	Support
SOP function	Support
One-button power on	Support
Upper computer	Support
Program upgrade	Support

2.4. Communication protocol list

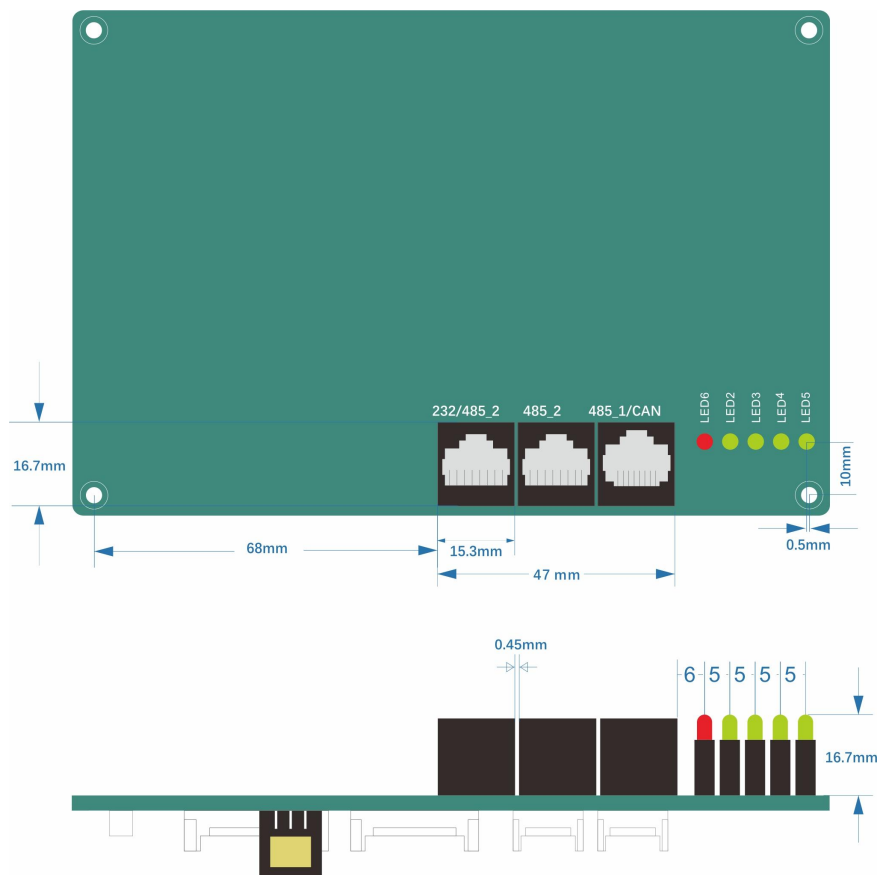
Sequence number	Host computer	RS485 communication protocol	Host computer	CAN communication protocol
1	0x00-DEYE	DEYE	0x00-Solis	Solis
2	0x01-Voltronic	Voltronic	0x01-Sofar	Sofar
3	0x02-Growatt	Growatt	0x02-Growatt	Growatt
4	0x03-Pylon	Pylon(default)	0x03-Victron	Victron
5	0x04-SRNE	SRNE	0x04-LXP	LXP
6	0x05-INVT	INVT	0x05-SMA	SMA
7	0x66-TG-EP	TG-EP	0x06-SRNE	SRNE
8			0x07-Pylon	Pylon
9			0x08-DEYE	DEYE(default)

2.5. Main board size

Front:

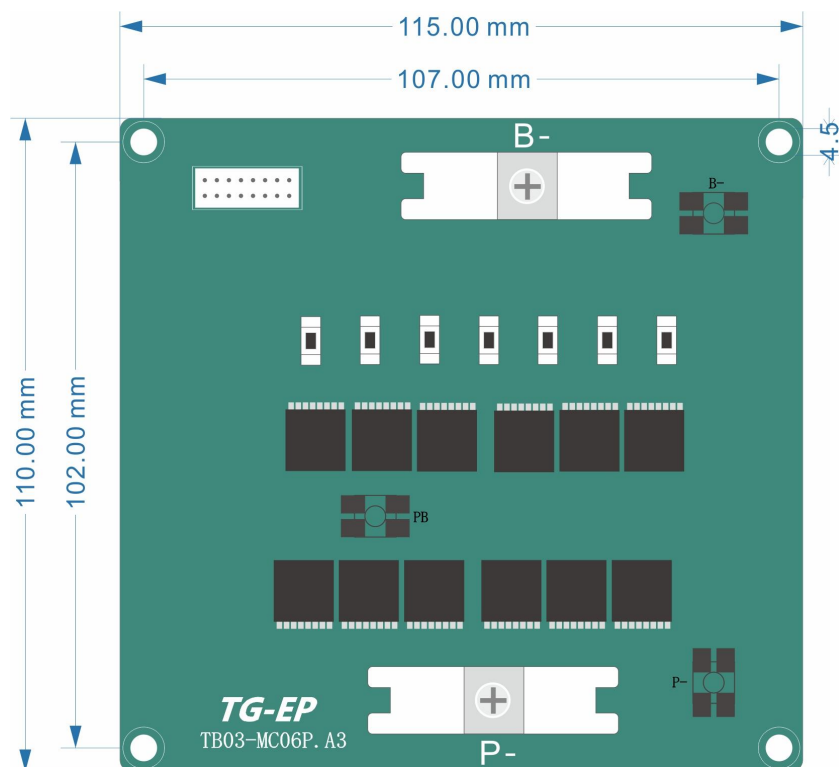


Back:

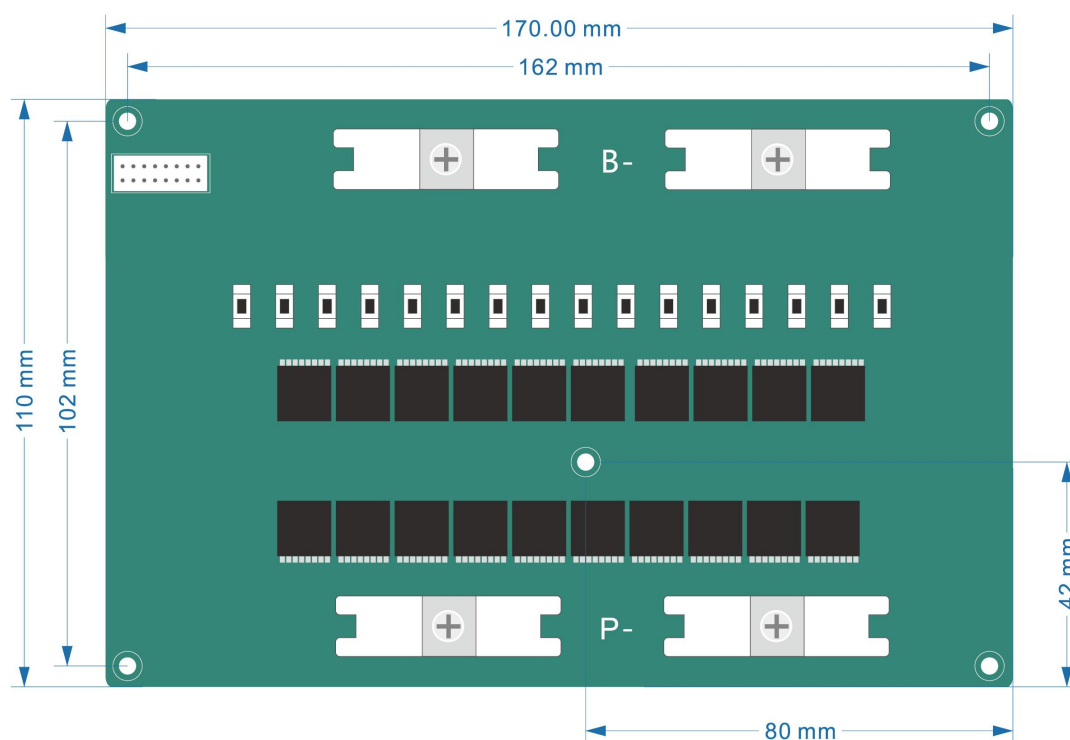


2.6. Power board dimensions

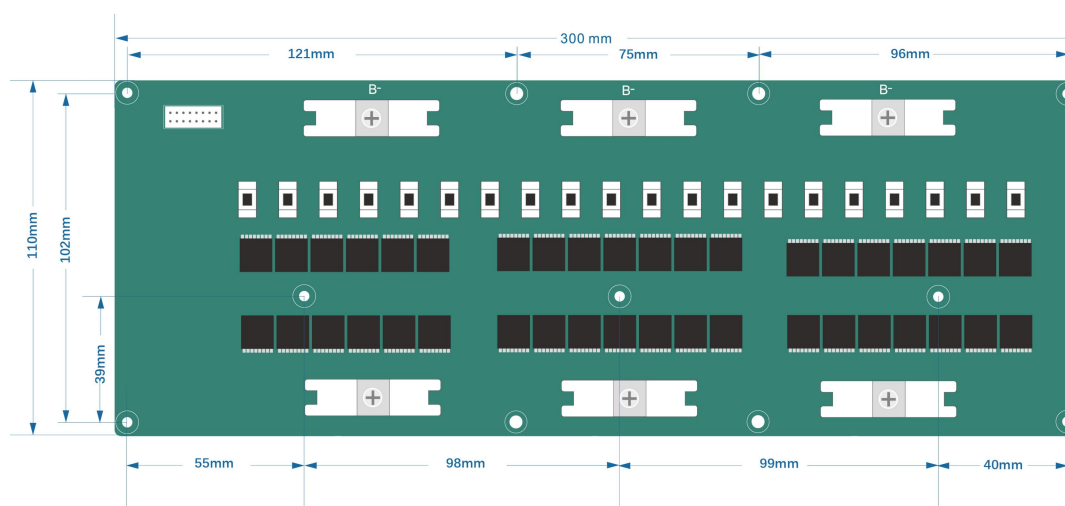
100A/120A:



150A/200A:

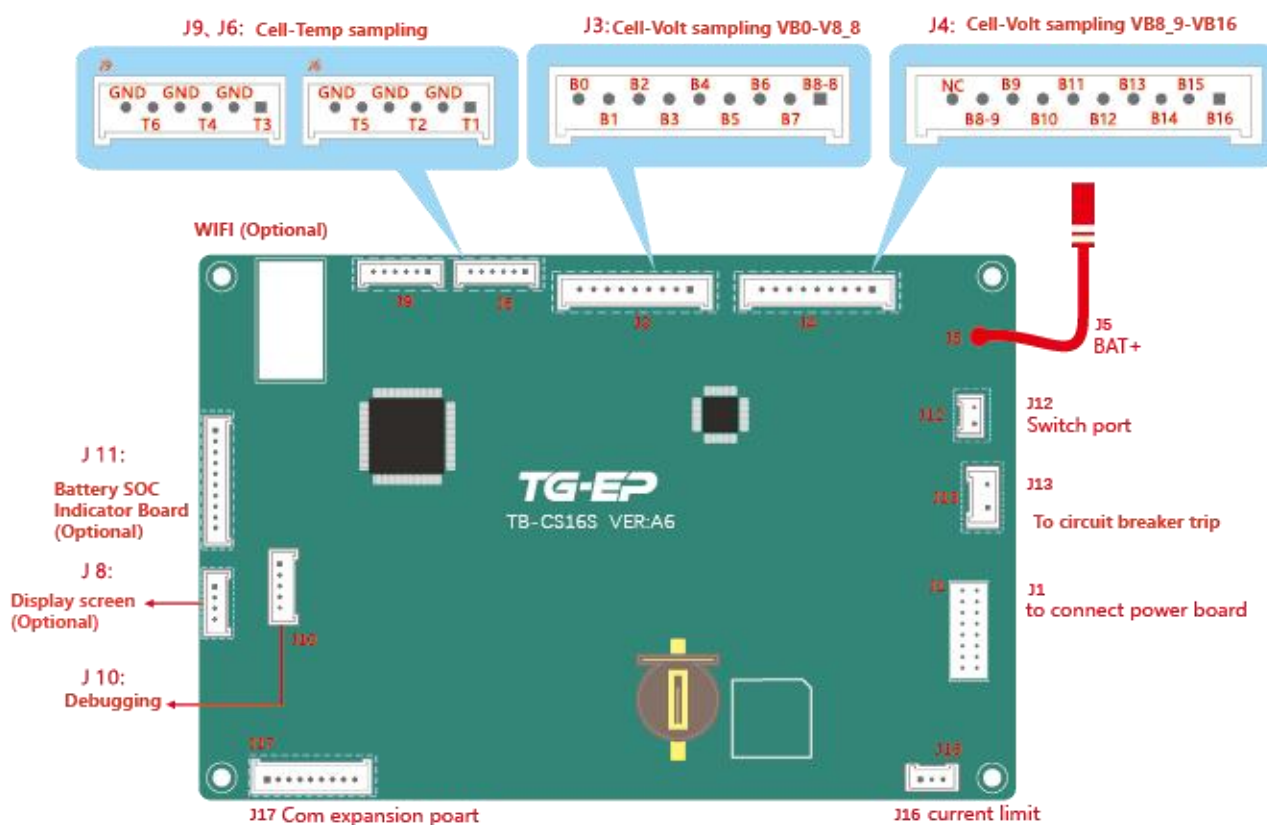


300A:



3. Port function

3.1. Main board port function diagram



3.2. Main board port definition table

Mark	Functional Description	Load	Remark
J6 (Cell temperature sampling)			
TEMP1	Temperature detection1+	/	
GND	Temperature detection-	/	
TEMP2	Temperature detection2+	/	
GND	Temperature detection-	/	
TEMP5	Temperature detection5+	/	
J9 (Cell temperature sampling)			
TEMP3	Temperature detection3+	/	
GND	Temperature detection-	/	
TEMP4	Temperature detection4+	/	
GND	Temperature detection-	/	
TEMP6	Temperature detection6+	/	
GND	Temperature detection-	/	
J3 (Cell voltage sampling)			
VB0	Cell negative	/	
VB1	1#Cell voltage detection	5V,5mA	
VB2	2#Cell voltage detection	5V,5mA	
VB3	3#Cell voltage detection	5V,5mA	
VB4	4#Cell voltage detection	5V,5mA	
VB5	5#Cell voltage detection	5V,5mA	
VB6	6#Cell voltage detection	5V,5mA	
VB7	7#Cell voltage detection	5V,5mA	
VB8_8	8#Cell voltage detection	5V,5mA	
J4 (Cell voltage sampling)			
NC	/	/	
VB8_9	8#Cell voltage detection	5V,5mA	impedance correction
VB9	9#Cell voltage detection	5V,5mA	

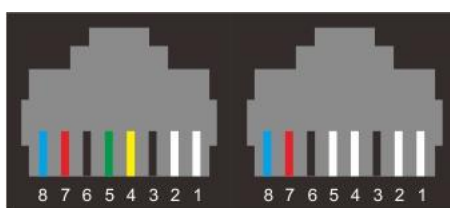
Mark	Functional Description	Load	Remark
VB10	10#Cell voltage detection	5V,5mA	
VB11	11#Cell voltage detection	5V,5mA	
VB12	12#Cell voltage detection	5V,5mA	
VB13	13#Cell voltage detection	5V,5mA	
VB14	14#Cell voltage detection	5V,5mA	
B15	15#Cell voltage detection	5V,5mA	
VB16	16#Cell voltage detection	5V,5mA	
J12 (Power switch)			
2.54-2P	On/off switch	/	
J1 (Power board port)			
2.0-12P	Power board interface	/	
J13 (External circuit breaker trip)			
B+	Power Supply	/	
MCU_TRIP	External circuit breaker trip	/	
J10 (debugging port)			
3.3V	St-link	/	
CLK	St-link	/	
DIO	St-link	/	
RST	St-link	/	
B-	St-link	/	
J8 (display port)			
5V	Power supply	/	
TX	Communication	/	
RX	Communication	/	
GND	GND	/	
J11 (LED light)			
5V	Power supply	/	
GND	GND	/	
L1	Power Level Indicator 1	/	Indicates 0% to 25% capacity.

Mark	Functional Description	Load	Remark
L2	Power Level Indicator 2	/	Indicates 25.1% to 50% capacity.
L3	Power Level Indicator 3	/	Indicates 50.1% to 75% capacity.
L4	Power Level Indicator 4	/	Indicates 75.1% to 100% capacity.
L6	Power Level Indicator 5	/	Reserved
L6	Power Level Indicator 6	/	Reserved
L7	Fault indicator light	/	Reserved
J15 (Parallel communication RS485-2 and Host computer communication RS232)			
NC	/	/	2
GND	GND	/	3
USART2_TX	Communication	/	4
USART2_RX	Communication	/	5
GND	GND	/	6
RS485_2A	485 Communication 2	/	7
RS485_2B		/	8
J2 (Parallel communication RS485-2)			
NC	/	/	2
GND	GND	/	3
NC	/	/	4
NC	/	/	5
GND	GND	/	6
RS485_2A	485 Communication 2	/	7
RS485_2B		/	8
J7 (Inverter communication RS485-1 and CAN)			
RS485_1A	485 Communication 1	/	1
RS485_1B		/	2
GND	GND		3
CANH	CAN Communication	/	4
CANL		/	5
GND	GND	/	6

Mark	Functional Description	Load	Remark
RS485_1A	485 Communication 1	/	7
RS485_1B		/	8
LED indicator on board			
LED6	Fault indicator	/	
LED2 (L1)	Power Level Indicator 1	/	Indicates 0% to 25% capacity.
LED3 (L2)	Power Level Indicator 2	/	Indicates 25.1% to 50% capacity.
LED4 (L3)	Power Level Indicator 3	/	Indicates 50.1% to 75% capacity.
LED5 (L4)	Power Level Indicator 4	/	Indicates 75.1% to 100% capacity.

3.3. Communication port diagram

3.3.1. Parallel communication RS485-2 and Host computer communication port RS232



J15:
RS485-2
/RS232

J2: RS485-2

Position No.	8	7	6	5	4	3	2	1
Definition	RS485_2B	RS485_2A	GND	RS232_RX	RS232_TX	GND	/	/
Position No.	8	7	6	5	4	3	2	1
Definition	RS485_2B	RS485_2A	GND	/	/	GND		

3.3.2. Inverter communication port RS485-1 and CAN



J7:RS485-1
/CAN

Position	8	7	6	5	4	3	2	1
----------	---	---	---	---	---	---	---	---

No.								
Definition	RS485_1B	RS485_1A	GND	CAN_L	CAN_H	GND	RS485_1A	RS485_1B

3.4. LED indicator instruction

LED light working status indication :

status	Normal/Alert/ Protection	ALM	L1	L2	L3	L4	Indication
sleep	Sleep	Off	Off	Off	Off	Off	Off
Standby	Normal	Off	Based on the power display				
	Alert	blink					
Charge	Normal	Off	Based on the power display				charging
	Alert	blink	Highest Level Indicator Blinking				Charging
	Temperature, current, voltage protection	always on	Based on the power display				Stop charging
Discharge	Normal	Off	Based on the power display				discharging
	Alert	blink					discharging
	Temperature, current, voltage protection	always on	Based on the power display				Stop discharging
Emergency fault	Failure and Fuse tripping fault	always on	Off	Off	Off	Off	Stop charging and discharging

LED light power indication:

Power Level Indicator		L1	L2	L3	L4
SOC	0-25%	always on	off	off	off
	25.1-50%	always on	always on	off	off
	50.1-75%	always on	always on	always on	off
	75.1-100%	always on	always on	always on	always on

4. BMS installation instructions

4.1. Safety regulations requirements

Before starting installation or operation, please read the operating instructions and precautions carefully to avoid accidents. When installing or operating our company's equipment, you must comply with the regulations:

- Safety regulation and engineering design specifications of the relevant industry
- Strictly follow the relevant equipment precautions and special safety instructions provided by our company.

Specific Operational Requirements:

Accessories and Connections:

- All accessories connected to the protection board must be standard components supplied by our company (refer to the "Product List").
- Unauthorized connection of unverified external devices or accessories is strictly prohibited. For special requirements, prior confirmation from our technical support department is mandatory. Our company assumes no responsibility for damage to the circuit board resulting from the connection of non-standard or unapproved equipment.

Assembly Operations:

- During assembly, ensure that no part of the protection board makes direct contact with the cell surfaces to prevent cell damage.
- All assemblies must be secure and reliable.

Operational Precautions:

- During operation, strictly prevent high-temperature or metallic items (e.g., wire ends, soldering irons, solder) from contacting components on the circuit board to avoid damage.
- Consistently observe and implement protective measures: anti-static, moisture-proof, and waterproof.

Parameters and Conditions:

- Strictly adhere to the equipment's design parameters and operating conditions. All operational parameters (e.g., voltage, current, temperature) must not exceed the limits

specified in this datasheet. Operation outside these parameters may damage the protection board or other circuit components. For special requirements, prior confirmation from our technical support department is required.

Power Operations:

- When performing power-on or power-off operations, the specified power sequence must be strictly followed.

Battery Connection:

- When connecting the battery pack, always verify correct polarity. Incorrect or reverse polarity connections are strictly prohibited.

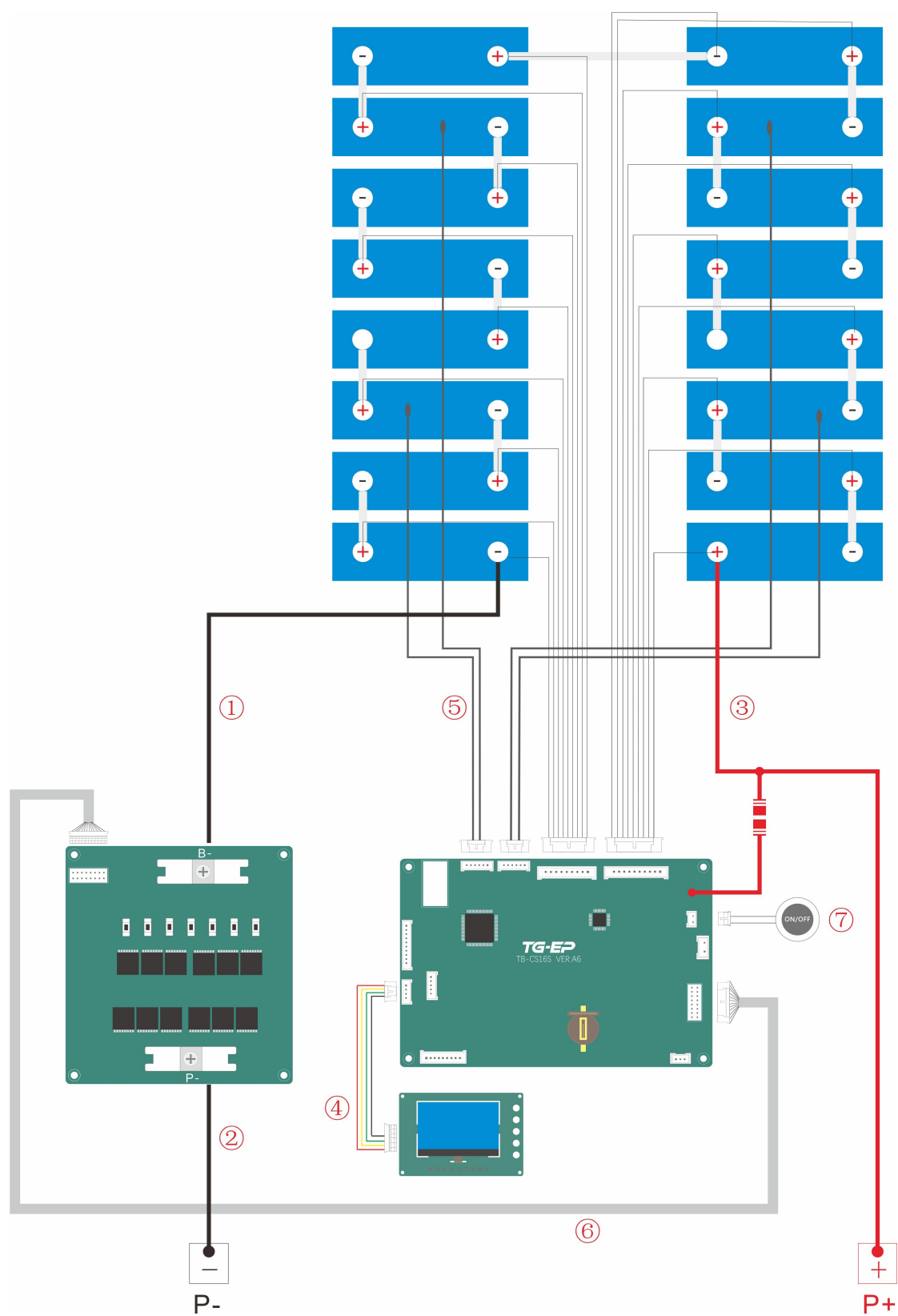
Initial Power-On Check:

- After completing the assembly of the battery pack and protection board, if there is no voltage output or inability to charge upon initial power-on, immediately turn off the power and carefully inspect all wiring for correctness.

The final explanation right belongs to TG-EP.

4.2. BMS installation steps

Installation Diagram:



Installation Steps:

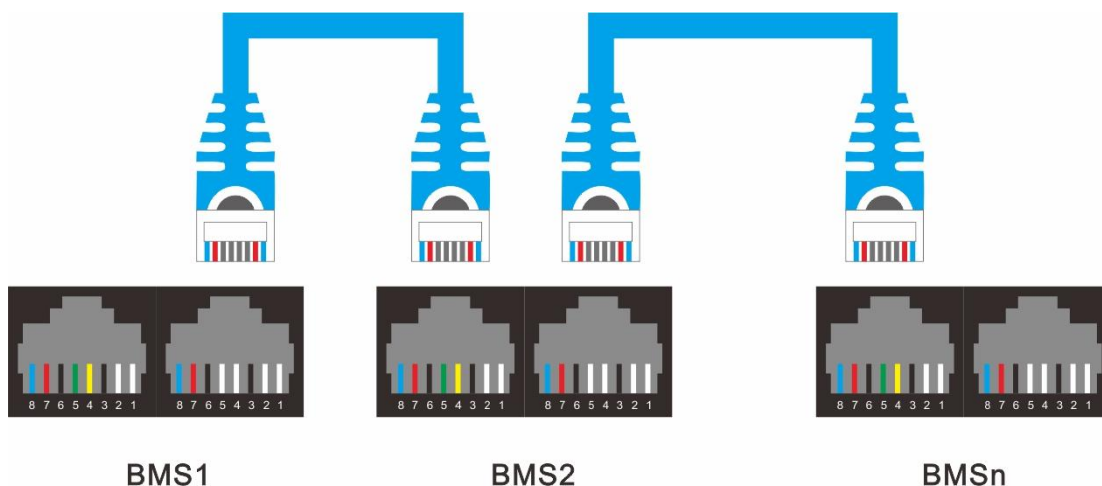
- ① Secure the main board according to the structural dimensions. Connect the B- terminal to the negative pole of the battery, as shown in the figure.
- ② Connect the P- terminal to the load's P- connection point.
- ③ Connect the main board's B+ to the positive pole of the battery.
- ④ As shown in the figure, connect the NTC sensor to port J6. Connect the cell voltage sense wires for cells 1-8 to port J3, and the sense wires for cells 9-16 to port J4.
- ⑤ Connect the main board to the power board.
- ⑥ Finally, connect the switch to J12. After ensuring all the above connections are correct, close the J12 switch to power up the BMS.
- ⑦ If connecting to an inverter, first ensure the inverter is powered OFF. Also, keep the BMS powered OFF initially. Connect the battery's P+ to the load's P+ connection. Only after all wiring is complete, power on the system in the following sequence: first close the BMS's J12 switch, then turn on the inverter's switch.

Special Notes:

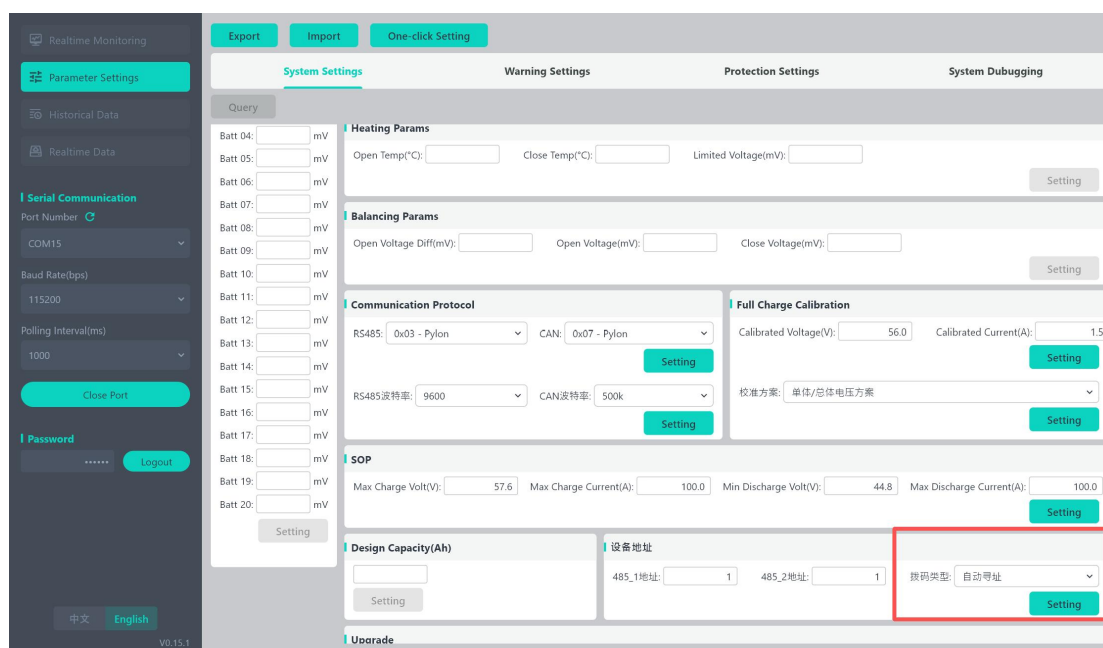
- 1) Make sure the switch (J12) is turned off before wiring or disconnecting;
- 2) When removing the wires, remove the other wires first, then remove the B- and B+ wires.

4.3. BMS parallel instructions**4.3.1. Auto-Addressing Parallel System Setup**

- ① Install the BMS for each battery pack according to the BMS installation instructions, ensuring each BMS remains powered OFF.
- ② As shown in the figure, connect the RS485_2 parallel communication port of each BMS using a communication cable.

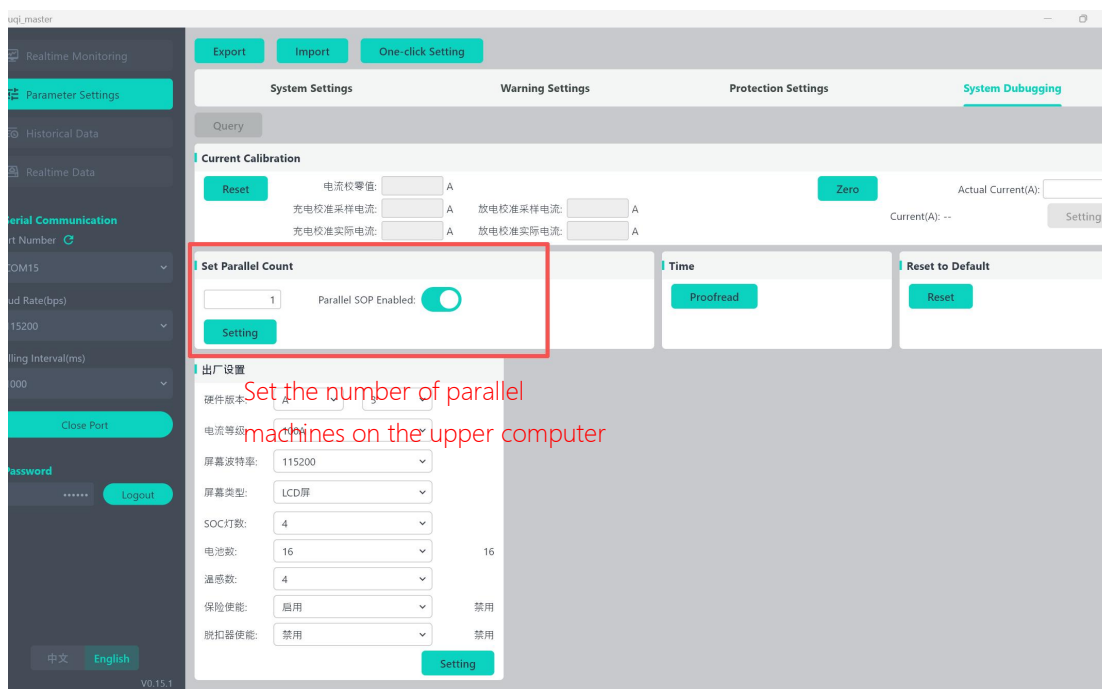
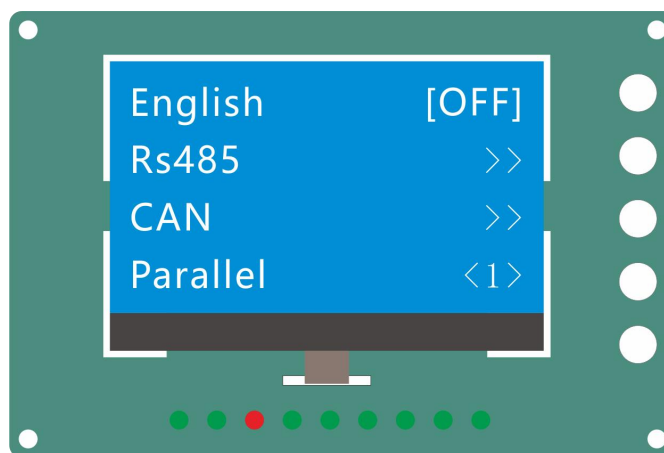


③ Power on each BMS unit sequentially. Connect to the host computer and verify that the Addressing Mode for each unit is set to Auto-Addressing (this is the default setting; no change is required if unmodified).



④ Connecting the host unit to a computer, set the Number of Parallel Units.

Method 1:
Set the number of
parallel devices on the
display screen



⑤ The absence of an "Internal Communication Alarm" indicates a successful parallel system setup. The host unit will retain the parallel unit count, and no reconfiguration is needed for subsequent power cycles.

If an "Internal Communication Alarm" occurs, use the host computer to check the status parameters of all hosts and slaves. Any slave unit showing no parameters or non-updating parameters has a communication failure. Restart the host and wait for re-parallel connection.

⑥ If connecting to an inverter, ensure the parallel communication is error-free, then power OFF all batteries in the parallel system. Connect the host unit to the inverter. The power-on sequence for the parallel system is: Slave BMS units -> Host BMS unit -> Inverter.

Note:

1. Please ensure that parallel communication is successfully established before connecting the parallel power cables and closing the parallel circuit.
2. Under normal conditions, the voltage difference between battery packs operating in parallel should be $\leq 3V$. If the voltage difference exceeds 3V, please follow the correct installation procedure for the battery system and inverter system, and then connect to the utility grid before proceeding.

5. Parameters list

Function Name	Trigger Default	Restore Default Values/Conditions	Delay Default
Single over-voltage alarm	$\geq 3600mV$	$< 3400mV$	1000mS
Single under-voltage alarm	$\leq 2800mV$	$> 3000mV$	1000mS
Single over-voltage protection	$\geq 3650mV$	1. Maximum cell voltage is lower than the recovery voltage release(3380mV) 2. Discharge current $\geq 3A$ release Any of the above conditions are met, the system will resume	1000mS
Single under-voltage protection	$\leq 2700mV$	$> 2950mV$ 1. Minimum cell voltage is higher than the recovery voltage release 2. Charge current $\geq 1A$ Release Any of the above conditions are met, the system will resume	1000mS
Total battery over-voltage alarm	$\geq 57.6V$	$< 54.0V$	1000mS
Total battery under-voltage alarm	$\leq 44.8V$	$> 48.0V$	1000mS
Total over-voltage protection	$\geq 58.4V$	$< 54.4V$ 1. Voltage lower than the recovery voltage release 2. Discharge current $\geq 3A$ release Any of the above conditions are met, the system will resume	1000mS

Function Name		Trigger Default	Restore Default Values/Conditions	Delay Default
Total voltage under-voltage protection		$\leq 43.2V$	$> 47.2V$	1000mS
			1. Voltage higher than the recovery voltage release 2. Charge current $\geq 1A$ Release Any of the above conditions are met, the system will resume	
Cell temperature alarm	Charging high temperature alarm	$\geq 55^{\circ}C$	$< 50^{\circ}C$	100mS
	Charging low temperature alarm	$\leq 5^{\circ}C$	$> 10^{\circ}C$	100mS
	Discharge high temperature alarm	$\geq 60^{\circ}C$	$< 55^{\circ}C$	100mS
	Discharge low temperature alarm	$\leq -15^{\circ}C$	$> -10^{\circ}C$	100mS
Cell temperature prohibition charging	Charging high temperature protection	$\geq 60^{\circ}C$	$< 55^{\circ}C$	1000mS
	Charging low temperature protection	$\leq 0^{\circ}C$	$> 5^{\circ}C$	1000mS
Cell temperature prohibition discharging	Discharge high temperature protection	$\geq 65^{\circ}C$	$< 60^{\circ}C$	1000mS
	Discharge low temperature protection	$\leq -20^{\circ}C$	$> -15^{\circ}C$	1000mS
MOS high temperature	MOS high temperature alarm	$\geq 95^{\circ}C$	$< 80^{\circ}C$	100mS
	MOS high temperature protection	$\geq 105^{\circ}C$	$< 85^{\circ}C$	1000mS
Temperature Difference Protection	Temperature Difference Alarm	$> 10^{\circ}C$	$< 5^{\circ}C$	1000mS
	Temperature Difference	$> 15^{\circ}C$	$< 10^{\circ}C$	1000mS

Function Name		Trigger Default	Restore Default Values/Conditions	Delay Default
	Protection			
Charging over-current alarm	16S100A	105A	/	1000mS
	16S120A	126A		
	16S150A	157.5A		
	16S200A	210A		
	16S300A	315A		
Charge over-current protection 1	16S100A	110A	1. Timed release, 60S 2. Release when discharge current ≥3A Note: Locked 3 times, need to restart to release.	5000mS
	16S120A	132A		
	16S150A	165A		
	16S200A	220A		
	16S300A	330A		
over-current protection 2	16S100A	115A	1. Timed release, 60S 2. Release when discharge current ≥3A Note: Locked 3 times, need to restart to release	200mS
	16S120A	138A		
	16S150A	172.5A		
	16S200A	230A		
	16S300A	345A		
Discharge over-current alarm	16S100A	105A	/	2000mS
	16S120A	126A		
	16S150A	157.5A		
	16S200A	210A		
	16S300A	315A		
Discharge over-current protection 1	16S100A	110A	1. Timed release, 360S 2. Release when charging current ≥1A Note: Locked 3 times, need to restart to release	2000mS
	16S120A	132A		
	16S150A	165A		
	16S200A	220A		
	16S300A	330A		
Discharge over-current protection 2	16S100A	115A	1. Timed release, 60S 2. Release when charging current > 1A 3. Locked 3 times, need to restart to release	200mS
	16S120A	138A		
	16S150A	172.5A		
	16S200A	230A		
	16S300A	345A		
short-circuit protection	16S100A	600A	Automatically recover after 1 minute delay, locked after 3 consecutive attempts	220us
	16S120A	800A		
	16S150A	1000A		
	16S200A	1200A		
	16S300A	1700A		
Cell balance function	Balance opening voltage	3400mV		
	Balance opening Voltage difference	30mV		

Function Name		Trigger Default	Restore Default Values/Conditions	Delay Default
	Balanced mode	Balanced charging and standby status		
Battery capacity	Battery rated capacity	According to the actual capacity	/	/
	Low SOC Alarm Threshold	< 10%	> 15%recover	1s
Max charge current	16S100A	100A	/	/
	16S120A	120A		
	16S150A	150A		
	16S200A	200A		
	16S300A	300A		
Max discharge current	16S100A	100A	/	/
	16S120A	120A		
	16S150A	150A		
	16S200A	200A		
	16S300A	300A		
Max charge voltage		57.6V	/	/
Monitor power consumption management	Sleep time	1440 min	The system enters sleep mode when all following conditions are met for the duration of the Sleep Delay Time: No communication, and no charging/discharging activity. Wake-up via: RS485/CAN communication or charging initiation.	
Pre-charge function	Pre-charge time	open	/	2000ms
large voltage difference	Large voltage difference alarm	Differential Voltage > 600mV	Differential Voltage < 500mV	/
	Large voltage difference protection	Differential Voltage > 800mV	Differential Voltage < 500mV	/
Full charge calibration	1、 If Full Charge Voltage > 56.0V (configurable) AND Calibration Current < 1.5A (configurable), then the SOC is calibrated to 100%. If the Maximum Cell Voltage ≥ 3650mV (configurable), then the SOC is calibrated to 100%. By default, the SOC is calibrated if either condition is met. The system supports configuration to require only Condition 1 for calibration.			
Full discharge calibration	Single cell voltage ≤ 2700mV (settable), or overall voltage ≤ 43.2V (settable). When either condition is met, the SOC is calibrated to 0%.			
SOH	Cyclic	200 cycles/1%		

Function Name	Trigger Default	Restore Default Values/Conditions	Delay Default
attenuation coefficient			

6. Configure parameters and protocols

Configuration parameters: During the first installation and debugging, the following parameters need to be verified or configured through the upper computer:

Parameters	Setting criteria
Rated capacity	based on the actual capacity
Max discharge current	based on the actual capacity
Max discharge current	based on the actual capacity

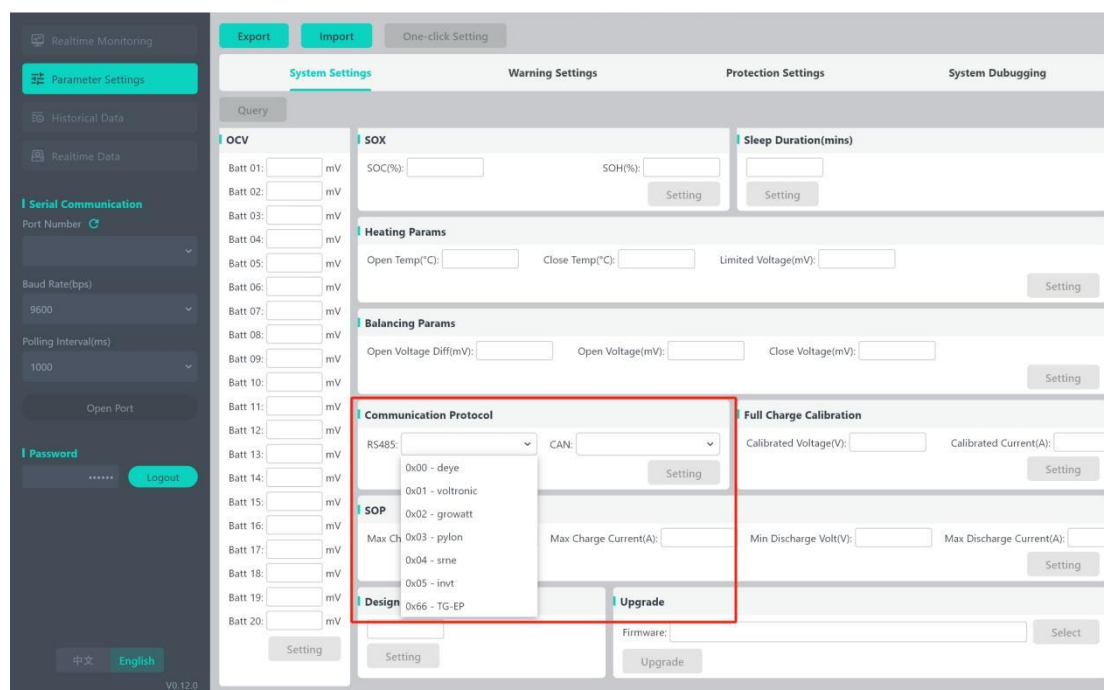
Configuration Protocol: The configuration protocol can be configured through upper computer.

Upper computer Configuration Protocol:

On the upper computer "Parameter Settings" > "System Settings" page, find the "Communication Protocol" window, select the required protocol, and click "Set".

Please note that if either the "RS485" or "CAN" input box is empty, the setting cannot be successful. In this case, you can wait for the data to be read before clicking Set, or select a value in the input box that

does not need to be set and then click Set.



7.Main function description

7.1 Voltage detection and protection

The single board supports 16-channel battery cell detection ports, with single cell voltage detection, total voltage detection, over-voltage, under-voltage alarm and protection functions, high detection accuracy, fast protection response, and different parameters can be set according to the characteristics of the battery cells used.

Single unit overcharge protection and recovery

When any section of the battery cell is higher than the set value of monomer overcharging protection, BMS enters into overcharging protection state, and the charging equipment can not charge the battery; after monomer over-voltage protection, the overcharging protection state will be lifted when the highest monomer voltage drops below the recovery value of monomer overcharging.

Total voltage overcharge protection and recovery

When the battery voltage is higher than the total voltage overcharge protection setting value, the BMS enters into the overcharge protection state, and the charging equipment can not charge the battery; the overcharge protection state is lifted when the total voltage drops below the total voltage overcharge recovery value.

Single over-discharge protection and recovery

When any battery cell is lower than the set value of single over-discharge protection, BMS enters into over-discharge protection state, and the load can't discharge the battery; after over-discharge protection occurs, charging the battery pack to reach the restoration value can release the over-discharge protection state.

Total voltage over-discharge protection and recovery

When the battery voltage is lower than the total voltage over-discharge protection setting value, BMS enters into the over-discharge protection state, and the load can't discharge the battery; after the over-discharge protection occurs, charging the battery pack to reach the restoration value can release the over-discharge protection state.

7.2 Current detection and protection

Support charging and discharging over-current alarm and protection, current alarm protection, current protection level differentiation, to realize different response time and protection logic under different current sizes, current detection accuracy $\leq \pm 2\%$, current error within 50A not more than 1A, parameters can be set to adjust.

Charging over-current protection and recovery

When the charging current exceeds the charging over-current protection setting value and reaches the delay time BMS enters the charging over-current protection, the battery can not continue to charge; after the charging over-current protection, BMS automatically delays the recovery of the charging over-current protection, and re-detects the external charger current after the fault is lifted.

Discharge over-current protection and recovery

When the discharge current exceeds the setting value of discharge over-current protection and reaches the delay time, BMS enters into discharge over-current protection and the battery can not continue to be discharged; after the occurrence of discharge over-current protection, BMS automatically delays the recovery of discharge over-current protection, and re-tests the current of the external charger after the fault is lifted.

7.3 Temperature detection and protection

Support 4-channel core temperature, 1-channel Mos temperature detection. with charging and discharging high-temperature, low-temperature detection, alarm and protection, detection accuracy of

not more than $\pm 3\text{ }^{\circ}\text{C}$, parameters can be set to adjust.

Charging and discharging high temperature protection and recovery

When the temperature of any cell is higher than the set value of high temperature protection during charging and discharging, the BMS enters into high temperature protection and stops charging or discharging; when the temperature of all cells is lower than the high temperature recovery value, the BMS resumes charging or discharging.

Charging and discharging low temperature protection and recovery

When the temperature of the highest battery cell is lower than the low temperature protection setting value under charge/discharge state, BMS enters into low temperature protection and stops charging or discharging; when the temperature of all battery cells is higher than the low temperature recovery value, BMS resumes charging or discharging.

Power Temperature Protection

When a detected power temperature exceeds the set Power Protection Threshold, the BMS enters a Power High-Temperature Protection state and ceases all charging and discharging activity.

7.4 Balance function

In standby and charging state, when the cell voltage difference exceeds the balance start voltage difference, and the highest cell voltage is higher than the balance start voltage, the balance function is turned on, and the passive balance current will be 100mA, which will keep the consistency of the voltage of the battery cell and improve the efficiency of the use of the battery and the cycle life; the balance will be stopped when the difference of the voltage of the battery cell is less than the set value.

7.5 Pre-charging function

Built-in pre-charging circuit, the pre-charging function is activated at the moment of power-on, avoiding the large current generated at the moment of discharging, resulting in output over-current protection.

7.6 Communication function

Support RS485, RS232, CAN, and can be extended according to the needs of the use of WIFI, communication for parallel connection of multiple machines, as well as connecting with the host computer.

7.7 SOC calculation and calibration

SOC detection accuracy $\leq \pm 5\%$, support online SOC calibration and local SOC calibration, when SOC deviation reduces cycle efficiency, the system automatically calibrates to ensure that SOC accuracy meets the requirements and improve the use of efficiency.

8.Version comparison table

Specification	Hardware	Main board program	Display program	Host computer
V2.3	Main board A6;Power board A4	BH01S-G1-V1.0.1	V3.4	V0.15.2
V2.4	Main board B1/B2;Power board A4	BH01S-G1-V1.1.1	V3.4	V1.0.1
V2.5	Main board B2;Power board A4	BH01S-G1-V1.1.7	V3.4	V1.0.1

Shenzhen Tringo Control Co., Ltd.

Company add (RD center): 4F, Bldg.4, Nantai Yunchuang Valley, Fenghuang Str., Guangming Dist.,
Shenzhen, CN

Web: www.tg-ep.com

Our company reserves the right to modify the equipment parameters without prior notice.