BLUE ENERGY

Rechargeable Li-ion Battery
BEP-5100 USER MANUAL

This manual introduces the BEP-5100 from Blue Energy Power. Before installing the battery, please read this manual thoroughly and carefully follow the instructions provided throughout the installation process. If you have questions or require clarification, contact Blue Energy Power immediately.

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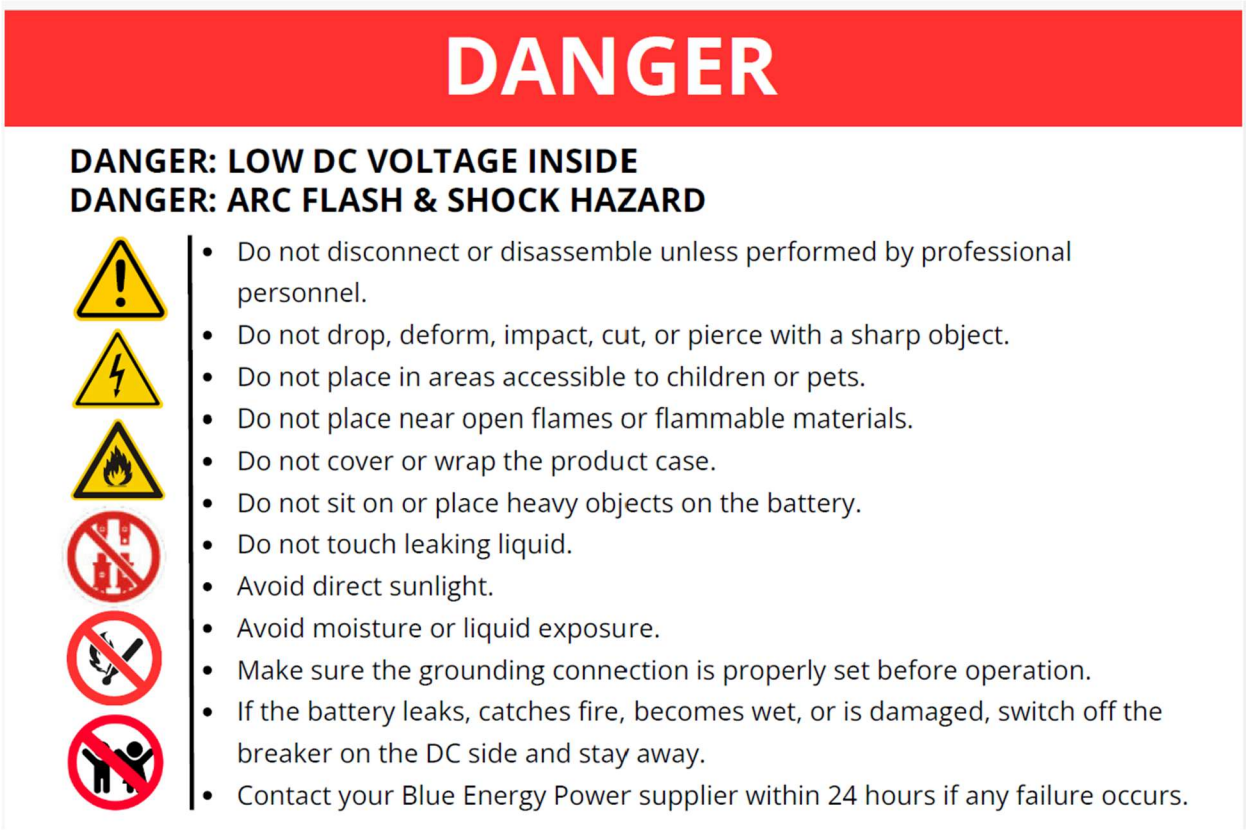
1. Symbol in label, manual, and product

	Caution! Warning! Reminding. Safety related information. Risk of battery system failure or life cycle reduces
	Warning electric shock.
	Warning Fire. Do not place near flammable materials.
	Do not reverse connection the positive and negative.
	Do not place near open flame or flammable materials.
	Do not place in areas accessible to children or pet.

1.1. Danger



2. Core Safety Essentials

Important Reminders

1. **Read the User Manual**
   It is essential to carefully read the user manual provided in the accessories before installing or using the battery. Failure to follow the instructions and warnings in this document may result in electrical shock, serious injury, death, or damage to the battery, potentially rendering it inoperable.
2. **Battery Storage**
   If the battery is stored for an extended period, it must be charged every six months to maintain a State of Charge (SOC) of no less than 90%.
3. **Recharging After Discharge**
   Recharge the battery within 12 hours after it is fully discharged.
4. **Installation Environment**
   - Do not install the product outdoors.
   - Avoid installing the battery in environments outside the operational temperature or humidity ranges specified in the manual.

5. **Cable Management**
   Ensure that cables are not exposed to external elements.
6. **Connection Precautions**
   - Do not reverse the power terminal connections.
   - Avoid direct connections between the battery and PV solar wiring.
7. **Maintenance**
   Disconnect all battery terminals before performing any maintenance.
8. **Abnormalities**
   If any abnormalities are observed, contact the supplier within 24 hours.
9. **Cleaning Guidelines**
   Do not use cleaning solvents to clean the battery.
10. **Chemical Exposure**
    Keep the battery away from flammable substances, harsh chemicals, and vapors.
11. **Painting Restrictions**
    Do not paint any part of the battery, including its internal or external components.
12. **Direct Wiring Prohibition**
    Do not connect the battery directly to PV solar wiring.
13. **Warranty Exclusions**
    The warranty does not cover direct or indirect damages resulting from non-compliance with the above guidelines.
14. **Foreign Objects**
    Avoid inserting any foreign objects into any part of the battery.

2.1. Before Connecting

1. **Product Inspection**
   After unpacking, check the product. If the product is damaged, contact the local retailer immediately.
2. **Power Off**
   Before installation, disconnect the grid power and ensure the battery is completely turned off.
3. **Correct Wiring**
   Ensure the wiring is accurate. Do not reverse the positive and negative cables, and avoid short circuits with external devices.
4. **Prohibited AC Connection**
   Do not directly connect the battery to AC power.
5. **Grounding Requirements**
   The battery must be grounded, with a resistance less than 0.1Ω.
6. **Equipment Compatibility**
   Ensure the battery system's electrical parameters are compatible with related equipment.
7. **Environmental Protection**
   Keep the battery away from water and fire.

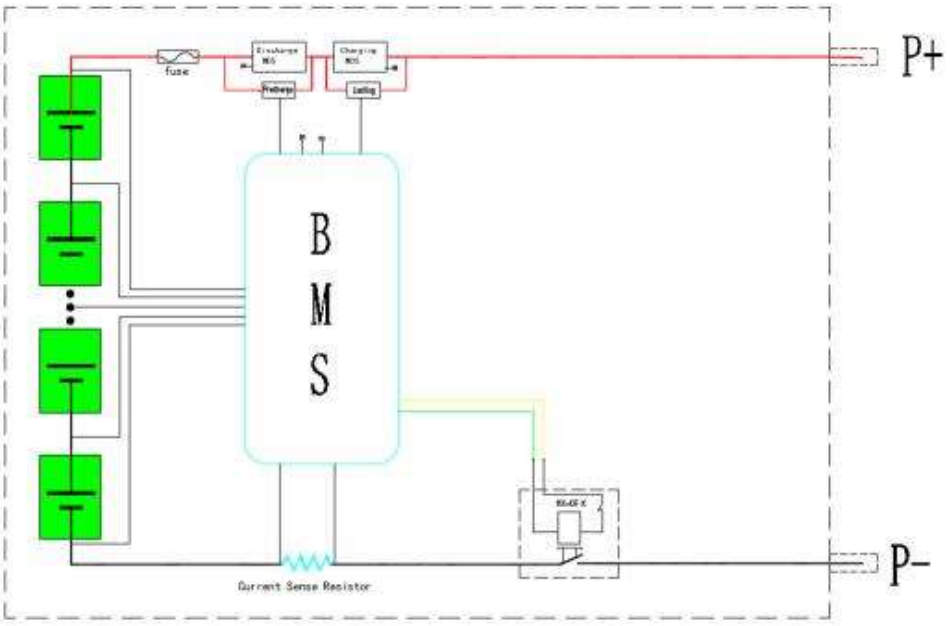
2.2. During Use

1. **Power Off for Repairs or Relocation**
   If the battery system needs to be moved or repaired, the power must be disconnected, and the battery must be fully shut down.
2. **Prohibited Battery Mixing**
   Do not connect the battery with other types of batteries.
3. **Inverter Compatibility**
   Do not connect the battery to a faulty or incompatible inverter.
4. **Disassembly Prohibition**
   Do not disassemble the battery or remove the QC tab.
5. **Fire Safety**
   In the event of a fire, use only a dry powder fire extinguisher. Liquid fire extinguishers are strictly prohibited.
6. **Authorized Repairs Only**
   Only personnel from Blue Energy Power or those authorized by Blue Energy Power may open, repair, or disassemble the battery. Any violations of safety operations, design standards, production protocols, or equipment safety guidelines will void any warranties, and Blue Energy Power will not be responsible for the resulting consequences.

3. Specifications

3.1 Appearance and Interface

3.2 Electrical schematic diagram



3.3 Parameters

Items	Specifications
Rate energy (kWh)	5.1kWh
Configuration	1P16S
Nominal Voltage (V)	51.2V
Working Voltage (V)	42V ~58.4V
Nominal Capacity (Ah)	100Ah
Rated charge/discharge Current (A)	50A / 70A @ 25±2°C
Maximum charging current	50A @25±2°C
Maximum discharge current	70A @25±2°C
Working Temperature	0~40°C (charge) -20~40°C (discharge)
Humidity (%)	5~95%
Altitude Limited (m)	0-3000m
Weight (kg)	46kg / 102lbs
Dimensions (mm)	175x360x530mm
Storage temperature and Humidity	6 Months: 14 to 77°F/-10 to 25°C 3 Months: -4 to 113°F/-20 to 45°C
Cycle life	>6000 – Cycles at 80% DOD
Communication mode	CAN&RS485

3.4 Protection parameters

3.4.1 Individual cell over voltage parameters

Individual cell over voltage parameter				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Over Voltage warning	ON	Over voltage warning	3500mV	Over voltage warning recovery- Over voltage protection
		Over voltage warning recovery	3400mV	3000mV-over voltage warning
		Under voltage warning	2900mV	Under voltage protection-under voltage Warning recovery
		Under voltage warning recovery	3000mV	Under voltage warning-3300mV
Over Voltage protection	ON	Over voltage protection	3650mV	Over voltage warning-4500mV
		Over voltage protection recovery	3400mV	Over voltage warning recovery-over voltage protection
		Over voltage recovery condition	1.Individual cell voltage decreases to over voltage recovery threshold. 2. The remaining capacity is lower than 96% of the intermittent power supply. Both conditions should be satisfied	
			Output current ≥1A	

3.4.2 Individual cell low voltage parameters

Individual cell low voltage parameter				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Under Voltage Protection	ON	Under voltage protection	2700mV	1500mV-under Voltage protection recovery
		Under voltage protection recovery	2900mV	Under voltage protection-under voltage warning
		Under voltage protection condition	When an individual cell gets under voltage protection threshold, BMS maintain communication with inverter for 1 minute and powers off.	
		Under voltage protection recovery	Input current ≥1A	

3.4.3 Pack over voltage parameters

Pack over voltage parameter				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Over voltage warning	ON	Over voltage warning	56.0V	Over voltage warning recovery- over voltage protection
		Over voltage warning recovery	54.0V	53.0V over voltage warning
		Under voltage warning	46.4V	Under voltage protection-under voltage warning recovery
		Under voltage warning recovery	48.0V	Under voltage warning- 55.0V

Over voltage protection	ON	Over voltage protection	57.6V	Over voltage warning-60.0V
		Over voltage protection recovery	54.0V	Over voltage warning recovery-over voltage protection
		Over voltage protection recovery conditions	1.Individual cell voltage decreases to over voltage recovery threshold. 2. The remaining capacity is lower than 96% of the intermittent power supply. Both conditions should be satisfied	
			Output current ≥1A	

3.4.4 Pack low voltage parameters

Pack low voltage parameter				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Under voltage protection	ON	Under voltage protection	41.6V	36.0V – under voltage warning recovery
		Under voltage protection recovery	46.0V	Under voltage protection-under voltage warning
		Under voltage protection condition	When the total voltage gets under voltage protection threshold, BMS maintain communication with inverter for 1 minute and powers off.	
		Under voltage protection recovery conditions	Input current ≥1A	

3.4.5 Cell high/low temperature (charging) parameters

Cell high/low temperature (charging) parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Cell Temperature (Charging)	ON	High temperature warning	50°C	High temperature warning recovery-high temperature protection
		High temperature warning recovery	47°C	35°C- high temperature warning
		High temperature protection (charging)	55°C	High temperature protection recovery 80°C
		High temperature protection recovery	50°C	High temperature warning recovery-high temperature protection
		Low temperature warning	2°C	Low temperature protection-low temperature warning recovery
		Low temperature warning recovery (Charging)	5°C	Low temperature warning -10°C
		Low temperature protection	-10°C	-20°C- low temperature protection recovery
		Low temperature protection recovery	0°C	Low temperature protection-low temperature warning recovery

3.4.6 Cell high/low temperature (discharging) parameters

Cell high/low temperature (discharging) parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Cell Temperature (Discharging)	ON	High temperature warning	52°C	High temperature warning recovery-high temperature protection
		High temperature warning recovery	47°C	High temperature protection recovery-80°C
		High temperature protection	55°C	High temperature warning recovery-high temperature protection
		High temperature protection recovery	50°C	High temperature warning recovery-high temperature protection
		Low temperature warning	10°C	Low temperature protection-low temperature warning recovery
		Low temperature warning recovery	3°C	Low temperature warning -10°C
		Low temperature protection	-15°C	-30°C- low temperature protection recovery
		Low temperature recovery	0°C	Low temperature protection-low temperature warning recovery

3.4.7 Ambient high/low-temperature parameters

Ambient high/low temperature parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Cell Temperature (Discharging)	ON	High temperature warning	50°C	High temperature warning recovery-high temperature protection
		High temperature warning recovery	47°C	-20°C- High temperature warning recovery
		High temperature protection	60°C	High temperature protection recovery -80°C
		High temperature protection recovery	55°C	High temperature warning recovery-high temperature protection
		Low temperature warning	0°C	Low temperature protection-low temperature warning recovery
		Low temperature warning recovery	3°C	Low temperature warning -60°C
		Low temperature protection	-10°C	-30°C- low temperature protection recovery
		Low temperature recovery	0°C	Low temperature protection-low temperature warning recovery

3.4.8 MOSFET high/low temperature parameters

MOSFET high/low temperature parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
MOSFET temperature	ON	High temperature warning	90°C	High temperature warning recovery-high temperature warning
		High temperature warning recovery	85°C	60°C – high temperature warning
		High temperature protection	100°C	High temperature warning - 120°C
		High temperature protection recovery	85°C	High temperature warning recovery- high temperature protection

3.4.9 Charging current limiting-parameters

Charging current limiting parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Current limiting (charging)	OFF	Active current limiting	10A	When the current > 10A, current limiting activated
	ON	Passive current limiting		When the charger current>charging over current warning (configurable), current limiting activated
		Charging current limiting time delay	5 min	After the current limiting is being activated, BMS re-checks the current to judge whether to maintain current limiting

3.4.10 Charging over limiting parameters

Charging current limiting parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Over current warning (charging)	ON	Over current warning	100A	Charging over current warning recovery-charging over current protection
		Over current warning recovery	95A	0A-charging over current warning
Over current protection (charging)	ON	Over current Protection	110A	0A~110A
		Over current protection time delay	10S	Configurable
		Over current protection recovery Conditions	BMS detects any output discharge current. After 60 seconds, the protection recovers automatically	
Effective charging current	Charging current (in)		1000mA	
	Charging current (out)		700mA	

3.4.11 Discharging over limiting parameters

Discharging over current parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Over current warning	ON	Over current warning	-105A	Over current protection-over current warning recovery
		Over current warning recovery	-103A	Over current warning-0A
Over current protection	ON	Over current protection	-110A	Transient over current protection-0A
		Over current protection time delay	10S	Configurable
		Over current protection recovery conditions	BMS detects any input charge current. After 60 seconds, the protection recovers automatically.	

3.4.12 Transient over limiting parameters

Transient over current parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Over current protection (transient)	ON	Over current protection	-100A	Discharge over current protection-100A
		Over current protection time delay	30mS	Configurable
		Over current protection recovery	BMS detects any input charge current. After 60seconds, the protection recovers automatically	
	OFF	Over current Lock	Continuously over current for 2 times. The over current lock times exceeded	
		Over current lock times	5 times	
		Over current lock release	Connected with charger	

3.4.13 Short circuit parameters

Short circuit parameters				
Functions	**Status**	**Items**	**Default**	**Configurable Range**
Short circuit protection	ON	Short circuit protection current value and time delay	Programmed into software (cannot be edited) Connot be turned off	
		Short circuit protection recovery	BMS detects any input charge current. After 60 seconds, the protection recovers automatically	
	ON	Short circuit protection lock	Continuously short in the output circuit. The over-current protection lock times exceeded	
		Short circuit protection lock times	5 times	
		Short circuit protection lock release	Connected with charger	
Effective discharging current	Discharge current (in)		-1000mA	
	Discharge current (out)		-700mA	

3.4.14 Cell balance parameters

Short circuit parameters				
Functions	**Status**	**Item**	**Default**	**Configurable Range**
Cell balance	ON	Standby balance	When there is no charging and discharging current flow, the standby equalization will be activated	
		Standby time	10 hours	Configurable
	ON	Charging equalization	When at the charging or floating charging status, the charging equalization will be activated	
	Balance conditions	Active voltage	3350mV	Configurable
		Active voltage difference	30mV	
		End voltage	20mV	
	ON	Temperature	According to the temperature range of no equalization (ambient temperature)	
		No equalization high temperature	50°C	Configurable
		No equalization low temperature	0°C	
Cell failure	ON	Voltage difference	500mV	Configurable
		Voltage difference recovery	300mV	

3.4.15 Capacity parameters

Capacity parameters				
Capacity	Nominal capacity		100Ah	5-105Ah
	Remaining capacity	Calculated accordingly to the cell voltage		Configurable
	Cycle life accumulated capacity	20%	Cycle life (configurable)	
	ON	Remaining capacity warning	15%	
	ON	Remaining capacity protection	8%	Output current flow will be cut oof
Reset Button	Power on/activation		When the BMS is in the sleep state, press the 1S reset button, the BMS will be activated, and LED indicators will turn on in turn, then the BMS will turn into the normal working state	
	Shut down/hibernate		When the BMS is in standby or working state (except charging), press the 3S reset button the BMS will be hibernated, and the LED indicator lights will turn on in turn, and then the BMS will go into hibernation state.	

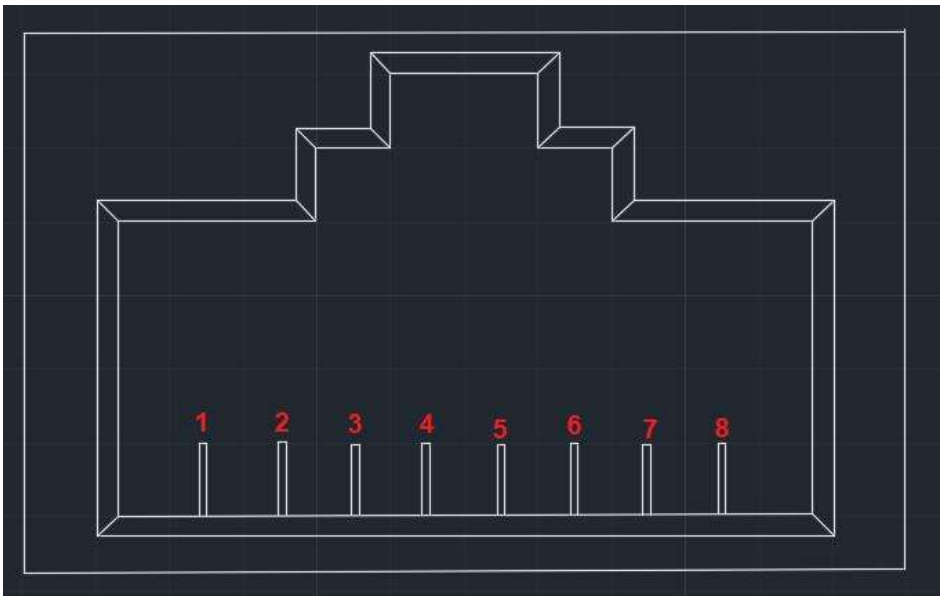
3.4.16 Other parameters

Pre-Charging	2000ms	0-5000ms	The pre-charging function will be activated once the BMS powered on	
BMS Power consumption	ON	Longest standby time	48 hours (Do not connect with charger, and no effective charging current)	
Heating	ON	Start heating temperature	0°C	Configurable
		Stop heating temperature	10°C	
		Heating function activation	When connected with charger, and the cell temperature reaches the setting value, the heating function is activated. Heating function disables when at standby and discharge status.	
External switch	OFF	When at the standby status, the BMS can be powered on/off through external switches		
LCD screen	ON	Monitoring software to check the cell voltage temperature and current		
Charging activating	ON	1 minute	The BMS powered off after under voltage protection. Press the button for recovering from protection status and activate output current	Configurable
Compensating impedance	Connection fault impedance	10mΩ	Default between 8 and 9	Battery connection line impedance compensation
	Compensation 1	0mΩ	9	Configurable
	Compensation 2	0mΩ	13	

4. Communication

4.1 CAN communication

BMS transmits information through the CAN interface. Baud rate 500KBITS/S. CAN interface applies 8P8C connectors. And CAN connector communicates with the inverter or CAN TEST. RS485 collects the information. Then CAN transmits the battery pack information to PCS.
CAN connector definition:

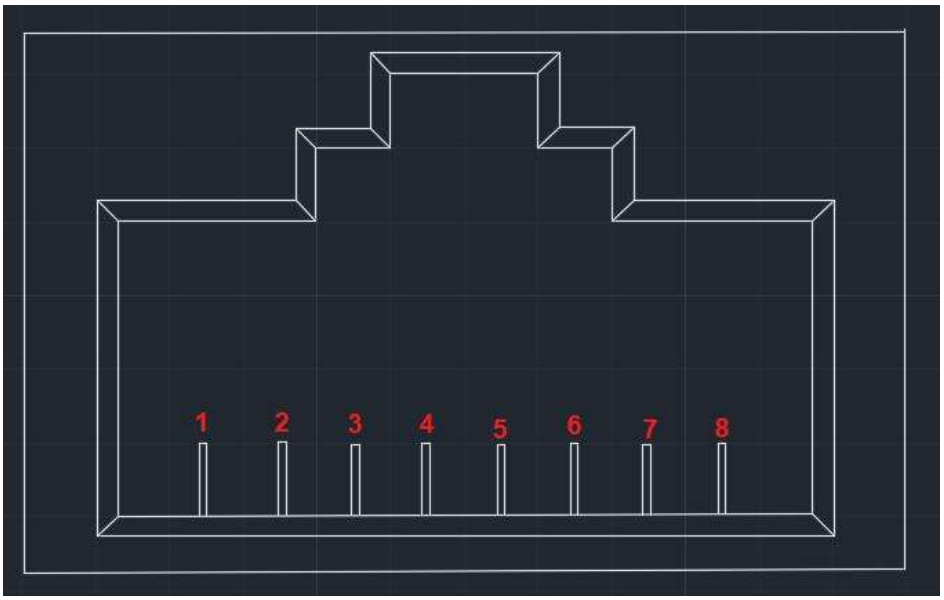


PINS	DEFINITION
1,2,7,8	NC
4	CAN-L
5	CAN-H
3,6	GND

4.2 RS485

BMS could collect battery pack information through RS485 communication.
Baud rate: 19200bps. RS485 interface applies 8p8c connectors.

RS485 connectors definition

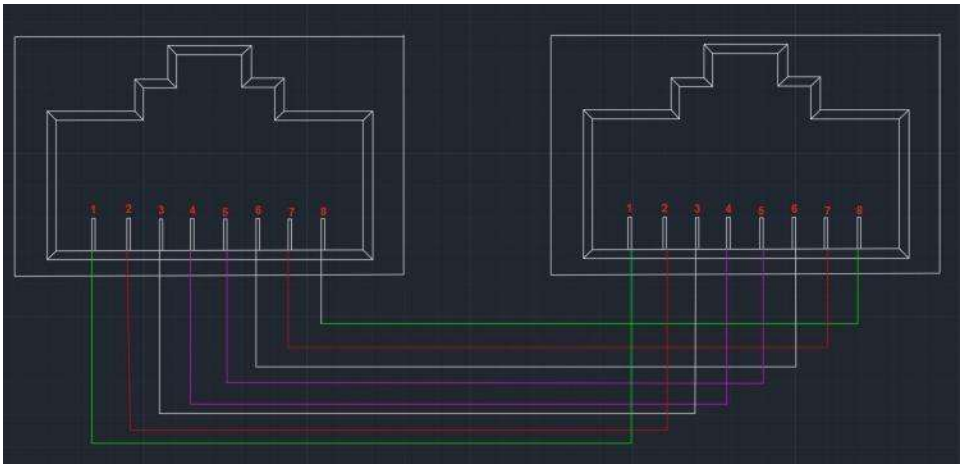


PINS	DEFINITION
1/8	RS485-B
2/7	RS485-A
3/6	Ground
4/5	Internal Communication (NC)

4.3 Parallel

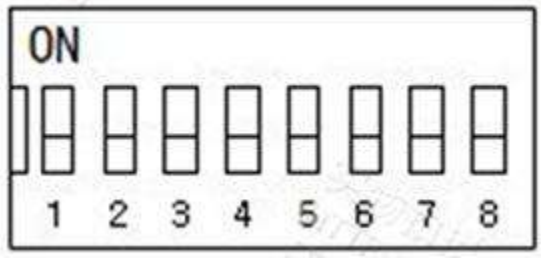
When connected in parallel with RS485 connectors. CAN connectors act as upper communication interfaces. End devices could get the collected battery information through the CAN interface.

RS485 connector connection:



4.4 DIP switch

DIP ADDRESS: if the battery pack is connected in parallel, the DIP address identifies each pack with different addresses.
Bits 1 to 4 represent the different addresses of paralleled packs, and bits 5 to 8 represent the number of slave packs.
Host settings: bit 1 to bit 4 are 0, the host address is fixed to 0, and bits 5 to bit 8 are set according to the number of parallel slaves. (See Table 2)
Slave set: bit 1 to bit 4 are set according to the device sequence, and the slave address range is 1 to 15. Bit5 to bit8 are fixed to 0. (See Table 1)
Check the Appendix for details.



5. Working mode

5.1 Charging mode

When a charger is detected, and the charger voltage is 0.5V+ more than the battery voltage, BMS will turn on the charging MOSFET. When the charging current reaches the effective charging current value, enters charging mode.

5.2 Discharging mode

When a load is detected, and the discharging current reaches the effective charging current value, BMS enters discharging mode.

5.3 Standby mode

When the BMS is not in charging mode or discharging mode, it enters standby mode.

5.4 Power off mode

5.4.1 Power off

When meeting any condition as below, the system will be powered off (without charger only)
1) Individual or entirety battery remains over discharge protecting mode within 30 seconds.
2) Press the button for 3 seconds. (make sure no charger is connected, otherwise it will not enter low power mode.)

5.4.2 Awaken

When you meet any of the conditions below, the system will enter working mode

1) Connect the charger and the voltage will need to reach more than 300V
2) Press the power button for 3 seconds to start the system

6. LED indicators

6.1 LED lights

One running indicator (Green)
One warning indicator (Red)
And four capacity indicators (Green)

SOC				**ALARM**	**RUN**

6.2 Capacity indicators

Status	Charging				Discharging			
Capacity	L4	L3	L2	L1	L4	L3	L2	L1
0-25%	OFF	OFF	OFF	Blink	OFF	OFF	OFF	Green
25%-50%	OFF	OFF	Blink	Green	OFF	OFF	Green	Green
50%75%	OFF	Blink	Green	Green	OFF	Green	Green	Green
≥75%	Blink	Green	Green	Green	Green	Green	Green	Green
Running	Green				Blink			

6.3 Lights blinking Explanation A

Blink Type	Lighten TIME	OFF TIME
Blink A	0.25 s	3.75 s
Blink B	0.5 s	0.5 s
Blink C	0.5 s	1.5 s

6.4 Running status indicators

SYSTEM	Running	RUN	ALM	SOC				REMARK
OFF	Sleeping	OFF	OFF	OFF	OFF	OFF	OFF	OFF
STANBY	Running	Blink A	OFF	OFF	OFF	OFF	OFF	Standby
CHARGE	Running	Green	OFF	According to the remaining capacity				LED Blink B
	Over current warning	Green	Blink B	According to the remaining capacity				LED Blink B
	Over voltage protection	Blink A	OFF	OFF	OFF	OFF	OFF	
	Temp and over current protection	Blink A	Blink A	OFF	OFF	OFF	OFF	
DISCHARGE	Running	Blink C	OFF	According to the remaining capacity				
	Warning	Blink C	Blink C					
	Temp over current, short circuit protection	OFF	RED	OFF	OFF	OFF	OFF	
	Under voltage protection	OFF	OFF	OFF	OFF	OFF	OFF	No discharge

6.5 Installation instructions

Check the battery status before installation

7. Safety precautions

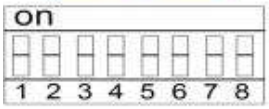
- Do not place the battery on flammable building materials
- The temperature should be between 10°C and 30°C
- The installation site should have some free space around the battery to dissipate heat (as shown in the figure below), which is suitable for installation on concrete or other non-flammable surfaces.

7.1 Harness connection

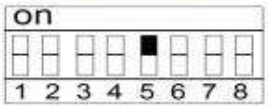
The battery should be turned off before connecting

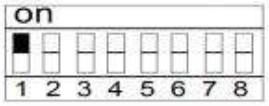
7.2 DIP setting

1 Pack

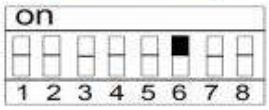


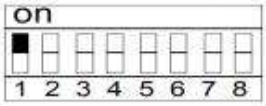
2 in Parallel

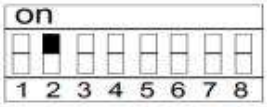




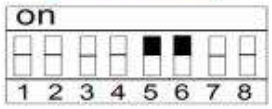
3 in Parallel

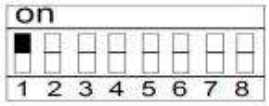


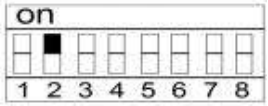


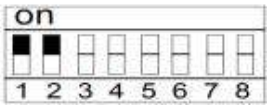


4 in Parallel









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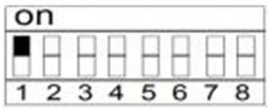

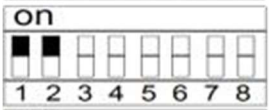

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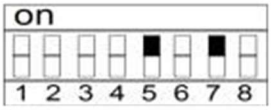

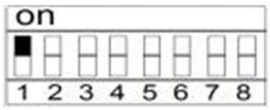

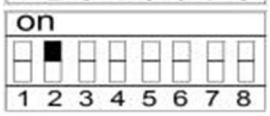

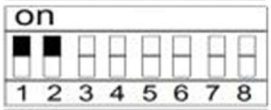

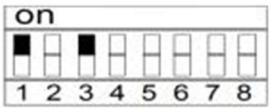

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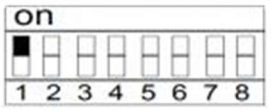

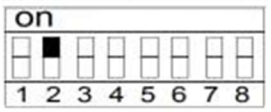

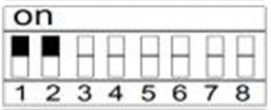

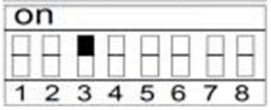

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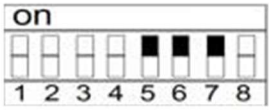

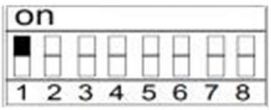

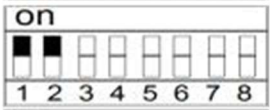

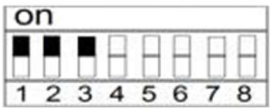

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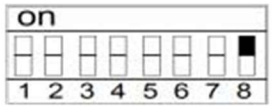	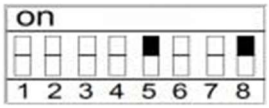	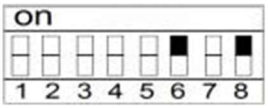	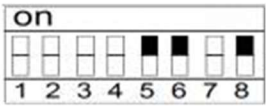
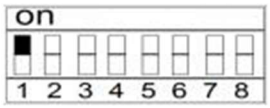	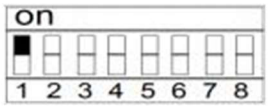	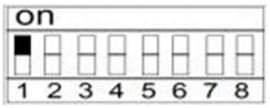	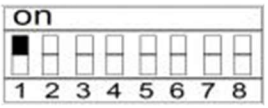
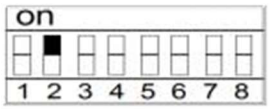	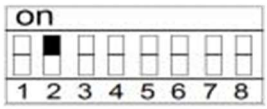	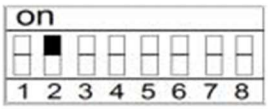	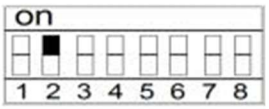
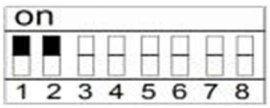	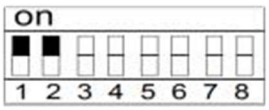	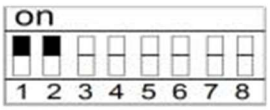	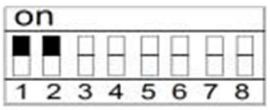
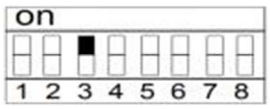	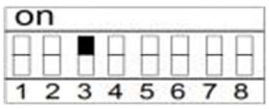	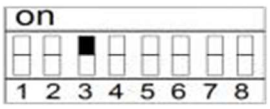	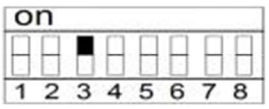
	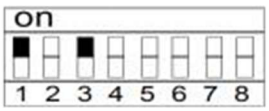	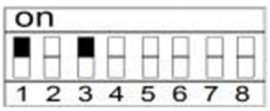	
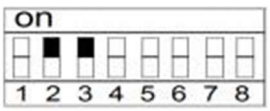	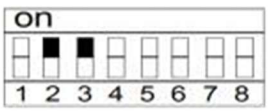	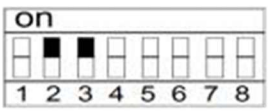	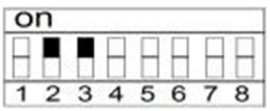
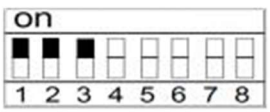	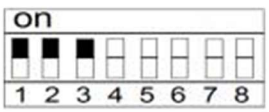	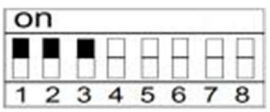	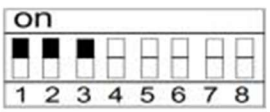
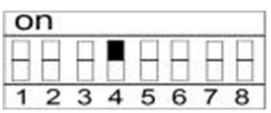	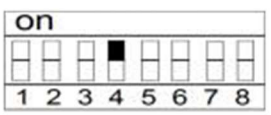	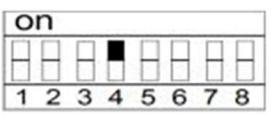	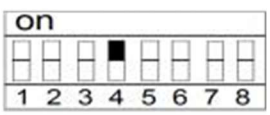
	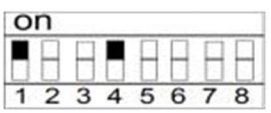	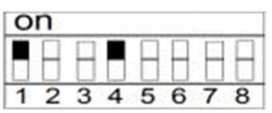	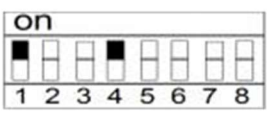
		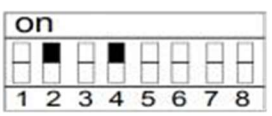	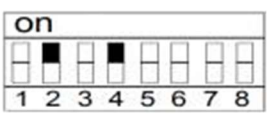
			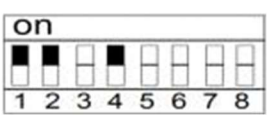

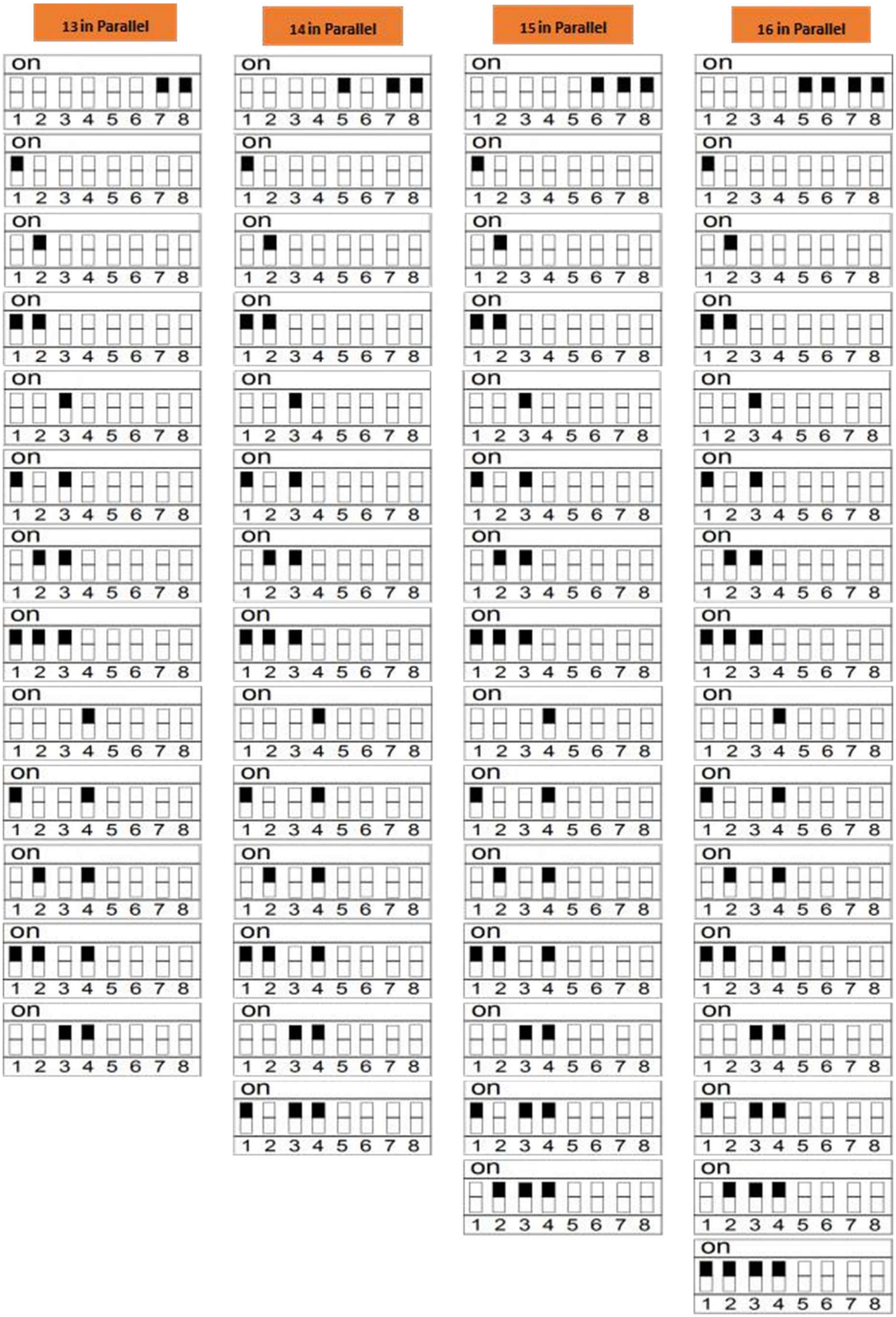
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